



OFFICE OF THE
GENERAL COUNSEL

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DOCKETED
USNRC

November 13, 1998

'98 NOV 16 A9:32

Johanna Matanich, Esq.
New Mexico Environmental Law Center
1405 Luisa St., Suite 5
Santa Fe, NM 87505

OFFICE OF SECRETARY
RULEMAKING AND
ADJUDICATION STAFF

In the Matter of
HYDRO RESOURCES, INC (HRI)
Docket No. 40-8968-ML

Dear Ms. Matanich:

By letter dated September 29, 1998, you forwarded a request, on behalf of Intervenor ENDAUM and SRIC, that additional documents be added to the hearing file in the above-captioned proceeding and that the Staff provide certain information. See Letter from J. Matanich to J. Hull and M. Young, dated September 29, 1998. See also Letter from J. Hull, NRC, to Administrative Judges, dated June 11, 1998 (forwarding Hearing File). Intervenor's request for information and documents has been submitted in the above-captioned 10 C.F.R. Part 2, Subpart L proceeding where discovery is prohibited, but the Presiding Officer may rule on issues regarding appropriate materials for the hearing file. See 10 C.F.R. § 2.1231. Further, even when discovery is permitted under NRC regulations, the Staff is not required to respond to interrogatories or requests for documents in a formal, trial-type NRC proceeding unless (1) the presiding officer determines that the interrogatory answer is necessary to a proper decision in the proceeding and (2) that the document is not publicly available. See 10 C.F.R. §§ 2.720(h)(2)(ii), 2.744, 2.790.

While the Staff views the September 29 letter as being beyond the scope of 10 C.F.R. § 2.1231 and contrary to the discovery regulations cited above, without waiving these objections, the Staff response is provided below.

1. **Structural cross-sections and structural contour maps for all three sites.**

Structural cross-sections submitted to the NRC are included in the applications or environmental reports for the sites and are part of the hearing file. See Letter from Mark S. Pelizza, HRI, to Bob Carlson, NRC, dated October 16, 1998 (Pelizza Letter) (attached), at 1.

2. **Driller's logs for all Crownpoint monitoring wells (n=10) at the Crownpoint site.**

This request apparently seeks "driller's logs" that record what a driller found when drilling a bore hole. The Staff did not use these logs, but used the geophysical logs with stratigraphic interpretations on cross sections submitted with the application. These logs are all part of the hearing file. See Pelizza Letter at 1.

SEC4-040

DS03

19717

3. **Maps of ore bodies at each site, including those depicted in three dimensions.**

Maps of ore bodies, such as depicted at FEIS, pages 3-16 (Fig. 3.6) and 3-20 (Fig. 3.8) were submitted with the application and are part of the hearing file. Three-dimensional maps were not submitted to the NRC. See Pelizza Letter at 2.

4. **Surface elevations for all boreholes at all three sites.**

Surface elevations were not submitted to the NRC. See Pelizza Letter at 2.

5. **Excursion scenario modeling done by HRI staff for all three sites.**

HRI excursion scenario modeling was not submitted to the NRC. See Pelizza Letter at 2.

6. **Supplement aquifer modeling for the Church Rock and Crownpoint sites** [provide "Church Rock and Crownpoint Aquifer Modeling Supplement," dated October 19, 1993, cited in the Mark Pelizza affidavit of September 8, 1998].

The Staff has not been able to locate the requested document in its files, but notes that the document requested is listed as a reference in Appendix A of the HRI License. Documents believed to be similar to the October 19, 1993 supplement are attached to the Pelizza Letter. See Pelizza Letter at 2 and attachment. The Crownpoint worksheet was also submitted as part of an October 15, 1996, HRI response that is already part of the hearing record. See *id.*

7. **Description and findings of an NRC Staff solute-transport for radium-226 concentrations at Town of Crownpoint water wells supporting FEIS** [Was the FEIS discussion of groundwater impacts at pages 4-47 through 4-49 based on the information in William Ford's memorandum to Robert Carlson, dated March 11, 1997?]

Yes. Please note that the Staff does not agree with the assertion in item 7 that "[t]he NRC staff doubts that radium-226 concentrations will meet federal drinking water standards, let alone baseline, following restoration at the Crownpoint site. See Joe Holonich letter to Susan Jordan (July 17, 1997) at 2-3."

8. **Copies of three documents pertaining to restoration and license termination at the Mobil Section 9 Pilot Project** [referenced by NRC Staff Hydrologist William Ford in his February 20, 1998 affidavit]

R. **[Mobil Alternative Energy, Inc., 1986]** Letter from J. F. Cullen, Mobil Alternative Energy, Inc., to Felix R. Miera, New Mexico Radiation Protection Bureau, dated January 22, 1986, Restoration Progress Report, Crownpoint Section 9 Pilot, In Situ Leach Plant [AN. 9808120141]

S. **[Mobil Mining and Minerals Company, 1986]** Letter from J. F. Cullen, Mobil Mining and Minerals Company, to Gary Konwinski, NRC, dated November 14, 1986, forwarding Mobil Pilot In-Situ Leach Uranium Project restoration declaration with four attachments. [AN. 8702060301]

V. **[NRC Environmental Assessment for SUA-1479, Feb. 4, 1988]** Letter to Jim Analla, BIA, from Edward Hawkins, URFO, Reg. IV, NRC, dated February 4,

1988 [AN. 8802230395], transmitting *Draft Finding of No Significant Impact Regarding A Termination of the Source and Byproduct Material License and Environmental Assessment in Consideration of the Release of Source Material License SUA-1479 for Mobil Oil Corporation, Crownpoint, Section 9, In Situ Test Project* [AN. 8802230437]

Copies of the three documents are attached and will be added to the hearing file. (These documents are part of the HRI docket and also available from the PDR.)

9. Post-restoration water quality data for Mobil Section 9 Pilot Project and Teton Section 13 Pilot Test.

Documents "S" and "V" in item 8, above, contain the requested data. Reference 13 in document "V" identifies "Mobil Oil Corporation, September 1987. Groundwater Restoration Stability Results," however, the Staff could not locate that reference. The Staff did locate and is providing the following document (in Docket No. 40-8911) that contains data from stability samples collected from November 1986 to April 1987 (and the document will be added to the hearing file):

Letter from J. F. Cullen, Mobil Coal Producing Inc., to Thomas T. Olsen, NRC, dated June 2, 1987. [AN. 8708240360]

10. Any NRC Staff, NRC contractor or licensee reports that evaluate the asserted efficiency of the vacuum drier/bag filter emission control system for the yellowcake drier/bag filter emission control system for the yellowcake drier at the central processing plant.

The only information the NRC used to evaluate the HRI vacuum dryer was provided with the application. See FEIS at 4-74; Pelizza Letter at 2.

Attachment 2 is a supplemental HRI Hearing File Index, which includes the documents identified above and updates the index to include other documents enclosed herewith.

Sincerely,



Mitzi A. Young
Counsel for NRC Staff

Enclosures: As stated

cc w/encls: Peter Bloch, Presiding Officer
Thomas Murphy, Special Assistant
Anthony Thompson
Roderick Ventura
Diane Curran

OCAA
PDR
SECY
ASLB Panel
Adjudicatory File

cc: w/o encls: Remainder of Service List

HRI, INC.

(A Subsidiary of Uranium Resources, Inc.)

2929 Coors Road NW
Suite 101
Albuquerque, N.M. 87120-2929
Telephone: (505) 833-1777
Fax: (505) 833-0777

12750 Merit Drive
Suite 1020, LB 12
Dallas, Texas 75251
Telephone: (972) 387-7777
Fax: (972) 387-7779

P.O. Box 777
Crownpoint, New Mexico 87313
Telephone: (505) 786-5845
Fax: (505) 786-5555

October 16, 1998

Mr. Bob Carlson
Project Manager
Office of Nuclear Material Safety & Safeguards
U.S. Nuclear Regulatory Commission
2 White Flint North
11545 Rockville, Pike
Mail Stop T-7J9
Washington, D.C. 20852

RE: New Mexico Environmental Law Center Information Request

Dear Mr. Carlson:

To follow-up on our telephone conversation of yesterday, I believe that most of the information requested by NMELC can be found in the record as follows:

1. Structural cross-sections and structural contour maps - The cross sections described in the Geraghty and Miller "Hydrodynamic Control" report are the same cross sections labeled as Figures 2.6-6 through 2.6-10 of the *Churchrock Revised Environmental Report*, March 1993 (Updated October 11, 1993), and labeled Figure 2.2-7 through 2.2-10 within the *Crownpoint Project In-Situ Mining Technical Report*, June 12, 1992. Cross sections for the Unit 1 location, not referenced by Geraghty and Miller, are within Appendix D-1 of the *Unit 1 UIC Application and Technical Report*, October 9, 1992. All of these reports are part of the hearing record. No structure contour maps have been required or provided.

2. Driller's logs - Monitor wells drilled at Churchrock Section 8 are CR1 through CR8 (n=8). Monitor wells drilled at Crownpoint Section 24 are CP1 through CP10 (n=10). Geophysical logs of monitor wells CR1 through CR6 along with logs from select exploration holes are duplicated on Figures 2.6-6 through 2.6-8 of the *Churchrock Revised Environmental Report*, March 1993. Geophysical logs of monitor wells CP1 through CP10 along with logs from select exploration holes are duplicated on Figure 2.2-7 through 2.2-13 within the *Crownpoint Project In-Situ Mining Technical Report*, June 12, 1992. Both of these reports are part of the hearing record. By having these cross-sections, Petitioners have log copies that have photographically have been reduced to equal scale and will provide a more ready comparison of geologic data than will full size logs of different scale.

Any more detailed analysis of exploration data as closely guarded proprietary information and will not be made available. Additionally, as described in Section 8 of the COP, the geological analysis and hydrological testing that is submitted after the wellfield installation is provided to regulators as positive proof that the mine unit will perform as specified in the license. An infinite amount of drill holes could not replace the confidence that is derived from the actual wellfield testing.

3. Orebody maps – This information is not required by NRC and is not part of the hearing record. In addition, as stated in #2 above, details of the subsurface orebody is not public information.

4. Surface elevation of boreholes – This information is not part of the hearing record and as stated in #2 above, HRI will not agree to provide the exploration database. Therefore borehole surface elevations serve no purpose.

5. Excursion scenario modeling – Petitioners have requested a copy of the software that has been licensed to HRI to perform a variety of types of multiple well subsurface analysis at ISL locations. This software is not part of the hearing record and is not available to the public unless they are willing to pay license fees.

The software simply provides a user-friendly interface to conduct millions of calculations and provide instantaneous visual results using well-known reservoir theory specified for ISL. The user provides a given combination of input parameters such as well numbers, well patterns, well spacing, permeability, formation thickness, flow rates, etc. HRI will provide licensing information so Petitioners can purchase the software directly.

6. Supplement aquifer modeling for Churchrock and Crownpoint Sites dated October 19, 1993 – I have searched my files and have not been able to locate a copy of this correspondence. To the best of my recollection the "Supplement" that Petitioners request are the mining sequence work sheets that were referenced on page 4 of the Geraghty and Miller study that was transmitted to NRC the previous day. I know of no other supplementary aquifer modeling that was done at that time. The mining sequence work sheets are attached hereto. Note that the Crownpoint worksheet is also within the October 15, 1996 (Response to NRC Comments) Q2/78 that is part of the hearing record.

7. NRC solute-transport model – I understand that this information is to be distributed by NRC.

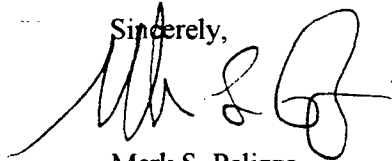
8. Copies of three Mobil references – I understand that this information is to be distributed by NRC.

9. Teton and Mobil water quality data – I understand that this information is to be distributed by NRC.

10. Vacuum drier/bag filter emission control system – HRI has described the Vacuum dryer that is proposed for the Crownpoint project initially in § 3.2 of the Churchrock Project Environmental Report dated 4-88 and most recently in the COP Rev. 2.0 § 2.5. Both of these reports are part of the hearing record. The Vacuum dryer is widely used, off the shelf, zero emission technology. Petitioners, however, they may wish to contact vendors and get additional information.

Please feel free to contact me with questions pertaining to this matter.

Sincerely,



Mark S. Pelizza
Vice President
Health, Safety and Environmental Affairs

Cc: Tony Thompson

REVISED SCHEDULE

REVISED

8-14-93

HLA/CSB

CROWNPOINT PRODUCTION + RESTORATION (REVISION #3)

WF = WELL FIELD
PROD = PRODUCTION
REST = RESTORATION

PRODUCTION SCHEDULE

DAY 0

JAN 1, 1996

WF1 PROD
(2855.3 gpm)

497 da

(1.36 YR) DAY 497

WF2 PROD
(4105 gpm)

482 da

(2.68 YR) DAY 979

WF3 PROD
(2565.6 gpm)

557 da

(4.21 YR) DAY 1536

WF + PROD
(2893.3 gpm)

424 da

(5.1 YR) DAY 1960

Avg PROD = 490 DAYS
1.34 YRS

RESTORATION SCHEDULE

DAY 730 (2 YR)

405 da

WF1 REST @ 350 gpm EXT

DAY 1135 (3.11 YR)

566 da

WF2 REST @ 350 gpm EXT

DAY 1701 (4.66 YR)

408 da

WF3 REST @ 350 gpm EXT

DAY 2109 (5.78 YR)

351 da

WF4 REST @ 350 gpm EXT

DAY 2460 (6.74 YR)

Avg REST = 432 DAYS
1.18 YRS

8-19-93 COPY TO GERRITY + MILLER
(JACK COLLINS)

8-16-93 COPY TO HARRY, PAUL, JR.
8-16-93 FAX TO MARK

(8-18-93 COPY OF FIVE PAGES
TO HARRY, PAUL,
RON, JIM, MARK,
MIKE, FRANK, ADRIAN,
D)

CROWNPOINT WELLFIELDS

6-14-13
CSB

(REVISION #3)

PRODUCTION						RESTORATION			
WELLFIELD	WELLS	MAX I/E GPM	BLEED	EXT GPM	INTJ GPM	MAX I/E GPM	BLEED	EXT GPM	INTJ GPM
1	188	35	1%	2850.3	2826.7	4.30	17%	350.0	-346.5
2	285	}	}	4105.0	4063.9	2.99	17%	350.0	-346.5
3	172			2565.6	2539.9	4.78	17%	349.8	-346.3
+	196			2893.3	2864.3	4.24	17%	349.9	-346.4
	861			12419.2	12294.8	4.15	5%	350.2	-332.7
						4.08	8%	350.1	-322.0
						4.04	10%	350.4	-315.4
						3.98	12.5%	349.7	-306.0

	ZONE	TOTAL EXT GPM	TOTAL INTJ GPM	TOTAL WELLS
1	✓ ULA	323.3	320.1	23
2	✓ ULA	1083.6	1072.8	78
3	✓ MLA	878.5	869.8	57
4	✓ ULB	556.9	551.3	35
5	✓ LB	597.5	591.5	39
6	✓ UUC	1929.5	1910.2	140
7	✓ UC	1143.5	1132.1	76
8	✓ MC	1986.8	1967.0	145
9	✓ ULC	2458.0	2433.5	172
10	✓ MLC	70.7	70.0	5
11	✓ LLC	1390.7	1376.8	91
		12,419.0	12,295.1	861

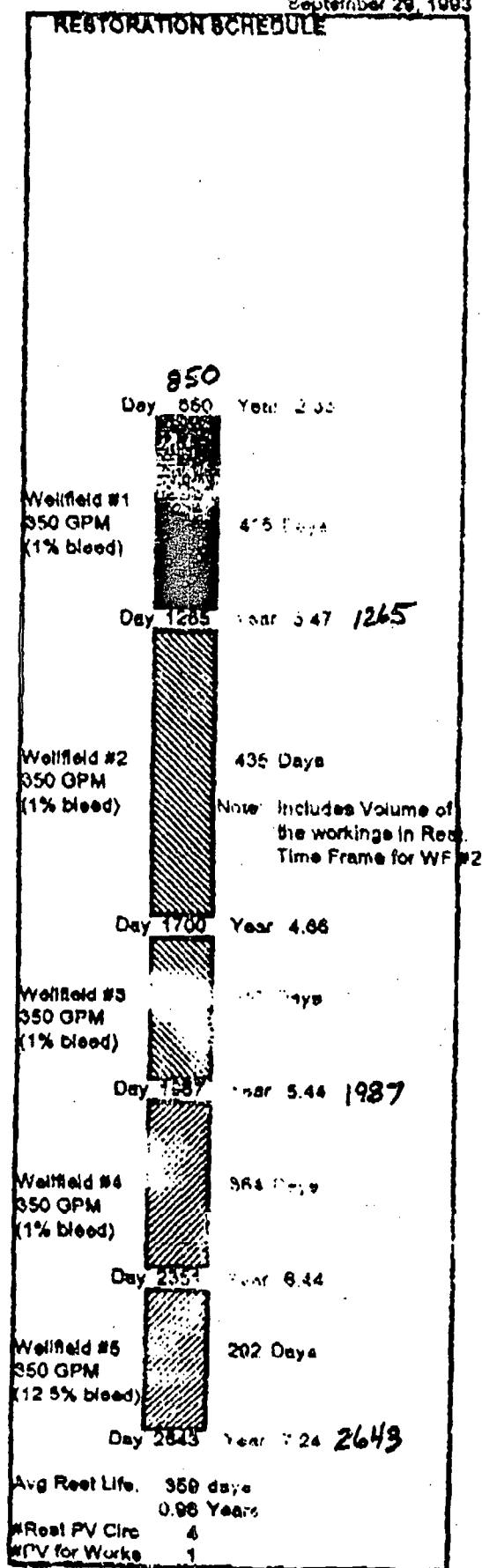
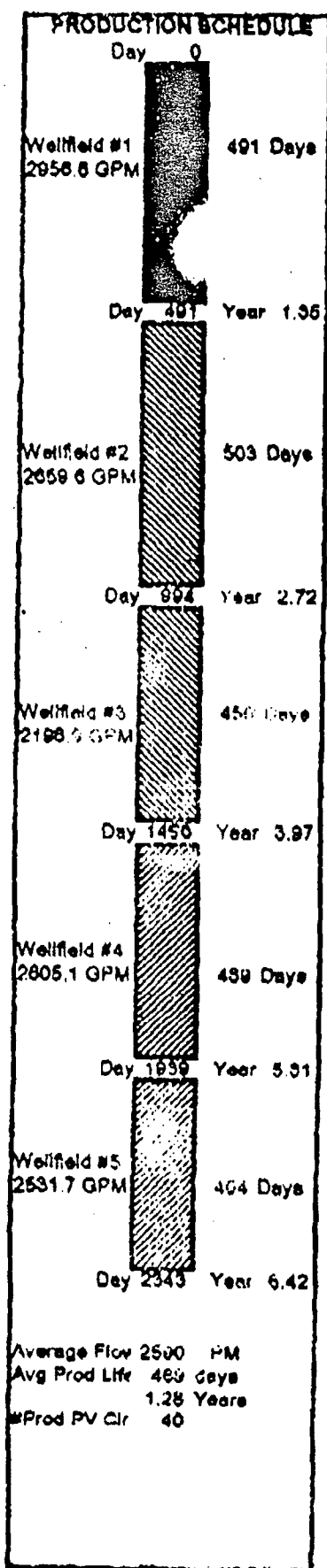
ALL WF4
REST.

USED
THIS
TO ACHIEVE
DD IN
MON WELLS

SUMS
CHECK
w/ ABOVE

PRODUCTION & RESTORATION SCHEDULE FOR THE CHURCHROCK WELLFIELDS

Revision #8 by WPG
September 29, 1993



URI Mine Schedule
CHURCHROCK revision 6

9-29-93 1008 AM
 WC

	Pre Prod	Prod	Pre Rest	Rest	Post Rest	
WF1	—	491	359	415	1378	2643
WF2	491	503	271	425	943	2643
WF3	994	456	250	287	656	2643
WF4	1450	489	48	364	292	2643
WF5	1939	404	8	292	—	2643

End of production times (days)

WF1 491 ✓
 WF2 994 ✓
 WF3 1450 ✓
 WF4 1939 ✓
 WF5 2343 ✓
 end of Rest time
 WF5 2643

HRI HEARING FILE INDEX
October 1998 Supplement

<u>DATE</u>	<u>NRC PDR Accession Number</u>	<u>DESCRIPTION</u>
1/22/86	9808120141	Letter from J.F. Cullen, Mobil Alternative Energy, Inc., to Felix R. Miera, New Mexico Radiation Protection Bureau re: Restoration Progress Report, Crownpoint Section 9 Pilot, In Situ Leach Plant
11/14/86	8702060301	Letter from J. F. Cullen, Mobil Mining and Minerals Company, to Gary Konwinski, NRC, forwarding Mobil Pilot In-Situ Leach Uranium Project restoration declaration with four attachments.
6/2/87	8708240360	Letter from J. F. Cullen, Mobil Coal Producing Inc., to Thomas T. Olsen, NRC, dated June 2, 1987, regarding restoration stability analyses.
2/4/88	8802230437	Letter to Jim Analla, BIA, from Edward Hawkins, URFO, Reg. IV, NRC, [AN. 8802230385], transmitting Draft Finding of No Significant Impact Regarding A Termination of the Source and Byproduct Material License and Environmental Assessment in Consideration of the Release of Source Material License SUA-1479 for Mobil Oil Corporation, Crownpoint, Section 9, In Situ Test Project
5/1/98		Letter from Joseph J. Holonich, NRC, to Rennie Cohoe, Navajo Nation Environmental Protection Agency [response to NNEPA comments on FEIS]
5/20/98		Letter from Joseph J. Holonich, NRC, to Lynne Sebastian, State Historic Preservation Officer, [re: Determination of Effect for the Church Rock Section 8 and Crownpoint Section 12 Portion Historic Properties on Portions of the Crownpoint, New Mexico Project]
5/20/98		Letter from Joseph J. Holonich, NRC, to James Copeland, BLM [re: Historic Properties on Portions of the HRI Uranium Mining Project Areas] enclosing 5/20/98 letter to Lynne Sebastian (above)

5/20/98 Letter from Joseph J. Holonich, NRC, to Alan S. Downer, Navajo Nation Historic Preservation Dept. [re: HRI's Uranium Mining Project, Church Rock Section 17 - No Historic Properties Found] enclosing 5/20/98 letter to Lynne Sebastian

5/20/98 Letter from Joseph J. Holonich, NRC, to Jenni Denetson, BIA [re: Historic Properties on Portions of the HRI Uranium Mining Project Areas] enclosing 5/20/98 letter to Lynne Sebastian

6/1/98 Letter from Jerrold E. Crockford, BLM, to Robert Carlson, NRC [re: effect on cultural resources]

6/3/98 Letter from Glenna Dean, NM Office of Cultural Affairs, to Joseph Holonich, NRC [re: effect on cultural resources]

6/24/98 Letter from Peter T. Noyes, Navajo Historic Preservation Department, to Joseph J. Holonich, NRC [re: approval per Navajo Nation Cultural Resources Protection Act for Navajo Lands]

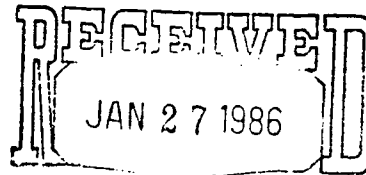
7/10/98 Letter from Joseph J. Holonich, NRC, to Richard F. Clement, HRI [Responses to Staff's National Historic Preservation Letters Dated May 20, 1998]

Mobil Alternative Energy Inc.

P.O. BOX 17772
DENVER, COLORADO 80217

January 22, 1986

Mr. Felix R. Miera, Program Manager
Uranium Licensing Section
Radiation Protection Bureau
Environmental Improvement Division
P. O. Box 968
Santa Fe, New Mexico 87504



RADIATION PROTECTION BUREAU

RESTORATION PROGRESS REPORT
CROWNPOINT SECTION 9 PILOT
IN SITU LEACH PLANT

Dear Mr. Miera:

The purpose of this letter is to provide the New Mexico Environmental Improvement Division and the Bureau of Land Management with an update on Mobil's restoration efforts at the Crownpoint Section 9 Pilot In Situ Leach Test Site.

Restoration Activities

Hydrogen Sulfide Injection: The procedure of injecting H_2S into the wells which was begun May 1, 1984 and described in the 1984 Restoration Progress Report was continued in early 1985. The final H_2S injection was completed March 18, 1985. The H_2S treated wells continued² to be sampled and monitored at intervals² of once every two to four weeks. Produced waters were analyzed for pH, U_3O_8 , and molybdenum.

After final H_2S injection, the wells were allowed to sit inactive to allow time for the chemical reactions to occur and were periodically sampled. Of the 13 wells treated, the September 1985 laboratory analysis (Attachment 6) shows that molybdenum concentration has decreased in 10 wells and increased in 3 wells. The well field average for molybdenum has decreased from 7.7 mg/l in September 1984 and 10.4 mg/l in December 1984 to 4.8 mg/l in September 1985. Eight of the wells were below the NMWQCC standard for molybdenum in the September 1985 sampling compared to two wells below the standard in the September 1984 sampling.

Well Maintenance Program: A well maintenance program was begun in October 1985 with the approval of the State Engineer's Office. This program consisted of cleaning out the wells, and acidizing selected wells in preparation for the next phase of restoration. The selected wells were Numbers 211, 215, 216, 217, and 220. The acidizing work consisted of spotting a 15% hydrochloric acid solution in perforated zones of the selected wells to redevelop the perforations. After allowing sufficient time for redevelopment of the perforations, the acidic waters were removed from the wells. The static water level quickly returned to normal,

indicating successful redevelopment of the perforations. A pump test to help define the remainder of the restoration program is scheduled for early 1986.

Sample Analyses - Results to Date: Field assays of the production stream corresponding to cumulative gallons produced since October 1, 1980 are shown in Attachment 1. Attachments 2, 3, and 4 are graphic presentations of molybdenum data and the majority of the other data in Attachment 1. All six parameters of concern have shown very significant drops in concentration since the beginning of restoration efforts and several parameters continue to decrease in concentration as restoration efforts proceed. Reduction in parameter concentrations range from a high of 99.8% for uranium to 78% for bicarbonate (see Attachment 1).

With respect to trace metals and other minor constituents, the September 1985 analytical data (see Attachments 5 and 6) show the average concentration in the well field are below the New Mexico Standards (Section 3-103 NMWQCC Regulations) for all parameters except molybdenum. Molybdenum, which was approximately 80 mg/l at the start of restoration, has been reduced approximately 94%, based on the September 1985 sampling. Eight of the thirteen wells sampled were at or below the 1.0 mg/l standard compared to three at or below the standard in the September 1984 sampling.

Radiometric data (see Attachment 6) was also secured in the September 1985 sampling. The activity levels for these parameters have shown significant decreases since the beginning of restoration. The combined radium 226 and 228 concentration was at a 37.4 ± 2 pCi/l level, which is slightly above the September 1984 level and Section 3-103 NMWQCC Standards, but well within the naturally occurring range (0.0 ± 2.7 to 89.4 pCi/l) observed during baseline water quality sampling at the Section 9 Pilot Site location. Percent reductions in radiometric activity levels are shown in Attachment 7.

In summary, the data available at this time demonstrate that 25 of 27 pertinent parameters listed in Section 3-103 of the NMWQCC Regulations are less than levels specified in the Regulations. The radium 226 and 228 parameter is slightly above the standard, but consistent with baseline water quality values. Molybdenum concentration is also above the standard, but it has been reduced approximately 37% from the September 1984 value. This reduction in molybdenum concentration can be attributed to the utilization of H_2S as a reductant and allowing time for the chemical reactions related to the use of H_2S to occur. We feel we have been diligent in trying to reduce molybdenum concentrations and have shown marked improvement over previous results.

Individual Well Variations: As stated in previous reports, there have been variations in parameter concentrations in different wells, most

Mr. Felix R. Miera
January 22, 1986
Page 3

markedly with respect to molybdenum. In comparing the September 1984 sampling results with September 1985 sampling results, two wells show molybdenum increases with only one of any significance. The elevated level of molybdenum in several wells is believed to be related to both the amount of naturally occurring molybdenum in the formation at that particular location and the degree of sweep efficiency at that location during restoration efforts. However, wells have begun to show decreases in molybdenum levels due to the use of H_2S as a reductant.

USGS Observation Well No. 9U-277: Clean up of Well No. 9U-277, related to molybdenum concentration, was completed since the last restoration progress report. Molybdenum levels decreased from 3.2 mg/l in December 1984 to less than 0.2 mg/l in June 1985 and have remained at this low level through November 1985.

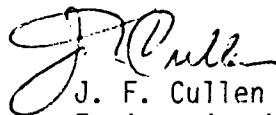
Future Restoration Plans

Following the pump test of the well field previously mentioned, a ground water sweep restoration method is scheduled to be employed. It is Mobil's intention to continue restoration efforts based on ground water hydraulic principles rather than ground water chemistry due to the less than expected success of the H_2S injection program.

We appreciate your cooperation throughout our restoration efforts and the granting of the necessary approvals that have allowed us to use a variety of restoration techniques in our effort to achieve complete restoration of the affected portion of the aquifer. We look forward to your continued cooperation.

If you have any questions, please contact me at (303) 293-6300.

Very truly yours,



J. F. Cullen
Engineering Manager

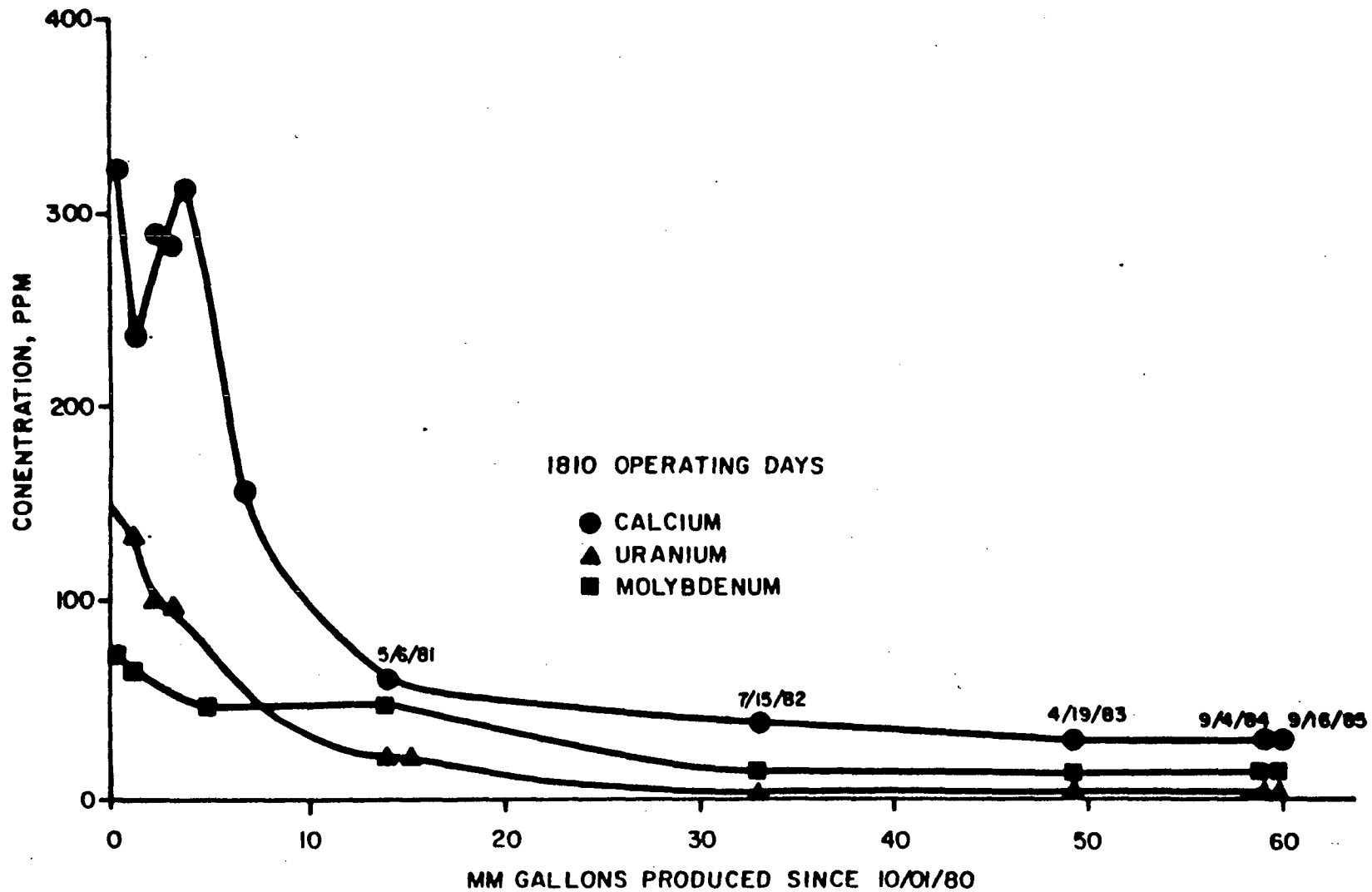
DGGANEY/jrh:212/c
Attachments

ATTACHMENT 1

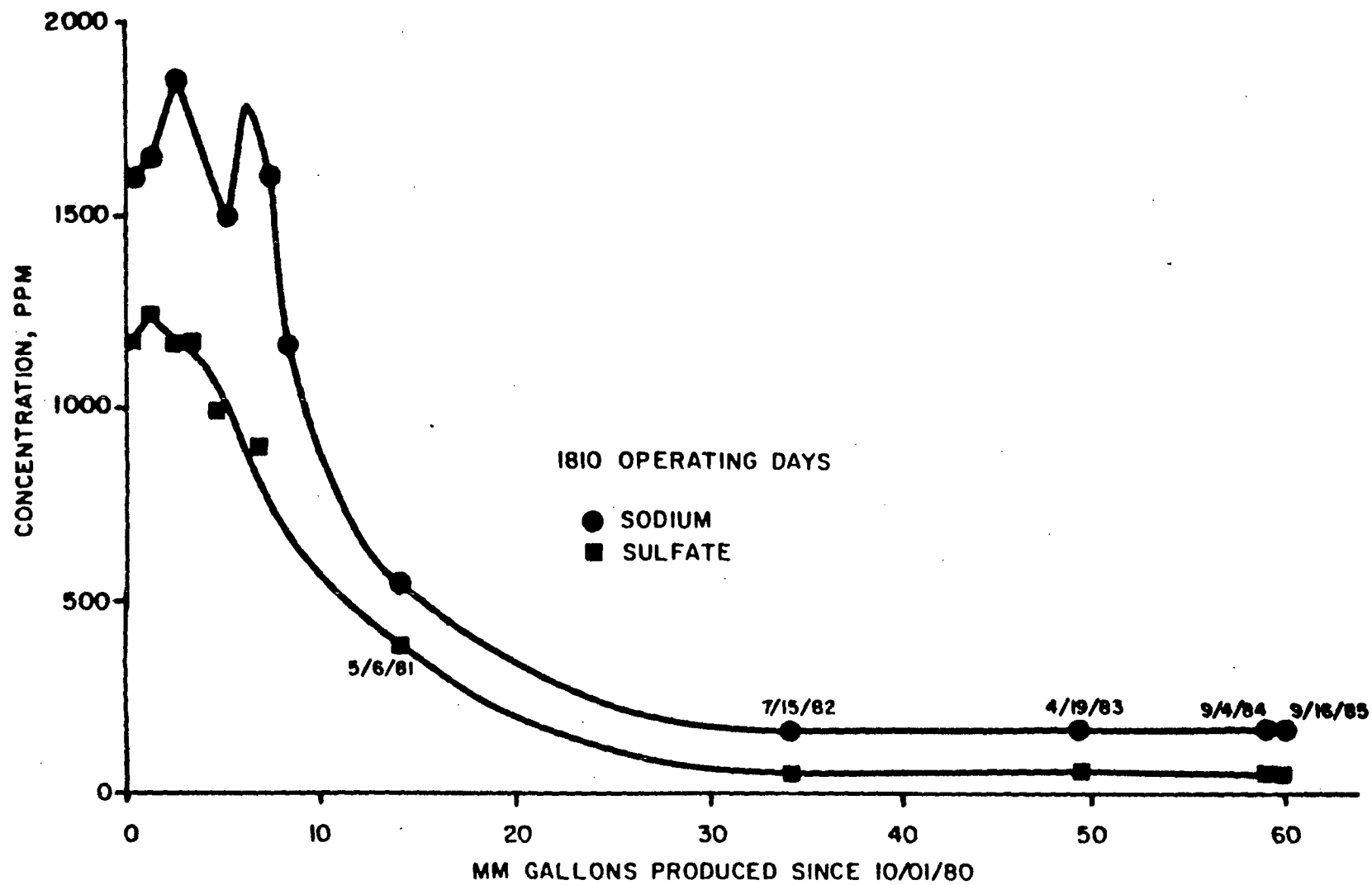
PRODUCTION STREAM FIELD ASSAYS

Cumulative Gallons Produced Since October 1, 1980	<u>U₃O₈</u> <u>ppm</u>	<u>Ca</u> <u>ppm</u>	<u>So₄</u> <u>ppm</u>	<u>NaCO₃</u> <u>ppm</u>	<u>Na</u> <u>ppm</u>	<u>Cl</u> <u>ppm</u>
-	145	320	1176	1005	1600	1671
374,762	142	326	1150	1023	1650	1671
736,639	132	317	1275	915	1620	1548
1,088,626	125	304	1175	874	1510	1656
1,373,375	103	280	1150	769	1850	1760
1,707,067	106	231	1100	800	1780	1795
2,075,608	97	276	1100	781	1510	1755
2,425,021	101	291	1050	737	1580	1728
2,721,818	89	282	1075	683	1640	1714
3,061,598	72	277	1150	683	1470	1678
3,446,723	72	306	975	698	1710	1860
3,791,287	62	310	925	612	1730	1800
4,117,896	58	282	975	585	1520	1787
5,007,311	48	228	977	622	1506	1639
5,384,309	42	235	902	617	1460	1405
5,757,729	40	193	866	649	1449	1213
6,126,444	34	157	787	634	1070	1010
6,362,630	32	156	775	610	1130	978
10,278,269	26	93	578	552	581	559
13,833,820	4	55	348	415	379	174
34,361,987	0.54	38	43	122	156	150
44,036,014	0.42	18	69	183	181	101
58,332,122	0.59	19	81	173	163	115
59,173,469	0.28	46	85	225	141	101
% Reduction in Concentration	99.8%	86%	93%	78%	92%	94%

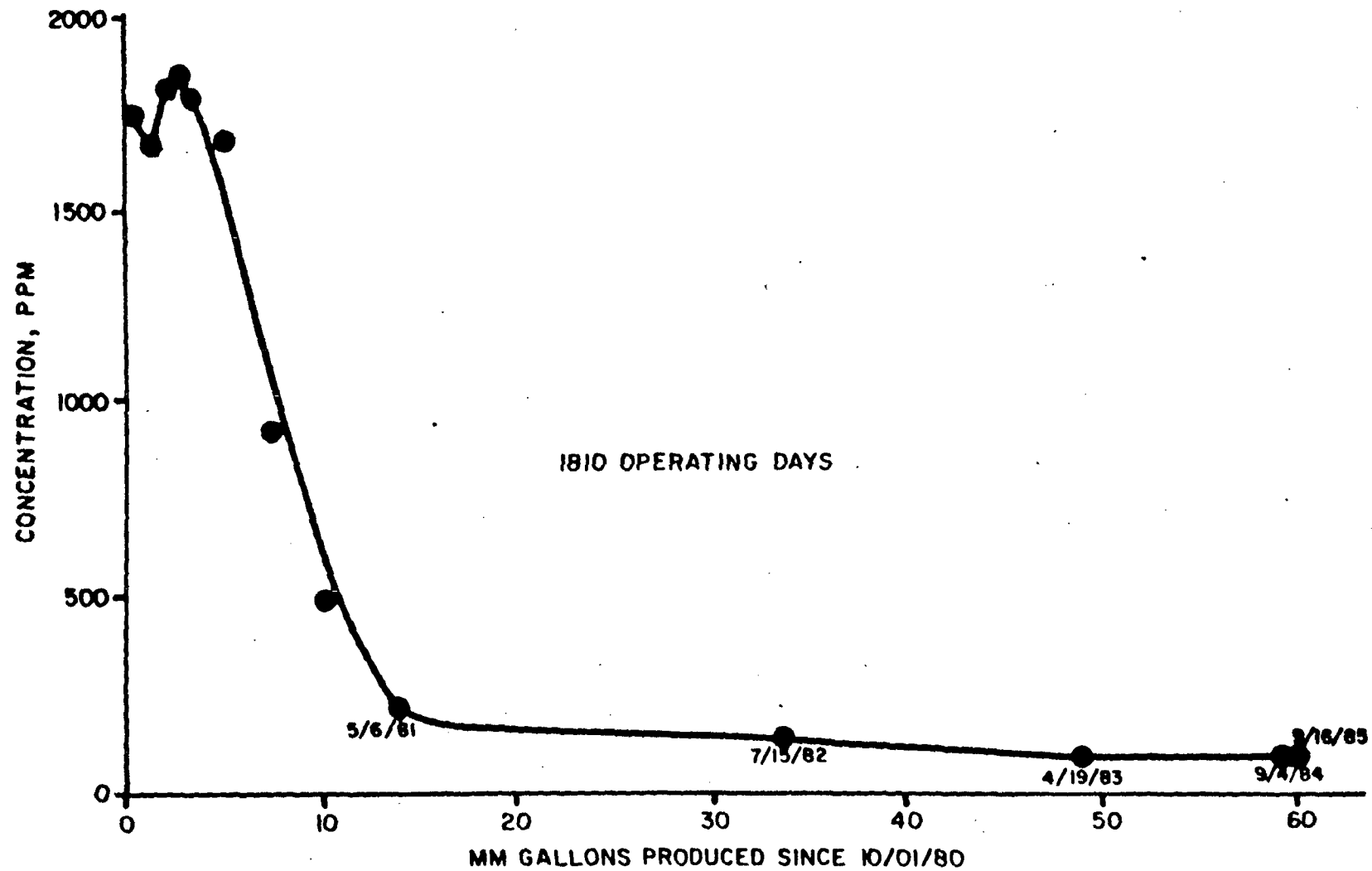
ATTACHMENT 2
CALCIUM, URANIUM, MOLYBDENUM RESTORATION



ATTACHMENT 3
SODIUM, SULFATE RESTORATION



ATTACHMENT 4
CHLORIDE RESTORATION



ATTACHMENT 5

Comparison of Parameter Concentrations for Production Stream Versus New Mexico Standards for Ground Water of 10,000 mg/l TDS Concentration or Less.

(Samples Taken September 4, 1984 and September 16, 1985)

Parameter	New Mexico Standard (mg/l)	Production Stream 1433 Days of Operation Section 9 Pilot Leach (mg/l)	Production Stream 1810 Days of Operation Section 9 Pilot Leach (mg/l)
Aluminum	5.0	< 0.5	< 0.5
Arsenic	0.1	0.057	0.032
Barium	1.0	0.26	0.22
Boron	0.75	0.1	0.22
Cadmium	0.01	< 0.005	< 0.007
Chloride	250.0	115.0	101.0
Chromium	0.05	0.007	0.011
Cobalt	0.05	< 0.02	0.026
Copper	1.0	< 0.005	0.012
Cyanide	0.2	< 0.005	< 0.007
Fluoride	1.6	< 0.5	< 0.5
Iron	1.0	0.06	0.37
Lead	0.05	< 0.005	< 0.006
Manganese	0.2	0.048	0.096
Molybdenum	1.0	7.65	4.80
Mercury	0.002	< 0.0001	< 0.0001
Nickel	0.2	0.02	< 0.02
Nitrate	10.0	0.94	< 0.05
pH*	6-9	8.4	8.2
Phenols	0.005	< 0.002	0.004
Radium-226 and -228	30.0 pCi/l	34.1 ±2	37.4 ±2
Selenium	0.05	0.017	0.032
Silver	0.05	< 0.005	< 0.006
Sulfate	600.0	81.5	85.0
TDS	1000.0	479.0	517.0
Uranium	5.0	0.59	0.28
Zinc	10.0	0.027	0.030

* Dimensionless (Units)

DGG12/85
jrh212



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

ATTACHMENT 6
Page 1 of 12

November 4, 1985
Page 1 of 2

Mr. Joe Sciba
Mobil Oil Corp.
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-20717-2
Date Samples Rec'd 9-30-85

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

8752-20717-2-1
208
9-23-85

8752-20717-2-2
210
9-23-85

Determination: mg/L

Arsenic, dissolved	0.005	0.007
Barium, dissolved	0.4	<0.2
Cadmium, dissolved	<0.005	<0.005
Chromium, dissolved	<0.005	<0.005
Cyanide	<0.005	<0.005
Fluoride	<0.5	<0.5
Lead, dissolved	<0.005	0.007
Mercury, total	<0.0001	<0.0001
Nitrate (as N)	<0.05	<0.05
Selenium, dissolved	<0.005	<0.005
Silver, dissolved	<0.005	<0.005
Chloride	140	4
Copper, dissolved	0.005	0.008
Iron, dissolved	0.06	0.14
Manganese, dissolved	0.22	0.009
Phenols	<0.002	<0.002
Sulfate (as SO ₄)	130	40
TDS (at 180°C)	760	270
Zinc, dissolved	0.019	0.043
pH	7.9	8.2
Aluminum, dissolved	<0.5	<0.5
Boron	0.2	0.2
Cobalt, dissolved	<0.02	<0.02
Molybdenum, dissolved	0.26	0.43
Nickel, dissolved	<0.02	0.03
Conductivity, μ hos/cm	1400	490

Accu-Labs Research, Inc.

November 4, 1985
Page 2 of 2

Mr. Joe Sciba
Mobil Oil Corp.

RE: 8752-20717-2
Date Samples Rec'd 9-30-85

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

8752-20717-2-1
208
9-23-85

8752-20717-2-2
210
9-23-85

Determination: mg/L

Sodium, dissolved	200	97
Calcium, dissolved	69	1.8
Magnesium, dissolved	2.5	0.06
Potassium, dissolved	1.8	0.4
Carbonate (as CO ₃)	<5	<5
Bicarbonate (as HCO ₃)	340	240
Silica (as SiO ₂)	53	19

These samples are scheduled to be disposed of 30 days after the date of this report.

CC/dh *dh*

Mary Labisiak for CC
Cathy Cairns
Water Laboratory
Supervisor



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

October 24, 1985

Page 1 of 6

Mr. Joe Sciba
Mobil Oil Corp.
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-20647-11

Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation	8752-20647-11-1	8752-20647-11-2	8752-20647-11-3	8752-20647-11-4	8752-20647-11-5
Sponsor Designation	209	211	212	213	214
	9-16-85	9-16-85	9-16-85	9-16-85	9-16-85
Determination: mg/L					
Arsenic, dissolved	0.006	0.18	0.007	<0.005	0.011
Barium, dissolved	<0.2	0.2	<0.2	0.2	<0.2
Cadmium, dissolved	<0.005	0.008	<0.005	0.005	<0.005
Chromium, dissolved	0.013	0.010	0.010	0.010	0.010
Cyanide	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5	<0.5	<0.5
Lead, dissolved	<0.005	0.005	0.009	<0.005	<0.005
Mercury, total	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nitrate (as N)	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium, dissolved	<0.005	0.15	0.018	<0.005	<0.005
Silver, dissolved	<0.005	0.014	<0.005	<0.005	0.006
Chloride	88	190	4	70	87
Copper, dissolved	0.007	0.032	0.020	0.008	0.008
Iron, dissolved	0.07	1.6	0.12	0.11	0.63
Manganese, dissolved	0.14	0.36	<0.005	0.063	<0.005
Phenols	<0.002	0.002	0.005	<0.002	0.005
Sulfate (as SO ₄)	87	130	51	120	<5
TDS (at 180°C)	570	750	270	540	320

October 24, 1985

Page 2 of 6

Mr. Joe Sciba
Mobil Oil Corp.

RE: 8752-20647-11

Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation	8752-20647-11-1	8752-20647-11-2	8752-20647-11-3	8752-20647-11-4	8752-20647-11-5
Sponsor Designation	209	211	212	213	214
	9-16-85	9-16-85	9-16-85	9-16-85	9-16-85
Determination: mg/L					
Zinc, dissolved	0.027	0.028	0.037	0.015	0.027
pH	8.4	7.9	8.7	8.0	10.3
Aluminum, dissolved	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	0.2	0.2	0.3	0.2	0.3
Cobalt, dissolved	0.03	0.04	0.04	<0.02	0.02
Molybdenum, dissolved	0.20	35	0.30	0.47	0.60
Nickel, dissolved	<0.02	<0.02	<0.02	<0.02	<0.02
Conductivity, μ hos/cm	940	1100	520	1200	1100
Sodium, dissolved	140	150	120	160	140
Calcium, dissolved	52	80	3.9	43	2.6
Magnesium, dissolved	0.82	3.2	0.23	0.75	<0.05
Potassium, dissolved	1.2	1.5	1.1	1.2	0.8
Carbonate (as CO_3)	6	<5	16	<5	110
Bicarbonate (as HCO_3)	310	150	220	310	<5
Silica (as SiO_2)	50	92	22	50	32

October 24, 1985

Page 3 of 6

Mr. Joe Sciba
Mobil Oil Corp.

RE: 8752-20647-11
Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation	8752-20647-11-6	8752-20647-11-7	8752-20647-11-8	8752-20647-11-9	8752-20647-11-10
Sponsor Designation	215	216	217	218	219
	9-16-85	9-16-85	9-16-85	9-16-85	9-16-85
Determination: mg/L					
Arsenic, dissolved	0.074	0.025	0.059	<0.005	0.006
Barium, dissolved	<0.2	<0.2	0.2	0.2	<0.2
Cadmium, dissolved	0.009	0.008	0.014	<0.005	0.011
Chromium, dissolved	0.010	0.010	0.015	0.010	0.020
Cyanide	<0.005	<0.005	0.061	<0.005	<0.005
Fluoride	0.6	<0.5	0.5	<0.5	0.5
Lead, dissolved	<0.005	<0.005	<0.005	<0.005	0.005
Mercury, total	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nitrate (as N)	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium, dissolved	0.012	0.028	0.11	0.054	<0.005
Silver, dissolved	<0.005	<0.005	0.005	<0.005	<0.005
Chloride	110	210	190	10	180
Copper, dissolved	0.010	0.009	0.031	<0.005	0.006
Iron, dissolved	0.33	1.4	0.19	0.05	0.05
Manganese, dissolved	0.036	0.20	0.16	0.008	0.042
Phenols	0.002	0.016	<0.002	<0.002	<0.002
Sulfate (as SO ₄)	160	72	59	46	120
TDS (at 180°C)	660	640	620	270	700

October 24, 1985

Page 4 of 6

Mr. Joe Sciba
Mobil Oil Corp.

RE: 8752-20647-11
Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation	8752-20647-11-6	8752-20647-11-7	8752-20647-11-8	8752-20647-11-9	8752-20647-11-10
Sponsor Designation	215	216	217	218	219
	9-16-85	9-16-85	9-16-85	9-16-85	9-16-85
Determination: mg/L					
Zinc, dissolved	0.032	0.043	0.032	0.029	0.032
pH	8.6	9.0	8.5	8.4	7.7
Aluminum, dissolved	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	0.2	0.2	0.2	0.2	0.2
Cobalt, dissolved	0.03	<0.02	<0.02	<0.02	0.04
Molybdenum, dissolved	1.1	3.7	12	0.52	0.16
Nickel, dissolved	<0.02	<0.02	<0.02	<0.02	<0.02
Conductivity, μ mhos/cm	1200	1000	1100	520	1100
Sodium, dissolved	130	180	130	110	140
Calcium, dissolved	86	56	92	5.5	100
Magnesium, dissolved	0.81	2.0	0.96	0.11	2.2
Potassium, dissolved	1.0	1.3	1.0	0.4	1.2
Carbonate (as CO_3)	12	12	10	<5	<5
Bicarbonate (as HCO_3)	220	170	250	250	240
Silica (as SiO_2)	59	71	210	18	140

October 24, 1985
Page 5 of 6

Mr. Joe Sciba
Mobil Oil Corp.

RE: 8752-20647-11
Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

8752-20647-11-11
220
9-16-85

Determination: mg/L

Arsenic, dissolved	0.024
Barium, dissolved	<0.2
Cadmium, dissolved	<0.005
Chromium, dissolved	0.014
Cyanide	<0.005
Fluoride	<0.5
Lead, dissolved	0.017
Mercury, total	0.0001
Nitrate (as N)	<0.05
Selenium, dissolved	0.009
Silver, dissolved	<0.005
Chloride	31
Copper, dissolved	<0.005
Iron, dissolved	0.08
Manganese, dissolved	<0.005
Phenols	0.003
Sulfate (as SO ₄)	89
TDS (at 180°C)	350

October 24, 1985
Page 6 of 6

Mr. Joe Sciba
Mobil Oil Corp.

RE: 8752-20647-11
Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

8752-20647-11-11
220
9-16-85

Determination: mg/L

Zinc, dissolved	0.029
pH	8.2
Aluminum, dissolved	<0.5
Boron	0.2
Cobalt, dissolved	0.02
Molybdenum, dissolved	7.7
Nickel, dissolved	<0.02
Conductivity, μ mhos/cm	640
Sodium, dissolved	140
Calcium, dissolved	6.7
Magnesium, dissolved	0.18
Potassium, dissolved	0.7
Carbonate (as CO_3)	<5
Bicarbonate (as HCO_3)	220
Silica (as SiO_2)	25

These samples are scheduled to be disposed of 30 days after the date of this report.

CC/dh *dh*
cc: John Kauffman

Mary Labisiak for cc
Cathy Cairns
Water Laboratory
Supervisor



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

November 5, 1985

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corp.
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-20717-2
Date Samples Rec'd 9-30-85

REPORT OF ANALYSIS


ALR Designation	8752-20717-2-1	8752-20717-2-2
Sponsor Designation	208	210
	<u>9-23-85</u>	<u>9-23-85</u>

Determination: pCi/L

Uranium (as U), dissolved, mg/L	0.12	0.10
Radium-226, dissolved, ± counting error*	90 ± 4	1.7 ± 0.8
Radium-228, dissolved, ± counting error*	0.4 ± 1.7	1.4 ± 1.5
Combined Ra-226 and Ra-228, ± counting error*	90 ± 4	3.1 ± 1.7
Gross Alpha, dissolved, ± counting error*	250 ± 30	150 ± 20
Gross Beta, dissolved, ± counting error*	84 ± 8	39 ± 4
Lead-210, dissolved, ± counting error*	17 ± 2	9 ± 2
Thorium-230, dissolved, ± counting error*	0.0 ± 0.1	0.1 ± 0.1

*Variability of the radioactive disintegration process (counting error)
at the 95% confidence level, 1.96σ .

These samples are scheduled to be disposed of 45 days after the date of
this report.


Bud Summers
Radiochemistry
Supervisor

BS/dh
dh



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

October 25, 1985

Page 1 of 3

Mr. Joe Sciba
Mobil Oil Corp.
P.O. Drawer F
Crowmpoint, NM 87313

RE: 8752-20647-11
Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation	8752-20647-11-1	8752-20647-11-2	8752-20647-11-3	8752-20647-11-4	8752-20647-11-5
Sponsor Designation	209	211	212	213	214
	9-16-85	9-16-85	9-16-85	9-16-85	9-16-85
Determination: pCi/L					
Uranium (as U), dissolved, mg/L	0.18	0.36	0.55	0.36	0.044
Combined Ra-226 and Ra-228, ± counting error*	55 ± 3	87 ± 12	4.5 ± 1.2	32 ± 2	1.8 ± 1.1
Radium-226, dissolved, ± counting error*	54 ± 3	85 ± 12	3.6 ± 0.8	32 ± 2	1.2 ± 0.5
Radium-228, dissolved, ± counting error*	1.0 ± 0.9	1.7 ± 1.2	0.9 ± 0.9	0.5 ± 0.8	0.6 ± 1.0
Gross Alpha, dissolved, ± counting error*	350 ± 30	770 ± 40	770 ± 30	540 ± 30	68 ± 10
Gross Beta, dissolved, ± counting error*	130 ± 10	250 ± 10	160 ± 10	130 ± 10	20 ± 4
Lead-210, dissolved, ± counting error*	27 ± 4	38 ± 4	-0.5 ± 2.8	0.9 ± 3.0	0.7 ± 2.5
Thorium-230, dissolved, ± counting error*	-0.3 ± 0.4	0.0 ± 0.1	0.1 ± 0.1	0.0 ± 0.1	0.0 ± 0.1

October 25, 1985

Page 2 of 3

Mr. Joe Sciba
Mobil Oil Corp.

RE: 8752-20647-11

Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation	8752-20647-11-6	8752-20647-11-7	8752-20647-11-8	8752-20647-11-9	8752-20647-11-10
Sponsor Designation	215	216	217	218	219
	9-16-85	9-16-85	9-16-85	9-16-85	9-16-85
Determination: pCi/L					
Uranium (as U), dissolved, mg/L	0.57	0.36	0.20	0.33	0.29
Combined Ra-226 and Ra-228, ± counting error*	68 ± 3	26 ± 9	58 ± 4	5.5 ± 1.3	38 ± 3
Radium-226, dissolved, ± counting error*	66 ± 3	26 ± 9	56 ± 4	5.4 ± 1.0	38 ± 3
Radium-228, dissolved, ± counting error*	1.9 ± 0.8	-0.1 ± 1.0	1.8 ± 1.0	0.1 ± 0.8	0.1 ± 0.8
Gross Alpha, dissolved, ± counting error*	740 ± 40	530 ± 30	490 ± 30	450 ± 20	350 ± 30
Gross Beta, dissolved, ± counting error*	260 ± 10	130 ± 10	130 ± 10	100 ± 10	100 ± 10
Lead-210, dissolved, ± counting error*	20 ± 4	9.6 ± 3.2	4.3 ± 3.2	16 ± 3	12 ± 4
Thorium-230, dissolved, ± counting error*	0.3 ± 0.1	0.0 ± 0.1	0.1 ± 0.1	0.9 ± 0.3	0.4 ± 0.2

October 25, 1985

Page 3 of 3

Mr. Joe Sciba
Mobil Oil Corp.

RE: 8752-20647-11
Date Samples Rec'd 9-19-85

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

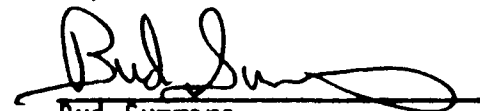
8752-20647-11-11
220
9-16-85

Determination: pCi/L

Uranium (as U), dissolved, mg/L	0.20
Combined Ra-226 and Ra-228, ± counting error*	17 ± 2
Radium-226, dissolved, ± counting error*	16 ± 2
Radium-228, dissolved, ± counting error*	0.9 ± 0.9
Gross Alpha, dissolved, ± counting error*	600 ± 30
Gross Beta, dissolved, ± counting error*	250 ± 10
Lead-210, dissolved, ± counting error*	140 ± 10
Thorium-230, dissolved, ± counting error*	20 ± 2

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

BS/dh *dh*
cc: John Kauffman


Bud Summers
Radiochemistry
Supervisor

ATTACHMENT 7

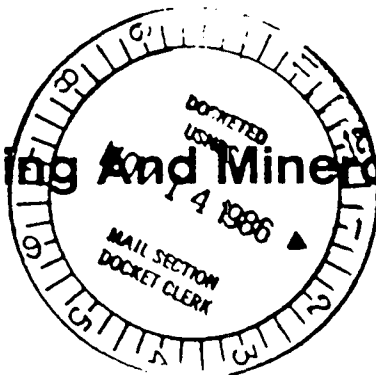
PRODUCTION STREAM SAMPLES - RADIOMETRICS

<u>Date Sampled</u>	<u>Gross Alpha pCi/l</u>	<u>Gross Beta pCi/l</u>	<u>Ra-226 Dissolved pCi/l</u>	<u>Ra-228 Dissolved pCi/l</u>
10/08/80	88,000 ± 700	57,200 ± 1,300	200 ± 30	5.8 ± 1.5
10/28/80	52,500 ± 800	31,800 ± 500	49 ± 7	0.5 ± 1.4
11/18/80	48,700 ± 1,000	31,100 ± 300	140 ± 10	1.8 ± 0.8
12/03/80	39,100 ± 900	32,100 ± 600	68 ± 12	1.2 ± 1.0
01/29/81	8,700 ± 200	4,200 ± 100	52 ± 7	2.1 ± 1.4
02/04/81	7,800 ± 200	2,700 ± 100	38 ± 6	0.5 ± 3.8
05/06/81	5,300 ± 100	1,300 ± 100	46 ± 6	0.7 ± 1.4
07/15/82	386 ± 30	149 ± 10	26 ± 3	0.7 ± 1.4
09/04/84	510 ± 30	120 ± 10	34 ± 3	0.4 ± 0.7
09/16/85	<u>470 ± 30</u>	<u>140 ± 10</u>	<u>37 ± 4</u>	<u>0.9 ± 1.0</u>
% Reduction in Activity Level	99%	99%	82%	84%

DGG 12/85
jrh:212

40-8911

Mobil Mining And Minerals Company



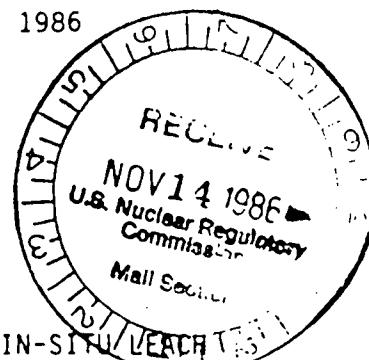
RETURN ORIGINAL TO PDR. HQ.

P.O. BOX 17772
DENVER, COLORADO 80217

A DIVISION OF
MOBIL OIL CORPORATION

November 14, 1986

Mr. Gary Konwinski
Project Manager
U. S. Nuclear Regulatory Commission
Region IV
P. O. Box 25325
Denver, Colorado 80225



MOBIL PILOT IN-SITU LEACH TESTS
URANIUM PROJECT, CROWNPPOINT, NM

Dear Mr. Konwinski:

In accordance with the provisions and stipulations to the Interim Mining and Reclamation Plan for the Pilot testing of in-situ uranium leaching near Crownpoint, New Mexico, please be advised that Mobil herein declares that restoration of the mining zone is complete. All water quality parameters are returned to a level consistent with the prescribed restoration standards.

As support for our restoration declaration, attached are:

- o Current water quality based on samples taken during September, 1986 (Attachment 1).
- o Historical annual water quality prior to development (Attachment 2) and through production and restoration (Attachment 3).
- o A production and restoration history of the project (Attachment 4).

To demonstrate the completeness of restoration, Mobil proposes to enter a nine (9) month "stability period". During this period samples will be taken monthly in accordance with Appendix "A".

Mobil proposes to begin the "stability period" during November, 1986. Please contact me if you need any additional information and to select a mutually agreeable date to obtain the initial samples.

750318
11-01-86
J.F.C.
J.F.C.

Very truly yours,

8702060301 861114
PDR ADDOCK 04008911
B PDR

J. F. Cullen
Manager Technical Services

JFC:sdm:29

cc: Kevin Lambert
John Andrews

87-114

Mobil Mining And Minerals Company

P.O. BOX 17777
DENVER, COLORADO 80217
A DIVISION OF
MOBIL OIL CORPORATION

November 14, 1986

Mr. Kevin Lambert
Environmental Improvement Division
Grandwater and Hazardous Waste Bureau
P. O. Box 968, Crown Building
Santa Fe, New Mexico 87504-0968

MOBIL PILOT IN-SITU LEACH URANIUM PROJECT, CROWNPOINT, NM

Dear Mr. Lambert:

In accordance with the provisions and stipulations to the Interim Mining and Reclamation Plan for the Pilot testing of in-situ uranium leaching near Crownpoint, New Mexico, please be advised that Mobil herein declares that restoration of the mining zone is complete. All water quality parameters are returned to a level consistent with the prescribed restoration standards.

As support for our restoration declaration, attached are:

- o Current water quality based on samples taken during September, 1986 (Attachment 1).
- o Historical annual water quality prior to development (Attachment 2) and through production and restoration (Attachment 3).
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To demonstrate the completeness of restoration, Mobil proposes to enter a nine (9) month "stability period". During this period samples will be taken monthly in accordance with Appendix "A".

Mobil proposes to begin the "stability period" during November, 1986. Please contact me if you need any additional information.

Very truly yours,

J. F. Cullen
Manager Technical Services

JFC:sdm.28

cc: Gary Konwinski
John Andrews

Mobil Mining And Minerals Company

P.O. BOX 17772
DENVER, COLORADO 80217
A DIVISION OF
MOBIL OIL CORPORATION

November 14, 1986

Mr. John M. Andrews, Jr.
U. S. Department Interior
Geological Survey Conservation Div.
P. O. Box 26124
Albuquerque, NM 87125

MOBIL PILOT IN-SITU LEACH URANIUM PROJECT, CROWNPOINT, NM

Dear Mr. Andrews:

In accordance with the provisions and stipulations to the Interim Mining and Reclamation Plan for the Pilot testing of in-situ uranium leaching near Crownpoint, New Mexico, please be advised that Mobil herein declares that restoration of the mining zone is complete. All water quality parameters are returned to a level consistent with the prescribed restoration standards.

As support for our restoration declaration, attached are:

- o Current water quality based on samples taken during September, 1986 (Attachment 1).
- o Historical annual water quality prior to development (Attachment 2) and through production and restoration (Attachment 3).
- o A production and restoration history of the project (Attachment 4).

To demonstrate the completeness of restoration, Mobil proposes to enter a nine (9) month "stability period". During this period samples will be taken monthly in accordance with Appendix "A".

Mobil proposes to begin the "stability period" during November, 1986. Please contact me if you need any additional information.

Very truly yours,

J. F. Cullen
Manager Technical Services

JFC:sdm:30

cc: Kevin Lambert
Gary Konwinski

ATTACHMENT 1

Current Water Quality - Crownpoint Section 9 Wellfield
September 1986

<u>Chemical Constituent</u>	<u>New Mexico Standard mg/liter</u>	<u>Restoration Standard mg/liter</u>	<u>1986 Average mg/liter</u>
Aluminum, dissolved	5.0	5.0	0.808
Arsenic	0.1	0.1	0.014
Barium	1.0	1.0	0.277
Boron	0.75	0.75	0.238
Cadmium	0.01	0.036	0.006
Chloride	250.0	250.0	54.538
Chromium	0.05	0.074	0.005
Cobalt, dissolved	0.05	0.05	0.021
Copper, dissolved	1.0	1.0	0.008
Cyanide	0.2	0.780	<0.005
Fluoride	1.6	1.6	<0.5
Iron, dissolved	1.0	5.50	0.146
Lead, dissolved	0.05	0.063	0.016
Manganese, dissolved	0.2	0.456	0.035
Molybdenum, dissolved	1.0	1.0	1.118
Mercury, total	0.002	0.002	0.0003
Nickel, dissolved	0.2	0.2	0.022
Nitrate (as N)	10.0	10.0	0.556
PH	6 to 9	6 to 9	9.062
Phenols	0.005	0.047	0.008
Combined Ra-226 & 228	30.0	97.2	59.939
Selenium, dissolved	0.05	0.05	0.006
Silver, dissolved	0.05	0.05	<0.005
Sulfate (as SO ₄)	600.0	600.0	47.615
TDS (at 180 C)	1000.0	1000.0	356.154
Uranium (as U)	5.0	5.0	0.319
Zinc, dissolved	10.0	10.0	0.039



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

October 24, 1986

Page 1 of 4

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-22793-8

Date Samples Rec'd 9-25-86

REPORT OF ANALYSIS

ALR Designation	8752-22793-8-1	8752-22793-8-2	8752-22793-8-3	8752-22793-8-4	8752-22793-8-5
Sponsor Designation	208	209	210	211	212
	9-22-86	9-22-86	9-22-86	9-22-86	9-22-86
Determination: mg/L					
Arsenic, dissolved	<0.005	0.007	0.009	0.025	0.005
Barium, dissolved	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium, dissolved	0.007	<0.005	<0.005	<0.005	<0.005
Cyanide	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5	<0.5	<0.5
Lead, dissolved	0.011	0.10	<0.005	<0.005	0.005
Mercury, total	0.0002	0.0015	0.0002	0.0002	<0.0001
Nitrate (as N)	0.14	<0.05	<0.05	0.07	0.09
Selenium, dissolved	0.008	0.011	<0.005	<0.005	0.005
Silver, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Chloride	29	35	26	110	12
Copper, dissolved	0.01	0.042	0.005	<0.005	<0.005
Iron, dissolved	0.10	0.26	0.02	<0.02	<0.02
Manganese, dissolved	0.015	0.029	0.020	0.16	0.010
Phenols	0.016	0.005	0.004	0.018	0.008
Sulfate (as SO ₄)	44	70	31	44	51
TDS (at 180°C)	310	360	280	420	300

October 24, 1986
Page 2 of 4

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-22793-8
Date Samples Rec'd 9-25-86

REPORT OF ANALYSIS

ALR Designation	8752-22793-8-1	8752-22793-8-2	8752-22793-8-3	8752-22793-8-4	8752-22793-8-5
Sponsor Designation	208	209	210	211	212
Determination: mg/L	<u>9-22-86</u>	<u>9-22-86</u>	<u>9-22-86</u>	<u>9-22-86</u>	<u>9-22-86</u>
Zinc, dissolved	0.038	0.21	0.012	0.011	0.013
pH	9.1	8.7	9.1	8.7	10
Aluminum, dissolved	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	0.1	0.1	0.2	0.6	0.5
Cobalt, dissolved	0.02	0.02	0.03	<0.02	<0.02
Molybdenum, dissolved	1.4	2.7	0.67	1.5	0.56
Nickel, dissolved	<0.02	<0.02	<0.02	<0.02	<0.02
Conductivity, μ mhos/cm	550	610	520	770	560
Sodium, dissolved	120	120	110	120	110
Calcium, dissolved	6.3	5.7	2.5	26	3.0
Magnesium, dissolved	0.12	0.17	0.09	0.81	<0.05
Potassium, dissolved	0.9	0.8	0.7	1.4	1.3
Carbonate (as CO_3)	6	12	18	12	87
Bicarbonate (as HCO_3)	210	190	200	170	86
Silica (as SiO_2)	28	29	14	22	27

October 24, 1986
Page 3 of 4

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-22793-8
Date Samples Rec'd 9-25-86

REPORT OF ANALYSIS

ALR Designation	8752-22793-8-6	8752-22793-8-7	8752-22793-8-8
Sponsor Designation	215	216	220
Determination: mg/L	<u>9-22-86</u>	<u>9-22-86</u>	<u>9-22-86</u>
Arsenic, dissolved	0.040	0.030	0.028
Barium, dissolved	0.3	0.4	<0.2
Cadmium, dissolved	<0.005	0.006	<0.005
Chromium, dissolved	<0.005	<0.005	<0.005
Cyanide	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5
Lead, dissolved	0.005	<0.005	<0.005
Mercury, total	<0.0001	<0.0001	<0.0001
Nitrate (as N)	0.62	4.0	<0.05
Selenium, dissolved	<0.005	<0.005	<0.005
Silver, dissolved	<0.005	<0.005	<0.005
Chloride	78	88	61
Copper, dissolved	0.005	<0.005	<0.005
Iron, dissolved	0.10	<0.02	0.02
Manganese, dissolved	0.048	0.035	0.026
Phenols	0.005	0.015	0.006
Sulfate (as SO ₄)	46	45	48
TDS (at 180°C)	370	380	260

October 24, 1986

Page 4 of 4

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-22793-8
Date Samples Rec'd 9-25-86

REPORT OF ANALYSIS

ALR Designation	8752-22793-8-6	8752-22793-8-7	8752-22793-8-8
Sponsor Designation	215	216	220
	<u>9-22-86</u>	<u>9-22-86</u>	<u>9-22-86</u>
Determination: mg/L			
Zinc, dissolved	0.016	0.013	0.013
pH	9.1	8.0	8.7
Aluminum, dissolved	<0.5	<0.5	<0.5
Boron	0.2	0.2	0.1
Cobalt, dissolved	<0.02	<0.02	<0.02
Molybdenum, dissolved	1.4	0.59	0.55
Nickel, dissolved	0.02	0.04	<0.02
Conductivity, μ mhos/cm	630	680	530
Sodium, dissolved	100	100	92
Calcium, dissolved	21	23	11
Magnesium, dissolved	0.44	0.37	0.31
Potassium, dissolved	1.2	2.8	0.7
Carbonate (as CO_3)	18	<5	12
Bicarbonate (as HCO_3)	140	160	140
Silica (as SiO_2)	28	23	16

These samples are scheduled to be discarded 30 days after the date of this report.

Cathy Cairns Shugart
Cathy Cairns Shugart
Water Laboratory
Supervisor

CCS/dh

dh



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

October 24, 1986

Page 1 of 2

Mr. Joe Sciba ;
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-22863-5

Date Samples Rec'd 10-6-86

REPORT OF ANALYSIS

ALR Designation	8752-22863-5-1	8752-22863-5-2	8752-22863-5-3	8752-22863-5-4	8752-22863-5-5
Sponsor Designation	213	214	217	218	219
Determination: mg/L	9-30-86	9-30-86	9-30-86	9-30-86	9-30-86
Aluminum, dissolved	<0.5	<0.5	<0.5	<0.5	4.5
Arsenic, dissolved	<0.005	<0.005	<0.005	0.015	0.008
Barium, dissolved	<0.2	<0.2	<0.2	<0.2	0.9
Bicarbonate (as HCO ₃)	170	160	93	180	190
Boron	0.2	0.2	0.2	0.3	0.2
Cadmium, dissolved	0.009	<0.005	0.006	0.007	<0.005
Calcium, dissolved	5.7	2.4	8.5	2.2	18
Carbonate (as CO ₃)	18	31	37	25	18
Chloride	40	38	88	25	79
Chromium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt, dissolved	<0.02	<0.02	<0.02	<0.02	<0.02
Conductivity, μ mhos/cm	550	590	610	520	800
Copper, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Cyanide	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5	<0.5	<0.5
Iron, dissolved	0.12	0.07	0.03	<0.02	1.1
Lead, dissolved	<0.005	<0.005	<0.005	<0.005	0.043
Magnesium, dissolved	0.11	<0.05	0.14	0.06	0.47

October 24, 1986
Page 2 of 2

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-22863-5
Date Samples Rec'd 10-6-86

REPORT OF ANALYSIS

ALR Designation	8752-22863-5-1	8752-22863-5-2	8752-22863-5-3	8752-22863-5-4	8752-22863-5-5
Sponsor Designation	213	214	217	218	219
	9-30-86	9-30-86	9-30-86	9-30-86	9-30-86
Determination: mg/L					
Manganese, dissolved	0.016	<0.005	<0.005	<0.005	0.076
Mercury, total	0.0002	<0.0001	<0.0001	<0.0001	0.0012
Molybdenum, total	0.98	0.67	1.1	0.92	1.5
Nickel, total	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate/Nitrite (as N)	0.86	<0.05	1.1	<0.05	0.10
pH	9.1	9.8	9.6	9.1	8.8
Phenols	<0.002	<0.002	0.010	0.003	0.007
Potassium, dissolved	0.7	0.8	0.7	0.4	0.9
Selenium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Silica (as SiO ₂)	22	19	25	18	38
Silver, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium, dissolved	110	140	110	120	140
TDS (at 180°C)	320	350	360	340	580
Sulfate (as SO ₄)	33	55	19	33	100
Zinc, dissolved	0.015	0.013	0.012	0.017	0.13

These samples are scheduled to be discarded 30 days after the date of this report.

Cathy Cairns Shugarts
Cathy Cairns Shugarts
Water Laboratory
Supervisor

CCS/dh

dh



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

October 3, 1986

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-22831-3

Date Samples Rec'd 10-1-86


REPORT OF ANALYSIS

ALR Designation	8752-22831-3-1	8752-22831-3-2	8752-22831-3-3
Sponsor Designation	Well 214	Well 218	Well 219
	<u>9-30-86</u>	<u>9-29-86</u>	<u>9-30-86</u>

Determination: pCi/L

Radon-222, ± counting error*	10 ± 5	11 ± 6	120 ± 10
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*Variability of the radioactive disintegration process (counting error)
at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of
this report.


Bud Summers
Radiochemistry
Supervisor

BS/dh 



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

September 29, 1986
Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

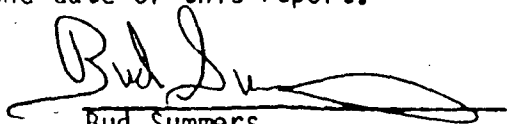
RE: 8752-22783-5
Date Samples Rec'd 9-24-86

REPORT OF ANALYSIS

ALR Designation	8752-22783-5-1	8752-22783-5-2	8752-22783-5-3	8752-22783-5-4	8752-22783-5-5
Sponsor Designation	Well 213	Well 215	Well 216	Well 217	Well 220
	<u>9-23-86</u>	<u>9-22-86</u>	<u>9-22-86</u>	<u>9-22-86</u>	<u>9-22-86</u>
Determination: pCi/L					
Radon-222, ± counting error	410 ± 20	1400 ± 100	850 ± 30	1700 ± 100	62 ± 9

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

BS/ch


Bud Summers
Radiochemistry Supervisor



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

September 22, 1986

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-22757-2
Date Samples Rec'd 9-19-86

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

8752-22757-2-1
No. 211
9-18-86

8752-22757-2-2
No. 212
9-18-86

Determination: pCi/L

Radon-222,
± counting error*

28 ± 6

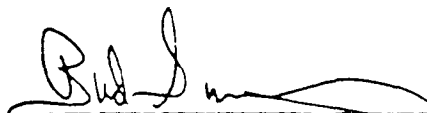
10 ± 5

*Variability of the radioactive disintegration process (counting error)
at the 95% confidence level, 1.96σ.

These samples are scheduled to be disposed of 45 days after the date of
this report.

BS/dh

dh



Bud Summers
Radiochemistry
Supervisor



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

YEAR/ 1986
SEPT.

September 22, 1986

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-22748-3
Date Samples Rec'd 9-18-86


REPORT OF ANALYSIS

ALR Designation	8752-22748-3-1	8752-22748-3-2	8752-22748-3-3
Sponsor Designation	<u>Well 208</u>	<u>Well 209</u>	<u>Well 210</u>

Determination: pCi/L

Radon-222, ± counting error*	440 ± 30	13,000 ± 1000	140 ± 20
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*Variability of the radioactive disintegration process (counting error)
at the 95% confidence level, 1.96σ .
These samples are scheduled to be disposed of 45 days after the date of
this report.


Bud Summers
Radiochemistry
Supervisor

BS/dh
dh



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

November 13, 1986

Page 1 of 2

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-22793-8

Date Samples Rec'd 9-25-86

REPORT OF ANALYSIS

ALR Designation	8752-22793-8-1	8752-22793-8-2	8752-22793-8-3	8752-22793-8-4	8752-22793-8-5
Sponsor Designation	208	209	210	211	212
	9-22-86	9-22-86	9-22-86	9-22-86	9-22-86
Determination: pCi/L					
Gross Alpha, dissolved, ± counting error*	310 ± 20	2200 ± 100	49 ± 8	84 ± 12	28 ± 7
Gross Beta, dissolved, ± counting error*	140 ± 10	1000 ± 100	10 ± 5	16 ± 10	17 ± 5
Lead-210, dissolved, ± counting error*	47 ± 3	770 ± 10	3.1 ± 1.6	2.4 ± 1.6	-0.2 ± 1.5
Radium-226, dissolved, ± counting error*	11 ± 2	120 ± 10	4.3 ± 1.2	34 ± 3	0.6 ± 0.4
Radium-228, dissolved, ± counting error*	0.9 ± 0.9	0.0 ± 1.4	-0.3 ± 0.8	0.2 ± 1.1	0.3 ± 1.0
Combined Radium-226 and Radium-228, ± counting error*	12 ± 2	120 ± 10	4.0 ± 1.4	34 ± 3	0.9 ± 1.1
Thorium-230, ± counting error*	5.9 ± 1.4	72 ± 2	0.0 ± 0.1	0.0 ± 0.1	0.2 ± 0.2
Uranium (as U), dissolved, mg/L	0.28	0.68	0.034	0.037	0.033

November 13, 1986

Page 2 of 2

Mr. Joe Sciba
Mobil Oil Corporation

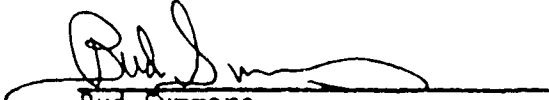
RE: 8752-22793-8
Date Samples Rec'd 9-25-86

REPORT OF ANALYSIS

ALR Designation	8752-22793-8-6	8752-22793-8-7	8752-22793-8-8
Sponsor Designation	215	216	220
	<u>9-22-86</u>	<u>9-22-86</u>	<u>9-22-86</u>
Determination: pCi/L			
Gross Alpha, dissolved, ± counting error*	700 ± 30	160 ± 20	210 ± 20
Gross Beta, dissolved, ± counting error*	260 ± 10	53 ± 7	34 ± 6
Lead-210, dissolved, ± counting error*	30 ± 2	11 ± 2	2.0 ± 1.5
Radium-226, dissolved, ± counting error*	58 ± 3	47 ± 4	26 ± 3
Radium-228, dissolved, ± counting error*	1.3 ± 0.8	1.1 ± 0.9	0.3 ± 0.9
Combined Radium-226 and Radium-228, ± counting error*	59 ± 3	48 ± 4	26 ± 3
Thorium-230, ± counting error*	46 ± 2	1.4 ± 0.4	0.4 ± 0.2
Uranium (as U), dissolved, mg/L	0.80	0.16	0.26

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be discarded 45 days after the date of this report.

BS/dh *dh*
cc: Jerry Lyons, Mobil


Bud Summers
Radiochemistry
Supervisor



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

November 14, 1986

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-22863-5
Date Samples Rec'd 10-6-86

PARTIAL REPORT

REPORT OF ANALYSIS

ALR Designation	8752-22863-5-1	8752-22863-5-2	8752-22863-5-3	8752-22863-5-4	8752-22863-5-5
Sponsor Designation	213	214	217	218	219
	9-30-86	9-30-86	9-30-86	9-30-86	9-30-86
Determination: pCi/L					
Radium-226, dissolved, ± counting error*	11 ± 2	4.4 ± 1.3	7.1 ± 1.6	2.2 ± 1.0	450 ± 10
Radium-228, dissolved, ± counting error*	0.5 ± 0.9	0.0 ± 0.7	-0.3 ± 0.6	-0.1 ± 0.8	3.6 ± 1.1
Combined Radium-226 and Radium-228, ± counting error*	12 ± 2	4.4 ± 1.5	6.8 ± 1.7	2.1 ± 1.3	450 ± 10
Uranium (as U), dissolved, mg/L	0.21	0.047	0.11	0.19	1.3

BS/dh

Bud Summers
Radiochemistry
Supervisor

ATTACHMENT 2
Baseline Water Quality
Data, Crownpoint, Section 9

FILE 1. A. 1. 2. 1

November 10, 1980

Mr. Gerald W. Stewart
Environmental Program Manager
Uranium Licensing Section
Radiation Protection Bureau
P. O. Box 968
Santa Fe, New Mexico 87503

Pilot In Situ Test
Crownpoint, Section 9
Radioactive Material License
NM-MOB-UL-02
Baseline and Restoration Data

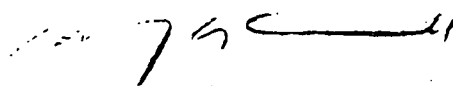
Dear Mr. Stewart:

Please find enclosed the final compilation and calculation of baseline and restoration values for all of the ground water sampling and analyses completed prior to initiating injection of leaching fluids at the Crownpoint, Section 9 Pilot In Situ Uranium Test Project. These data are submitted in compliance with Radioactive Material License NM-MOB-UL-02.

As can be seen in reviewing the data, wells 202 through 225 were sampled from five to six times for baseline determination while wells 276 through 280 were sampled three times for baseline determination. The mean, mean plus three standard deviations, maximum value, applicable New Mexico Water Quality Control Commission Standards, and restoration values are tabulated for each parameter for each well or group of wells in accordance with the USGS stipulations. The average value (baseline value) for each parameter for all wells is reported for both the Westwater Canyon and Dakota Aquifers.

If you have any questions, please contact me at (303) 572-2585 or W. A. Steingraber at (303) 572-5764.

Sincerely,


G. A. Cresswell
Hydrological & Environmental
Affairs Manager-Uranium

MAS:gh
Enclosures

File 1, A, 1, 2, 1

November 10, 1980

Ms. Maxine S. Goad
Program Manager
Ground Water Section
Water Pollution Control Bureau
P. O. Box 968
Santa Fe, New Mexico 87503

Pilot In Situ Test
Crownpoint, Section 9
Discharge Plan DP-26
Baseline and Restoration Data

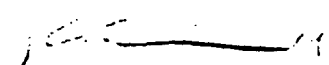
Dear Ms. Goad:

Please find enclosed the final compilation and calculation of baseline and restoration values for all of the ground water sampling and analyses completed prior to initiating injection of leaching fluids at the Crownpoint, Section 9 Pilot In Situ Uranium Test Project. These data are submitted in compliance with Discharge Plan DP-26.

As can be seen in reviewing the data, wells 202 through 225 were sampled from five to six times for baseline determination while wells 276 through 280 were sampled three times for baseline determination. The mean, mean plus three standard deviations, maximum value, applicable New Mexico Water Quality Control Commission Standards, and restoration values are tabulated for each parameter for each well or group of wells in accordance with the USGS stipulations. The average value (baseline value) for each parameter for all wells is reported for both the Westwater Canyon and Dakota Aquifers.

If you have any questions, please contact me at (303) 572-2585 or W. A. Steingraber at (303) 572-5764.

Sincerely,


G. A. Cresswell
Hydrological & Environmental
Affairs Manager-Uranium

WAS:gh
Enclosures

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	ALUMINUM mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	0.2	0.2	1.3	1.6	5.0	5.0
209	0.1					
210	0.3					
211	0.1					
212	0.1					
213	0.2					
214	0.3					
215	0.2					
216	0.4					
217	0.1					
218	0.2					
219	0.1					
220	0.5					
202	0.1				5.0	5.0
221	0.3				5.0	5.0
222	0.2				5.0	5.0
223	<0.1				5.0	5.0
224	0.6				5.0	5.0
225	0.1				5.0	5.0
207	0.3				5.0	5.0
277	<0.5	<0.5	<0.5	<0.5	5.0	5.0
278	<0.5					
279	<0.5					
280	<0.5					
276-A	<0.5				5.0	5.0
276-B	<0.5				5.0	5.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

ARSENIC
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.002	0.004	0.025	0.04	0.100	0.10
209	0.003					
210	0.017					
211	0.003					
212	0.002					
213	0.003					
214	0.003					
215	0.002					
216	0.003					
217	0.005					
218	0.003					
219	0.002					
220	0.004					
202	0.003				0.100	0.100
221	0.003				0.100	0.100
222	0.002				0.100	0.1
223	0.003				0.100	0.100
224	0.002				0.100	0.100
225	0.003				0.100	0.100
207	0.002				0.100	0.100
277	0.008	0.005	0.015	0.01	0.100	0.100
278	0.003					
279	0.005					
280	0.003					
276-A	0.002				0.100	0.100
276-B	0.006				0.100	0.100

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	BARIUM mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE		
208	0.1	0.2	0.7	0.6	1.0	1.0
209	0.2					
210	0.1					
211	0.3					
212	0.2					
213	0.2					
214	0.1					
215	0.1					
216	0.1					
217	0.2					
218	0.2					
219	0.1					
220	0.1					
202	0.2				1.0	1.0
221	<0.1				1.0	1.0
222	0.1				1.0	1.0
223	0.1				1.0	1.0
224	0.1				1.0	1.0
225	0.1				1.0	1.0
207	<0.1				1.0	1.0
277	<0.1	<0.1	0.1	0.1	1.0	1.0
278	0.1					
279	<0.1					
280	<0.1					
276-A	0.1				1.0	1.0
276-B	<0.1				1.0	1.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	BORON mg/l				NHWQC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	0.1	0.1	0.5	0.4	0.75	0.75
209	0.1					
210	0.1					
211	0.1					
212	0.1					
213	0.1					
214	0.1					
215	0.1					
216	0.2					
217	0.1					
218	0.1					
219	0.2					
220	0.1					
202	0.2	0.1	0.1	0.1	0.75	0.75
221	0.2				0.75	0.75
222	0.2				0.75	0.75
223	0.1				0.75	0.75
224	0.1				0.75	0.75
225	0.1				0.75	0.75
207	0.3				0.75	0.75
277	0.1				0.75	0.75
278	0.1				0.75	0.75
279	0.1					
280	0.1					
276-A	0.1				0.75	0.75
276-B	0.1				0.75	0.75

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

CADMIUM
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	<0.001	0.007	0.036	0.03	0.01	0.036
209	<0.001					
210	0.005					
211	0.009					
212	0.004					
213	0.007					
214	0.008					
215	0.007					
216	0.011					
217	0.009					
218	0.007					
219	0.011					
220	0.004					
202	0.001				0.01	0.010
221	0.011				0.01	0.011
222	0.007				0.01	0.010
223	0.011				0.01	0.011
224	0.005				0.01	0.010
225	<0.001				0.01	0.010
						0.010
207	0.001				0.01	
277	<0.01	<0.01	<0.01	<0.01	0.01	0.01
278	<0.01					
279	<0.01					
280	<0.01					
276-A	<0.01				0.01	0.010
276-B	<0.01				0.01	0.010

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

CHLORIDE
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	37.2	25.3	99.8	146.0	250	250.0
209	19.8					
210	28.0					
211	31.2					
212	8.8					
213	13.9					
214	20.4					
215	37.8					
216	10.2					
217	47.0					
218	15.5					
219	21.0					
220	30.1					
202	9.4	7.3	11.1	9.0	250	250.0
221	8.5					
222	5.6					
223	5.8					
224	26.3					
225	9.2					
207	30.0					
277	6.0					
278	7.0					
279	7.0					
280	9.0					
276-A	6.0					
276-B	95.3	250	250.0			

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

CHROMIUM
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.002	0.005	0.074	0.190	0.05	0.074
209	0.002					
210	0.002					
211	0.002					
212	0.003					
213	0.003					
214	0.001					
215	0.004					
216	0.002					
217	0.002					
218	0.032					
219	0.002					
220	0.002					
202	0.003				0.05	0.050
221	0.013				0.05	0.050
222	0.007				0.05	0.050
223	0.003				0.05	0.050
224	0.002				0.05	0.050
225	0.002				0.05	0.050
207	0.003				0.05	0.050
277	<0.05	<0.05	<0.05	<0.05	0.05	0.050
278	<0.05					
279	<0.05					
280	<0.05					
276-A	<0.05				0.05	0.050
276-B	<0.05				0.05	0.050

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

COBALT
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	<0.05	<0.05	<0.05	0.06	0.05	0.05
209	<0.05					
210	<0.05					
211	<0.05					
212	<0.05					
213	<0.05					
214	<0.05					
215	<0.05					
216	<0.05					
217	<0.05					
218	<0.05					
219	<0.05					
220	<0.05					
202	<0.05				0.05	0.05
221	<0.05				0.05	0.05
222	<0.05				0.05	0.05
223	<0.05				0.05	0.05
224	<0.05				0.05	0.05
225	<0.05				0.05	0.05
207	<0.05				0.05	0.05
277	<0.06	<0.06	<0.06	0.08	0.05	0.05
278	<0.06					
279	<0.06					
280	<0.06					
276-A	<0.06				0.05	0.06
276-B	<0.06				0.05	0.06

MOBIL OIL CORPORATION
 PILOT IN SITU LEACH TEST SITE
 SECTION 9 T17N, R13W
 MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	COPPER mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE		
208	0.010	0.003	0.029	0.07	1.0	1.000
209	<0.001					
210	0.005					
211	<0.05					
212	<0.05					
213	0.002					
214	0.001					
215	0.019					
216	<0.05					
217	<0.001					
218	0.001					
219	0.013					
220	0.002					
202	0.001				1.0	1.000
221	0.029				1.0	1.000
222	0.010				1.0	1.000
223	0.015				1.0	1.000
224	0.030				1.0	1.000
225	0.025				1.0	1.000
207	0.005				1.0	1.000
277	0.04	0.040	0.058	0.05	1.0	1.000
278	0.04					
279	0.04					
280	0.04					
276-A	0.04				1.0	1.000
276-B	0.04				1.0	1.000

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	CYANIDE mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE		
208	0.083	0.097	0.780	1.4	0.2	0.780
209	0.100					
210	0.050					
211	0.200					
212	0.175					
213	0.150					
214	0.050					
215	0.133					
216	0.020					
217	0.120					
218	0.050					
219	0.180					
220	0.067					
202	0.020				0.2	0.200
221	0.017				0.2	0.200
222	0.017				0.2	0.200
223	0.380				0.2	0.380
224	0.017				0.2	0.200
225	0.200				0.2	0.200
207	0.050				0.2	0.200
277	<0.005	<0.005	<0.005	<0.005	0.2	0.200
278	<0.005					
279	<0.005					
280	<0.005					
276-A	<0.005				0.2	0.200
276-B	<0.008				0.2	0.200

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

FLOURIDE
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.44	0.43	0.93	0.92	1.6	1.60
209	0.62					
210	0.38					
211	0.34					
212	0.37					
213	0.46					
214	0.42					
215	0.51					
216	0.33					
217	0.34					
218	0.42					
219	0.71					
220	0.26					
202	0.45				1.6	1.60
221	0.27				1.6	1.60
222	0.28				1.6	1.60
223	0.41				1.6	1.60
224	0.26				1.6	1.60
225	0.49				1.6	1.60
207	0.35				1.6	1.60
277	0.30	0.30	0.30	0.30	1.6	1.60
278	0.30					
279	0.30					
280	0.30					
276-A	0.30				1.6	1.60
276-B	0.40				1.6	1.60

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	IRON mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	1.29	0.64	5.50	8.50	1.00	5.50
209	0.18					
210	1.88					
211	0.06					
212	0.08					
213	0.41					
214	0.43					
215	0.83					
216	0.34					
217	0.08					
218	0.59					
219	0.19					
220	1.46					
202	2.05	0.16	0.51	0.38	1.00	2.05
221	0.14				1.00	1.00
222	0.24				1.00	1.00
223	0.42				1.00	1.00
224	2.46				1.00	2.46
225	0.19				1.00	1.00
207	2.20				1.00	2.20
277	0.08	0.16	0.51	0.38	1.00	1.00
278	0.35					
279	0.15					
280	0.09					
276-A	0.06	0.04			1.00	1.00
276-B	0.04				1.00	1.00

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

LEAD
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	0.001	0.003	0.063	0.170	0.05	0.063
209	0.004					
210	0.002					
211	< 0.001					
212	0.006					
213	0.001					
214	0.001					
215	0.001					
216	0.001					
217	0.001					
218	0.029					
219	0.001					
220	0.001					
202	0.001				0.05	0.050
221	0.007				0.05	0.050
222	0.001				0.05	0.050
223	0.002				0.05	0.050
224	0.001				0.05	0.050
225	0.001				0.05	0.050
207	0.003				0.05	
277	< 0.01	< 0.01	< 0.01	< 0.01	0.05	0.050
278	< 0.01					
279	< 0.01					
280	< 0.01					
276-A	< 0.01				0.05	0.050
276-B	< 0.01				0.05	0.050

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

MANGANESE
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.181	0.066	0.456	0.94	0.2	0.456
209	0.062					
210	0.108					
211	0.052					
212	0.009					
213	0.044					
214	0.041					
215	0.150					
216	0.018					
217	0.022					
218	0.069					
219	0.050					
220	0.031					
202	0.096				0.2	0.20
221	0.027				0.2	0.20
222	0.016				0.2	0.20
223	0.010				0.2	0.20
224	0.050				0.2	0.20
225	0.006				0.2	0.20
207	0.121				0.2	0.20
277	<0.01	<0.01	0.013	0.02	0.2	0.20
278	<0.01					
279	<0.01					
280	0.01					
276-A	<0.01				0.2	0.20
276-B	0.19				0.2	0.20

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	MOLYBDENUM mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE		
208	0.291	0.238	0.661	2.3	1.0	1.0
209	0.078					
210	0.582					
211	0.020					
212	0.165					
213	0.209					
214	0.044					
215	0.077					
216	0.078					
217	0.066					
218	0.486					
219	0.673					
220	0.272					
202	0.099				1.0	1.0
221	0.012				1.0	1.0
222	0.011				1.0	1.0
223	0.052				1.0	1.0
224	0.010				1.0	1.0
225	0.329				1.0	1.0
207	0.003				1.0	1.0
277	0.042	0.033	0.042	0.046	1.0	1.0
278	0.033					
279	0.036					
280	0.021					
276-A	0.020				1.0	1.0
276-B	0.007				1.0	1.0

MOBIL OIL CORPORATION
 PILOT IN SITU LEACH TEST SITE
 SECTION 9 T17N, R13W
 MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

TOTAL MERCURY
 mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	0.00087	0.00053	0.00194	0.0055	0.002	0.0020
209	0.00040					
210	0.00094					
211	0.00018					
212	0.00013					
213	0.00088					
214	0.00080					
215	0.00042					
216	<0.00004					
217	0.00008					
218	0.00008					
219	0.00024					
220	0.00080					
202	0.0010	0.00053	0.00194	0.0055	0.002	0.0020
221	0.00083				0.002	0.0020
222	0.00010				0.002	0.0020
223	0.00002				0.002	0.0020
224	<0.00004				0.002	0.0020
225	<0.00004				0.002	0.0020
207	<0.00004	0.00053	0.00194	0.0055	0.002	<0.0020
277	<0.00003				0.002	0.0020
278	<0.00003					
279	<0.00003					
280	<0.00003					
276-A	<0.00003	0.00053	0.00194	0.0055	0.002	0.0020
276-B	<0.00004				0.002	0.0020

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

NICKEL
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.01	0.02	0.11	0.10	0.2	0.20
209	0.02					
210	0.02					
211	0.03					
212	0.02					
213	0.02					
214	0.02					
215	0.02					
216	0.03					
217	0.04					
218	0.02					
219	0.03					
220	0.03					
202	0.01				0.2	0.20
221	0.02				0.2	0.20
222	0.03				0.2	0.20
223	0.03				0.2	0.20
224	0.03				0.2	0.20
225	0.03				0.2	0.20
207	0.02				0.2	0.20
277	0.03	0.02	0.08	0.06	0.2	0.20
278	0.04					
279	<0.02					
280	<0.02					
276-A	0.03				0.2	0.20
276-B	<0.02				0.2	0.20

MOBIL OIL CORPORATION
 PILOT IN SITU LEACH TEST SITE
 SECTION 9 T17N, R13W
 MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

NITRATE (asN)
 mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.08	0.08	0.69	1.9	10.0	10.0
209	0.08					
210	0.12					
211	0.08					
212	0.22					
213	0.08					
214	<0.10					
215	0.10					
216	0.09					
217	0.04					
218	0.07					
219	0.11					
220	0.05					
202	0.08				10.0	10.0
221	0.07				10.0	10.0
222	0.07				10.0	10.0
223	0.04				10.0	10.0
224	0.32				10.0	10.0
225	0.12				10.0	10.0
207	0.08				10.0	10.0
277	<0.04	0.05	0.23	0.15	10.0	10.0
278	<0.04					
279	0.08					
280	0.14					
276-A	<0.04				10.0	10.0
276-B	<0.05				10.0	10.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

pH

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	7.9	7.4	N/A	9.1	6 to 9	6 to 9
209	7.4					
210	7.3					
211	7.8					
212	8.0					
213	7.4					
214	7.4					
215	7.2					
216	7.8					
217	8.3					
218	7.4					
219	7.3					
220	7.8					
202	7.6				6 to 9	6 to 9
221	7.9				6 to 9	6 to 9
222	7.9				6 to 9	6 to 9
223	7.8				6 to 9	6 to 9
224	7.5				6 to 9	6 to 9
225	7.6				6 to 9	6 to 9
207	7.2				6 to 9	6 to 9
277	8.9	8.2	N/A	9.2	6 to 9	6 to 9
278	8.7					
279	8.6					
280	9.0					
276-A	8.8				6 to 9	6 to 9
276-B	7.6				6 to 9	6 to 9

MOBIL OIL CORPORATION
 PILOT IN SITU LEACH TEST SITE
 SECTION 9 T17N, R13W
 MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	PHENOLS mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	0.004	0.011	0.047	0.066	0.005	0.047
209	0.010					
210	0.010					
211	0.020					
212	0.023					
213	0.012					
214	0.008					
215	0.011					
216	0.011					
217	0.016					
218	0.004					
219	0.012					
220	0.009					
202	0.010				0.005	0.010
221	0.004				0.005	0.005
222	0.009				0.005	0.009
223	0.015				0.005	0.015
224	0.009				0.005	0.009
225	0.020				0.005	0.020
207	0.004				0.005	0.005
277	0.003	0.004	0.008	0.007	0.005	0.008
278	0.004					
279	0.005					
280	0.003					
276-A	0.003				0.005	0.005
276-B	0.009				0.005	0.009

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

COMBINED DISSOLVED
RADIUM 226 & RADIUM 228 pCi/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	<32.3	<21.6	<97.2	89.4 \pm 3.0	30.0	97.2
209	<48.2					
210	4.5					
211	<43.8					
212	<6.9					
213	<4.2					
214	<11.6					
215	<58.4					
216	3.8					
217	<6.6					
218	<12.3					
219	<29.0					
220	<23.7					
202	<1				30.0	30.0
221	<2.2				30.0	30.0
222	<1				30.0	30.0
223	<1				30.0	30.0
224	<1.1				30.0	30.0
225	<8.3				30.0	30.0
207	<1.1				30.0	30.0
277	5.1	2.4	8.3	7.2 \pm 5.8	30.0	30.0
278	1.6					
279	0.5					
280	2.5					
276-A	0.6				30.0	30.0
276-B	2.4				30.0	30.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	SELENIUM mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE		
208	<0.01	<0.01	<0.01	0.01	0.05	0.05
209	<0.01					
210	<0.01					
211	<0.01					
212	<0.01					
213	<0.01					
214	<0.01					
215	<0.01					
216	<0.01					
217	<0.01					
218	<0.01					
219	<0.01					
220	<0.01					
202	<0.01				0.05	0.05
221	<0.01				0.05	0.05
222	<0.01				0.05	0.05
223	<0.01				0.05	0.05
224	<0.01				0.05	0.05
225	<0.01				0.05	0.05
207	<0.01				0.05	0.05
277	0.014	0.015	0.025	0.022	0.05	0.05
278	0.013					
279	0.019					
280	0.014					
276-A	0.016				0.05	0.05
276-B	0.005				0.05	0.05

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

SILVER
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	<0.01	<0.01	<0.01	0.02	0.05	0.05
209	<0.01					
210	<0.01					
211	<0.01					
212	<0.01					
213	<0.01					
214	<0.01					
215	<0.01					
216	<0.01					
217	<0.01					
218	<0.01					
219	<0.01					
220	<0.01					
202	<0.01				0.05	0.05
221	<0.01				0.05	0.05
222	<0.01				0.05	0.05
223	<0.01				0.05	0.05
224	<0.01				0.05	0.05
225	<0.01				0.05	0.05
207	<0.01				0.05	0.05
277	<0.005	<0.005	<0.005	<0.005	0.05	<0.005
278	<0.005				0.05	0.05
279	<0.005				0.05	0.05
280	<0.005				0.05	0.05
276-A	<0.005				0.05	0.05
276-B	<0.005				0.05	0.05

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	SULFATE mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	52	40	138	158	600	600
209	16					
210	59					
211	30					
212	22					
213	61					
214	66					
215	30					
216	24					
217	23					
218	51					
219	18					
220	50					
202	51	30	43	37	600	600
221	40				600	600
222	37				600	600
223	33				600	600
224	36				600	600
225	28				600	600
207	217				600	600
277	32	30	43	37	600	600
278	26					
279	32					
280	31					
276-A	36	111			600	600
276-B	111				600	600

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

TOTAL DISSOLVED SOLIDS
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	390	373	589	701	1,000	1,000
209	355					
210	388					
211	366					
212	325					
213	390					
214	443					
215	383					
216	316					
217	386					
218	376					
219	370					
220	338					
202	412				1,000	1,000
221	331				1,000	1,000
222	315				1,000	1,000
223	309				1,000	1,000
224	326				1,000	1,000
225	331				1,000	1,000
207	601				1,000	1,000
277	322	318	340	325	1,000	1,000
278	317					
279	308					
280	323					
276-A	342				1,000	1,000
276-B	558				1,000	1,000

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	TOTAL URANIUM mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	0.023	0.013	0.062	0.082	5	5.0
209	0.006					
210	0.014					
211	0.007					
212	0.010					
213	0.008					
214	0.007					
215	0.014					
216	0.008					
217	0.005					
218	0.009					
219	0.010					
220	0.043					
202	0.002				5	5.0
221	0.005				5	5.0
222	0.008				5	5.0
223	0.006				5	5.0
224	0.007				5	5.0
225	0.012				5	5.0
207	0.007				5	5.0
277	<0.002	<0.002	<0.002	0.003	5	5.0
278	<0.002					
279	<0.002					
280	<0.002					
276-A	<0.002				5	5.0
276-B	0.002				5	5.0

MOBIL OIL CORPORATION
 PILOT IN SITU LEACH TEST SITE
 SECTION 9 T17N, R13W
 MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

ZINC
 mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	<0.01	0.01	0.19	0.51	10.0	10.0
209	<0.01					
210	0.01					
211	<0.01					
212	0.01					
213	<0.01					
214	<0.01					
215	0.01					
216	0.01					
217	0.01					
218	<0.01					
219	0.12					
220	0.01					
202	0.01				10.0	10.0
221	0.01				10.0	10.0
222	0.01				10.0	10.0
223	<0.01				10.0	10.0
224	0.02				10.0	10.0
225	<0.01				10.0	10.0
207	0.02				10.0	10.0
277	0.03	0.03	0.05	0.03	10.0	10.0
278	0.02					
279	0.02					
280	0.03					
276-A	0.04				10.0	10.0
276-B	0.03				10.0	10.0

HISTORICAL ANNUAL WATER QUALITY
CROWNPOINT SECTION 9 WELLFIELD

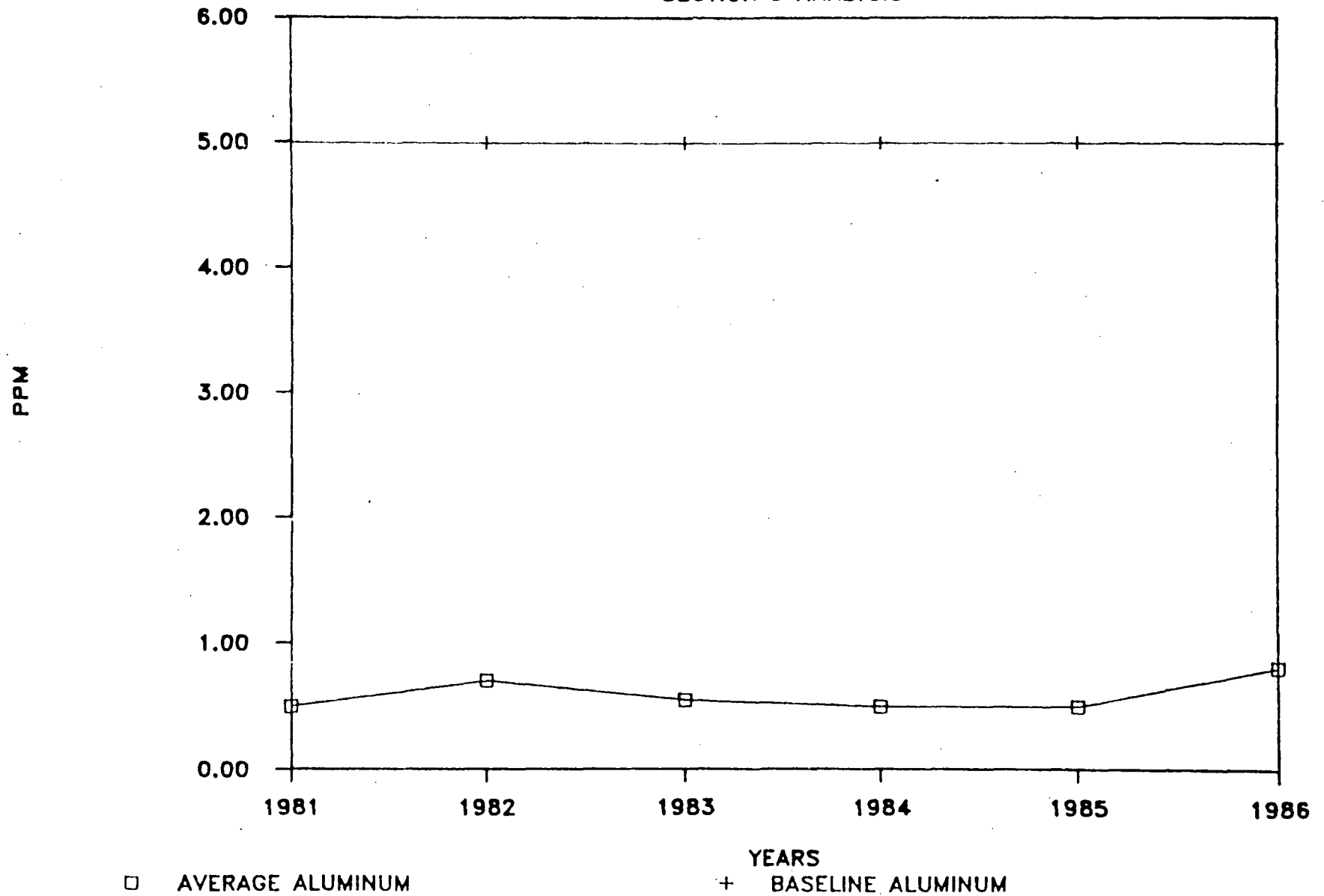
Chemical Constituent	New Mexico Standard mg/liter	Restoration Standard mg/liter	1981 Average of Values	1982 Average of Values	1983 Average of Values	1984 Average of Values	1985 Average of Values	1986 Average of Values
Aluminum, dissolved	5.0	5.0	0.500	0.700	0.550	0.500	0.500	0.808
Arsenic	0.1	0.1	0.086	0.073	0.069	0.057	0.032	0.014
Barium	1.0	1.0	0.227	0.200	0.325	0.262	0.215	0.277
Boron	0.75	0.75	0.191	0.155	0.088	0.108	0.215	0.238
Cadmium	0.01	0.036	0.005	0.005	0.005	0.005	0.007	0.006
Chloride	250.0	250.0	127.273	156.000	372.500	115.5	111.5	54.538
Chromium	0.05	0.074	0.004	0.005	0.005	0.007	0.011	0.005
Cobalt, dissolved	0.05	0.05	0.016	0.020	0.020	0.020	0.026	0.021
Copper, dissolved	1.0	1.0	0.007	0.005	0.005	0.005	0.012	0.008
Cyanide	0.2	0.780	0.005	0.005	0.005	0.005	0.009	<0.005
Fluoride	1.6	1.6	0.336	0.309	0.413	0.500	0.508	<0.5
Iron, dissolved	1.0	5.50	0.130	0.018	0.015	0.065	0.372	0.146
Lead, dissolved	0.05	0.063	0.005	0.022	0.009	0.005	0.006	0.016
Manganese, dissolved	0.2	0.456	0.217	0.053	0.142	0.048	0.096	0.035
Molybdenum, dissolved	1.0	1.0	27.667	9.076	13.250	8.231	4.803	1.118
Mercury, total	0.002	0.002	0.0002	0.0019	0.0001	0.0001	0.0001	0.0003
Nickel, dissolved	0.2	0.2	0.030	0.020	0.070	0.021	0.021	0.022
Nitrate (as N)	10.0	10.0	0.050	0.075	0.050	0.941	0.050	0.556
PH	6 to 9	6 to 9	6.665	8.402	*	8.438	8.446	9.062
Phenols	0.005	0.047	0.005	0.012	0.003	0.002	0.004	0.008
Combined Ra-226 & 228	30.0	97.2	*	30.525	*	22.077	48.677	59.939
Selenium, dissolved	0.05	0.05	0.017	0.149	0.067	0.017	0.032	0.006
Silver, dissolved	0.05	0.05	0.007	0.005	0.005	0.005	0.006	<0.005
Sulfate (as SO ₄)	600.0	600.0	131.091	44.182	46.500	81.538	80.846	47.615
TDS (at 180 C)	1000.0	1000.0	623.182	529.727	785.000	479.231	556.923	356.154
Uranium (as U)	5.0	5.0	*	0.166	0.370	0.590	0.303	0.319
Zinc, dissolved	10.0	10.0	0.014	0.031	0.014	0.027	0.027	0.039

NOTE:

* Data not available.

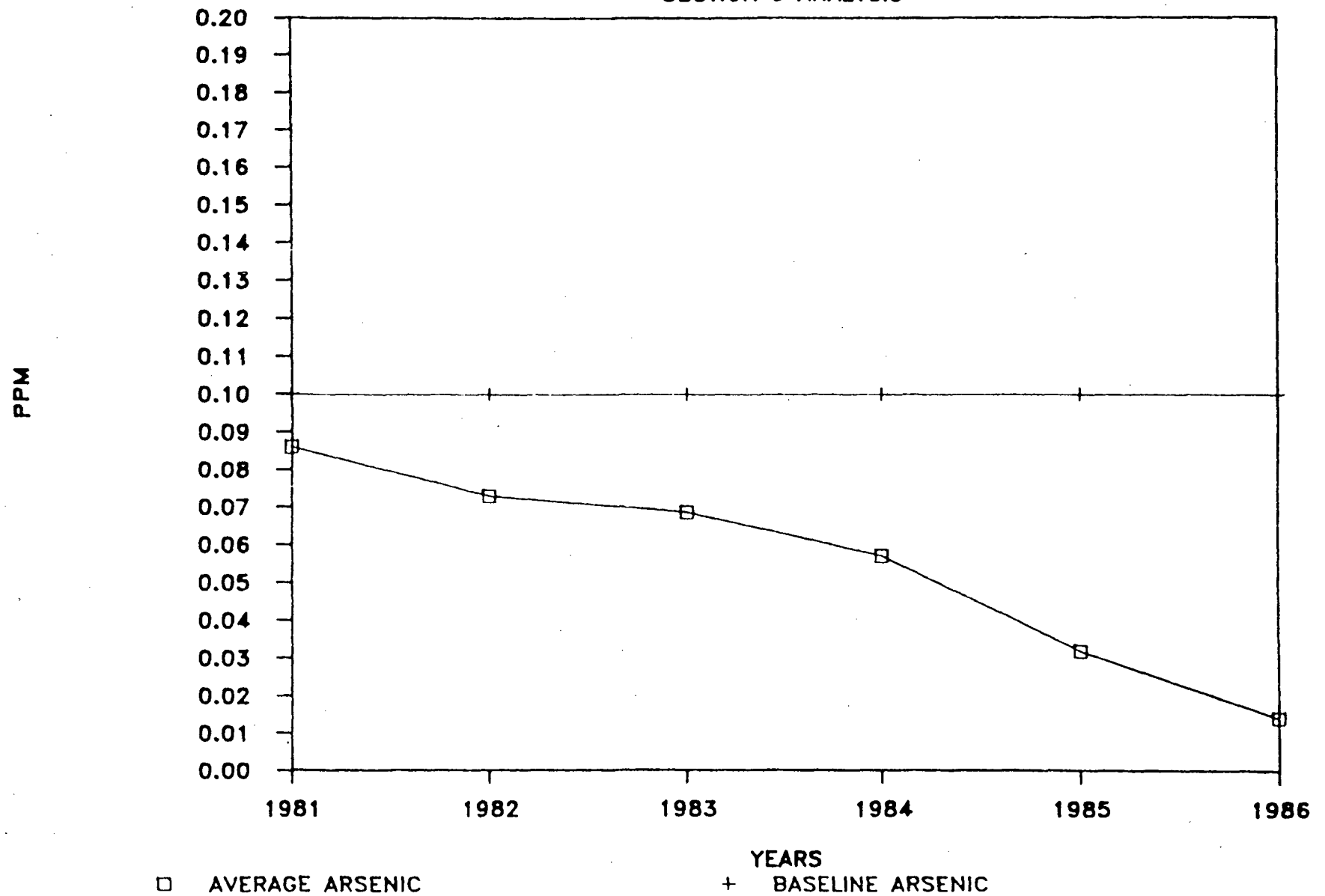
CROWNPOINT NEW MEXICO

SECTION 9 ANALYSIS



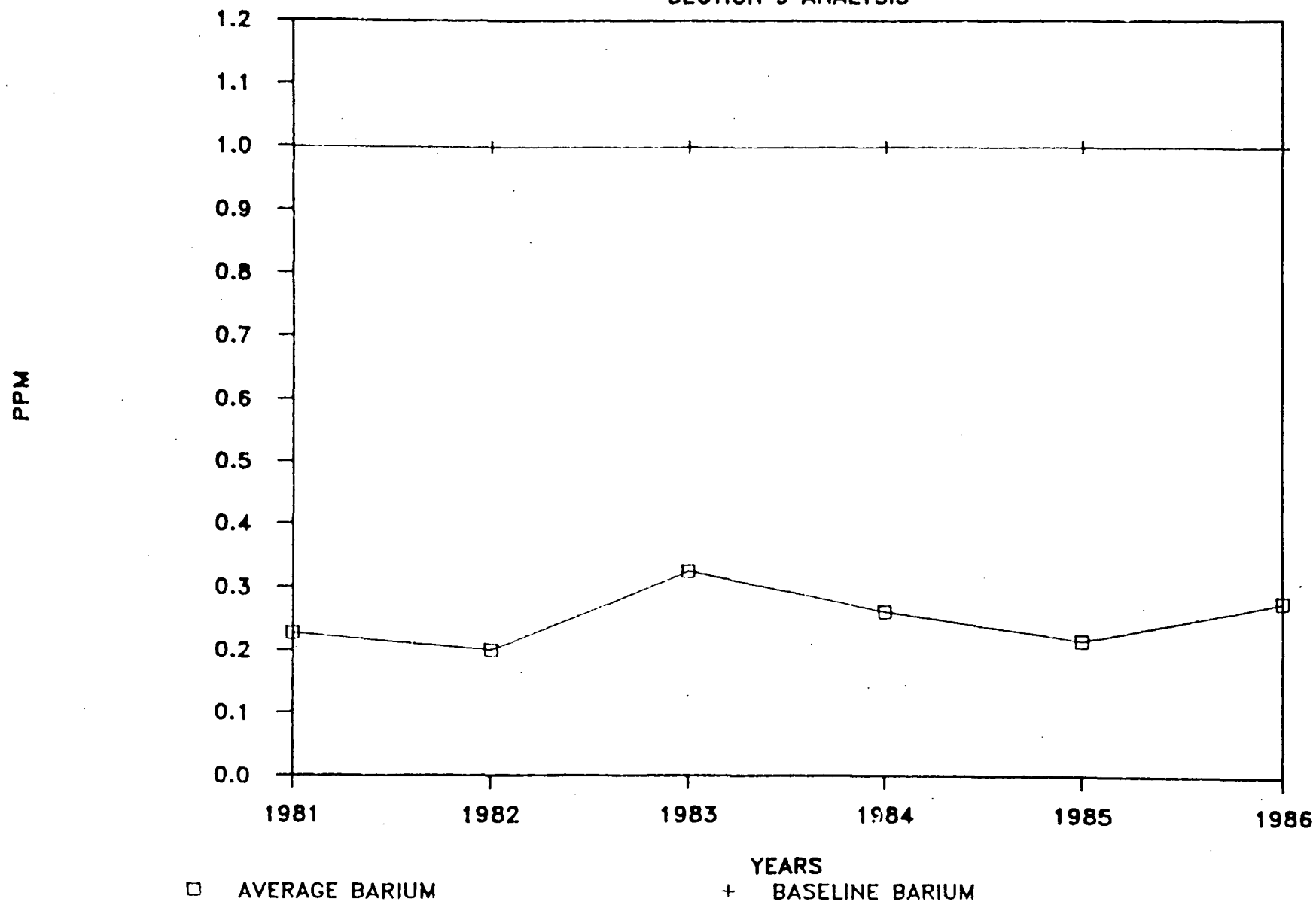
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SECTION 9 ANALYSIS



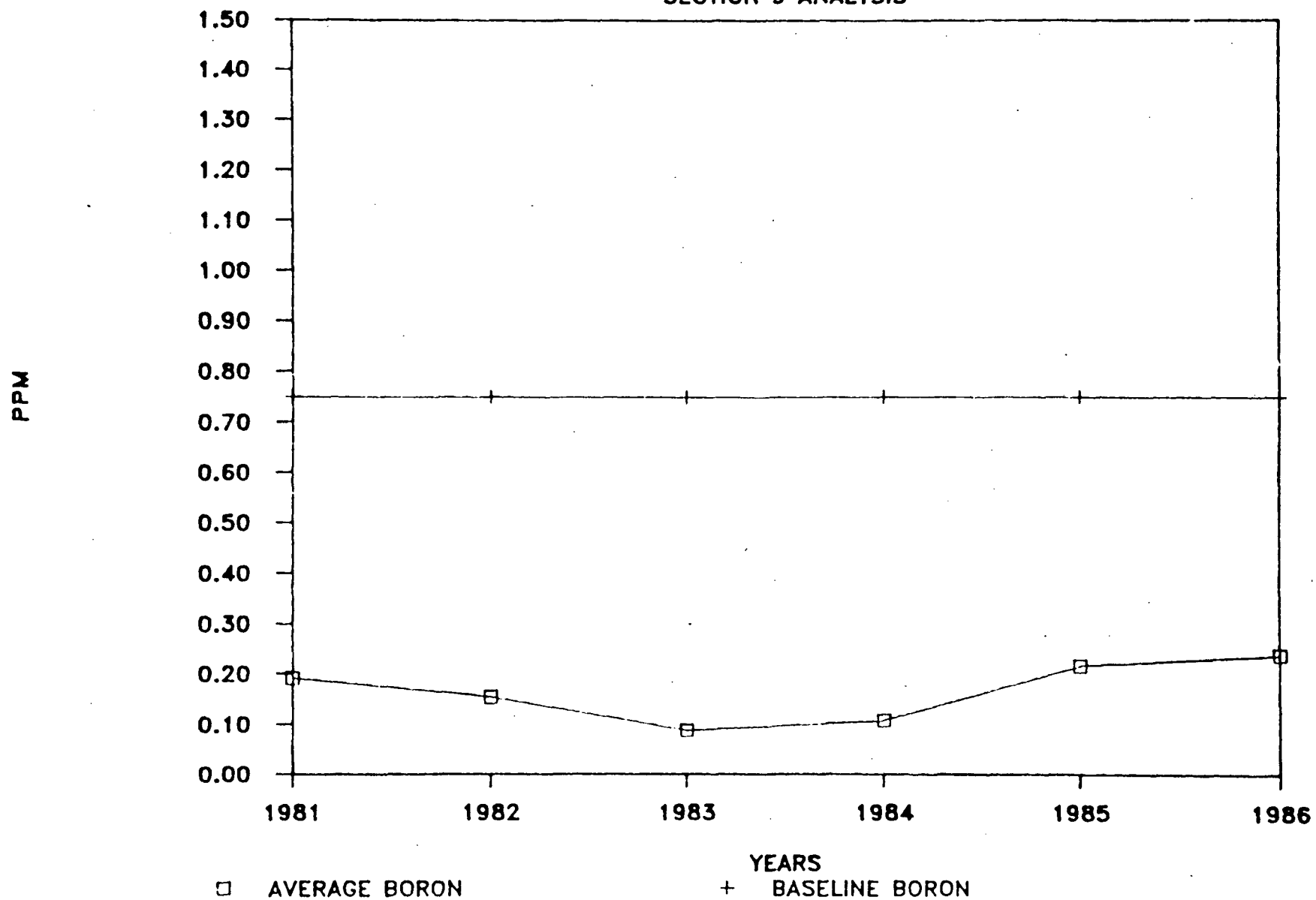
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SECTION 9 ANALYSIS



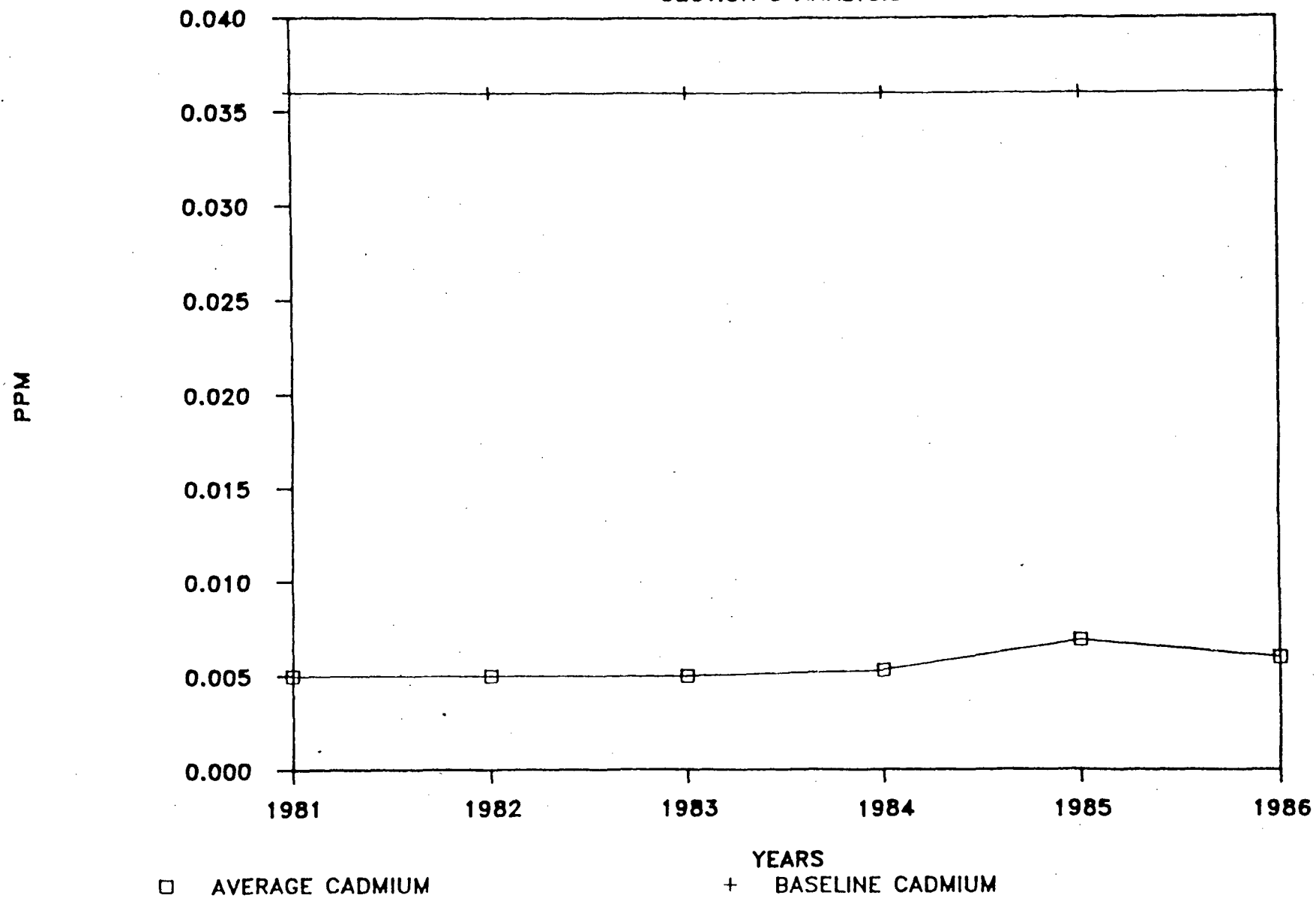
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SECTION 9 ANALYSIS



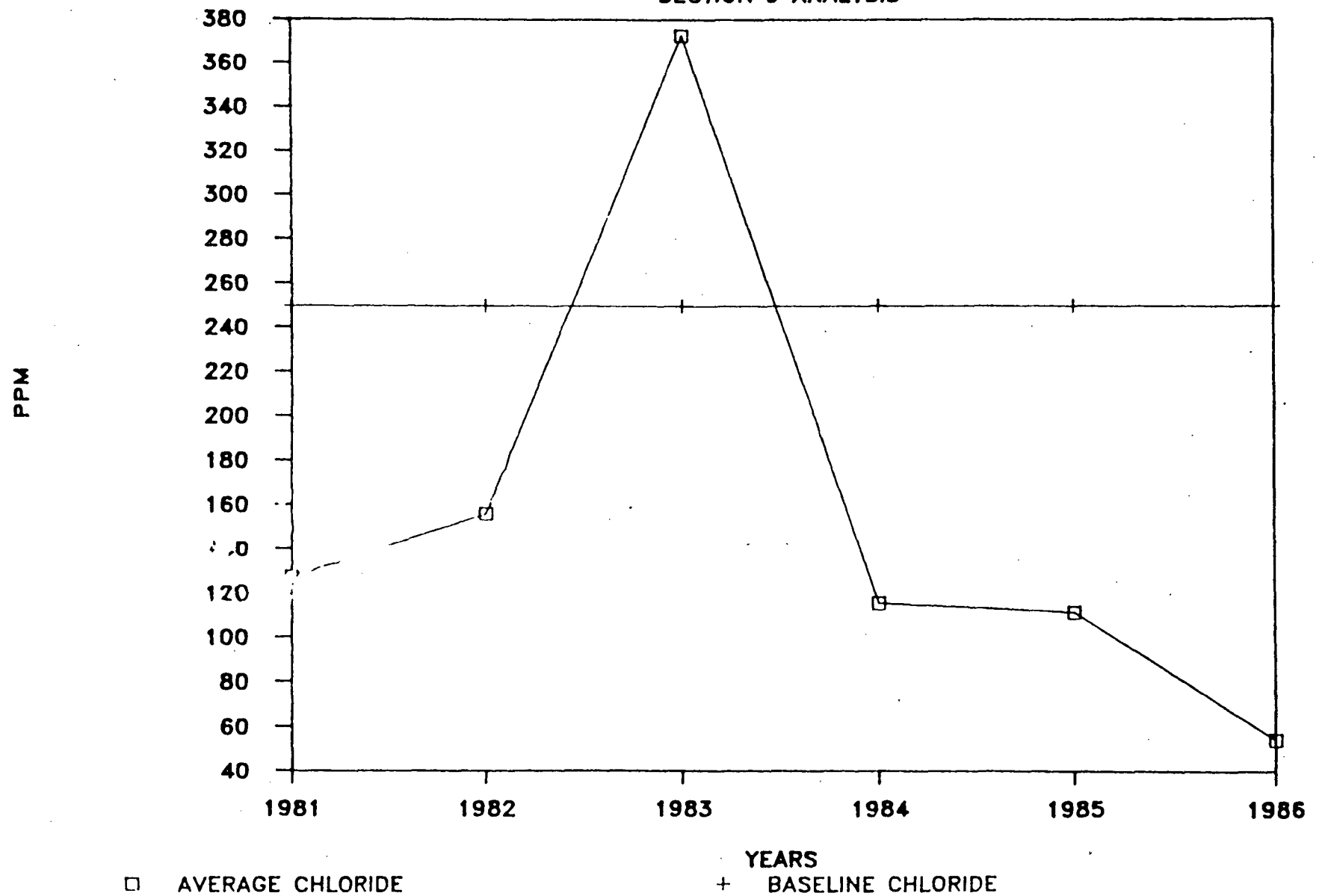
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SECTION 9 ANALYSIS



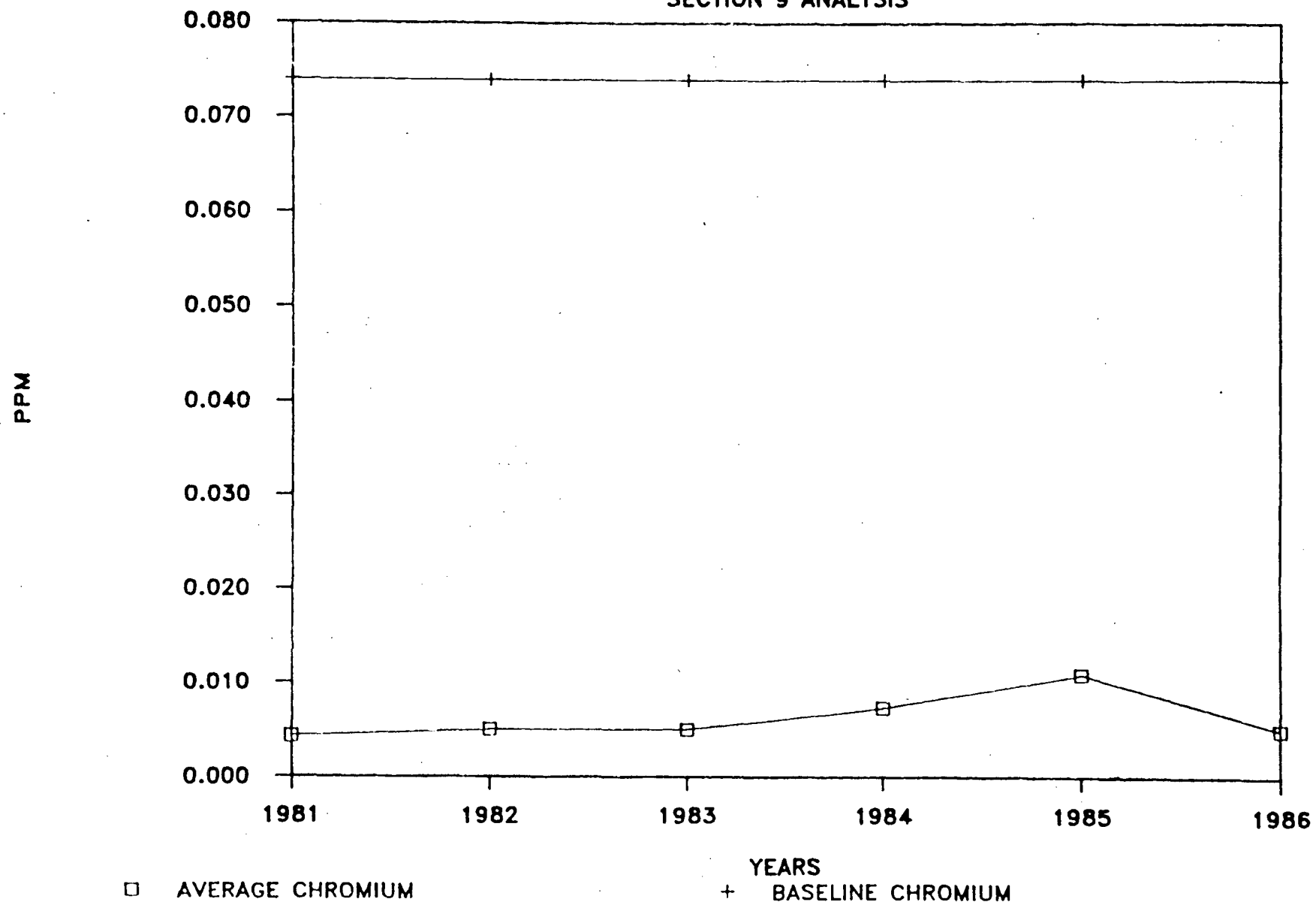
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SECTION 9 ANALYSIS



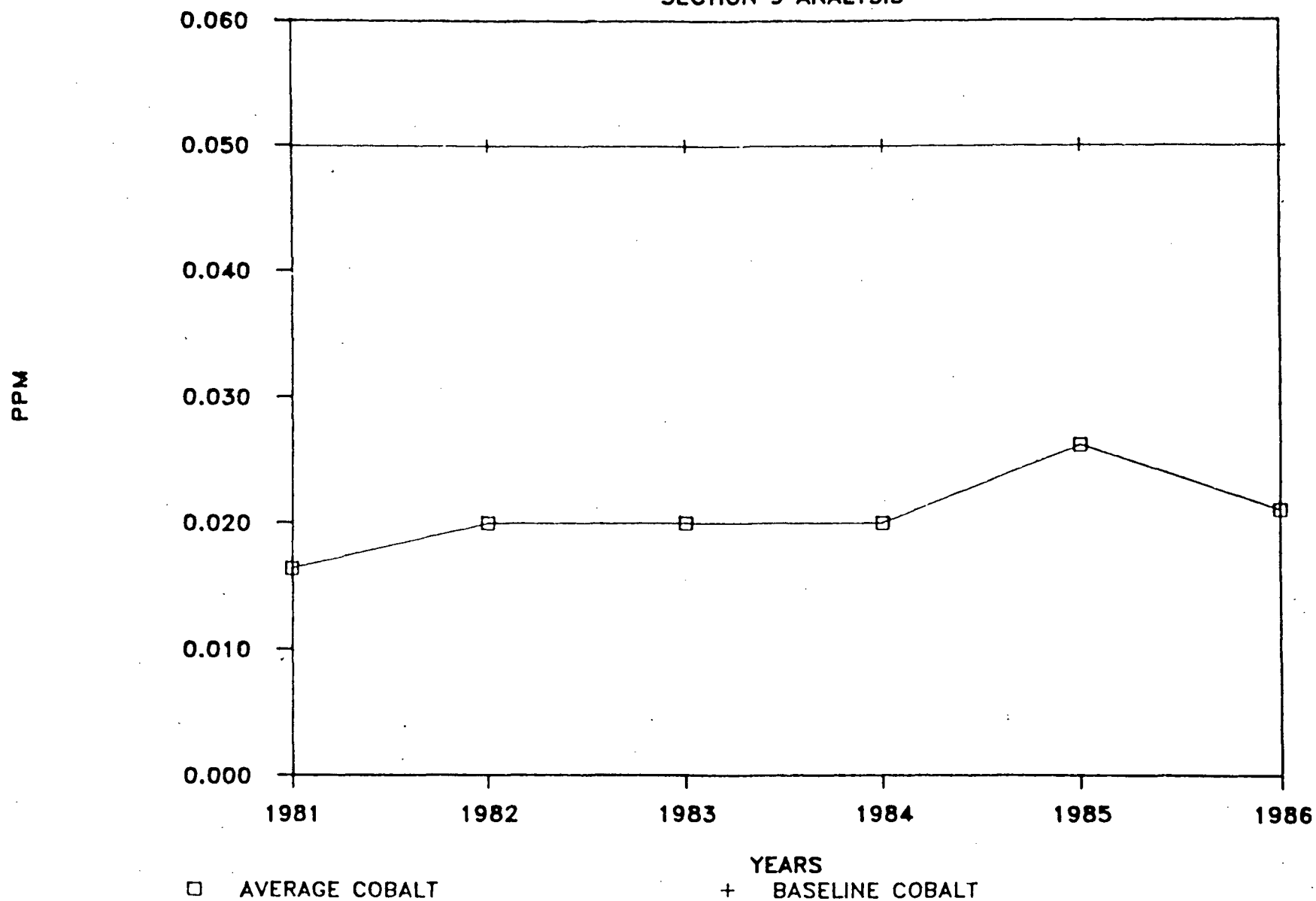
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SECTION 9 ANALYSIS



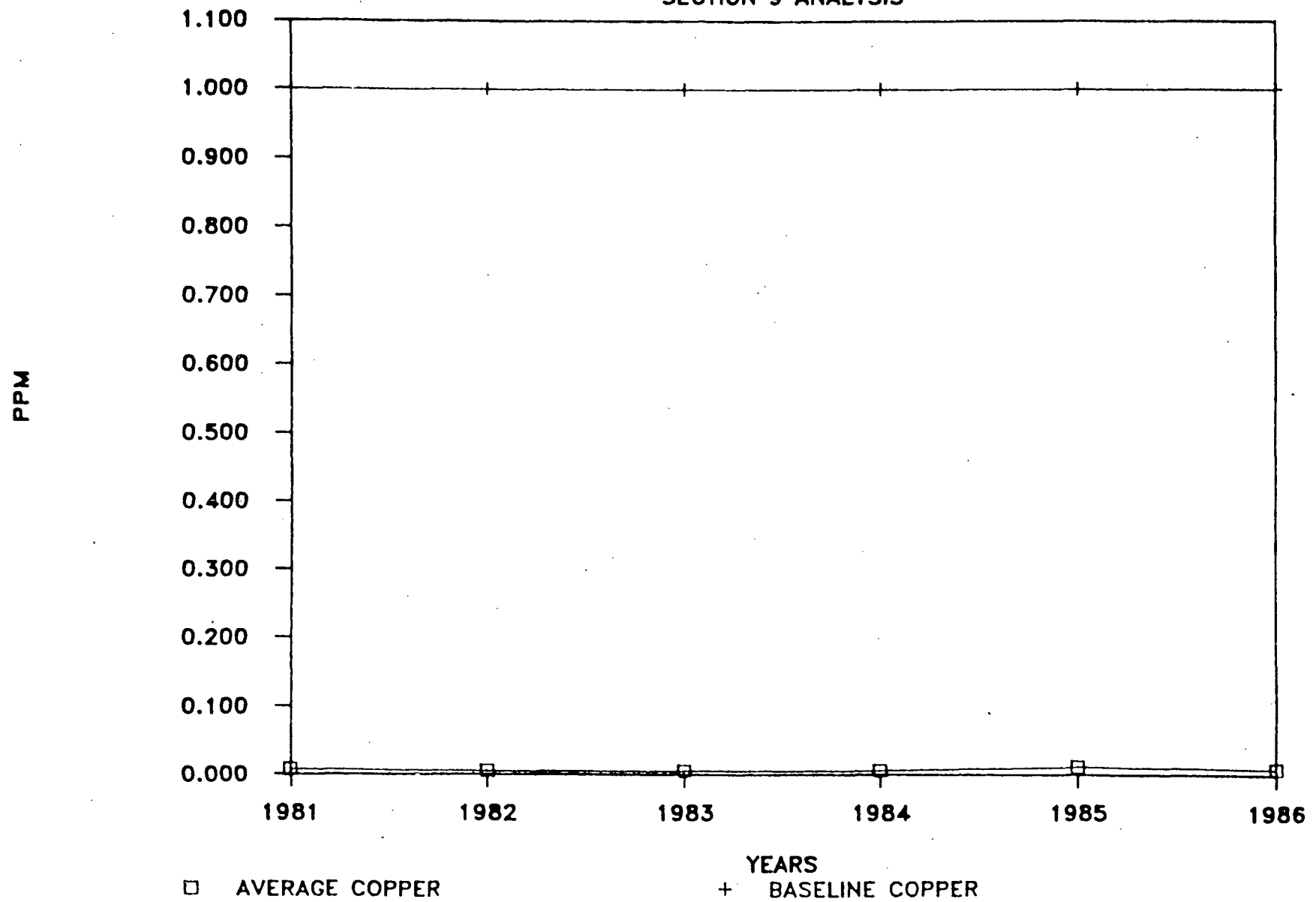
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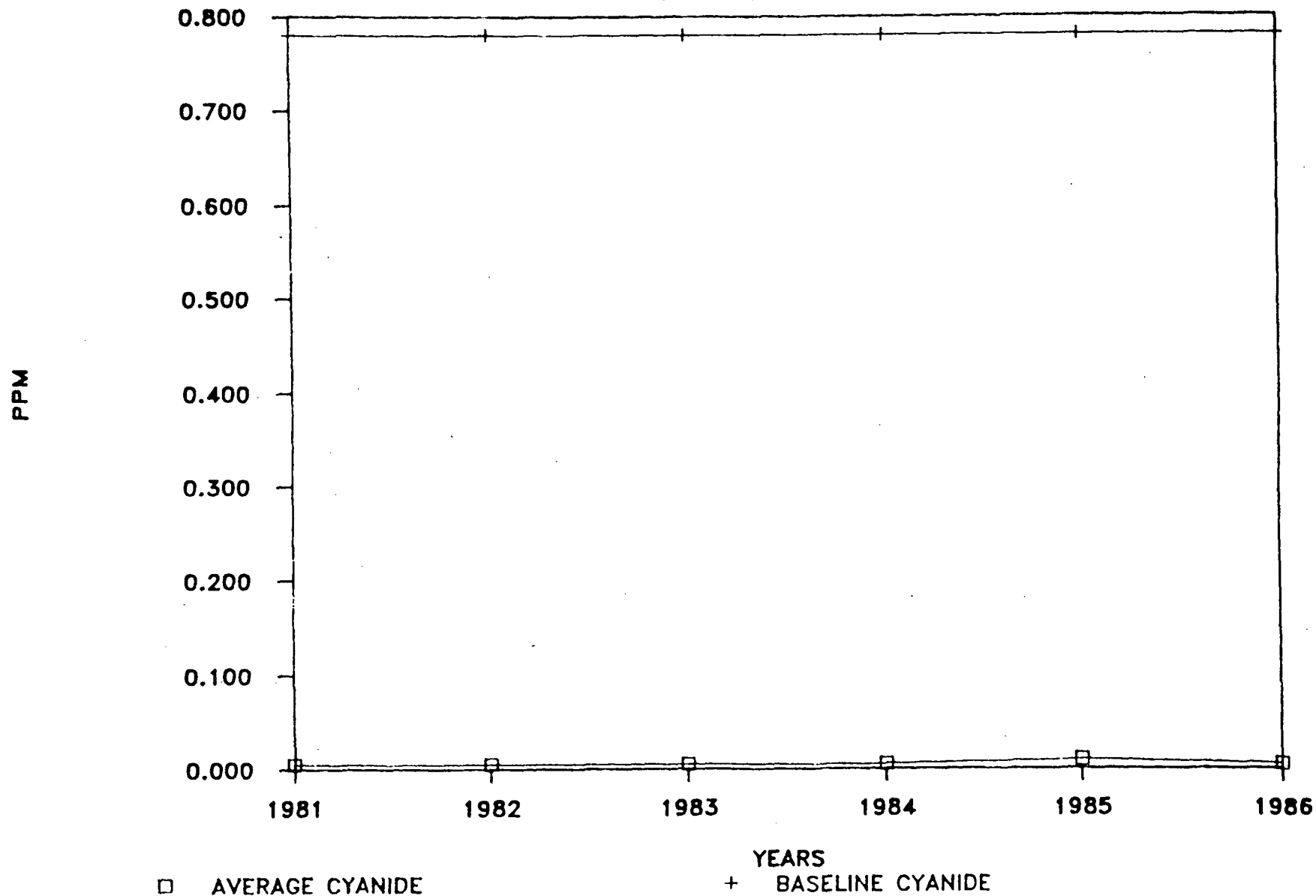
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SECTION 9 ANALYSIS



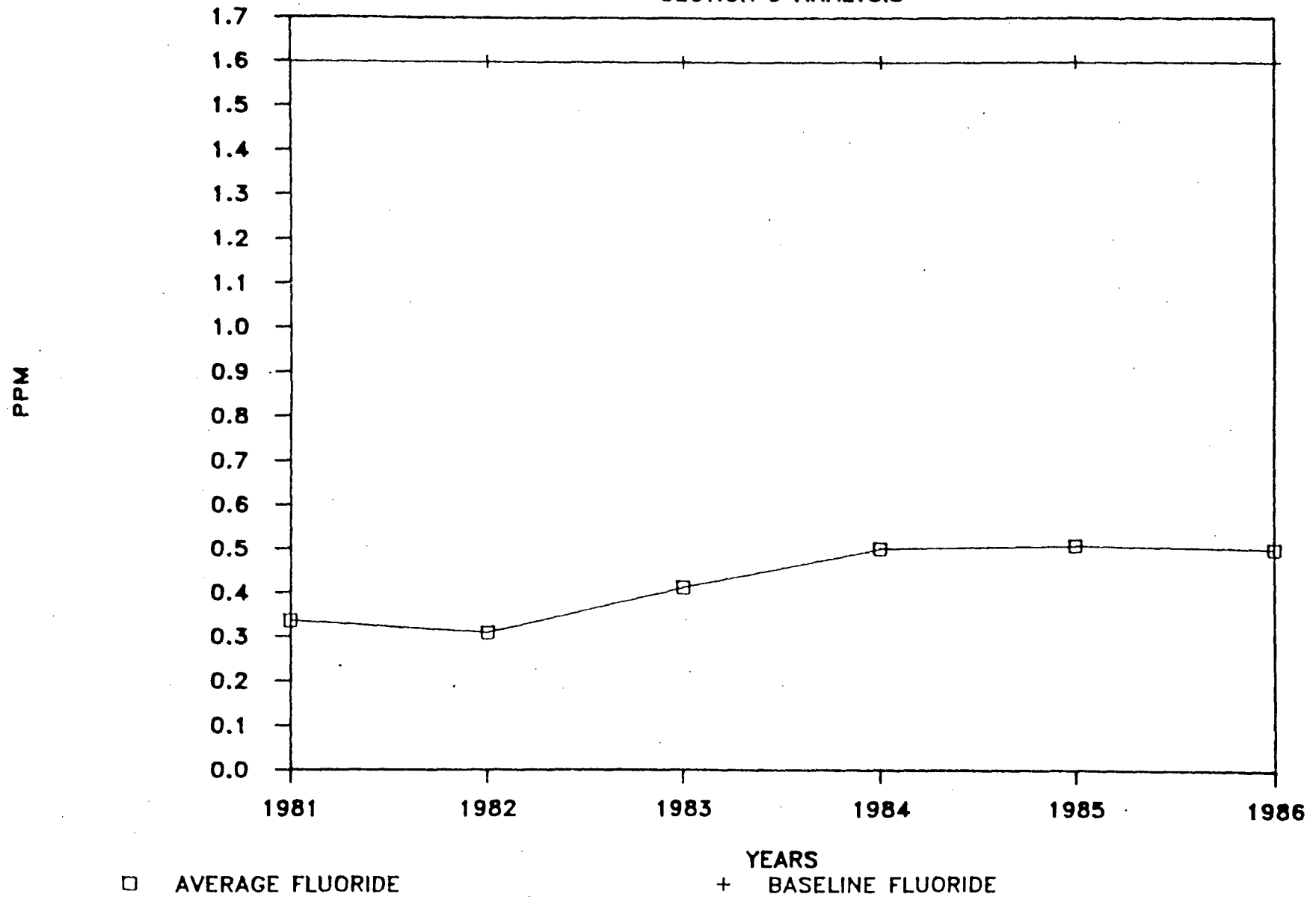
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SECTION 9 ANALYSIS



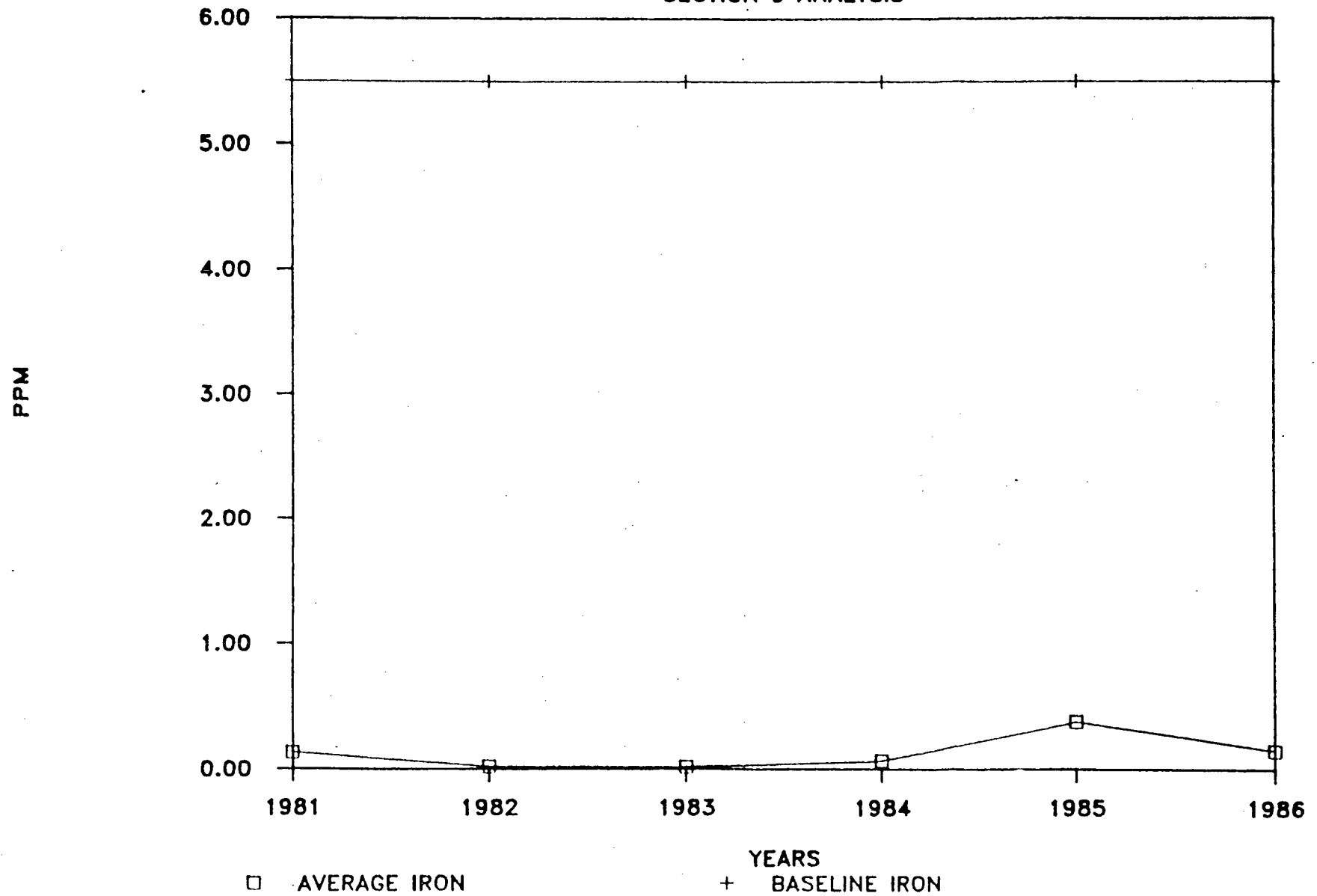
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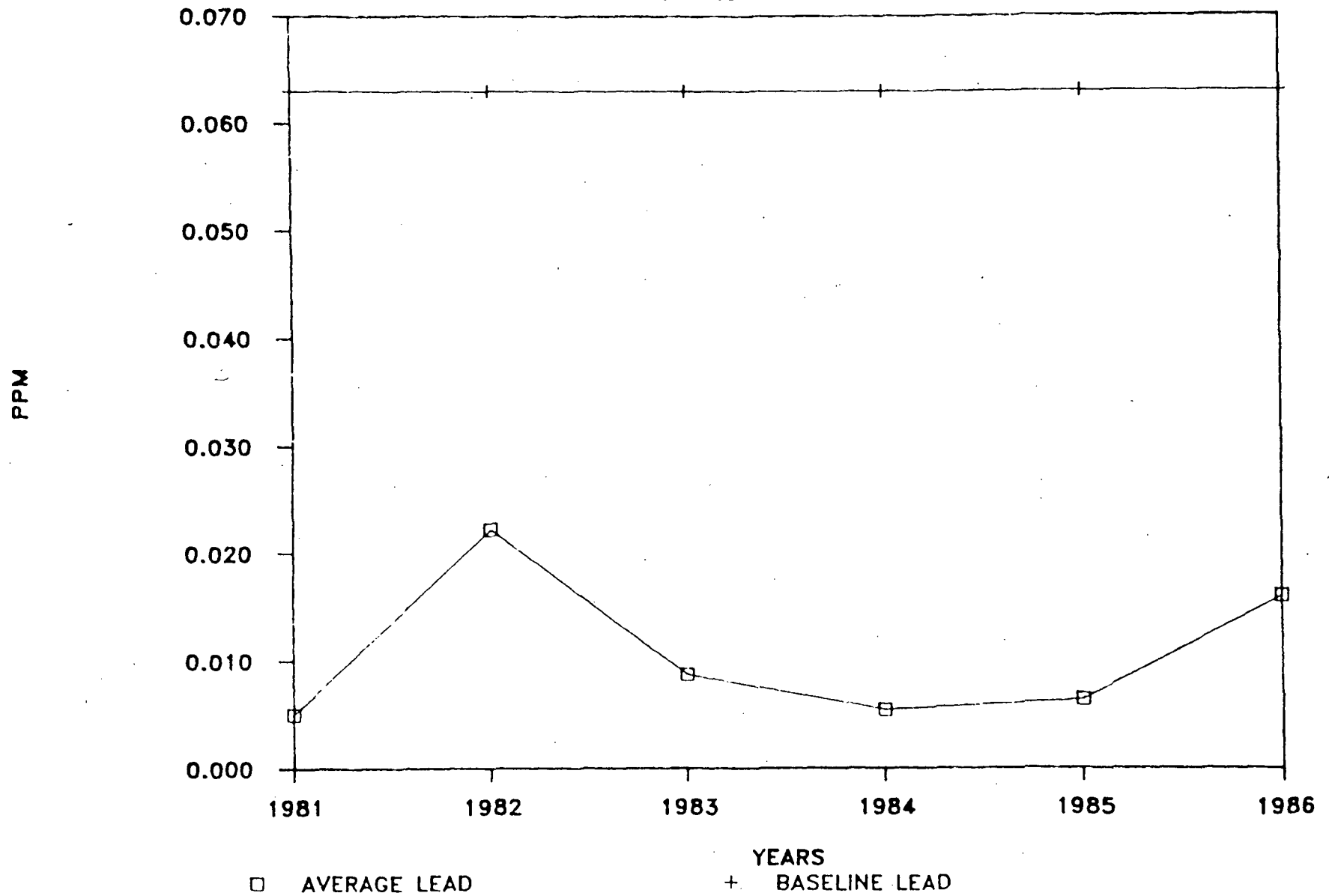
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SECTION 9 ANALYSIS



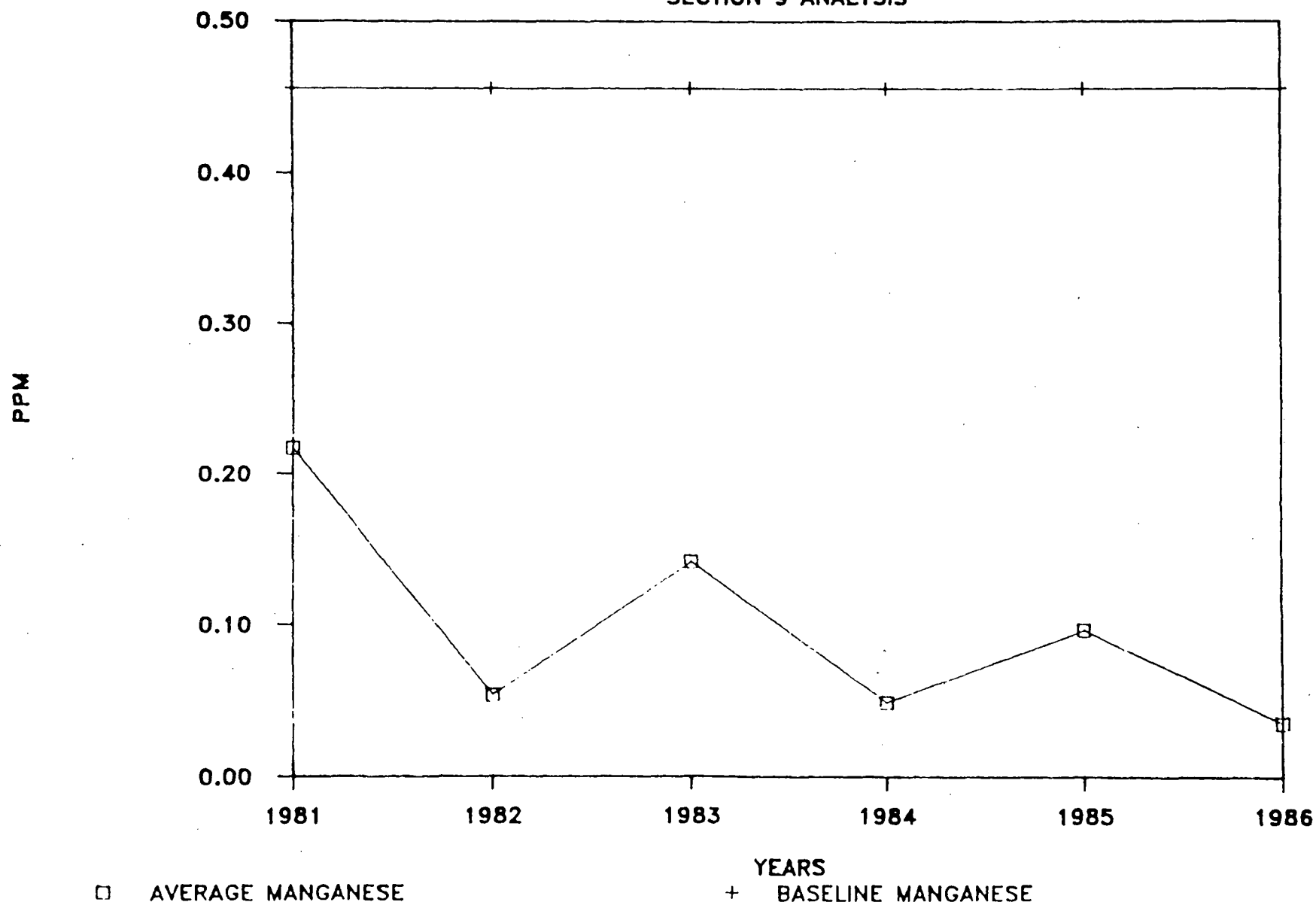
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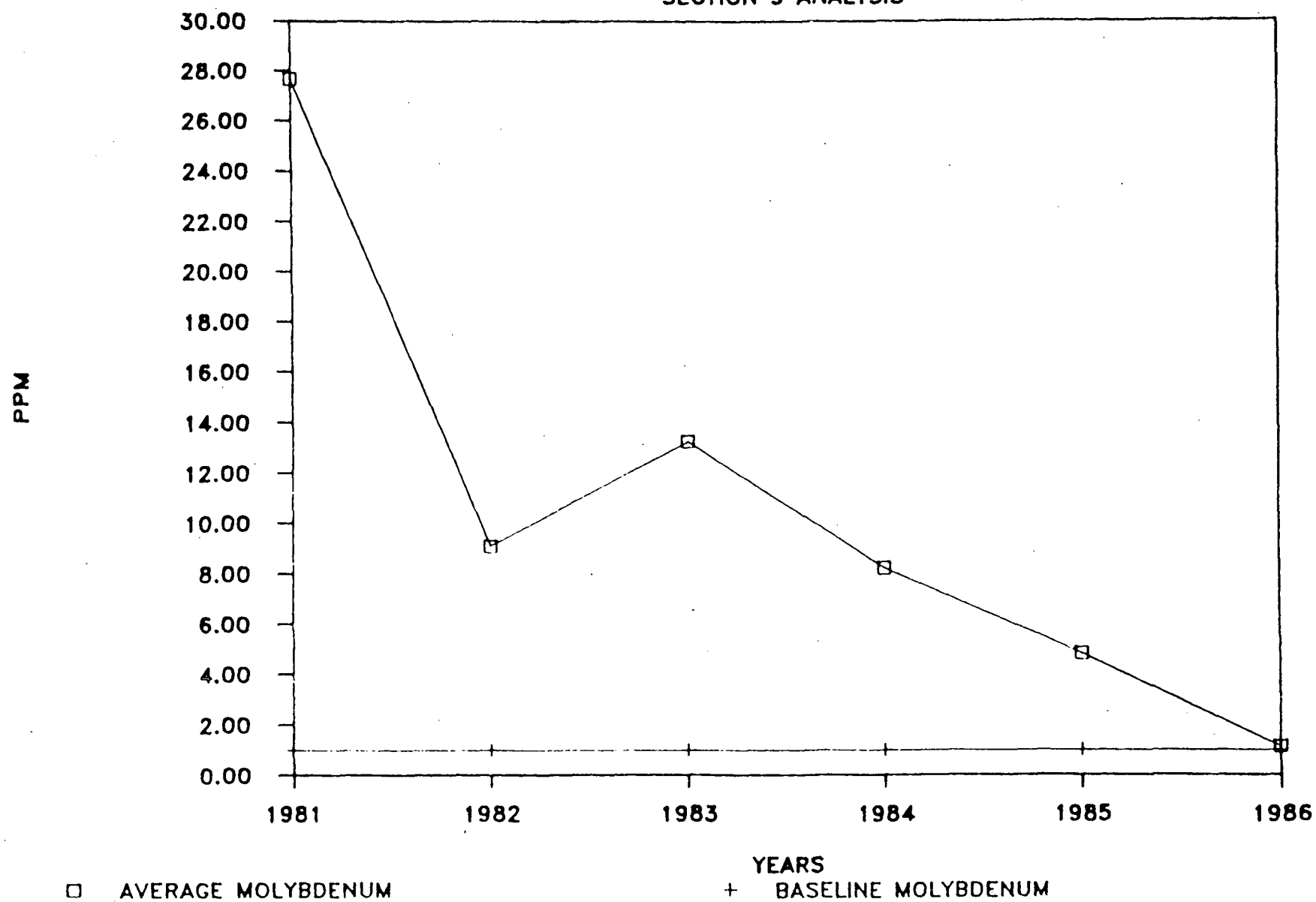
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SECTION 9 ANALYSIS



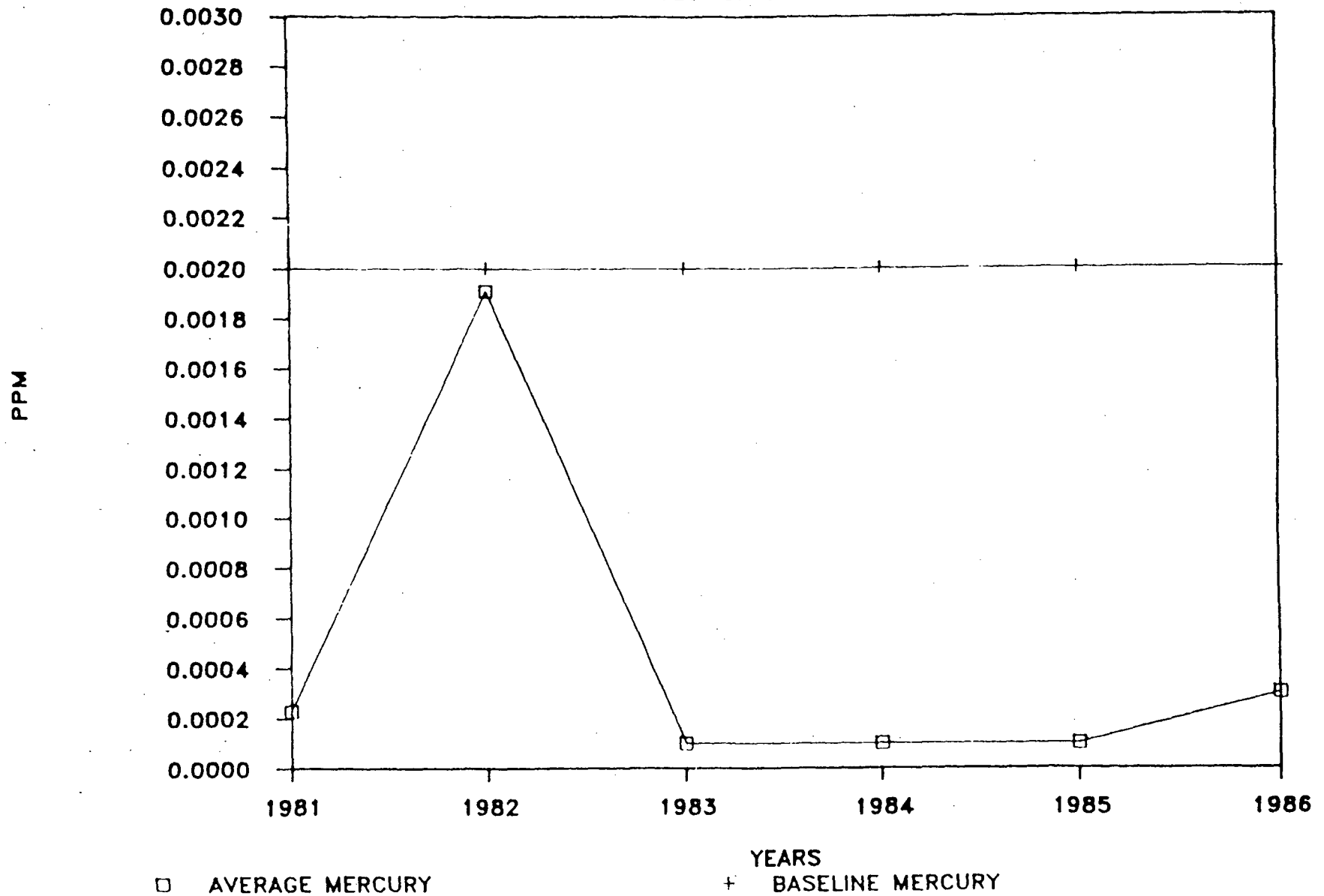
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SECTION 9 ANALYSIS



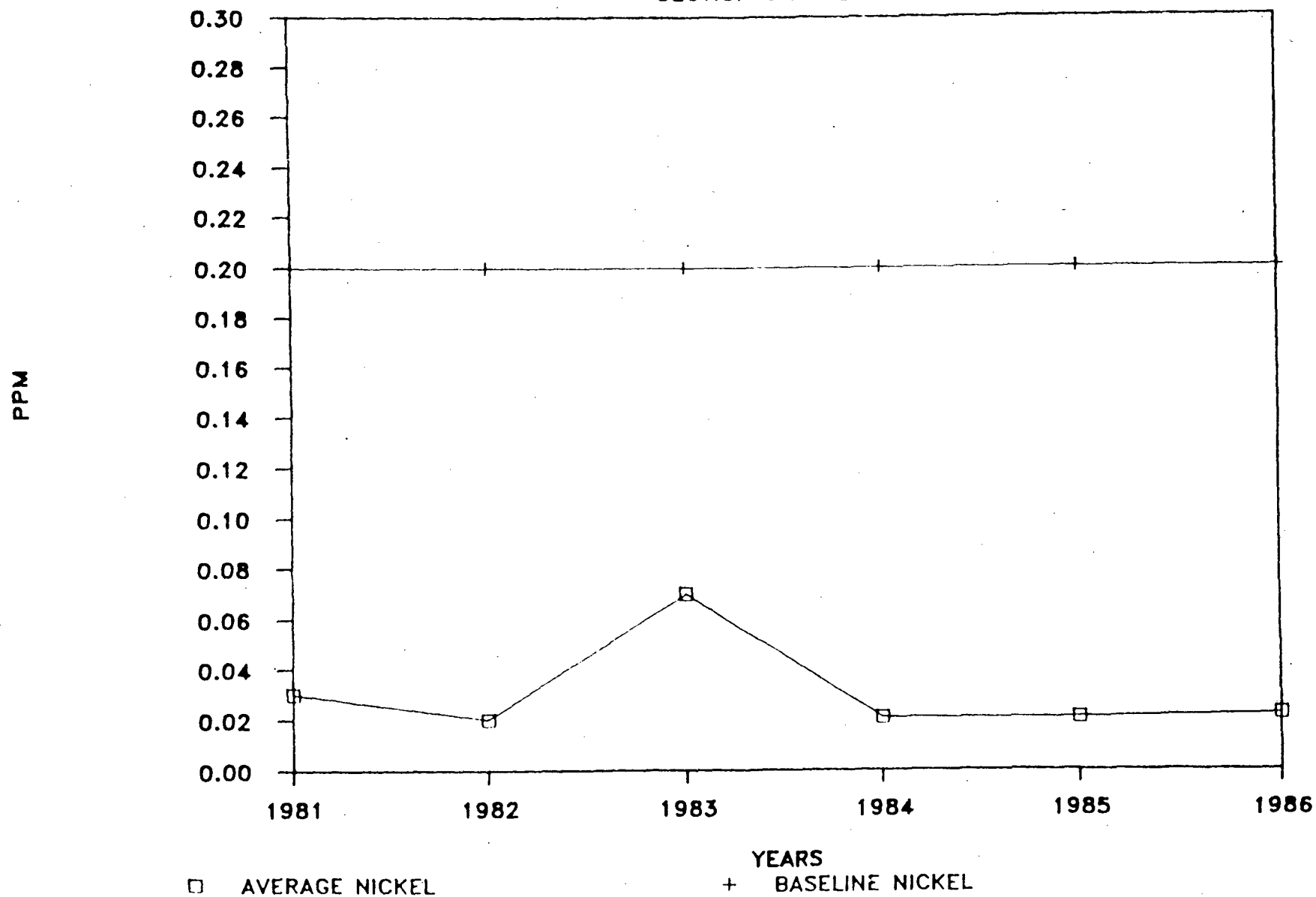
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SECTION 9 ANALYSIS



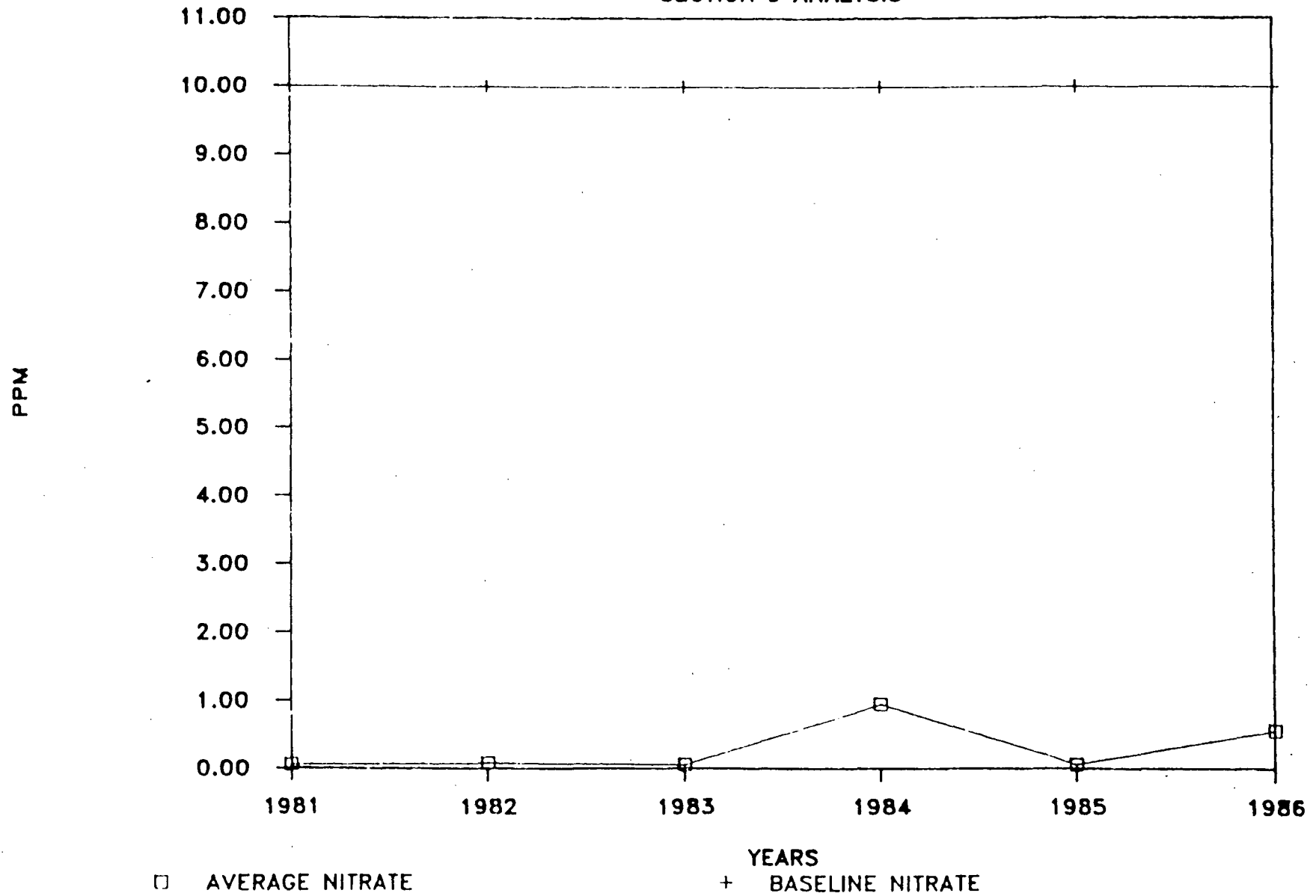
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SECTION 9 ANALYSIS



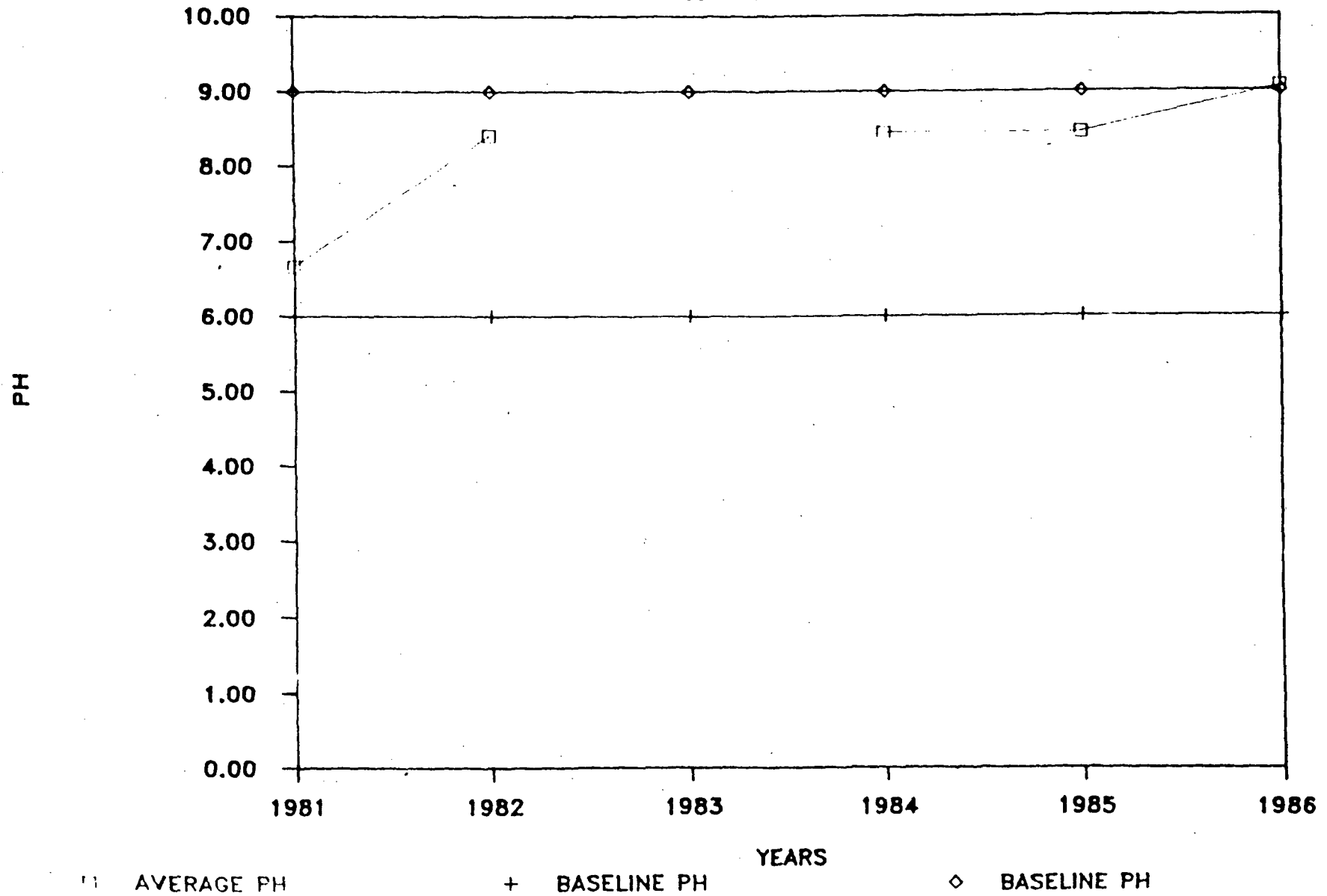
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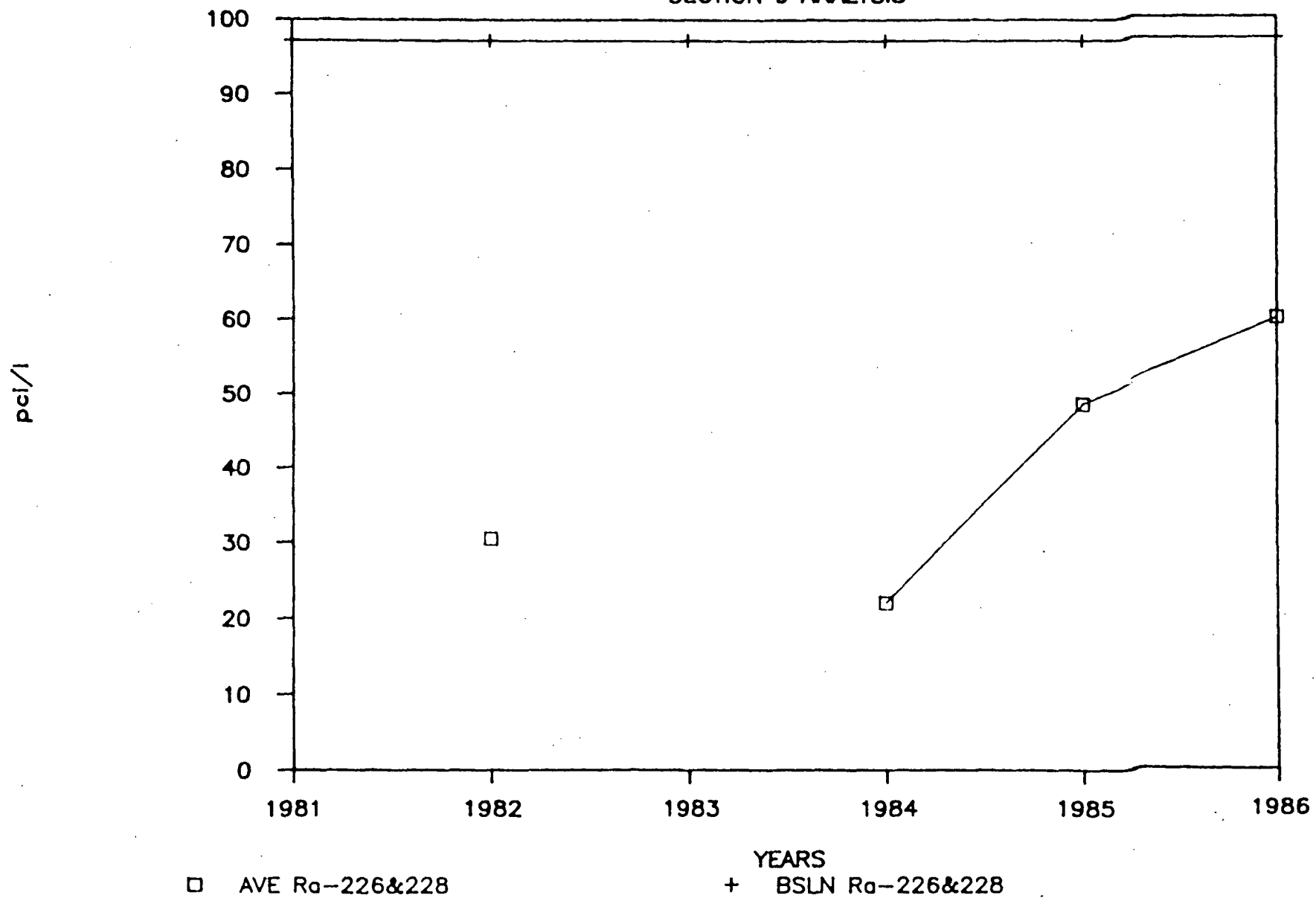
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SECTION 9 ANALYSIS



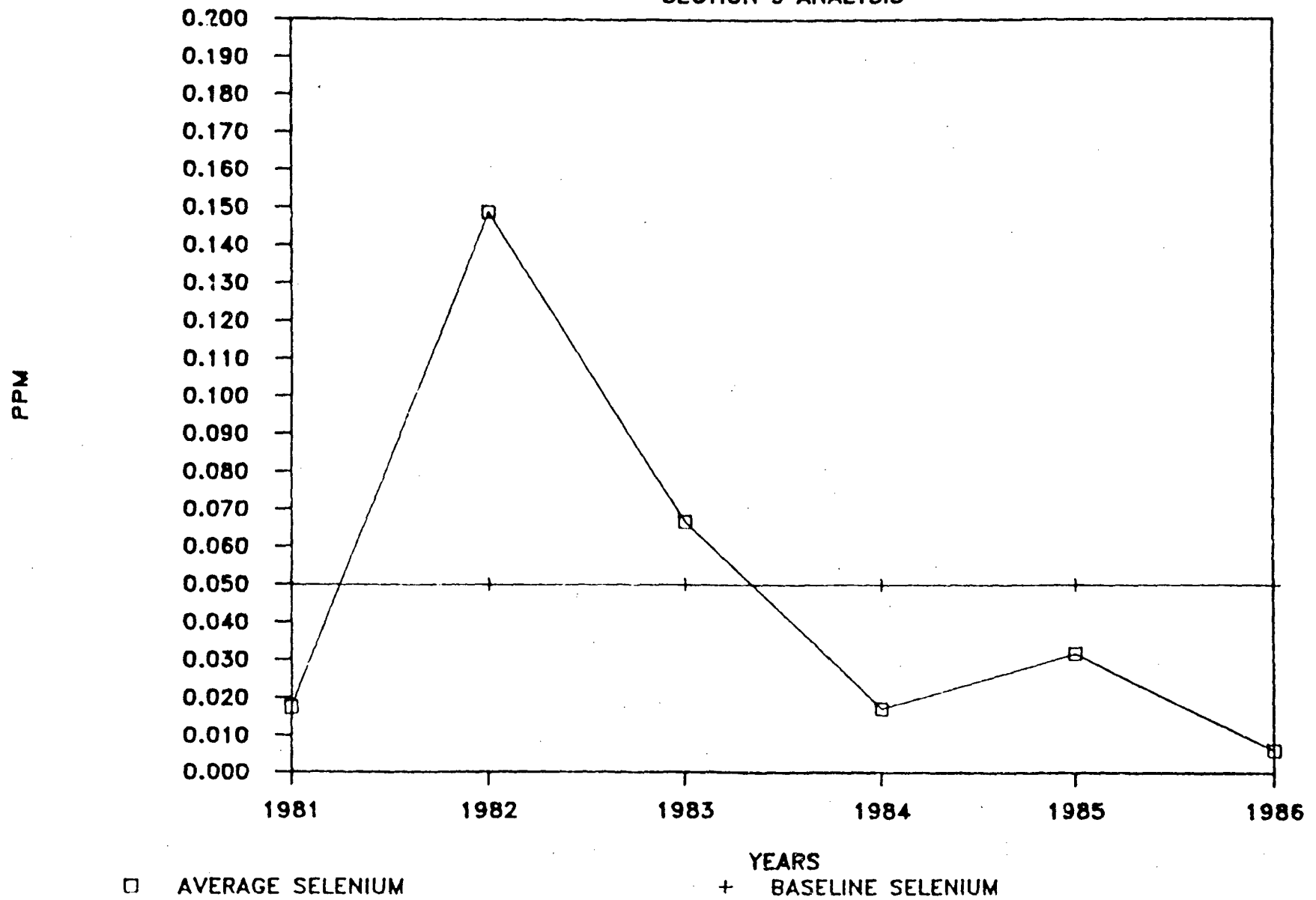
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SECTION 9 ANALYSIS



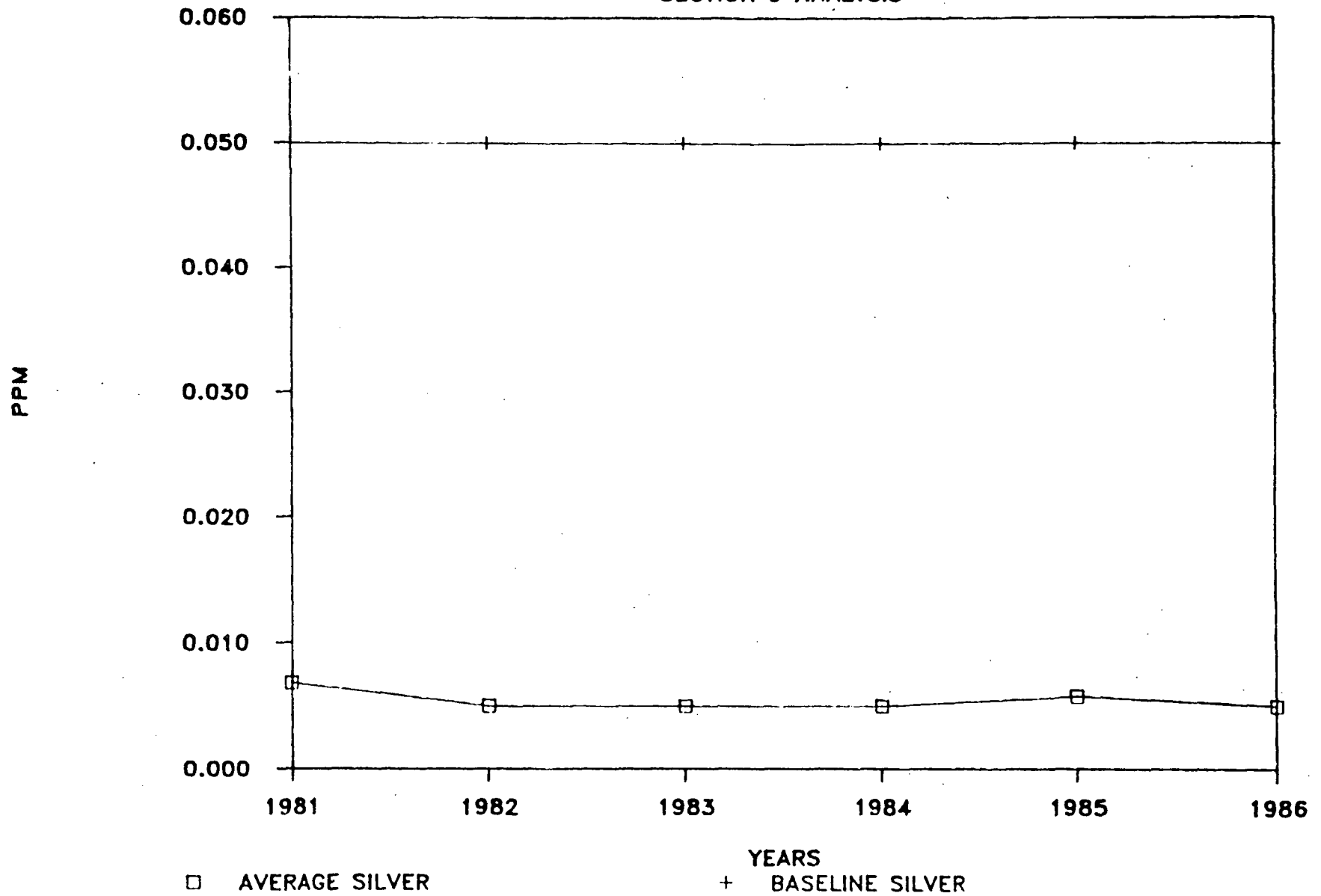
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SECTION 9 ANALYSIS



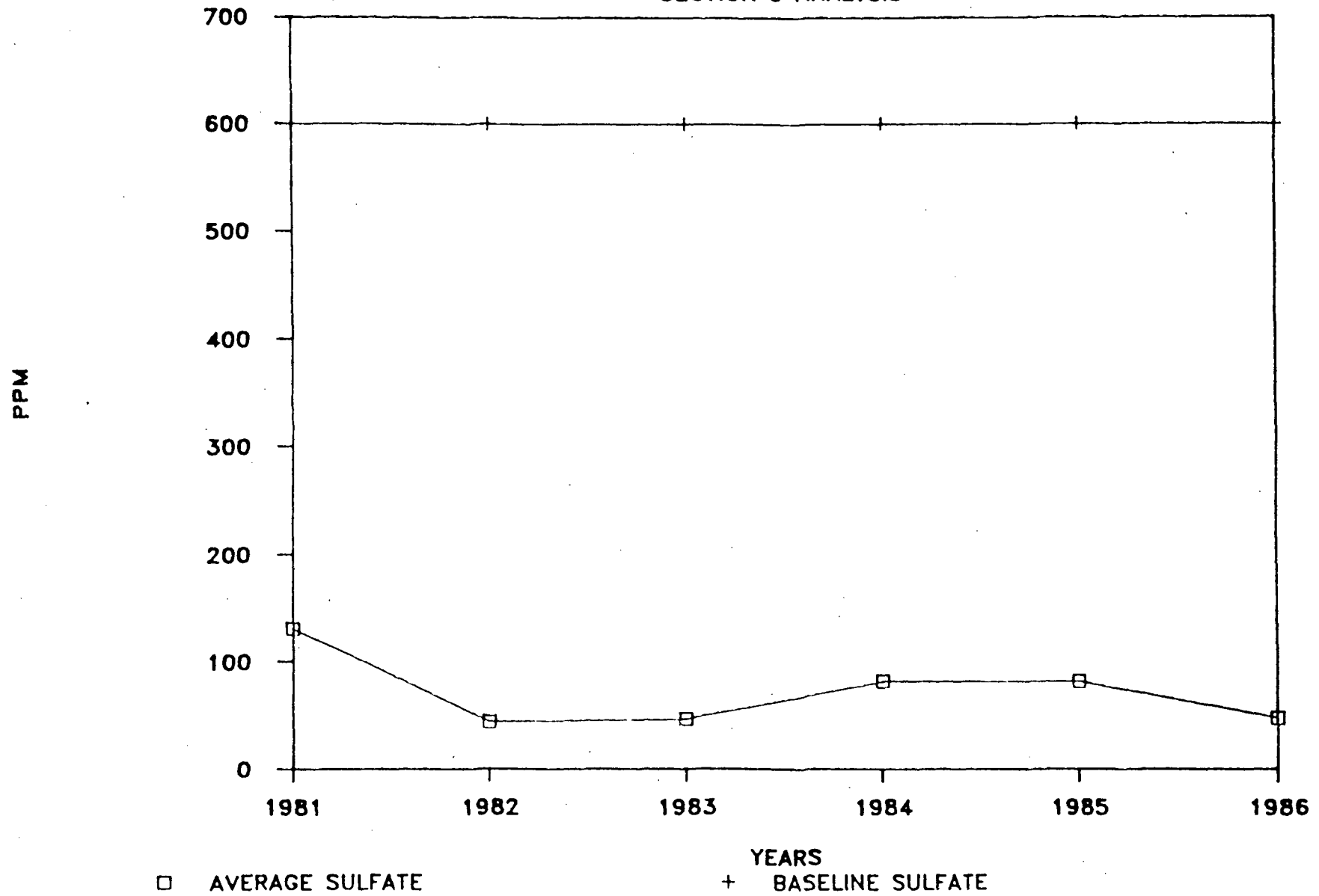
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SECTION 9 ANALYSIS



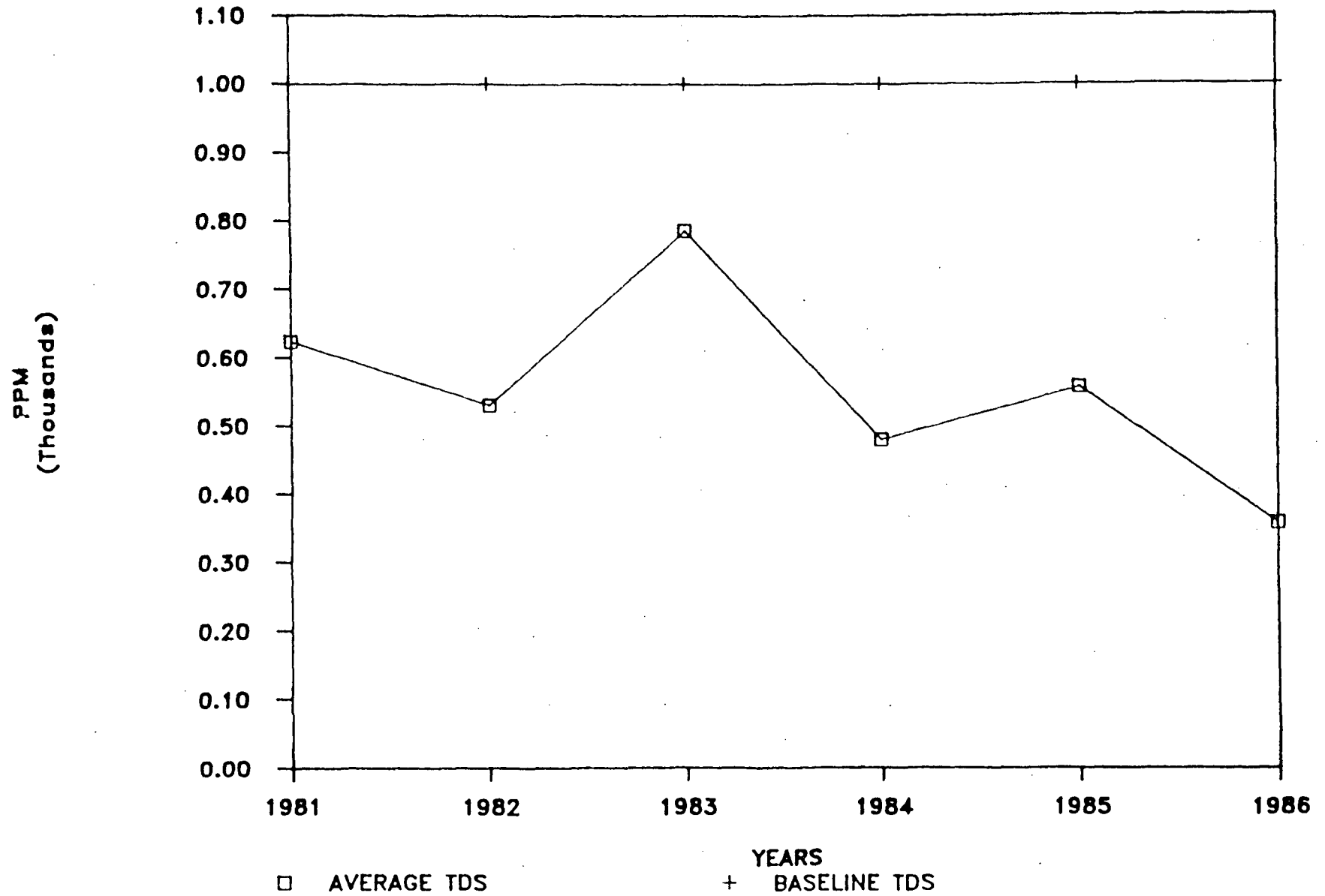
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SECTION 9 ANALYSIS



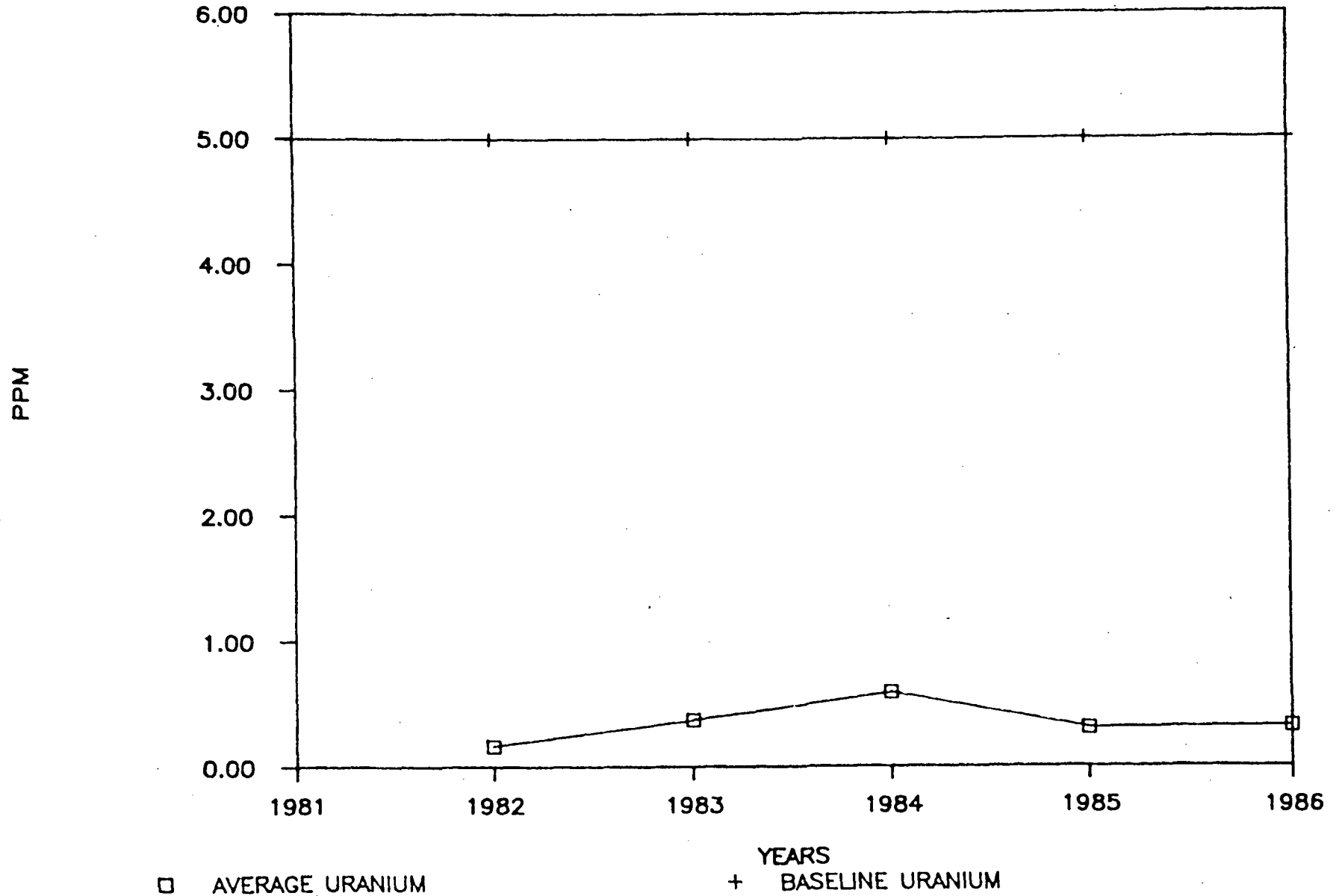
CROWNPOINT NEW MEXICO

SECTION 9 ANALYSIS



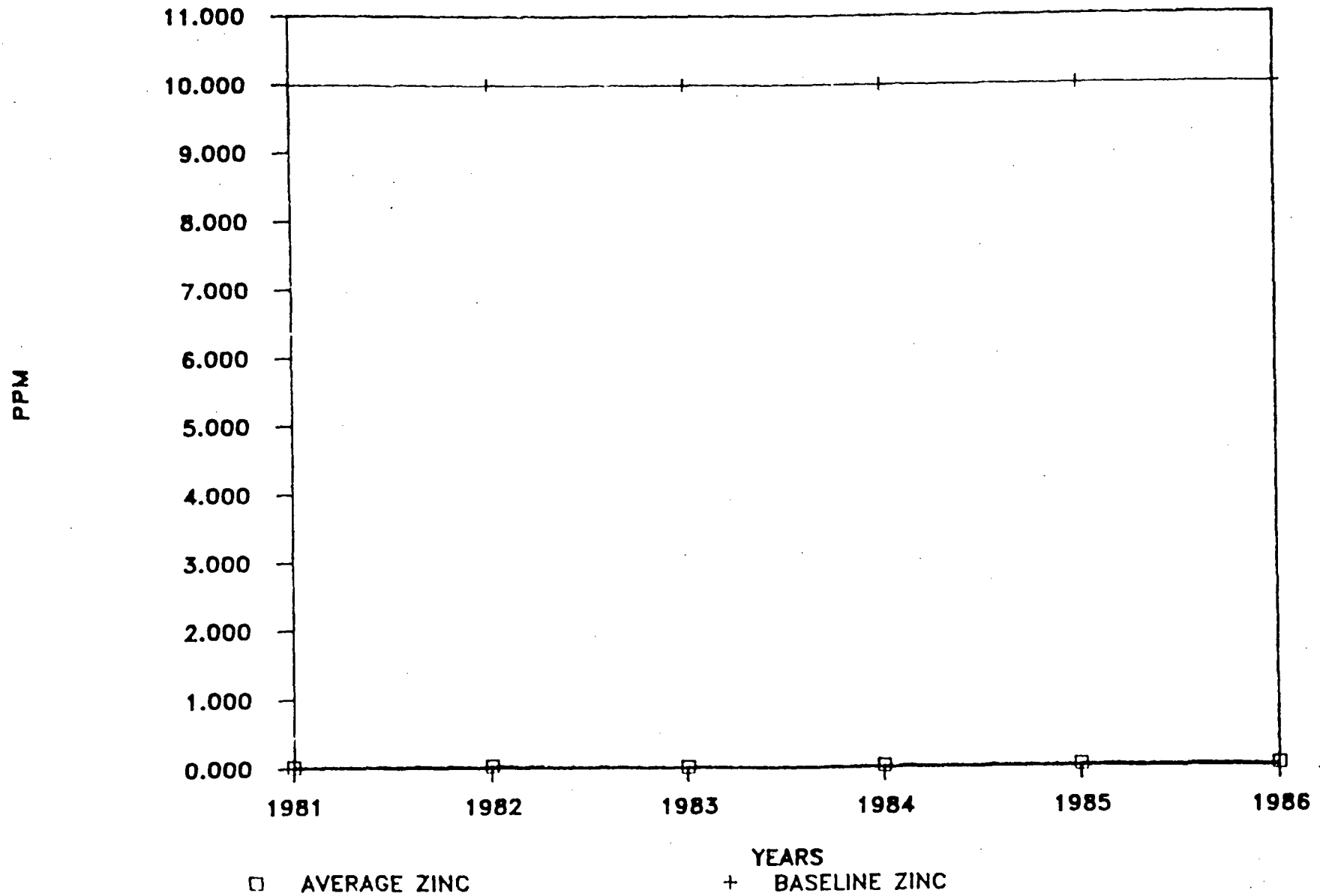
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SECTION 9 ANALYSIS



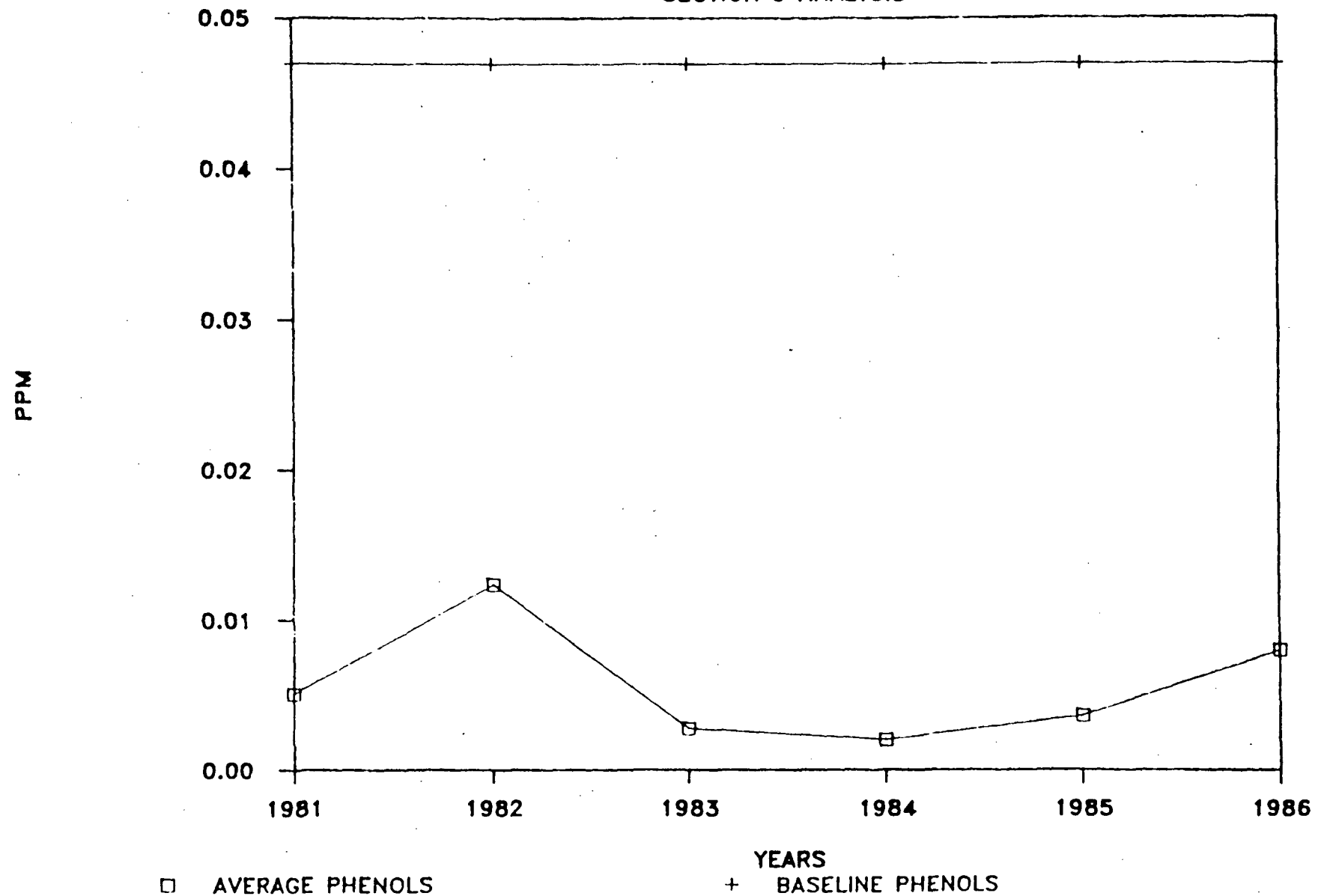
CROWNPOINT NEW MEXICO

SECTION 9 ANALYSIS



CROWNPOINT NEW MEXICO

SECTION 9 ANALYSIS



ATTACHMENT 4

PRODUCTION HISTORY CROWNPOINT SECTION 9 IN-SITU LEACH PILOT PLANT NOVEMBER 6, 1979 TO OCTOBER 1, 1980

The injection of chemicals began on November 6, 1979 and utilized a 2 gram per liter (g/L) NaHCO_3 solution. This was followed on November 9 by injection with 2g/L H_2O_2 and 2g/L NaHCO_3 . The injection rate was 73 gpm and the production rate was 75 gpm. The 2gpm bleed was pumped to a disposal pond. The use of the small bleed conserved water and helped eliminate excursions caused by over injection. These injection and production rates decreased to approximately 55 gpm over the life of the pilot test.

The first chemical break through in a production well was seen on November 15. Uranium break through occurred in a production well on November 16 and the production stream in all four production wells contained uranium by early December.

The production of uranium started slowly, but over 3 months gradually reached 100 ppm. By May 1980 the level of uranium in the production stream exceeded 100 ppm and remained at this level for the rest of the leaching phase of the test.

Molybdenum levels in the production stream reached 100 ppm almost immediately, rapidly escalated to 200 ppm and remained higher than the uranium concentration until May, 1980. Molybdenum concentrations after May remained slightly lower than uranium concentrations for the balance of the leaching phase. Figure 1 shows uranium and molybdenum levels as a function of time throughout the leaching phase of the pilot test.

Uranium in the leachate was removed by an ion exchange unit and the "barren" solution was reinjected into the well field after chemicals were added to regenerate the desired leachate formulation. Figure 2 is a process flow sheet for the in-situ leach plant. Details on the actual processing of uranium bearing leachate can be found in:

Vogt, T.C., Strom, E.T., Venuto, P.B., Winget, J.E., and Scoggins, M.W., "Insitu Leaching of Crownpoint, New Mexico Uranium One Part 6, The Section 9 Pilot Test", Journal of Petroleum Technology, December 1984, pp 2243-2254.

During the early portion of the leaching phase, uranium loading on the ion exchange (IX) resins was poor. The resin beads appeared to be loaded with as much molybdenum as uranium. Eventually a process was evolved to strip molybdenum from the IX resin selectively and remove it from the circuit. As molybdenum was gradually removed from the production stream, uranium loading on the IX beads improved.

The leaching phase of the Pilot Test continued until October 1, 1980, at which time the introduction of chemicals to the leachate ceased. It was

estimated that approximately 15% of the uranium in the pilot area was recovered during the leaching phase.

FIGURE 1

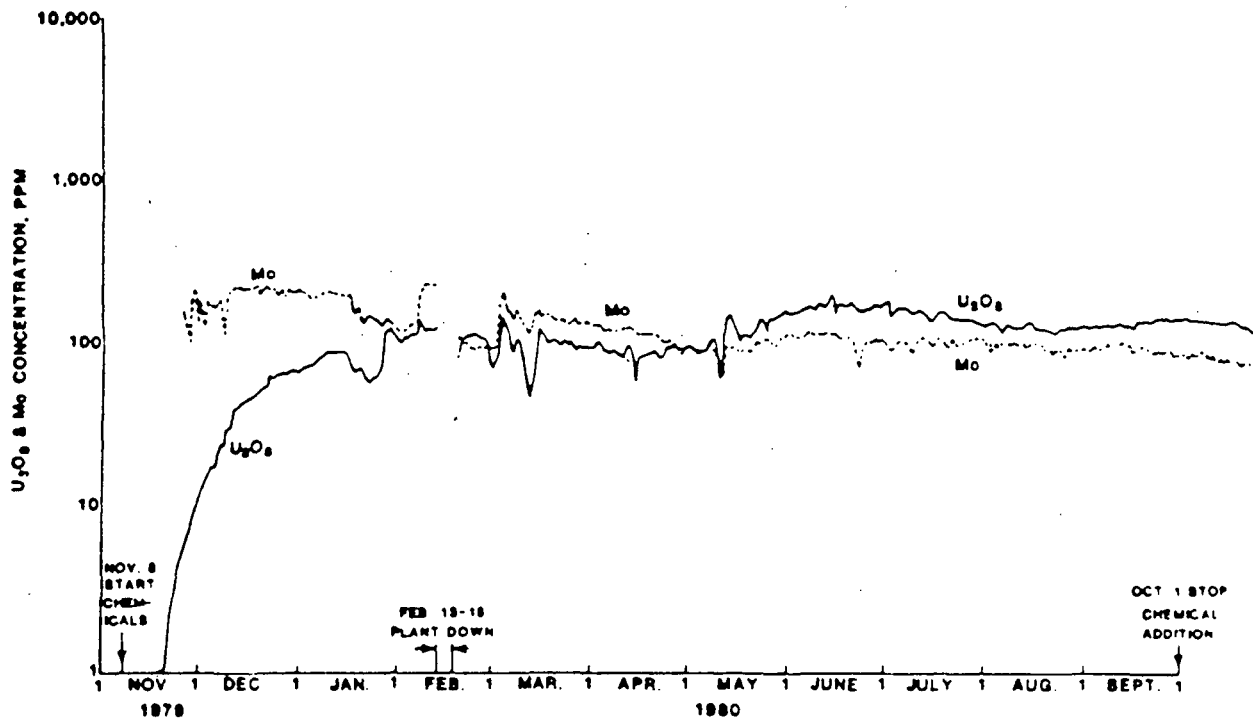


Fig. 7—Uranium and molybdenum levels in the production stream at the Crownpoint Section 9 pilot test

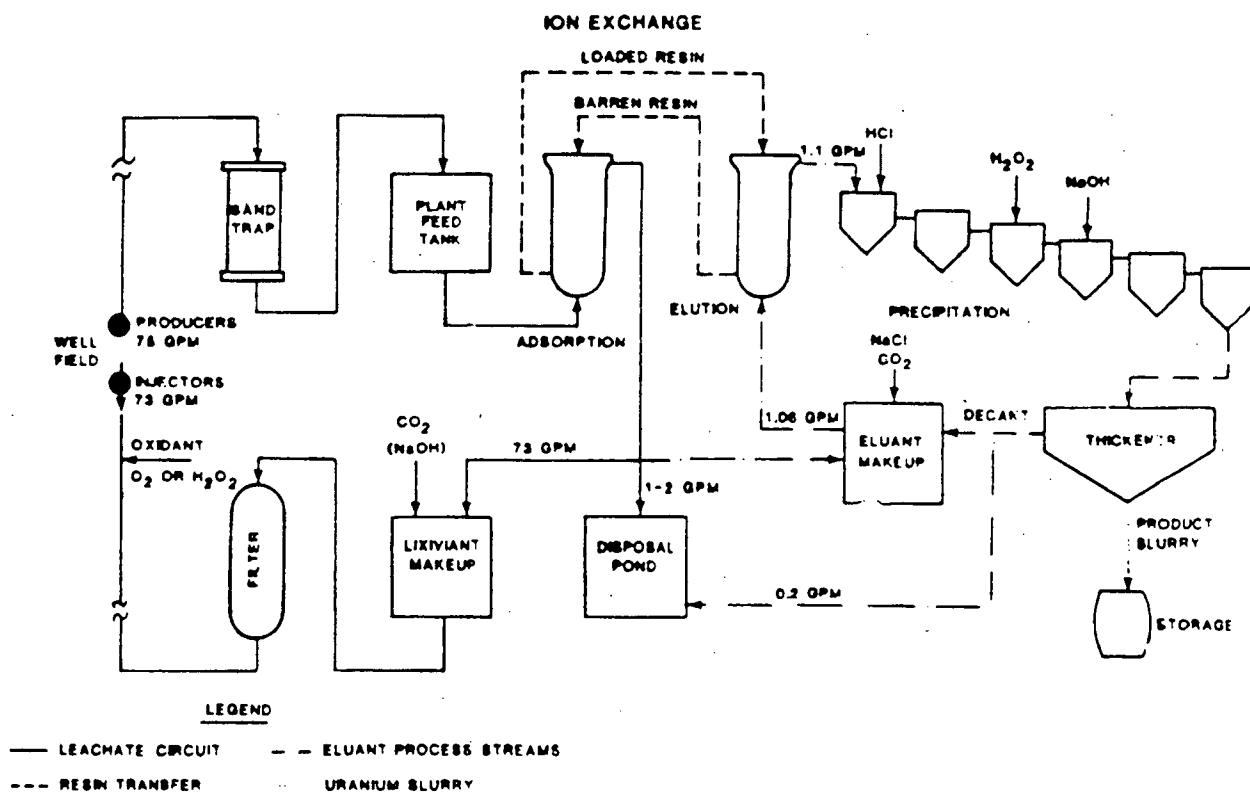


Fig. 6—Process flowsheet for in-situ pilot plant

ATTACHMENT 4

RESTORATION HISTORY

CROWNPOINT SECTION 9

IN-SITU LEACH PILOT PLANT

OCTOBER 1980 TO OCTOBER 1986

Stage 1 Leaching Stopped, Normal Well Field Operation Continued (October 1, 1980 to December 1st week).

Injection of lixiviant chemicals was stopped on October 1, 1980. Normal operation of the well field continued, however, (to remove uranium and molybdenum from the leachate) at a flow rate of about 40 gpm.

Uranium was removed by the ion exchange columns. Molybdenum was removed by the molybdenum strip circuit incorporated in the surface plant. Waste waters were routed to the evaporation ponds and barren lixiviant (no chemicals added) was circulated back to the well field.

During this two month period, significant reduction in concentrations of calcium, sodium, sulfates, bicarbonate, molybdenum, uranium, and radionuclide activities were measured in the leachate (i.e., water removed from the well field for treatment).

Stage 2 Water Softening Treatment (December 1st Week to December 24, 1980)

A lime water softener was brought on stream during the first week of December 1980. The softener was used to reduce temporary hardness and alkalinity from the barren lixiviant prior to injection into the well field. This "pretreatment" was necessary for successful operation of a reverse osmosis unit planned for installation.

Lime slurry generated by the water softener was shipped to Kerr-McGee for disposal in an approved tailings impoundment. Waste waters generated by the water softener were routed to the evaporation ponds for disposal. During this three week period concentrations of major ions in the leachate remained fairly stable with no significant reduction in concentrations noted.

Stage 3 Ground Water Sweep (December 24 to 30, 1980)

A high rate ground water sweep (approximately 260 gpm) was initiated on December 24, 1980. Water was simply pumped from the well field and routed to a surge pond. Pumping was stopped on December 30, 1980 when the pond capacity was 80% consumed by the discharge.

Approximately 2.2 MM gallons of water was pumped from the well field and routed directly to the waste evaporation ponds.

During this six day sweep significant reduction in concentrations of calcium, sodium, sulfates, chlorides, and uranium was observed.

Stage 4 Pond Water Treatment (December 30, 1980 to late January 1981)

While waiting for the Reverse Osmosis (R. O.) unit to be brought on stream for the well field, water was pumped from the pond to the water softener and back to the pond to reduce temporary hardness and alkalinity.

During this three to four week period no restoration activity in the well field was conducted.

Stage 5 R. O. Treatment and Ground Water Sweep (Late January 1981 to July 1981)

The reverse osmosis (R.O.) unit was installed and put into operation in late January 1981. Water was withdrawn from the well field at approximately 70 gpm and processed through the water softener to reduce temporary hardness and alkalinity. From the softener the water was passed through the R.O. unit to reduce the concentration of other dissolved constituents.

During this five plus month period, a significant reduction in concentrations of calcium, sodium, sulfates, chlorides, bicarbonate, uranium, and radio-nuclide activity was observed in the water produced from the well field. Only a small reduction in the molybdenum concentration was recorded.

Stage 6 Lime Treatment and Ground Water sweep (July 1981 to May 1982)

In July, lime (calcium hydroxide) was added to the R.O. permeate to reduce dissolved molybdenum in the leach pattern.

Experiments at Mobil's Field Research Laboratory (FRL) in Dallas had indicated that an increase in pH and an increase in calcium would be beneficial in reducing the levels of dissolved molybdenum.

Prior to addition of lime in the R.O. permeate, molybdenum levels in the well field has leveled off at approximately 32 mg/l. Major cations and anions continued to decline slowly in concentration. By adding lime to the system, the molybdenum levels decreased steadily to 9.7 mg/l (average for the well field). A significant reduction in concentrations of calcium, sodium, sulfates, chlorides, bicarbonates, uranium, and radionuclide activity during the ten plus month period also occurred.

Stage 7 Ion Exchange and "Clean Water" Sweep (May 1982 to November 8, 1982)

Use of the R. O. unit and the addition of lime to the well field was halted in May 1982. At that point a "clean water" sweep was initiated. All water from the well field was routed to the ion exchange columns for removal of molybdenum and uranium.

The waste fluid from the ion exchange columns was routed to the evaporation ponds for disposal. The clean water produced was recirculated back to the well field to continue the sweep. A small bleed of ground water was maintained during the sweep operation.

Major cations and anions continued to decline slowly in concentration such that all were below required restoration levels. Molybdenum concentrations continued to decline slowly.

Stage 8 Sodium Sulfide Treatment and Ground Water Sweep (November 8, 1982 to April 15, 1983)

On November 8, 1982 sodium sulfide (a reducing agent) was added to the clean water produced from the ion exchange columns to eliminate dissolved oxygen introduced into the system due to contact with the atmosphere in the surface process plant. By creating a reducing environment in the well field, dissolved molybdenum concentrations would drop along with other heavy metals such as selenium. Sodium sulfide injection was terminated on April 15, 1983 after approximately 9 MM gallons of water were circulated through the well field.

No significant change in major water quality parameters, including molybdenum, occurred during this six month period.

Stage 9 Sit and Soak Period (August 15 to July 14, 1983)

Beginning April 15, 1983 the well field was allowed to "sit and soak" with just a minimum (1 gpm) bleed for approximately three months. All bleed water was routed to the evaporation ponds for disposal.

Analysis of the bleed water at the beginning and end of the sit and soak stage showed no change in major parameters including molybdenum.

Stage 10 Ground Water Sweep (July 14, 1983 to January 13, 1984)

From July 14 to August 3, 1983 a brief ground water sweep was conducted in the well field. Approximately 1 MM gallons of water were pumped from the well field and discharged directly into the evaporation ponds for disposal during this three week period.

From August 10, 1983 to November 9, 1983 a minimum bleed (1 gpm) was maintained on the well field. Use of the low flow rate was necessary until an amended water appropriation application (submitted to the State Engineer) was approved. The 1 GPM bleed was routed to the evaporation ponds for disposal.

After receipt of the amended water appropriation at the end of October 1983, production flow was increased to 40 gpm on November 9, 1983. No water was injected back into the formation, but was routed to the evaporation ponds for disposal.

On December 16, 1983 production flow was decreased from 40 gpm to 20 gpm because the evaporation ponds were approaching full capacity. All flow was stopped on January 13, 1984.

During this five month sweep period no significant change in molybdenum concentrations were observed. Concentrations of sodium and chloride did drop significantly.

Stage 11 R.O. Treatment and Ground Water Sweep (January 18 to May 1, 1984)

On January 18, 1984 a reverse osmosis (R. O.) unit was brought on line to reduce dissolved constituents. Water was pumped from the well field at about 34 gpm and routed to the R.O. Unit for treatment. R. O. Permeate was injected back into the well field at a rate of 25gpm. R. O. reject (approximately 9 gpm) was routed to the third evaporation pond for disposal.

During the three plus month period concentrations of chloride and molybdenum decreased slightly.

Stage 12 Hydrogen Sulfide Injection (May 1, 1984 to March 18, 1985)

On May 1, 1984 Hydrogen sulfide (H_2S) was injected into the wellfield to test the effectiveness of the chemical as a reductant (i.e., to lower the pH of the ground water in the well field, maintain the aquifer redox potential in a reduced state similar to preleaching conditions, and reduce the concentration of dissolved molybdenum and other heavy metals).

Tests were conducted by pumping ground water at a rate of approximately 20 gpm from one well, adding 400 mg/l H_2S , and injecting the treated water into another well (13 total). The total volume of water injected into each well treated was approximately 40 M gallons. The H_2S treated wells were sampled and monitored at an interval of once every two to four weeks. Samples were analyzed for pH, uranium, and molybdenum.

Water samples collected and analyzed during this period showed mixed results for molybdenum. Of the 13 wells, molybdenum concentrations dropped in six wells, rose in four wells, and stayed approximately the same in three wells.

Stage 13 Sit and Soak Period (March 18, 1985 to April 15, 1986)

Following H_2S treatment/injection the well field was allowed to "sit and soak" to allow sufficient time for dissolved molybdenum to react with H_2S to form MoS_2 (solid). During this period water samples were collected from the well field periodically and analyzed.

Of the 13 wells treated with H_2S , the September 1985 laboratory analysis showed molybdenum concentration decreased in ten wells and increased in three wells. The well field average concentration for molybdenum had decreased from 7.7 mg/l in September 1984 and 10.4 mg/l in December 1984 to 4.8 mg/l in September 1985. By September 1985, eight of the wells were below NMWQCC 1.0 mg/l standard for molybdenum.

Also, during this period beginning in October 1985 a well maintenance program was conducted in the well field with the approval of the State Engineer's Office. Five wells were selected for maintenance which included cleaning and acidizing to improve well performance. The well maintenance program ended in December 1985.

Stage 14 Ground Water Circulation (April 15, 1986 - May 20, 1986)

To insure that a well was properly cleaned and insure that residual well bore material was not contaminating the samples, the wells were pumped to the pond. After pumping each well, water from within the wellfield was pumped in a closed circuit into each well to insure uniform mixing of reduced fluids throughout the wellfield.

Stage 15 Sit and Soak (Static Condition) May 20, 1986 - Present

In preparation for declaring restoration, the wellfield has remained idle except for routine water quality sampling as required under the terms and conditions of the permits.

MOBIL PILOT INSITU LEACH

URANIUM PROJECT

CROWNPOINT, NEW MEXICO

APPENDIX A

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SAMPLING PROCEDURE

The following procedure is utilized in obtaining samples of water from the wells in the Section 9 wellfield. The well field is shown on Exhibit 1.

1. A packer and sampling apparatus is lowered down the well to a point where the bottom of the packer is even with the top of the perforations. The sampling device, a pneumatic displacement pump, is attached 2.0 feet below the bottom of the packer so the pump lies adjacent to perforations in the well casing. The placement of the packer and pump is diagrammed on Exhibit 2. The packer is inflated by nitrogen gas to a pressure that is 40 to 50 pounds greater than the hydrostatic pressure at that depth in the well.
2. The pump, also operated by nitrogen gas, then evacuates two casing volumes of water occupying the perforated interval of the well at a rate of 0.10 pgm. This volume of water varies from 29 to 57 gallons depending upon the size of the casing and the extent of the perforated interval. This water is evacuated in order to allow fresh formation water to displace the stagnant water in the well bore prior to sampling. Exhibit 3 is a tabulation of the wells, their inside diameters, and the volume of stagnant water to be evacuated prior to the taking of the sample.

The sampling device is a pneumatic displacement pump manufactured by Baski Water Instruments, Inc. of Denver, Colorado. The operation of this pump is described on Exhibit 4.

3. Following evacuation of two casing volumes of stagnant water, a three gallon sample is taken. This sample is treated for use in the various analyses as described below.
 - A. 1 Liter non-filtered, untreated.
 - B. 1 Liter filtered through a 0.45 micron filter and preserved with 6 NaOH tablets.
 - C. 1 Liter filtered as above and preserved with 2mls of H_2SO_4 or 5mls $CuSO_4$. This sample stored in glass container.
 - D. 1 Liter filtered as above and preserved with 5mls conc $HHNO_3$.
 - E. 1 Liter filtered as above and preserved with 2mls conc. H_2SO_4 .
 - F. 0.5 Liter non-filtered and preserved with 2.5 mls conc. HNO_3 .
 - G. 1 Gallon filtered as above and preserved with 20mls conc HNO_3 .

Radon 222 is sampled in the field by attaching tubing to a sample port and filling a vacuum blood sample tube by inserting an injection needle through the vacuum tube seal. The radon sample is shipped to the lab the following morning by air express. Samples A, B, and C are shipped cold in an ice chest while the rest are shipped at room temperature.

EXHIBIT 1

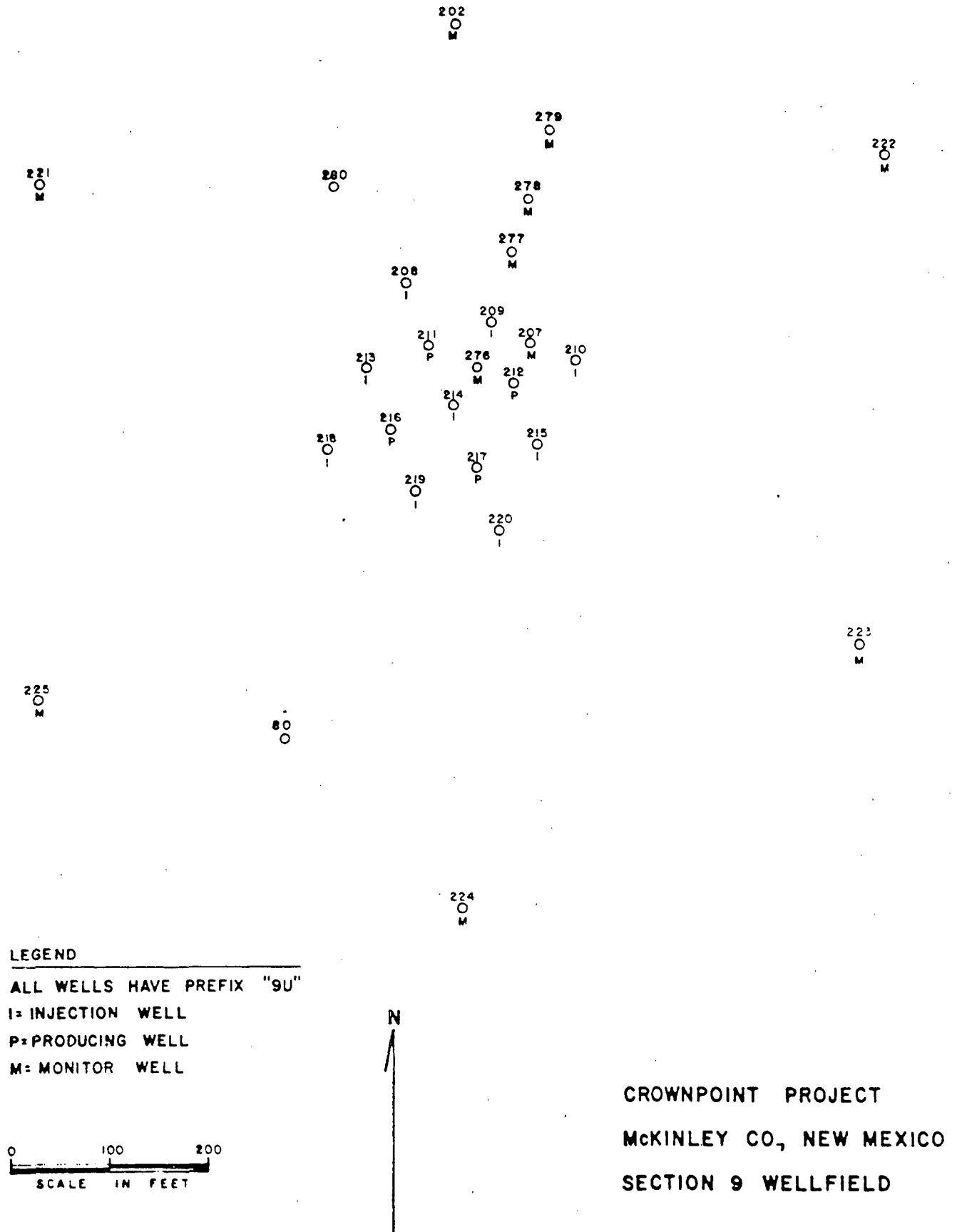


EXHIBIT 2

TYPICAL INSTALLATION FOR WATER SAMPLING

SECTION 9 WELLFIELD

CROWMPOINT PROJECT

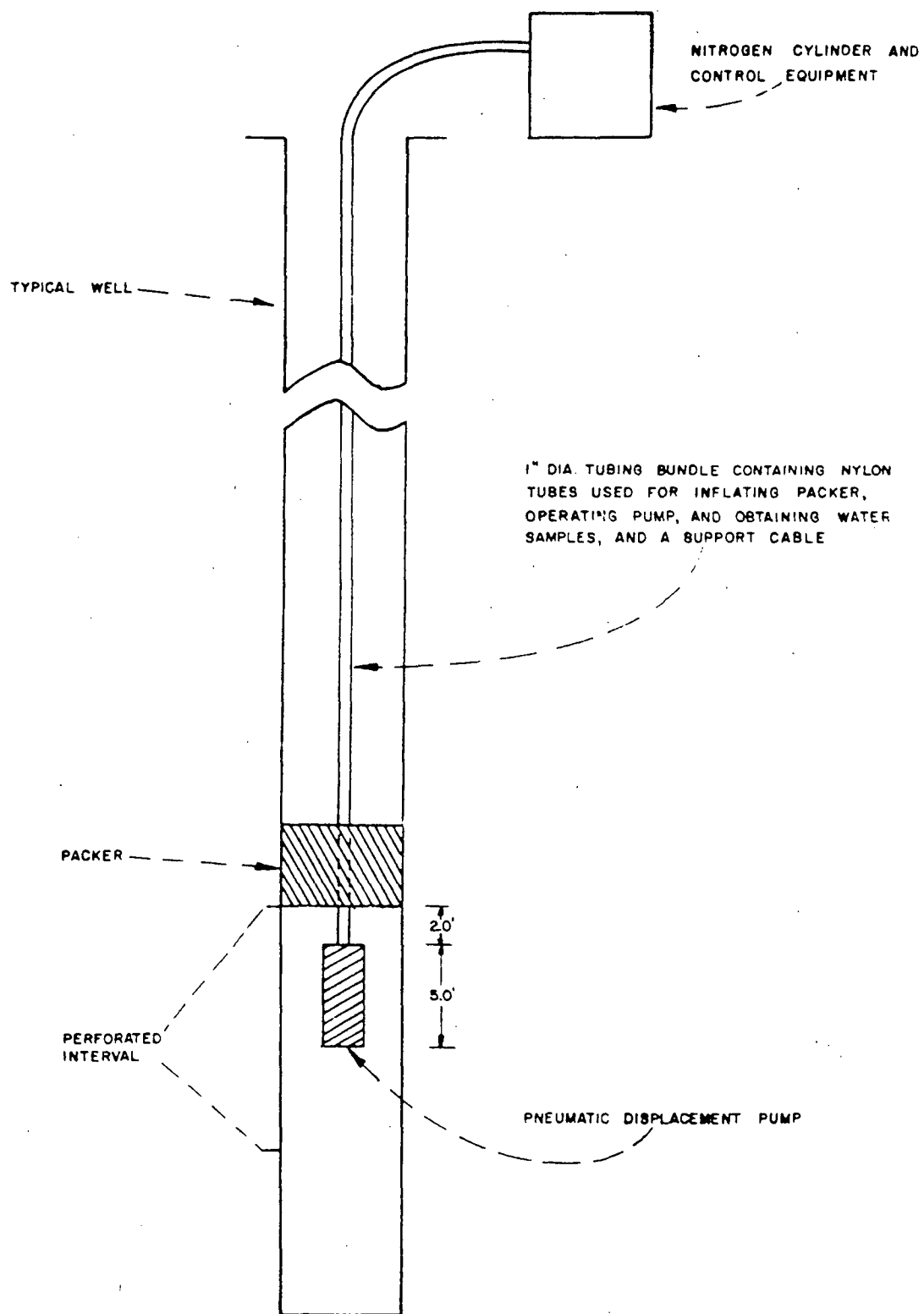
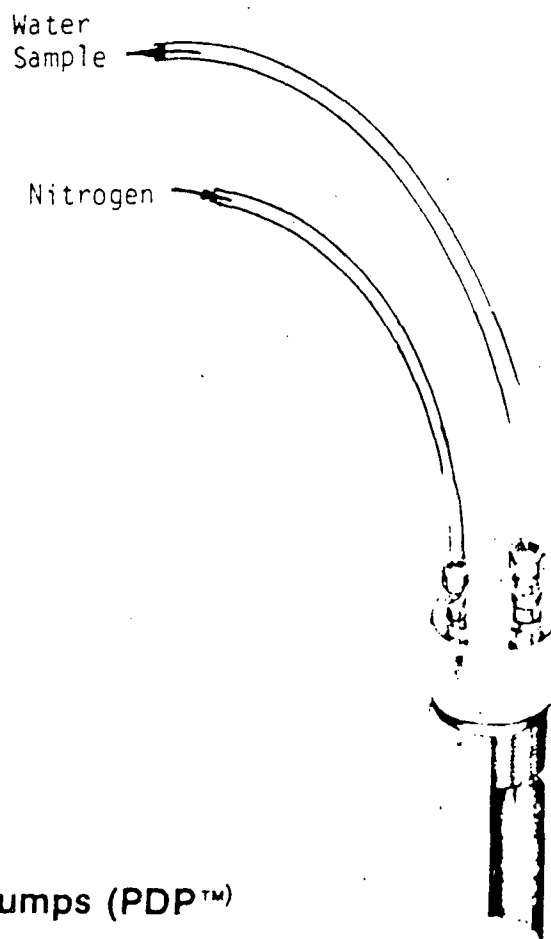


EXHIBIT 3
WELL PARAMETERS
SECTION 9 WELLFIELD
CROWNPOINT PROJECT

<u>WELL 17-13-9U</u>	<u>CASING I.D. IN INCHES</u>	<u>PERFORATED INTERVAL, FT.</u>	<u>PACKER PLACEMENT, FT.</u>	<u>TWO CASING VOLUMES, GAL</u>
208	5.0	1952-1980	1952	57
209	5.0	1953-1979	1953	53
210	5.0	1954-1982	1954	57
211	5.0	1954-1971	1954	35
212	5.0	1955-1977	1955	45
213	5.0	1946-1974	1946	57
214	6.0	1957-1967	1957	29
215	5.0	1966-1988	1966	45
216	5.0	1956-1978	1956	45
217	5.0	1956-1981	1956	51
218	5.0	1952-1978	1952	53
219	5.0	1952-1976	1952	49
220	5.0	1968-1994	1968	53

EXHIBIT 4



Pneumatic Displacement Pumps (PDP™)

Pneumatic displacement pumps (PDP™) are used for obtaining non-aerated water samples from boreholes. The PDP™ is lowered to the desired depth, and compressed nitrogen gas is fed into it, forcing (or displacing) a sample of water to the ground surface. The nitrogen pressure is then released and the PDP™ fills up with water, thus ready to begin another cycle.

A battery operated timed nitrogen controller (TNC™) can automatically cycle the pneumatic displacement pump. In this fashion an unmanned well can be pumped out at a controlled rate.

If samples must be obtained more than twice a year, it might prove more economical to have a permanent installation. A screen can be attached to the bottom end of the PDP™ to prevent plugging should it be desirable or necessary to bury it in the ground.

For a more efficient operation, it is possible to combine a PDP™ with air-lifting. Using this combination a borehole can be rapidly air-lift pumped and, simultaneously, a non-aerated water sample can be delivered by the PDP™.

Because of their construction, PDP™ require minimum maintenance and are easy to disassemble and clean.

They are available in either stainless steel or flexible, reinforced vinyl, each with a Teflon* valve. The rigid, stainless steel sampler (or PDP) normally comes in five-foot sections, while the flexible, vinyl sampler is available in any length.

As a rule, stainless steel is utilized for depths to 1,000 feet. On special order, however, a PDP™ of stainless steel can be supplied for depths of up to 5,000 feet. Vinyl is limited to depths of 300 feet.

*DuPont

EXHIBIT 5
CROWNPOINT SECTION 9
WELLFIELD SAMPLING SCHEDULE

<u>WELL NO</u>	<u>NOV.</u> <u>1986</u>	<u>DEC.</u> <u>1986</u>	<u>JAN.</u> <u>1987</u>	<u>FEB.</u> <u> </u>	<u>MAR.</u> <u> </u>	<u>APR.</u> <u> </u>	<u>MAY</u> <u> </u>	<u>JUNE</u> <u> </u>	<u>JULY</u> <u> </u>
208	X	Y			X	Y			X
209	X			Y	X	Y			X
210	X			Y	X	Y			X
211	X		Y		X		Y		X
212	X		Y		X		Y		X
213	X	Y			X			Y	X
214	X	Y			X	Y			X
215	X		Y		X			Y	X
216	X		Y		X		Y		X
217	X		Y		X		Y		X
218	X	Y			X			Y	X
219	X			Y	X		Y		X
220	X			Y	X			Y	X

X: Full Analysis of stability period parameters (quadrimonthly).

Y: Full analysis of stability period parameters (monthly).

EXHIBIT 6

List of Water Quality Parameters to be Detected

Crownpoint Section 9 Wellfield

Restoration Sample Parameters

A. Quadrimestly parameters, mg/L

Aluminum, dissolved	Manganese (dissolved)
Arsenic	Molybdenum (dissolved)
Barium	Mercury (dissolved)
Boron	Nickel (total)
Cadmium	Nitrate (as N)
Chloride	pH
Chromium	Phenols
Cobalt (dissolved)	Combined Radium 226&228 (pci/L)
Copper (dissolved)	Selenium (dissolved)
Cyanide	Silver (dissolved)
Fluoride	Sulfate (as SO ₄)
Iron (dissolved)	TDS (at 180 degrees F)
Lead (dissolved)	Uranium (as U)

B. Monthly parameters, mg/L

Chloride	Combined Ra 226&228 (pci/L)
Manganese	Selenium
Molybdenum	Sulfate
Phenols	TDS

LABORATORY IDENTIFICATION AND ANALYTICAL METHODS

Laboratory Identification and Certification

Mobil proposes to utilize the same laboratory which has historically analyzed our samples. Accu-Labs Research, Inc., located in Wheat Ridge, Colorado, is certified by the United States Environmental Protection Agency and the Colorado Department of Health. See Exhibits 7 and 8 for certification letters.

Analytical Methods

The analytical methods utilized by Accu-Labs Research, Inc for Mobil's samples are outlined in Exhibit 9. Please note that the nominal detection limits for each water quality parameter are shown in the Methods Summary Section of Exhibit 9.



EXHIBIT 7

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
ONE DENVER PLACE — 999 18TH STREET — SUITE 1300
DENVER, COLORADO 80202-2413

RECEIVED

JUL 29 1986

WHEATRIDGE

JUL 22 1986

Ref: 8HWM-RP

Mr. William R. Gilgren
Accu-Labs Research, Inc.
11485 W. 48th Ave.
Wheatridge, CO 80033

Dear Mr. Gilgren:

Attached is a copy of Robert Tauer's report of his on-site evaluation of your laboratory. The purpose for the visit was to determine if your laboratory should continue to be certified under the Safe Drinking Water Act.

Based on the recommendations in the report I am granting certification to Accu-Labs Research, Inc., for the analysis of gross alpha, gross beta, Radium 226, Radium 228, Uranium, and Tritium in drinking water. The certification will remain in effect for three years. Continued satisfactory performance on EPA/Las Vegas check samples is required.

If you have any further questions concerning the certification or the report, please contact Robert Tauer at (303) 236-5083.

Sincerely yours,

James B. Lehr
James B. Lehr, Director
Environmental Services Division

Attachment

cc: Juanita Hillman
8-ES



EXHIBIT 8

COLORADO DEPARTMENT OF HEALTH

Richard D. Lamm
Governor

Thomas M. Vernon, M.D.
Executive Director

MARCH 19, 1986

RECEIVED

MAR 24 1986

WHEATRIDGE

WILLIAM GILGREN, PRESIDENT
ACCU-LABS RESEARCH, INC.
11485 W. 48TH AVENUE
WHEAT RIDGE, COLORADO 80033

CERTIFICATION STATUS OF ACCU-LABS RESEARCH, INC.

Based on a review of Performance Evaluation WS017, Accu-Labs Research, Inc. is CERTIFIED for the inorganic parameters and total trihalomethane analyses. The certification for Pesticide/Herbicide analyses is downgraded to PRO-VISIONALLY CERTIFIED.

Anne M. Wolfgang

ANNE M. WOLFGANG
QUALITY ASSURANCE COORDINATOR

AMW/mak

EXHIBIT 9

SUMMARY OF ANALYTICAL METHODS UTILIZED BY ACCU-LABS RESEARCH, INC.

Total Uranium; Water:

An aliquot of the sample is pipetted onto a NaF-LiF pellet and fused. The pellet is exposed to ultraviolet light and the fluorescence is measured. The intensity of the fluorescence is directly proportional to the uranium concentration.

Reference: No. 1, 3, 4, 7, 8, 9

Total Uranium; Solids:

An aliquot of sample was digested with nitric, sulfuric, perchloric, and hydrofluoric acid and evaporated to dryness. The residue was dissolved in dilute nitric acid and extracted with ethyl acetate. A very small aliquot of the organic layer was pipetted onto a NaF-LiF pellet and fused using a Geoco fusion burner. The pellet was exposed to ultraviolet light and the fluorescence measured using a fluorometer.

Reference: No. 4

Radium-226; Water:

Radium in the sample is concentrated and coprecipitated with Barium Sulfate. The precipitate is either gross alpha counted to determine the total Radium-226 alpha activity or is redissolved into a basic EDTA solution. The solution is placed in a sealed bubbler and stored for ingrowth of Rn-222. After ingrowth, the gas is purged into a Lucas cell and counted for its alpha activity.

Reference: No. 1, 2, 3, 5, 7, 8, 9

Radium-226; Solids:

An aliquot of the sample is fused with sodium peroxide and dissolved completely in dilute HCl. Radium-226 in the sample is concentrated and separated by coprecipitation with barium sulfate. The precipitate is either gross alpha counted to determine the Radium-226 activity or dissolved into a basic EDTA solution, placed in a sealed bubbler and stored for ingrowth of Rn-222. After ingrowth, the gas is purged into a scintillation cell. When the Rn-222 daughters are in equilibrium with the parent, the scintillation cell is counted for alpha activity.

Reference: No. 1, 2, 3, 5

Gross Alpha/Beta; Water:

An aliquot of the sample, containing up to 120 ng dissolved solids, was acidified and brought to dryness. The residue was transferred to a stainless steel planchet and counted for its Gross Alpha and Gross Beta activity. The final reported result was corrected for self absorption and backscatter.

Reference: No. 1, 2, 3, 4, 6, 7, 8, 9

Lead-210; Water and Solids:

The sample is digested with acid, redissolved in dilute HCl and run through an anion exchange column to separate out the Lead-210. Following separation, the Lead-210 is precipitated out as lead chromate. After decay of the Lead-210 to Bismuth-210, a gross beta count is taken.

Reference: No. 6, 9

Thorium-230; Water and Solids:

The sample is digested with acid, redissolved in 9N Nitric acid. Thorium is then separated by anion exchange followed by a gross alpha count. The total thorium alpha activity is reported at Th-230.

Reference: No. 7

Radium-228; Water and Solids:

All radium is separated from the sample as a BaSO_4 precipitate. Ac-228 is allowed to ingrow. After ingrowth, Ac-228 is co-precipitated with Yttrium as the oxalate and gross beta counted.

Reference: No. 1, 2, 3, 8

NOTE: The referenced methodology does allow Accu-Labs Research, Inc. to meet NRC Guideline 4.14 Lower Level of Detection, provided the client submits sufficient volume of sample when requesting the analyses.

METHOD REFERENCES UTILIZED BY ACCU-LABS RESEARCH, INC.

1. U.S. Environmental Protection Agency, 1979, Radiochemical Analytical Procedures for Analysis of Environmental Samples, Report No. EMSL-LV-0539-1, Las Vegas, NV, U.S. Environmental Protection Agency.
2. American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1985, Standard Methods for the Examination of Water and Wastewater, 16th ed., Washington, D.C., Am. Public Health Association.
3. U.S. Environmental Protection Agency, 1976, Interim Radiochemical Methodology for Drinking Water, Report No. EPA-600/4-75-008, Cincinnati, U.S. Environmental Protection Agency.
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5. Misaqi, Fazlallah L., Monitoring Radon-222 Content of Mine Waters Informational Report 1026, U.S. Department of Interior, Mining Enforcement and Safety Administration, Denver, Colorado, 1975.
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7. "Handbook of Analytical Procedures", USAEC, Grand Junction Lab, 1970, page 196.
8. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA-600/4-80-032, August 1980, Environmental Monitoring and Support Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.
9. "Methods for Determination of Radioactive Substances in Water and Fluvial Sediments", U.S.G.S. Book 5, Chapter A5, 1977.
10. "Acid Dissolution Method for the Analysis of Plutonium in Soil", EPA-600/7-79-081, March 1979, U.S. EPA Environmental Monitoring and Support Laboratory, Las Vegas, Nevada, 1979.
11. "Procedures for the Isolation of Alpha Spectrometrically Pure Plutonium, Uranium and Americium", by E.H. Essington and B.J. Drennon, Los Alamos National Lab, private communication.
12. "Isolation of Americium from Urine Samples", Rocky Flats Plant, Health Safety and Environmental Laboratories, Laboratory Procedure, HS and EL-7, revised 1/21/83.

METHODS SUMMARY

<u>PARAMETER</u>	<u>REFERENCE NO.</u>	<u>EPA METHOD NO.</u>	<u>NOMINAL DETECTION LIMIT</u>
Color (Colorimetric- Platinum-Cobalt)	1, 2	110.2	2 color units
Conductance (Specific conductance, mhos at 25°C)	1, 2, 3	120.1	2 mhos/cm
Hardness, total (mg/L as CaCO ₃) (titrimetric, EDTA)	1, 2, 3	130.2	2 mg/L
pH (Electrometric)	1, 2, 3	150.1	0.1 units
Residue, Filterable (TDS, Gravimetric, Dried 180°C)	1, 2	160.1	5 mg/L
Residue, Unfilterable (TSS, Gravimetric, Dried 105°C)	1	160.2	5 mg/L
Residue, Total (TS, Gravi- metric, Dried at 103-105°C)	1, 2	160.3	5 mg/L
Residue, Volatile (TV, Gravimetric, Ignition at 550°C)	1, 2	160.4	5 mg/L
Settleable Matter (Volu- metric, Imhoff Cone)	1, 2	160.5	0.1 ml/L/hr
Temperature (Thermometric)	1, 2	170.1	
Turbidity (Nephelometric)	1, 2, 3	180.1	1 NTU
Aluminum (Atomic Absorption direct aspiration)	1, 2, 4	202.1	0.5 mg/L
Aluminum (Atomic Absorption furnace technique)	1, 2, 4, 5	202.2	0.05 mg/L
Antimony (Atomic Absorption direct aspiration)	1, 2, 4	204.1	0.5 mg/L

WRITTEN CC DATE 6-28-84 QA TJA DATE 7/2/84APPROVED [Signature]PAGE 1 OF 8

<u>PARAMETER</u>	<u>REFERENCE NO.</u>	<u>EPA METHOD NO.</u>	<u>NOMINAL DETECTION LIMIT</u>
Antimony (Atomic Absorption furnace technique)	1, 2, 4, 5	204.2	0.005 mg/L
Arsenic (Atomic Absorption furnace technique)	1, 2, 4, 5	206.2	0.005 mg/L
Barium (Atomic Absorption direct aspiration)	1, 2, 4	208.1	0.2 mg/L
Beryllium (Atomic Absorption direct aspiration)	1, 2, 4	210.1	0.005 mg/L
Beryllium (Atomic Absorption furnace technique)	1, 2, 4, 5	210.2	0.001 mg/L
Bismuth (Atomic Absorption direct aspiration)	4		0.2 mg/L
Boron (Colorimetric, curcumin)	1, 2	212.3	0.1 mg/L
Cadmium (Atomic Absorption direct aspiration)	1, 2, 4	213.1	0.005 mg/L
Cadmium (Atomic Absorption furnace technique)	1, 2, 4, 5	213.2	0.0005 mg/L
Calcium (Atomic Absorption direct aspiration)	1, 2, 4	215.1	0.1 mg/L
Chromium (Atomic Absorption direct aspiration)	1, 2, 4	218.1	0.005 mg/L
Chromium (Atomic Absorption furnace technique)	1, 2, 4, 5	218.2	0.005 mg/L
Chromium, hexavalent (Colorimetric diphenylcarbazide)	1, 2	218.4	0.02 mg/L
Cobalt (Atomic Absorption direct aspiration)	1, 2, 4	219.1	0.02 mg/L
Cobalt (Atomic Absorption furnace technique)	1, 2, 4, 5	219.2	0.005 mg/L

WRITTEN CC- DATE 6-28-84 QA JJD DATE 7/2/84

APPROVED [Signature]

PAGE 2 OF 8

<u>PARAMETER</u>	<u>REFERENCE NO.</u>	<u>EPA METHOD NO.</u>	<u>NOMINAL DETECTION LIMIT</u>
Copper (Atomic Absorption direct aspiration)	1, 2, 4	220.1	0.005 mg/L
Copper (Atomic Absorption furnace technique)	1, 2, 4, 5	220.2	0.001 mg/L
Germanium (Atomic Absorption direct aspiration)	4		0.5 mg/L
Gold (Atomic Absorption direct aspiration)	1, 2, 4	231.1	0.5 mg/L
Iron (Atomic Absorption direct aspiration)	1, 2, 4	236.1	0.01 mg/L
Iron (Atomic Absorption furnace technique)	1, 2, 4, 5	236.2	0.005 mg/L
Lead (Atomic Absorption direct aspiratin)	1, 2, 4	239.1	0.1 mg/L
Lead (Atomic Absorption furnace technique)	1, 2, 4, 5	239.2	0.005 mg/L
Lithium (Atomic Absorption direct aspiration)	4		0.001 mg/L
Magnesium (Atomic Absorption direct aspiration)	1, 2, 4	242.1	0.05 mg/L
Manganese (Atomic Absorption direct aspiration)	1, 2, 4	243.1	0.005 mg/L
Manganese (Atomic Absorption furnace technique)	1, 2, 4, 5	243.2	0.0005 mg/L
Mercury (Manual Cold Vapor technique)	1, 2	245.1	0.0001 mg/L
Molybdenum (Atomic Absorp- tion furnace technique)	1, 2, 4, 5	246.2	0.005 mg/L
Nickel (Atomic Absorption direct aspiration)	1, 2, 4	249.1	0.02 mg/L

WRITTEN CC DATE 6-25-84 QA TJA DATE 7/2/84

APPROVED [Signature]

PAGE 3 OF 8

<u>PARAMETER</u>	<u>REFERENCE NO.</u>	<u>EPA METHOD NO.</u>	<u>NOMINAL DETECTION LIMIT</u>
Nickel (Atomic Absorption furnace technique)	1, 2, 4, 5	249.2	0.005 mg/L
Palladium (Atomic Absorption direct aspiration)	1, 4	253.2	0.005 mg/L
Platinum (Atomic Absorption furnace technique)	1, 4	255.2	0.05 mg/L
Potassium (Atomic Absorption direct aspiration)	1, 2, 4, 5	258.1	0.1 mg/L
Selenium (Atomic Absorption furnace technique)	1, 2, 4, 5	270.2	0.005 mg/L
Silver (Atomic Absorption direct aspiration)	1, 2, 4	272.1	0.005 mg/L
Silver (Atomic Absorption furnace technique)	1, 2, 4, 5	272.2	0.001 mg/L
Sodium (Atomic Absorption direct aspiration)	1, 2, 4	273.1	0.1 mg/L
Tin (Atomic Absorption direct aspiration)	1, 4	282.1	1.0 mg/L
Tin (Atomic Absorption furnace technique)	1, 4	282.2	0.005 mg/L
Thallium (Atomic Absorption direct aspiration)	1, 2, 4	279.1	0.5 mg/L
Thallium (Atomic Absorption furnace technique)	1, 2, 4, 5	279.2	0.005 mg/L
Vanadium (Atomic Absorption direct aspiration)	1, 2, 4	286.1	0.5 mg/L
Vanadium (Atomic Absorption furnace technique)	1, 2, 4, 5	286.2	0.005 mg/L
Zinc (Atomic Absorption direct aspiration)	1, 2, 4	289.1	0.005 mg/L

WRITTEN CC DATE 6-28-84 QA JJD DATE 7/2/84

APPROVED [Signature]

PAGE 4 OF 8

<u>PARAMETER</u>	<u>REFERENCE NO.</u>	<u>EPA METHOD NO.</u>	<u>NOMINAL DETECTION LIMIT</u>
Zinc (Atomic Absorption furnace technique)	1, 2, 4, 5	289.2	0.001 mg/L
Nitrogen, Kjeldahl, total (Digestion, Colorimetric Phenate)	1, 2	351.1	1 mg/L
Nitrogen, Kjeldahl, total (Digestion, Ion Selective Electrode)	1, 2	351.4	1 mg/L
Nitrate-Nitrite (Colori- metric, Automated, Cadmium Reduction)	1, 3, 7	353.2	0.05 mg/L
Nitrite (Colorimetric, Automated)	1, 3, 7	353.2	0.05 mg/L
Phosphorus - All Forms (Colorimetric, Ascorbic Acid, Single Reagent)	1, 2, 3,	365.2	0.02 mg/L
Silica, dissolved (Colori- metric)	1, 2, 3	370.1	2 mg/L
Sulfate (Colorimetric, Auto- mated, Methylthymol Blue, AAII)	1, 2, 8	375.2	3 mg/L
Sulfate (Gravimetric)	1, 2, 3	375.3	5 mg/L
Sulfide (Titrimetric Iodine)	1, 2	376.1	1 mg/L
Biological Oxygen Demand (Oxygen Depletion 5 Day 20°C)	1, 2	405.1	2 mg/L
Chemical Oxygen Demand (Titrimetric, Low Level)	1, 2, 3	410.2	2 mg/L
Oil and Grease, total- recoverable (Gravimetric, Separatory Funnel Extraction)	1, 2	413.1	1 mg/L

WRITTEN cc DATE 6-28-84 QA JLL DATE 7/2/84

APPROVED [Signature]

PAGE 5 OF 8

<u>PARAMETER</u>	<u>REFERENCE NO.</u>	<u>EPA METHOD NO.</u>	<u>NOMINAL DETECTION LIMIT</u>
Organic Carbon, total (Combustion or Oxidation IR Detection)	1, 2, 3	415.1	1 mg/L
Phenolics, total-recoverable (Spectrophotometric, Manual 4-APP with Distillation)	1, 2, 3	420.1	0.002 mg/L
Acidity (Titrimetric)	1, 2, 3	305.1	5 mg/L
Alkalinity (Titrimetric pH 4.5)	1, 2, 3	310.1	5 mg/L
Chloride (Colorimetric, Automated, Ferricyanide AA11)	1, 2, 6	325.2	3 mg/L
Chloride (Titrimetric, Mercuric Nitrate)	1, 2, 3	325.3	3 mg/L
Cyanide, total (Spectrophotometric)	1, 2, 3	335.2	0.005 mg/L
Fluoride (Potentiometric, Ion Selective Electrode)	1, 2, 3	340.2	0.5 mg/L
Iodide (Titrimetric)	1, 3	345.1	2 mg/L
Nitrogen, Ammonia (Colorimetric Automated Phenate)	1, 2	350.1	0.2 mg/L
Nitrogen, Ammonia (Potentiometric, Ion Selective Electrode)	1, 2	350.3	0.2 mg/L
Inorganic Carbon, total (Coulometric)	9		1 mg/L
Surfactants (MBAS)	2	425.1	0.025 mg/L
Thiosulfate (Titration)	10		1 mg/L

WRITTEN CC DATE 6-28-84 QA JTB DATE 7/2/84

APPROVED [Signature]

PAGE 6 OF 8

<u>PARAMETER</u>	<u>REFERENCE NO.</u>	<u>EPA METHOD NO.</u>	<u>NOMINAL DETECTION LIMIT</u>
Pesticides:	11	608	
Lindane			0.004 mg/L
Endrin			0.0002 mg/L
Methoxychlor			0.1 mg/L
Toxaphene			0.005 mg/L
Herbicides:	12		
2,4-D			0.1 mg/L
2,4,5-TP (Silvex)			0.01 mg/L
Trihalomethanes	11, 13	601, 501.2	0.01 mg/L
PCB's	11	608	0.001 mg/L
Total Organic Halogens	14	450.1	0.005 mg/L

WRITTEN CC DATE 6/28/84 QA JLL DATE 7/2/84APPROVED [Signature]PAGE 7 OF 8

REFERENCES

1. "Methods for Chemical Analysis of Water and Wastes" US EPA, 1979 (EPA-600-4-79-020).
2. "Standard Methods for the Examination of Water and Wastewater", 14th Edition, 1975.
3. Annual Book of ASTM Standards, Part 31, "Water", 1976.
4. "Analytical Methods for Atomic Absorption", Perkin-Elmer Corporation, 1976.
5. "Analytical Methods for Atomic Absorption using the HGA Graphite Furnace", Perkin-Elmer, 1973.
6. Technicon Autoanalyzer, Industrial Method No. 99-70W, Technicon Industrial Systems, September, 1973.
7. Technicon Autoanalyzer, Industrial Method No. 100-70W, "Nitrate and Nitrite in Wastewater".
8. Technicon Autoanalyzer, Industrial Method No. 118-71/W, "Sulfate in Water and Wastewater".
9. Procedure developed at Huffman Laboratories referred to as "Carbonate Carbon" or "Mineral Carbon".
10. "The Encyclopedia of Industrial Chemical Analysis", Volume 18, Page 432, 1973.
11. "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", US EPA 1982 (EPA-600/4-82-057).
12. "Methods for Organochlorine Pesticides and Chlorophenoxy Acid Herbicides in Drinking Water and Raw Source Water", US EPA 1981 (EPA 600/4-81-053).
13. "The Analysis of Trihalomethanes in Drinking Water by Liquid/Liquid Extraction", US EPA 1979.
14. "Total Organic Halide", US EPA 1981 (EPA 600/4-81-055).

WRITTEN cc DATE 6-28-84 QA JLL DATE 7/2/84
APPROVED [Signature]
PAGE 8 OF 8

OTHER ACTIVITIES

As part, of Mobil's permit, routine water sampling and analysis of all monitor wells has been required. Recognizing that the purpose of the "Stability Period" is to determine water quality in a static, or natural, condition, and the pumping of these monitor wells creates an unnatural condition, Mobil proposes to discontinue all routine monitor well sampling. Instead, effective November 15, 1986, Mobil will conduct routine water sampling and analysis of monitor wells on the second, fourth, and eighth month of the program.

During the Stability Period, Mobil will suspend all activities which could impact the water quality of the reservoir. All operational activities pertaining to the Westwater Formation in the wellfield will be limited to the sampling described in this document.

0400891111CE

Mobil Coal Producing Inc.

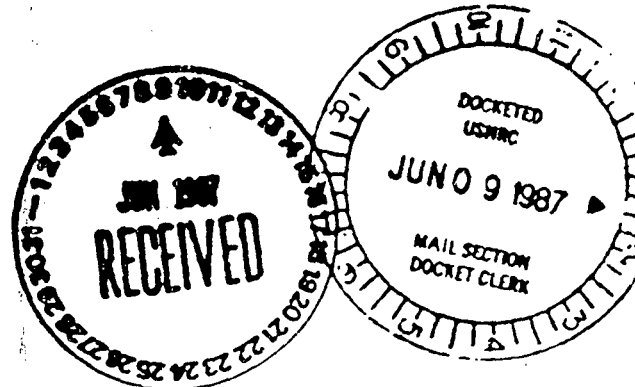
8911
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P.O. BOX 17772
DENVER, COLORADO 80217

RETURN ORIGINAL TO PDR, HQ

June 2, 1987

Mr. Thomas T. Olsen
Project Manager
United States Nuclear Regulatory Commission
P.O. Box 25325
Denver, CO 80225



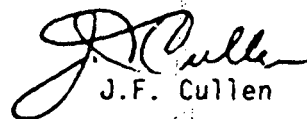
Dear Mr. Olsen:

In reference to our May 27 meeting, concerning the restoration stability program for Mobil's Crownpoint ISL Uranium Pilot facility, please find enclosed a copy of the water quality analysis for the well field. These analyses cover the period November 1986 through March 1987. Analytical results of the May samples are currently not available from Accu-Labs Research, Inc.

After reviewing these analyses you will note that Mobil has been checking Accu-Labs molybdenum results with Intermountain Laboratories. The check sampling began in January after noticing significant variations in the molybdenum values for each well over a one month period. Accu-Labs was advised of our doubling checking of results and implemented a more rigorous quality control program. Since the program was implemented, we have seen a very close correlation in molybdenum analyses between the laboratories.

If you have any questions concerning these analyses please contact me.

Very truly yours,


J.F. Cullen

8708240360 870602
PDR ADDCK 04008911
C PDR

JFC/62/em

enclosure

cc: Kevin A. Lambert
State of New Mexico
Environmental Improvement Division
P.O. Box 968 - Runnels Bldg.
1190 St. Francis Drive
Santa Fe, New Mexico 87504-0968

App. Cont.	Cashier Check
Check No.	82831
Amount	Free Labor
Type of Fee	Am 9
Date Check Recd	6/21/87
Received By	am

DESIGNATED ORIGINAL

Certified By Mary C. Hood

87-702

CROWNPOINT
STABILITY SAMPLING MOLYBDENUM

WELL NO.	NOVEMBER 87	DECEMBER 86	JANUARY 87		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY	
		AC	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM
208	1.2	2.0					2.19	1.79	2.19	1.79						
209	3.2				1.3	1.05	.55	.98	1.0	.87						
210	.17				.25	.2	.17	.14	.22	.16						
211	2.3		3.9	2.88			3.9	4.05			2.66					
212	.37		.28	.21			.33	.27			.22					
213	1.1	1.7					2.0	2.11								
214	.91	.91	1.2				.97	.87	.85	.63						
215	1.7	1.7	1.9	1.05			1.2	1.29								
216	7.7		4.1	3.13			4.2	3.24			2.87					
217	4.0		2.8	.83			3.0	3.35			.86					
218	.29	.55					.24	.26								
219	3.3				1.3	1.50	1.3	1.40			.72					
220	.55	.019			1.2	1.25	1.1	1.08								
<hr/>																
AVE	2.02	1.36	2.59	1.62	1.01	1.0	1.63	1.53	1.09	.82	N/A	1.46				

AC - ACCU-LABS

IM - INTERMOUNTAIN

STABILITY PERIOD
ANALYSIS OF MONITOR WELLS

8708240372 870602
PDR ADOCK 04008911
C PDR



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

March 3, 1987

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23657-8

Date Samples Rec'd 2-16-87

REPORT OF ANALYSIS


ALR Designation	Sponsor Designation	Gross Alpha, dissolved, ± counting error*, pCi/L	Gross Beta, dissolved, ± counting error*, pCi/L
8752-23657-8-1	202 2-11-87	2 ± 5	-2 ± 3
-2	207 2-11-87	9 ± 10	-1 ± 4
-3	221 2-11-87	12 ± 7	4 ± 3
-4	222 2-11-87	0 ± 5	-2 ± 5
-5	223 2-11-87	0 ± 4	0 ± 3
-6	224 2-11-87	5 ± 5	2 ± 3
-7	225 2-11-87	21 ± 7	17 ± 3
-8	276B 2-11-87	18 ± 9	3 ± 3

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.

These samples are scheduled to be disposed of 45 days after the date of this report.

BS/dh

dh


Bud Summers
Radiochemistry
Supervisor

Mobil Oil Corporation

ENERGY MINERALS DIVISION

DATE 2-10

REPORT NO. 2

CROWNPOINT, SECTION 9, PILOT TEST

BIWEEKLY DATA REPORT

WELL NO.	pH	Ec (μ mhos)	SULFATE (mg/l)	URANIUM (mg/l)	MOLYBDENUM (mg/l)	SODIUM (mg/l)	GROSS α (pci/l)	GROSS β (pci/l)
9U-202	<u>8.8</u>	<u>322</u>	<u>9</u>	<u><0.1</u>	<u>.008</u>	<u>130</u>	<u>2\pm5</u>	<u>-2\pm3</u>
9U-207	<u>8.7</u>	<u>710</u>	<u>240</u>	<u><0.1</u>	<u><0.005</u>	<u>190</u>	<u>9\pm10</u>	<u>-1\pm4</u>
9U-221	<u>8.6</u>	<u>351</u>	<u>30</u>	<u><0.1</u>	<u>.008</u>	<u>130</u>	<u>12\pm7</u>	<u>4\pm3</u>
9U-222	<u>8.7</u>	<u>378</u>	<u>28</u>	<u><0.1</u>	<u>.008</u>	<u>130</u>	<u>0\pm5</u>	<u>-2\pm5</u>
9U-223	<u>8.7</u>	<u>312</u>	<u>25</u>	<u><0.1</u>	<u>.009</u>	<u>120</u>	<u>0\pm4</u>	<u>0\pm3</u>
9U-224	<u>8.8</u>	<u>311</u>	<u>29</u>	<u><0.1</u>	<u>.007</u>	<u>120</u>	<u>5\pm5</u>	<u>2\pm3</u>
9U-225	<u>8.9</u>	<u>300</u>	<u>18</u>	<u><0.1</u>	<u><0.005</u>	<u>110</u>	<u>21\pm7</u>	<u>17\pm3</u>
9U-276B	<u>8.6</u>	<u>620</u>	<u>22</u>	<u><0.1</u>	<u><0.005</u>	<u>170</u>	<u>18\pm9</u>	<u>3\pm3</u>
9U-279	_____	_____	_____	_____	_____	_____	_____	_____

COMMENTS: _____

Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

December 31, 1986
Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23310-8
Date Samples Rec'd 12-15-86
Assignment 8301

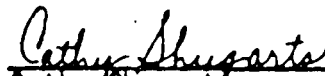
REPORT OF ANALYSIS

ALR Designation	Sponsor Designation	Molybdenum, dissolved, mg/L	Sodium, dissolved, mg/L
8752-23310-8-1	202 12-10-86	<0.005	110
-2	207 12-10-86	<0.005	180
-3	221 12-10-86	0.006	110
-4	222 12-10-86	0.005	120
-5	223 12-10-86	0.009	110
-6	224 12-10-86	0.005	110
-7	225 12-10-86	0.005	110
-8	276 12-10-86	<0.005	150

These samples are scheduled to be disposed of 30 days after the date of this report.

CS/dh




Cathy Shugarts
Supervisor
Water Laboratory



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

January 12, 1987
Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NE 87313

RE: 8752-23310-8
Date Samples Rec'd 12-15-86
Assignment 8301

REPORT OF ANALYSIS

ALR Designation	Sponsor Designation	Gross Alpha, dissolved, ± counting error*, pCi/L	Gross Beta, dissolved, ± counting error*, pCi/L
8752-23310-8-1	202 12-10-86	8 ± 5	1 ± 2
-2	207 12-10-86	3 ± 6	3 ± 3
-3	221 12-10-86	10 ± 5	3 ± 2
-4	222 12-10-86	3 ± 4	2 ± 2
-5	223 12-10-86	0 ± 3	2 ± 2
-6	224 12-10-86	5 ± 4	3 ± 2
-7	225 12-10-86	16 ± 6	16 ± 3
-8	276 12-10-86	0 ± 4	2 ± 2

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

BS/dh

Bud Summers
Radiochemistry
Supervisor

Mobil Oil Corporation

ENERGY MINERALS DIVISION

12-10

REPORT NO. 13-86

CROWNPOINT, SECTION 9, PILOT TEST

BIWEEKLY DATA REPORT

WELL NO.	pH	Ec (μ mhos)	SULFATE (mg/l)	URANIUM (mg/l)	MOLYBDENUM (mg/l)	SODIUM (mg/l)	GROSS A (pci/l)	GROSS B (pci/l)
9U-202	8.5	320	13	<0.1	0.005	110	8 \pm 5	1 \pm 2
9U-207	8.5	700	195	<0.1	0.005	180	3 \pm 6	3 \pm 3
9U-221	8.5	327	20	<0.1	0.006	110	10 \pm 5	3 \pm 2
9U-222	8.4	341	27	<0.1	0.005	120	3 \pm 4	2 \pm 2
9U-223	8.4	322	23	<0.1	0.009	110	0 \pm 3	2 \pm 2
9U-224	8.3	328	20	<0.1	0.005	110	5 \pm 4	3 \pm 2
9U-225	8.3	360	19	<0.1	0.005	110	16 \pm 6	16 \pm 3
9U-276B	8.5	478	110	<0.1	0.005	150	0 \pm 4	2 \pm 2
9U-279								

COMMENTS:

MONITOR WELLS ANALYSIS BEFORE STABILITY PERIOD

8708240425 870602
PDR ADOCK 04008911
C PDR

Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

December 10, 1986

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

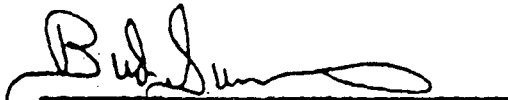
RE: 8752-23182-13
Date Samples Rec'd 11-24-86
Assignment 8401

REPORT OF ANALYSIS

ALR Designation	Sponsor Designation	Gross Alpha, dissolved, ± counting error*, pCi/L	Gross Beta, dissolved, ± counting error*, pCi/L
8752-23182-13-1	202 11-19-86	0 ± 4	4 ± 3
-2	207 11-19-86	-2 ± 6	5 ± 4
-3	221 11-19-86	12 ± 6	4 ± 3
-4	222 11-19-86	5 ± 5	2 ± 2
-5	223 11-19-86	1 ± 4	3 ± 2
-6	224 11-19-86	5 ± 4	6 ± 3
-7	225 11-19-86	19 ± 7	21 ± 3
-8	276A 11-19-86	3 ± 4	4 ± 3
-9	276B 11-19-86	2 ± 5	3 ± 3
-10	277 11-19-86	24 ± 10	5 ± 3
-11	278 11-19-86	5 ± 5	8 ± 3
-12	279 11-19-86	1 ± 4	4 ± 3
-13	280 11-19-86	3 ± 4	4 ± 3

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

BS/dh


Bud Summers
Radiochemistry
Supervisor



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

December 5, 1986
Page 1 of 3

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23182-13
Date Samples Rec'd 11-24-86
Assignment 8401

REPORT OF ANALYSIS

ALR Designation	8752-23182-13-1	8752-23182-13-2	8752-23182-13-3	8752-23182-13-4	8752-23182-13-5
Sponsor Designation	202	207	221	222	223
	11-19-86	11-19-86	11-19-86	11-19-86	11-19-86
Determination: mg/L					
Arsenic, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury, total	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum, dissolved	0.017	<0.005	0.014	0.013	0.017
Sodium, dissolved	110	190	120	130	110

December 5, 1986

Page 2 of 3

Mr. Joe Sciaba
Mobil Oil Corporation

RE: 8752-23182-13
Date Samples Rec'd 11-24-86
Assignment 8401

REPORT OF ANALYSIS

ALR Designation	8752-23182-13-6	8752-23182-13-7	8752-23182-13-8	8752-23182-13-9	8752-23182-13-10
Sponsor Designation	224	225	276A	276B	277
	11-19-86	11-19-86	11-19-86	11-19-86	11-19-86
Determination: mg/L					
Arsenic, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury, total	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc, dissolved	<0.005	<0.005	0.015	<0.005	0.012
Fluoride	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum, dissolved	0.013	0.014	0.031	0.006	0.007
Sodium, dissolved	110	110	120	170	150

December 5, 1986
Page 3 of 3

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23182-13
Date Samples Rec'd 11-24-86
Assignment 8401

REPORT OF ANALYSIS

ALR Designation	8752-23182-13-11	8752-23182-13-12	8752-23182-13-13
Sponsor Designation	278	279	280
Determination: mg/L	<u>11-19-86</u>	<u>11-19-86</u>	<u>11-19-86</u>
Arsenic, dissolved	<0.005	<0.005	<0.005
Mercury, total	<0.0001	<0.0001	<0.0001
Cadmium, dissolved	<0.005	<0.005	<0.005
Zinc, dissolved	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5
Molybdenum, dissolved	0.14	0.026	0.029
Sodium, dissolved	110	110	120

These samples are scheduled to be discarded 30 days after the date of this report.

CS/dh
dh

Mary Labisiak
for Cathy Shigarts
Water Laboratory
Supervisor

Mobil Oil Corporation

URANIUM MINERALS DIVISION

11-19

REPORT NO. 12-26

CROWNPOINT, SECTION 9, PILOT TEST MONTHLY DATA REPORT *

WELL NO.	ARSENIC (mg/l)	MERCURY (total) (mg/l)	CADMIUM (mg/l)	ZINC (mg/l)	FLOURIDE (mg/l)
9U-202	10.005	10.0001	10.005	10.005	10.5
9U-207	10.005	10.0001	10.005	10.005	10.5
9U-221	10.005	10.0001	10.005	10.005	10.5
9U-222	10.005	10.0001	10.005	10.005	10.5
9U-223	10.005	10.0001	10.005	10.005	10.5
9U-224	10.005	10.0001	10.005	10.005	10.5
9U-225	10.005	10.0001	10.005	10.005	10.5
9U-276B	10.005	10.0001	10.005	10.005	10.5
9U-279	10.005	10.0001	10.005	10.005	10.5

COMMENTS: * Samples collected and reported every four weeks / thirteen times per year

Mobil Oil Corporation

URANIUM MINERALS DIVISION

11-19

REPORT NO. 12-26

CROWNPOINT, SECTION 9, PILOT TEST

MONTHLY DATA REPORT *

WELL NO.	ARSENIC (mg/l)	MERCURY (total) (mg/l)	CADMIUM (mg/l)	ZINC (mg/l)	FLOURIDE (mg/l)
9U-276A	<u>20.005</u>	<u>20.0001</u>	<u>20.005</u>	<u>0.015</u>	<u>20.5</u>
9U-277	<u>20.005</u>	<u>20.0001</u>	<u>20.005</u>	<u>0.012</u>	<u>20.5</u>
9U-278	<u>20.005</u>	<u>20.0001</u>	<u>20.005</u>	<u>20.005</u>	<u>20.5</u>
9U-280	<u>20.005</u>	<u>20.0001</u>	<u>20.005</u>	<u>20.005</u>	<u>20.5</u>

COMMENTS: * Samples collected and reported every four weeks / thirteen times per year

Union Oil Corporation

URANIUM MINERALS DIVISION

11-19

REPORT NO. 12-26

CROWNPOINT, SECTION 9, PILOT TEST MONTHLY DATA REPORT *

WELL NO.	SULFATE (mg/l)	URANIUM (mg/l)	MOLYBDENUM (mg/l)	SODIUM (mg/l)	GROSS * (pci/l)	GROSS * (pci/l)
9U-276A	23	20.1	0.031	120	3±4	4±3
9U-277	15	20.1	0.007	150	24±10	5±3
9U-278	27	20.1	0.14	110	5±5	8±3
9U-280	26	20.1	0.029	120	3±4	4±3

COMMENTS: * Samples collected and reported every four weeks / thirteen times per year

Mobil Oil Corporation

ENERGY MINERALS DIVISION

11-19

REPORT NO. 12-26

CROWNPOINT, SECTION 9, PILOT TEST

BIWEEKLY DATA REPORT

WELL NO.	pH	Ec (μ mhos)	SULFATE (mg/l)	URANIUM (mg/l)	MOLYBDENUM (mg/l)	SODIUM (mg/l)	GROSS A (pci/l)	GROSS B (pci/l)
9U-202	8.4	322	19	20.1	0.012	110	0.54	4 \pm 3
9U-207	8.5	150	215	20.1	0.005	190	-2 \pm 6	5 \pm 4
9U-221	8.5	330	26	20.1	0.014 ¹	120	12 \pm 6	4 \pm 3
9U-222	8.3	353	20	20.1	0.013	130	5 \pm 5	2 \pm 2
9U-223	8.3	326	23	20.1	0.017	110	1 \pm 4	3 \pm 2
9U-224	8.2	352	26	20.1	0.013	110	5 \pm 4	6 \pm 3
9U-225	8.1	362	18	20.1	0.014	110	17 \pm 7	21 \pm 3
9U-276B	8.7	470	120	20.1	0.006	170	2 \pm 5	2 \pm 3
9U-279	8.6	322	24	20.1	0.026	110	1 \pm 4	4 \pm 3

COMMENTS:

STABILITY PERIOD

MOLYBDENUM ANALYSIS

JANUARY - MAY, 1987

INTERMOUNTAIN LABORATORIES

8708240431 870602
PDR ADOCK 04008911
C PDR



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

25 February, 1987

Mobil Alternative Energy Inc.
P.O. Box F
Crownpoint, NM 87313

Lab No.	Sample ID	Date Sampled	Molybdenum(mg/l)
P4480	9U-211 • 35 gal	01/21/87	2.88
P4481	9U-216 • 45 gal	01/21/87	3.13



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

25 February, 1987

Mobil Alternative Energy Inc.
P.O. Box F
Crownpoint, NM 87313

Lab No.	Sample ID	Date Sampled	Molybdenum(mg/l)
F4506	9U-212 • 45 gal	01/29/87	0.21
F4507	9U-215 • 45 gal	01/29/87	1.05
F4507	9U-217 • 51 gal	01/29/87	0.83
F4662	9U-209	02/13/87	1.05
F4663	9U-210	02/13/87	0.20
F4664	9U-219	02/13/87	1.50
F4665	9U-220	02/13/87	1.25



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

30 March. 1987

Mobil Alternative Energy Inc.
P.O. Box F
Crowpoint. NM 87313

Lab No.	Sample ID	Date Sampled	Dissolved Molybdenum (mg/l)
F4801	9U-208	03/13/87	1.79
F4802	9U-209	03/13/87	0.98
F4803	9U-210	03/13/87	0.14
F4804	9U-213	03/13/87	2.11
F4805	9U-214	03/13/87	0.87
F4838	9U-211	03/20/87	4.05
F4839	9U-215	03/20/87	1.29
F4840	9U-218	03/20/87	0.28
F4841	9U-219	03/20/87	1.40
F4842	9U-220	03/20/87	1.08



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 328-4737

20 May, 1987

Mobil Alternative Energy Inc.
P.O. Box F
Crowpoint, NM 87313

Lab No.	Sample ID	Date Sampled	Dissolved Molybdenum (mg/l)
		<i>MARCH</i>	
F4981	9U-212	04/14/87	0.27
F4982	9U-216	04/14/87	3.24
F4983	9U-217	04/14/87	2.35
F5020	9U-208	04/21/87	1.62
F5021	9U-209	04/21/87	0.67
F5022	9U-210	04/21/87	0.16
F5023	9U-214	04/21/87	0.63
F5118	9U-212	05/14/87	0.22
F5119	9U-217	05/14/87	0.86
F5120	9U-219	05/14/87	0.72
F5121	9U-211	05/15/87	2.66
F5122	9U-216	05/15/87	2.87

STABILITY PERIOD

FULL ANALYSES

NOVEMBER 1986 - APRIL 1987

ACCU-LABS, INCORPORATED

8708240435 870602
PDR ADOCK 04008911
C PDR



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

December 22, 1986
Page 1 of 2

Mr: Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23255-6
Date Samples Rec'd 12-5-86

REPORT OF ANALYSIS

ALR Designation	8752-23255-6-1	8752-23255-6-2	8752-23255-6-3
Sponsor Designation	208	210	211
	11-25-86	11-25-86	11-25-86
Determination: mg/L			
Aluminum, dissolved	<0.5	<0.5	<0.5
Arsenic, dissolved	<0.005	0.015	0.006
Barium, dissolved	<0.2	<0.2	<0.2
Boron	0.2	0.3	0.8
Cadmium, dissolved	<0.005	<0.005	<0.005
Chloride	26	10	120
Chromium, dissolved	<0.005	<0.005	<0.005
Cobalt, dissolved	<0.02	<0.02	<0.02
Copper, dissolved	<0.005	<0.005	<0.005
Cyanide	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5
Iron, dissolved	<0.02	<0.02	0.10
Lead, dissolved	0.014	<0.005	<0.005
Manganese, dissolved	<0.005	<0.005	0.067
Molybdenum, dissolved	1.2	0.17	2.3
Mercury, dissolved	0.0001	<0.0001	<0.0001
Nickel, total	<0.02	<0.02	<0.02
Nitrate (as N)	<0.05	<0.05	<0.05
pH	9.1	9.1	8.9
Phenols	<0.002	<0.002	0.005
Selenium, dissolved	<0.005	<0.005	<0.005
Silver, dissolved	<0.005	<0.005	<0.005
Sulfate (as SO ₄)	51	34	33
TDS (at 180°C)	330	270	420



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

January 16, 1987
Page 1 of 2

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-23255-6
Date Samples Rec'd 12-5-86

REPORT OF ANALYSIS

ALR Designation	8752-23255-6-1	8752-23255-6-2	8752-23255-6-3
Sponsor Designation	208	210	211
	<u>11-25-86</u>	<u>11-25-86</u>	<u>11-25-86</u>
Determination: pCi/L			
Radium-226, dissolved, ± counting error*	9.7 ± 1.8	1.2 ± 0.6	21 ± 4
Radium-228, dissolved, ± counting error*	0.2 ± 0.8	-0.9 ± 1.0	-0.9 ± 1.9
Combined Ra-226 and Ra-228, dissolved, ± counting error*	9.9 ± 2.0	0.3 ± 1.2	20 ± 4
Uranium (as U), dissolved, mg/L	0.12	0.026	0.022

February 3, 1987

Page 2 of 2

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23300-7
Date Samples Rec'd 12-12-86

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

8752-23300-7-6
219
11-26-86

8752-23300-7-7
220
11-26-86

Determination: pCi/L

Radium-226, dissolved,
± counting error*

180 ± 10

19 ± 2

Radium-228, dissolved,
± counting error*

-0.7 ± 1.9

1.9 ± 1.7

Combined Radium-226 and
Radium-228, dissolved,
± counting error*

180 ± 10

21 ± 2.6

Uranium (as U),
dissolved, mg/L

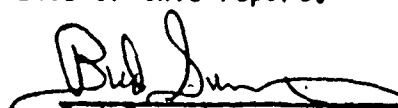
1.4

0.42

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be discarded 45 days after the date of this report.

BS/dh

dh:


Bud Summers
Radiochemistry
Supervisor

Accu-Labs Research, Inc.

January 12, 1987
Page 4 of 4

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23300-7
Date Samples Rec'd 12-12-86

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

8752-23300-7-6
219
11-26-86

8752-23300-7-7
220
11-26-86

Determination: mg/L

Molybdenum, dissolved
Mercury, dissolved
Nickel, total
Nitrate (as N)
pH
Phenols
Selenium, dissolved
Silver, dissolved
Sulfate (as SO₄)
TDS (at 180°C)
Molybdenum*

3.3, 2.6
0.0013
<0.02
<0.05
9.2
0.006
0.049
<0.005
87
550
2.1

0.019
<0.0001
<0.02
<0.05
9.2
0.003
<0.005
<0.005
25
320
--

*Sample neutralized to pH 7 with NaOH; supernate analyzed for molybdenum.

These samples are scheduled to be discarded 30 days after the date of this report.

Cathy Shugarts
Cathy Shugarts
Water Laboratory
Supervisor

CS/dh

Accu-Labs Research, Inc.

January 12, 1987
Page 3 of 4

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23300-7
Date Samples Rec'd 12-12-86

REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

8752-23300-7-6
219
11-26-86

8752-23300-7-7
220
11-26-86

Determination: mg/L

Aluminum, dissolved
Arsenic, dissolved
Barium, dissolved
Boron
Cadmium, dissolved
Chloride
Chromium, dissolved
Cobalt, dissolved
Copper, dissolved
Cyanide
Fluoride
Iron, dissolved
Lead, dissolved
Manganese, dissolved

3.4
0.008
0.7
0.3
<0.005
74
<0.005
<0.02
0.020
<0.005
<0.5
0.38
0.10
0.030

<0.5
0.043
0.2
0.2
<0.005
47
<0.005
<0.02
0.020
<0.005
<0.5
<0.02
<0.005
<0.005



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

February 3, 1987
Page 1 of 2

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23300-7
Date Samples Rec'd 12-12-86

REPORT OF ANALYSIS

ALR Designation	8752-23300-7-1	8752-23300-7-2	8752-23300-7-3	8752-23300-7-4	8752-23300-7-5
Sponsor Designation	209	212	215	216	217
	<u>11-26-86</u>	<u>11-26-86</u>	<u>11-26-86</u>	<u>11-26-86</u>	<u>11-26-86</u>
Determination: pCi/L					
Radium-226, dissolved, ± counting error*	41 ± 4	1.1 ± 0.6	39 ± 4	27 ± 3	7.1 ± 1.6
Radium-228, dissolved, ± counting error*	0.1 ± 1.1	-0.1 ± 0.9	1.6 ± 1.5	0.1 ± 1.0	0.0 ± 0.9
Combined Radium-226 and Radium-228, dissolved, ± counting error*	41 ± 4	1.0 ± 1.1	41 ± 4	27 ± 3	7.1 ± 1.8
Uranium (as U), dissolved, mg/L	0.11	0.003	0.29	0.081	0.084

Accu-Labs Research, Inc.

January 12, 1987

Page 2 of 4

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23300-7
Date Samples Rec'd 12-12-86

REPORT OF ANALYSIS

ALR Designation	8752-23300-7-1	8752-23300-7-2	8752-23300-7-3	8752-23300-7-4	8752-23300-7-5
Sponsor Designation	209	212	215	216	217
	11-26-86	11-26-86	11-26-86	11-26-86	11-26-86
Determination: mg/L					
Molybdenum, dissolved	3.2	0.37	1.7	7.7, 7.2	4.0, 3.7
Mercury, dissolved	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel, total	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate (as N)	<0.05	<0.05	<0.05	<0.05	<0.05
pH	8.9	9.5	9.5	9.9	9.2
Phenols	0.003	0.004	0.003	0.035	0.002
Selenium, dissolved	<0.005	<0.005	<0.005	0.002	<0.005
Silver, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Sulfate (as SO ₄)	62	23	45	31	35
TDS (at 180°C)	320	310	460	420	340
Molybdenum*	--	--	--	6.8	3.0

*Sample neutralized to pH 7 with NaOH; supernate analyzed for molybdenum.



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

January 12, 1987

Page 1 of 4

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23300-7

Date Samples Rec'd 12-12-86

REPORT OF ANALYSIS

ALR Designation	8752-23300-7-1	8752-23300-7-2	8752-23300-7-3	8752-23300-7-4	8752-23300-7-5
Sponsor Designation	209	212	215	216	217
	11-26-86	11-26-86	11-26-86	11-26-86	11-26-86
Determination: mg/L					
Aluminum, dissolved	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic, dissolved	<0.005	<0.005	0.026	0.034	<0.005
Barium, dissolved	<0.2	<0.2	<0.2	0.3	<0.2
Boron	0.2	0.3	0.3	0.3	0.2
Cadmium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Chloride	40	9	94	84	75
Chromium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt, dissolved	<0.02	<0.02	<0.02	<0.02	<0.02
Copper, dissolved	0.005	0.005	0.020	0.005	0.010
Cyanide	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5	<0.5	<0.5
Iron, dissolved	<0.02	0.02	0.04	0.04	<0.02
Lead, dissolved	0.012	<0.005	<0.005	<0.005	<0.005
Manganese, dissolved	<0.005	<0.005	0.014	<0.005	<0.005

January 16, 1987
Page 2 of 2

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23255-6
Date Samples Rec'd 12-5-86

REPORT OF ANALYSIS

ALR Designation	8752-23255-6-4	8752-23255-6-5	8752-23255-6-6
Sponsor Designation	213	214	218
	<u>11-25-86</u>	<u>11-25-86</u>	<u>11-25-86</u>
Determination: pCi/L			
Radium-226, dissolved, ± counting error*	6.7 ± 1.4	2.5 ± 1.1	3.6 ± 1.0
Radium-228, dissolved, ± counting error*	0.3 ± 1.0	0.5 ± 2.3	0.5 ± 3.3
Combined Ra-226 and Ra-228, dissolved, ± counting error*	7.0 ± 1.7	3.0 ± 2.5	4.1 ± 3.4
Uranium (as U), dissolved, mg/L	0.15	0.056	0.081

*Variability of the radioactive disintegration process (counting error)
at the 95% confidence level, 1.96σ.
These samples are scheduled to be discarded 45 days after the date of
this report.

BS/dh *dh*

Bud Summers

Bud Summers
Radiochemistry
Supervisor

December 22, 1986

Page 2 of 2

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23255-6

Date Samples Rec'd 12-5-86

REPORT OF ANALYSIS

ALR Designation	8752-23255-6-4	8752-23255-6-5	8752-23255-6-6
Sponsor Designation	213	214	218
	11-25-86	11-25-86	11-25-86
Determination: mg/L			
Aluminum, dissolved	<0.5	0.6	<0.5
Arsenic, dissolved	<0.005	0.009	0.016
Barium, dissolved	<0.2	<0.2	<0.2
Boron	0.2	0.5	0.2
Cadmium, dissolved	<0.005	<0.005	<0.005
Chloride	35	51	19
Chromium, dissolved	<0.005	<0.005	<0.005
Cobalt, dissolved	<0.02	<0.02	<0.02
Copper, dissolved	<0.005	<0.005	<0.005
Cyanide	0.006	<0.005	<0.005
Fluoride	<0.5	0.6	<0.5
Iron, dissolved	<0.02	0.20	<0.02
Lead, dissolved	<0.005	0.005	<0.005
Manganese, dissolved	<0.005	<0.005	<0.005
Molybdenum, dissolved	1.1	0.91	0.29
Mercury, dissolved	<0.0001	<0.0001	<0.0001
Nickel, total	<0.02	<0.02	<0.02
Nitrate (as N)	<0.05	<0.05	<0.05
pH	9.2	10.1	9.1
Phenols	0.002	0.002	<0.002
Selenium, dissolved	0.008	<0.005	<0.005
Silver, dissolved	<0.005	<0.005	<0.005
Sulfate (as SO ₄)	45	64	32
TDS (at 180°C)	310	360	300

These samples are scheduled to be discarded 30 days after the date of this report.

Cathy Shugarto
Cathy Shugarto
Water Laboratory
Supervisor

CS/dh *dh*



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

January 15, 1987

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23373-4

Date Samples Rec'd 12-23-86

REPORT OF ANALYSIS

ALR Designation	8752-23373-4-1	8752-23373-4-2	8752-23373-4-3	8752-23373-4-4
Sponsor Designation	208	213	214	218
	<u>12-17-86</u>	<u>12-17-86</u>	<u>12-17-86</u>	<u>12-17-86</u>
Determination: mg/L				
Chloride	30	34	51	13
Manganese, dissolved	<0.005	<0.005	<0.005	<0.005
Molybdenum, dissolved	2.0	1.7	1.2	0.55
Phenols	0.004	0.004	0.009	<0.002
Selenium, dissolved	<0.005	<0.005	<0.005	<0.005
Sulfate (as SO ₄)	50	33	64	30
TDS (at 180°C)	340	340	380	300

These samples are scheduled to be disposed of 30 days after the date of this report.

CS/dh

Cathy Shugarts
Supervisor
Water Laboratory



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

February 11, 1987

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23538-5

Date Samples Rec'd 1-28-87

REPORT OF ANALYSIS

ALR Designation	8752-23538-5-1	8752-23538-5-2	8752-23538-5-3	8752-23538-5-4	8752-23538-5-5
Sponsor Designation	211	212	215	216	217
	<u>1-19-87</u>	<u>1-19-87</u>	<u>1-20-87</u>	<u>1-21-87</u>	<u>1-22-87</u>

Determination: mg/L

Chloride	130	9.7	110	80	81
Manganese, dissolved	0.052	<0.005	<0.005	0.005	<0.005
Molybdenum, dissolved	4.6, 3.9	0.41, 0.28	2.2, 1.9	4.9, 4.1	3.6, 2.8
Phenols	0.008	0.006	0.005	0.025	0.003
Selenium, dissolved	0.007	<0.005	<0.005	0.008	<0.005
Sulfate (as SO ₄)	22	31	44	39	23
TDS (at 180°C)	450	310	460	380	370

These samples are scheduled to be discarded 30 days after the date of this report.

Cathy Shugarts
Cathy Shugarts
Water Laboratory
Supervisor

CS/dh *dh*



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February 27, 1987
Page 1 of 1

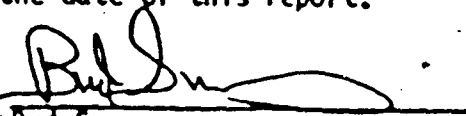
Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-23538-5
Date Samples Rec'd 1-28-87

REPORT OF ANALYSIS

ALR Designation	8752-23538-5-1	8752-23538-5-2	8752-23538-5-3	8752-23538-5-4	8752-23538-5-5
Sponsor Designation	211	212	215	216	217
Determination: pCi/L	1-19-87	1-19-87	1-20-87	1-21-87	1-22-87
Radium-226, dissolved, ± counting error*	41 ± 3	1.5 ± 0.6	46 ± 3	26 ± 3	9.7 ± 1.6
Radium-228, dissolved, ± counting error*	1.4 ± 1.0	0.2 ± 1.1	1.0 ± 1.1	0.6 ± 1.7	0.2 ± 1.1
Combined Ra-226 and Ra-228, ± counting error*	42 ± 3	1.7 ± 1.3	47 ± 3	27 ± 3	9.9 ± 1.9

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be discarded 45 days after the date of this report.


Bud Summers
Radiochemistry
Supervisor

BS/dh





Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

March 5, 1987

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23665-5

Date Samples Rec'd 2-17-87

REPORT OF ANALYSIS

ALR Designation	8752-23665-5-1	8752-23665-5-2	8752-23665-5-3	8752-23665-5-4	8752-23665-5-5
Sponsor Designation	209	210	219	220	9u80
	<u>2-9-87</u>	<u>2-10-87</u>	<u>2-11-87</u>	<u>2-12-87</u>	<u>2-13-87</u>

Determination: mg/L

Chloride	50	8	66	34	--
Manganese, dissolved	0.016	<0.005	0.028	<0.005	--
Molybdenum, dissolved	1.3	0.25	1.3	1.2	<0.005
Phenols	0.004	<0.002	0.006	<0.002	--
Selenium, dissolved	<0.05*	<0.025*	0.022	<0.025	--
Sulfate (as SO ₄)	85	34	89	40	--
TDS (at 180°C)	380	270	410	250	--

*Higher detection limit due to sample matrix interference.

These samples are scheduled to be discarded 30 days after the date of this report.

CS/dh

Cathy Shugarts
Water Laboratory
Supervisor



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

April 14, 1987

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-23665-5

Date Samples Rec'd 2-17-87

REPORT OF ANALYSIS

ALR Designation	8752-23665-5-1	8752-23665-5-2	8752-23665-5-3	8752-23665-5-4
Sponsor Designation	209	210	219	220
	<u>2-9-87</u>	<u>2-10-87</u>	<u>2-11-87</u>	<u>2-12-87</u>
Determination: pCi/L				
Radium-226, dissolved, ± counting error*	32 ± 3	2.4 ± 0.9	88 ± 5	13 ± 2
Radium-228, dissolved, ± counting error*	1.1 ± 1.3	-0.2 ± 1.0	3.1 ± 1.1	0.7 ± 0.9
Combined Ra-226 and Ra-228, ± counting error*	33 ± 3	2.2 ± 1.3	91 ± 5	14 ± 2

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be discarded 45 days after the date of this report.

Bud Summers
Radiochemistry
Supervisor

BS/dh

April 21, 1987

Page 2 of 2

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23873-5
Date Samples Rec'd 3-18-87

REPORT OF ANALYSIS

ALR Designation	8752-23873-5-1	8752-23873-5-2	8752-23873-5-3	8752-23873-5-4	8752-23873-5-5
Sponsor Designation	208	209	210	213	214
	3-10-87	3-12-87	3-11-87	3-9-87	3-13-87
Determination: mg/L					
Mercury, dissolved	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel, total	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate (as N)	<0.05	<0.05	<0.05	<0.05	<0.05
pH	9.1	9.3	9.2	9.0	10.6
Phenols	0.003	0.005	0.009	0.010	0.019
Selenium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Silver, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Sulfate (as SO ₄)	66	74	38	49	75
TDS (at 180°C)	380	410	320	350	360

These samples are scheduled to be discarded 30 days after the date of this report.

Cathy Shugarts
Cathy Shugarts
Water Laboratory
Supervisor

CS/dh

dh



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
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April 21, 1987

Page 1 of 2

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-23873-5
Date Samples Rec'd 3-18-87

REPORT OF ANALYSIS

ALR Designation	8752-23873-5-1	8752-23873-5-2	8752-23873-5-3	8752-23873-5-4	8752-23873-5-5
Sponsor Designation	208	209	210	213	214
	3-10-87	3-12-87	3-11-87	3-9-87	3-13-87
Determination: mg/L					
Aluminum, dissolved	<0.5	<0.5	<0.5	<0.5	1.1
Arsenic, dissolved	<0.005	<0.005	0.018	<0.005	0.013
Barium, dissolved	<0.2	<0.2	<0.2	<0.2	<0.2
Boron	0.2	0.2	0.7	0.2	0.7
Cadmium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Chloride	31	44	11	14	50
Chromium, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt, dissolved	<0.02	<0.02	<0.02	<0.02	<0.02
Copper, dissolved	<0.005	<0.005	<0.005	<0.005	<0.005
Cyanide	<0.005	<0.005	<0.005	<0.005	0.005
Fluoride	<0.5	<0.5	<0.5	<0.5	0.8
Iron, dissolved	0.02	<0.02	<0.02	<0.02	0.05
Lead, dissolved	0.005	0.005	<0.005	<0.005	<0.005
Manganese, dissolved	0.009	<0.005	<0.005	0.007	<0.005
Molybdenum, dissolved (HNO ₃)	2.1	0.55	0.17	2.0	0.97
Molybdenum, dissolved (HCl)	2.0	0.32	0.17	2.5	0.17



Accu-Labs Research, Inc.

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April 21, 1987

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23943-1

Date Samples Rec'd 3-30-87

REPORT OF ANALYSIS

ALR Designation:
Sponsor Designation:

8752-23943-1-1

211

3-20-87

Determination: mg/L

Aluminum, dissolved	<0.2
Arsenic, dissolved	<0.005
Barium, dissolved	<0.2
Boron	0.7
Cadmium, dissolved	<0.005
Chloride	130
Chromium, dissolved	<0.005
Cobalt, dissolved	<0.02
Copper, dissolved	<0.005
Cyanide	<0.005
Fluoride	<0.5
Iron, dissolved	0.03
Lead, dissolved	<0.005
Manganese, dissolved	0.023
Molybdenum, dissolved (HCl)	2.6
Molybdenum, dissolved (HNO ₃)	3.9
Mercury, dissolved	<0.0001
Nickel, total	<0.02
Nitrate/Nitrite (as N)	1.1
pH	9.3
Phenols	0.011
Selenium, dissolved	0.006
Silver, dissolved	<0.005
Sulfate (as SO ₄)	30
TDS (at 180°C)	450

These samples are scheduled to be disposed of 30 days after the date of this report.

CS/dh *dh*

Cathy Shugarts
Cathy Shugarts
Supervisor
Water Laboratory



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

May 22, 1987
Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crowpoint, NM 87313

RE: 8752-23943-1
Date Samples Rec'd 3-30-87

REPORT OF ANALYSIS

ALR Designation	8752-23943-1-1
Sponsor Designation	211
	<u>3-20-87</u>
Determination: pCi/L	
Radium-226, dissolved, ± counting error*	30 ± 3
Radium-228, dissolved, ± counting error*	0.5 ± 0.9
Combined Ra-226 and Ra-228, dissolved, ± counting error*	30 ± 3
Uranium (as U), dissolved, mg/L	0.015

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

BS/dh *dh*

Bud Summers

Bud Summers
Radiochemistry
Supervisor

Accu-Labs Research, Inc.

April 13, 1987

Page 2 of 2

Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-23911-4
Date Samples Rec'd 3-24-87

REPORT OF ANALYSIS

ALR Designation	8752-23911-4-1	8752-23911-4-2	8752-23911-4-3	8752-23911-4-4
Sponsor Designation	215	218	219	220
	<u>3-19-87</u>	<u>3-16-87</u>	<u>3-17-87</u>	<u>3-18-87</u>
Determination: mg/L				
Mercury, dissolved	<0.0001	<0.0001	<0.0001	<0.0001
Nickel, total	<0.02	<0.02	<0.02	<0.02
Nitrate/Nitrite (as N)	<0.05	<0.05	1.3	<0.05
pH	9.8	9.1	9.4	9.1
Phenols	0.006	0.015	0.009	0.017
Selenium, dissolved	<0.005	<0.005	0.008	<0.005
Silver, dissolved	<0.005	<0.005	<0.005	<0.005
Sulfate (as SO ₄)	48	38	76	40
TDS (at 180°C)	420	300	460	310

These samples are scheduled to be discarded 30 days after the date of this report.

Cathy Shugarts
Cathy Shugarts
Water Laboratory
Supervisor

CS/dh *dh*



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

April 13, 1987
Page 1 of 2

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-23911-4
Date Samples Rec'd 3-24-87

REPORT OF ANALYSIS

ALR Designation	8752-23911-4-1	8752-23911-4-2	8752-23911-4-3	8752-23911-4-4
Sponsor Designation	215	218	219	220
	3-19-87	3-16-87	3-17-87	3-18-87
Determination: mg/L				
Aluminum, dissolved	<0.5	<0.5	2.1	<0.5
Arsenic, dissolved	0.030	0.024	0.006	0.081
Barium, dissolved	<0.2	<0.2	0.3	<0.2
Boron	0.3	0.2	0.3	0.2
Cadmium, dissolved	<0.005	<0.005	<0.005	<0.005
Chloride	98	10	44	28
Chromium, dissolved	<0.005	<0.005	<0.005	<0.005
Cobalt, dissolved	<0.005	<0.005	<0.005	<0.005
Copper, dissolved	<0.005	<0.005	0.010	<0.005
Cyanide	<0.005	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5	<0.5
Iron, dissolved	0.02	0.02	0.20	0.02
Lead, dissolved	<0.005	<0.005	0.067	0.005
Manganese, dissolved	0.008	0.007	0.017	0.007
Molybdenum, dissolved (HNO ₃)	1.2	0.24	1.3	1.1
Molybdenum, dissolved (HCl)	0.78	0.24	0.67	1.1



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April 15, 1987

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Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

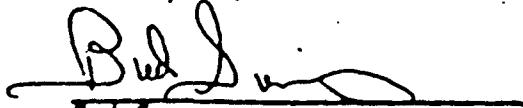
RE: 8752-23873-5

Date Samples Rec'd 3-18-87

REPORT OF ANALYSIS

ALR Designation	8752-23873-5-1	8752-23873-5-2	8752-23873-5-3	8752-23873-5-4	8752-23873-5-5
Sponsor Designation	208	209	210	213	214
	3-10-87	3-12-87	3-11-87	3-9-87	3-13-87
Determination: pCi/L					
Radium-226, dissolved, ± counting error*	8.4 ± 1.3	20 ± 3	1.0 ± 0.5	8.8 ± 1.5	3.3 ± 0.8
Radium-228, dissolved, ± counting error*	-0.5 ± 1.0	0.7 ± 0.9	0.1 ± 1.0	-0.9 ± 0.9	0.5 ± 0.9
Combined Ra-226 and Ra-228, ± counting error*	7.9 ± 1.6	21 ± 3	1.1 ± 1.1	7.9 ± 1.7	3.8 ± 1.2
Uranium (as U), dissolved, mg/L	0.086	0.061	0.021	0.11	0.023

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be discarded 45 days after the date of this report.


Bud Summers
Radiochemistry
Supervisor

BS/dh

dh



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

April 30, 1987

Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

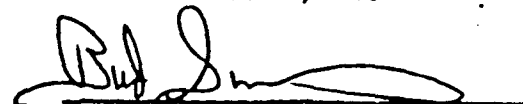
RE: 8752-23911-4

Date Samples Rec'd 3-24-87

REPORT OF ANALYSIS

ALR Designation	8752-23911-4-1	8752-23911-4-2	8752-23911-4-3	8752-23911-4-4
Sponsor Designation	215	218	219	220
Determination: pCi/L	<u>3-19-87</u>	<u>3-16-87</u>	<u>3-17-87</u>	<u>3-18-87</u>
Radium-226, dissolved, ± counting error*	40 ± 2	4.0 ± 0.6	57 ± 2	12 ± 1
Radium-228, dissolved, ± counting error*	0.9 ± 0.8	0.2 ± 1.2	0.9 ± 1.1	0.0 ± 0.8
Combined Ra-226 and Ra-228, dissolved, ± counting error*	41 ± 2	4.2 ± 1.3	58 ± 2	12 ± 1
Uranium (as U), dissolved, mg/L	0.13	0.036	0.76	0.35

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be discarded 45 days after the date of this report.


Bud Summers
Radiochemistry
Supervisor

BS/dh



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

May 11, 1987

Page 1 of 2

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-24100-3

Date Samples Rec'd 4-16-87

REPORT OF ANALYSIS

ALR Designation	8752-24100-3-1	8752-24100-3-2	8752-24100-3-3
Sponsor Designation	212	216	217
	<u>4/10 + 4/13/87</u>	<u>4/10/87</u>	<u>4/13/87</u>
Determination: mg/L			
Aluminum, dissolved	<0.5	<0.5	<0.5
Arsenic, dissolved	<0.005	0.027	<0.005
Barium, dissolved	<0.2	<0.2	<0.2
Boron	0.1	0.2	0.2
Cadmium, dissolved	<0.005	<0.005	<0.005
Chloride	7	81	84
Chromium, dissolved	<0.005	<0.005	<0.005
Cobalt, dissolved	<0.02	<0.02	<0.02
Copper, dissolved	<0.005	<0.005	<0.005
Cyanide	<0.005	<0.005	<0.005
Fluoride	<0.5	<0.5	<0.5
Iron, dissolved	0.01	0.06	0.03
Lead, dissolved	<0.005	<0.005	<0.005
Manganese, dissolved	<0.005	0.005	<0.005
Molybdenum, diss. (HCl)	0.30	3.7	1.6
Molybdenum, diss. (HNO ₃)	0.33	4.2	3.0
Mercury, dissolved	<0.0001	<0.0001	<0.0001
Nickel, total	<0.01	<0.01	<0.01
Nitrate/Nitrite (as N)	<0.05	<0.05	0.22
pH	9.6	10.0	9.2
Phenols	<0.002	0.018	0.003

May 11, 1987
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Mr. Joe Sciba
Mobil Oil Corporation

RE: 8752-24100-3
Date Samples Rec'd 4-16-87

REPORT OF ANALYSIS

ALR Designation	8752-24100-3-1	8752-24100-3-2	8752-24100-3-3
Sponsor Designation	212	216	217
	<u>4/10 + 4/13/87</u>	<u>4/10/87</u>	<u>4/13/87</u>

Determination: mg/L

Selenium, dissolved	<0.005	0.026	0.020
Silver, dissolved	<0.005	<0.005	<0.005
Sulfate (as SO ₄)	55	45	50
TDS (at 180°C)	310	340	360
Eh (Redox Potential), mv	--	--	+ 221

These samples are scheduled to be discarded 30 days after the date of this report.

Cathy Shugarts
Cathy Shugarts
Water Laboratory
Supervisor

CS/dh

dh



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
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May 22, 1987
Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-24100-3
Date Samples Rec'd 4-16-87

REPORT OF ANALYSIS

ALR Designation	8752-24100-3-1	8752-24100-3-2	8752-24100-3-3
Sponsor Designation	212 <u>4-10 and 4-13-87</u>	216 <u>4-10-87</u>	217 <u>4-13-87</u>
Determination: pCi/L			
Uranium (as U), dissolved, mg/L	0.004	0.017	0.052
Radium-226, dissolved, ± counting error*	0.9 ± 0.9	15 ± 2	7.4 ± 1.8
Radium-228, dissolved, ± counting error*	0.4 ± 0.9	1.5 ± 1.0	0.5 ± 0.7
Combined Ra-226 and Ra-228, dissolved, ± counting error*	1.3 ± 1.3	16 ± 2	7.9 ± 1.9

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

Bud Summers
Radiochemistry
Supervisor

BS/dh



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

May 11, 1987
Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crompoint, NH 87313

RE: 8752-24125-4
Date Samples Rec'd 4-23-87

REPORT OF ANALYSIS

ALR Designation	8752-24125-4-1	8752-24125-4-2	8752-24125-4-3	8752-24125-4-4
Sponsor Designation	208	209	210	214
	4-20-87	4-20-87	4-20-87	4-20-87
Determination: mg/L				
Chloride	27	50	<3	55
Manganese, dissolved	0.009	0.009	<0.005	<0.005
Molybdenum, dissolved (HCl)	2.2	0.66	0.21	0.15
Molybdenum, diss. (HNO ₃)	2.3	1.0	0.22	0.85
Phenols	<0.002	<0.002	<0.002	<0.002
Selenium, dissolved	<0.005	<0.005	<0.005	<0.005
Sulfate (as SO ₄)	11,000	10,000	11,000	11,000
TDS (at 180°C)	11,000	11,000	11,000	11,000

These samples are scheduled to be discarded 30 days after the date of this report.

CS/dh

dh

Cathy Shugart
Cathy Shugart
Water Laboratory
Supervisor



Accu-Labs Research, Inc.
11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

May 22, 1987
Page 1 of 1

Mr. Joe Sciba
Mobil Oil Corporation
P.O. Drawer F
Crownpoint, NM 87313

RE: 8752-24125-4
Date Samples Rec'd 4-23-87

REPORT OF ANALYSIS

ALR Designation	8752-24125-4-1	8752-24125-4-2	8752-24125-4-3	8752-24125-4-4
Sponsor Designation	208	209	210	214
	<u>4-20-87</u>	<u>4-20-87</u>	<u>4-20-87</u>	<u>4-20-87</u>
Determination: pCi/L				
Radium-226, dissolved, ± counting error*	6.8 ± 1.4	32 ± 3	1.8 ± 0.9	5.3 ± 1.3
Radium-228, dissolved, ± counting error*	0.2 ± 0.7	1.2 ± 0.8	0.1 ± 0.8	0.3 ± 0.9
Combined Ra-226 and Ra-228, dissolved, ± counting error*	7.0 ± 1.6	33 ± 3	1.9 ± 1.2	5.6 ± 1.6

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be discarded 45 days after the date of this report.

BS/dh *dh*

Bud Summers
Bud Summers
Radiochemistry
Supervisor

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- 1 -

FEB 4 1988

URFO:TT0
Docket No. 40-8911

Jim Analla, Environmental
Quality Services Officer
Bureau of Indian Affairs
P.O. Box 1060
Mail Code 305E
Gallup, New Mexico 87301

Dear Mr. Analla:

The Uranium Recovery Field Office (URFO) has completed review of all pertinent information involving the Mobil Oil Corporation, Crownpoint, Section 9, In Situ Pilot Test Project, ground-water restoration and reclamation program. An Environmental Assessment (EA) has been written and based on the EA, a draft finding of no significant impact (FONSI) is being forwarded for publication in the Federal Register. The comment period for the draft FONSI will be extended to 60 days to allow all interested parties adequate time to respond. A final FONSI will not be published until we are convinced that all outstanding issues have been adequately addressed. A copy of the EA and the draft FONSI are enclosed.

As I understand it, we have tentatively scheduled two meetings for March 8, 1988. At this phase of the process, it would be beneficial to all concerned to meet for informative sessions. The two scheduled meetings are to assure that all parties are aware of the status of the project and the responsibilities of each party. One meeting will be with the Navajo Tribe Officials at Gallup, New Mexico, at 1:30 p.m., and another with local interested citizens at Crownpoint, that evening. At this time, I anticipate that NRC may have three to seven representatives at the meetings. Please let me know if there are changes to the scheduled meetings.

In terms of agendas for the meetings, I suggest that Mobil start off with a brief history of the project, followed by discussions by each agency on their role, responsibilities and future actions. We should probably try to keep the meetings rather informal with plenty of time for discussion and questions. I also suggest that you lead the meetings for us.

OFC									
NAME									
DATE	88/02/03								

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PDR

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- 2 -

FEB 4 1988

If you have any questions or comments, please feel free to contact me or Mr. Tom Olsen of my staff at (303) 236-2805.

Sincerely,

151

Edward F. Hawkins, Chief
Licensing Branch 1
Uranium Recovery Field Office
Region IV

Enclosures: As stated

OFC	URFO	URFO
NAME	Tolsen/lv	EHawkins
DATE	88/02/03	2/4/88

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- 1 -

FEB 3 1988

URFO:TTO
Docket No. 40-8911

Mr. Roger Baer
Bureau of Land Management
Albuquerque District
435 Montano NE
Albuquerque, New Mexico 87107

Dear Mr. Baer:

The Uranium Recovery Field Office (URFO) has completed review of all pertinent information involving the Mobil Oil Corporation, Crownpoint, Section 9, In Situ Pilot Test Project, ground-water restoration and reclamation program. An Environmental Assessment (EA) has been written and based on the EA, a draft finding of no significant impact (FONSI) is being forwarded for publication in the Federal Register. The comment period for the draft FONSI will be extended to 60 days to allow all interested parties adequate time to respond. A final FONSI will not be published until we are convinced that all outstanding issues have been adequately addressed. A copy of the EA and the draft FONSI are enclosed.

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OFC

NAME

DATE : 88/02/03

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FEB 3 1988

- 2 -

If you have any questions or comments, please feel free to contact me or Mr. Tom Olsen of my staff at (303) 236-2805.

Sincerely,

151

Edward F. Hawkins, Chief
Licensing Branch 1
Uranium Recovery Field Office
Region IV

Enclosures: As stated

OFC	: URFO	TO	: URFO	EPH	:	:	:	:	:
NAME	: Tolson/lv	:	E Hawkins	:	:	:	:	:	:
DATE	: 88/02/03	:	2/3/88	:	:	:	:	:	:

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- 1 -

FEB 3 1988

URFO: TTO
Docket No. 40-8911

Ernest Rebuck, Program Manager
Ground Water Section
Environmental Improvement Division
New Mexico Health and Environmental Department
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Mr. Rebuck:

The Uranium Recovery Field Office (URFO) has completed review of all pertinent information involving the Mobil Oil Corporation, Crownpoint, Section 9, In Situ Pilot Test Project, ground-water restoration and reclamation program. An Environmental Assessment (EA) has been written and based on the EA, a draft finding of no significant impact (FONSI) is being forwarded for publication in the Federal Register. The comment period for the draft FONSI will be extended to 60 days to allow all interested parties adequate time to respond. A final FONSI will not be published until we are convinced that all outstanding issues have been adequately addressed. A copy of the EA and the draft FONSI are enclosed.

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OFC

NAME

DATE 88/02/03

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- 2 -

If you have any questions or comments, please feel free to contact me or Mr. Tom Olsen of my staff at (303) 236-2805.

Sincerely,

/s/

Edward F. Hawkins, Chief
Licensing Branch 1
Uranium Recovery Field Office
Region IV

Enclosures: As stated

OFC	URFO	TTD	URFO	3/2/88
NAME	T0lsen/lv		EHawkins	
DATE	88/02/03		2/3/88	

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- 1 -

URFO:TT0

Docket No. 40-8911

Jim Cullen, Manager
Technical Services
Mobil Oil Corporation
P.O. Box 17772
Denver, Colorado 80217

Dear Mr. Cullen:

The Uranium Recovery Field Office (URFO) has completed review of all pertinent information involving the Mobil Oil Corporation, Crownpoint, Section 9, In Situ Pilot Test Project, ground-water restoration and reclamation program. An Environmental Assessment (EA) has been written and based on the EA, a draft finding of no significant impact (FONSI) is being forwarded for publication in the Federal Register. The comment period for the draft FONSI will be extended to 60 days to allow all interested parties adequate time to respond. A final FONSI will not be published until we are convinced that all outstanding issues have been adequately addressed. A copy of the EA and the draft FONSI are enclosed.

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OFC

NAME

DATE 88/02/03

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If you have any questions or comments, please feel free to contact me or Mr. Tom Olsen of my staff at (303) 236-2805.

Sincerely,

151

Edward F. Hawkins, Chief
Licensing Branch 1
Uranium Recovery Field Office
Region IV

Enclosures: As stated

OFC	: URFO	AT0	: URFO	EPH
NAME	: Tolson/lv	: EHawkins		
DATE	: 88/02/03	: 2/3/88		

U.S. NUCLEAR REGULATORY COMMISSION

DOCKET NO. 40-8911

MOBIL OIL CORPORATION

DRAFT FINDING OF NO SIGNIFICANT IMPACT REGARDING A TERMINATION OF THE SOURCE AND BYPRODUCT MATERIAL LICENSE FOR OPERATION OF MOBIL OIL CORPORATION'S CROWNPOINT, SECTION 9, IN SITU PILOT TEST PROJECT, MCKINLEY COUNTY, NEW MEXICO.

AGENCY: U.S. Nuclear Regulatory Commission

ACTION: Notice of Draft Finding of No Significant Impact

1. Proposed Action

The proposed administrative action is to terminate the source and byproduct material license authorizing Mobil Oil Corporation to operate the Crownpoint, Section 9, In Situ Pilot Test Project facility located in McKinley County, New Mexico.

2. Reasons for Draft Finding of No Significant Impact

An environmental assessment was prepared by the staff at the U.S. Nuclear Regulatory Commission (NRC) and issued by the Commission's Uranium Recovery Field Office, Region IV. The environmental assessment performed by the Commission's staff evaluated potential impacts onsite and offsite due to radiological releases that may have occurred during the course of the operation. Additionally, an impact assessment was conducted on ground-water restoration efforts at the site. The assessment indicates that ground-water quality at the site was restored to required levels, with the exception of slightly elevated molybdenum concentrations. Documents used in preparing the assessment included the following:

- ° Environmental and operational information submitted by the licensee to the NRC during the period of October 1, 1986 through November 15, 1987;
- ° Discussions and written correspondence with the State of New Mexico;
- ° Site visit by NRC staff on May 11-12, 1987;
- ° Permit information from the New Mexico Environmental Improvement Division that was transferred to NRC at the time of NRC reassertion of authority over New Mexico licensees in 1986;
- ° Information derived from professional papers, journals and textbooks; U.S. NRC regulations and regulatory guides; Federal, State and local agencies; and independent consultants; and

- ° Mobil Oil Corporation's Irrigation Evaluation Report in Support of the Withdrawal of Discharge Plan DP-26, January 1988.

Based on the review of these documents, the Commission has determined that no significant impact will result from the proposed action.

The following statements support the draft finding of no significant impact and summarize the conclusions resulting from the environmental assessment.


- A. The site reclamation and decontamination program proposed by Mobil Oil Corporation is sufficient to meet all requirements as specified in 10 CFR Part 40.
- B. The ground-water quality at the site has been restored to required concentrations, with the exception of slightly elevated molybdenum concentrations. The elevated molybdenum concentrations are not considered significant due to the very small volume of affected ground water, the natural restoration that will continue to occur over time, and the low probability of use due to the depth to the aquifer and the availability of other, more easily accessible water. Further, it is highly unlikely that additional restoration will provide any more reduction in molybdenum concentration at the Mobil site.

In accordance with 10 CFR Part 51.33(a), the Director, Uranium Recovery Field Office, made the determination to issue a draft finding of no significant impact and to accept comments on the draft finding for a period of 60 days after issuance in the Federal Register.

This finding, together with the environmental assessment setting forth the basis for the finding, is available for public inspection and copying at the Commission's Uranium Recovery Field Office at 730 Simms Street, Golden, Colorado, and at the Commission's Public Document Room at 1717 H Street, Washington, D.C.

Dated at Denver, Colorado, this 4th day of February, 1988.

FOR THE NUCLEAR REGULATORY COMMISSION


Edward F. Hawkins, Chief
Licensing Branch 1
Uranium Recovery Field Office
Region IV

UNITED STATES NUCLEAR REGULATORY COMMISSION
ENVIRONMENTAL ASSESSMENT

BY THE

URANIUM RECOVERY FIELD OFFICE

IN CONSIDERATION OF THE RELEASE OF
SOURCE MATERIAL LICENSE SUA-1479

FOR

MOBIL OIL CORPORATION
CROWN POINT, SECTION 9, IN SITU PILOT TEST PROJECT
MCKINLEY COUNTY, NEW MEXICO

DOCKET NO. 40-8911

8802230437 880204
PDR ADOCK 04008911
C PDR

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1.0 INTRODUCTION

1.1 Background

Mobil Oil Corporation (Mobil) began uranium exploration in 1972 and commenced research and development activities for in-situ leaching (ISL) of uranium at a site known as Crownpoint, Section 9, In Situ Pilot Test Project, in 1978. This research was initially conducted under the State of New Mexico, Environmental Improvement Division (EID), Permit No. MM-MOB-UL-RI-01. Mobil presently has a USNRC Source Material License No. SUA-1479, as the authority for uranium licensing was transferred to USNRC from New Mexico in 1986, upon the State relinquishing the licensing program. Mobil had two other licenses for in-situ leaching in the same general area, but no leaching was ever performed at either site. These licenses were subsequently terminated. During the period of November 1979, through October 1980, test patterns which utilized sodium bicarbonate lixivants were operated at the Crownpoint, Section 9 site.

Since October of 1980, Mobil has been actively conducting aquifer restoration at this research and development (R&D) test site. Since that time, several concerns have arisen regarding the adequacy of restoration and the environmental impacts of the contamination of the ground water. The remaining major concern of the NRC is the presence of somewhat elevated concentrations of molybdenum in water samples from wells throughout the site. Mobil's original license with New Mexico established a molybdenum ground-water standard at 1 mg/l concentration. This standard is based on an irrigation criteria for the State of New Mexico. When comparing present Mobil site ground-water concentrations with baseline concentrations, it is evident that molybdenum at the Mobil site is somewhat elevated, but is not considered excessive in concentration.

In addition to ground-water restoration, Mobil will be required to complete surface reclamation and decontamination of their facility. The surface reclamation will be implemented through the State of New Mexico Environmental Improvement Division and decontamination will be completed in accordance with Code of Federal Regulations, Part 40, Appendix A, Criterion 6.

The purpose of an ISL R&D facility is to ensure that all phases of a mining operation and subsequent restoration can be accomplished as a prototype to a larger full-scale mining effort. In all cases, the ISL R&D must be operated in a safe manner and restoration must show that ground water is restored to an acceptable quality. The small scale of an ISL R&D ensures that if ground-water restoration is not

successful, the subsurface contamination is not extensive and is usually confined to a very small area.

1.2 Basis of NRC Review

An impact appraisal for the termination of Source Material License SUA-1479 has been performed by Region IV, Uranium Recovery Field Office (URFO) of the U.S. Nuclear Regulatory Commission (NRC). This report documents that appraisal. The staff performed the appraisal of environmental impacts in accordance with Title 10, Code of Federal Regulations (10 CFR Part 51, Licensing and Regulatory Policy and Procedures for Environmental Protection). In conducting this appraisal, the staff considered the following sources:

- ° Environmental and operational information submitted by the licensee to the NRC during the period of October 1, 1986, through November 15, 1987;
- ° Discussions and written correspondence with the State of New Mexico, EID;
- ° Site visit by NRC staff on May 11-12, 1987;
- ° Permit information from the New Mexico EID that was transferred to NRC at the time of NRC reassertion of authority over New Mexico licenses in 1986.
- ° Information derived from professional papers, journals and testbooks; U.S. NRC Regulations and Regulatory Guides; federal, State and local agencies; and independent consultants.

The purpose of this environmental assessment is to evaluate the nature of any remaining contamination, its statistical significance with respect to baseline variability, and its overall impact on the potential uses of the aquifer.

The analysis has been extremely difficult due to the hydrogeology of the site, complexities imposed by operational difficulties encountered during leaching and restoration, a high degree of natural variability and the small area of previous mining activity. Due to the high degree of uncertainty in the analysis of the ground-water quality data, no value of concentration or statistical function of concentration is used as a rigid criterion on which to base decisions.

2.0 SITE DESCRIPTION

This section describes the natural environment of the mining area and surrounding region. Data have been compiled through literature search, other projects in the vicinity and programs initiated by Mobil. More complete descriptions can be found in appendices and text of the Mobil license application (Mobil, 1978), Mobil restoration reports (Mobil, 1980-1987) and in Muck (1982).

2.1 Site Location and Topography

The Crownpoint, Section 9, In Situ Pilot Test Project (Figure 1) is located in McKinley County, New Mexico, approximately 6 miles west of Crownpoint, New Mexico. It consists of about 5 acres and is part of a single Navajo allotted lease of 160 acres.

The Crownpoint area lies within the Colorado Plateau Physiographic Province as defined by Fenneman (1931). This section is characterized by old plateaus, up-lifts, basins, dams and synclinal structures. In the vicinity of the ISL site, relief is not great as elevations in the area generally range between 5500 feet and 7000 feet. The land surface near the site dips gently to north and arroyos are in evidence throughout the area. The site elevation is approximately 6700 feet MSL.

In the project area, surface runoff generally is confined to numerous small, closed basins. These basins are characterized by poorly defined drainage networks where runoff is carried to lowland depressions. Due to the seasonal nature of runoff and to high evaporation rates, these depressions are frequently dry.

2.2 Geology

2.2.1 Regional Geology

The project site lies along the southwestern side of the San Juan Basin, a major structural basin covering most of northwestern New Mexico. The basin is a circular structure that also trends into Southwestern Colorado.

The San Juan Basin (see Figure 2) is composed of several thousand feet of Paleozoic, Mesozoic and sedimentary rocks which dip toward the center of the basin. Along the margins of the basin, synclinal and dome structures are present.

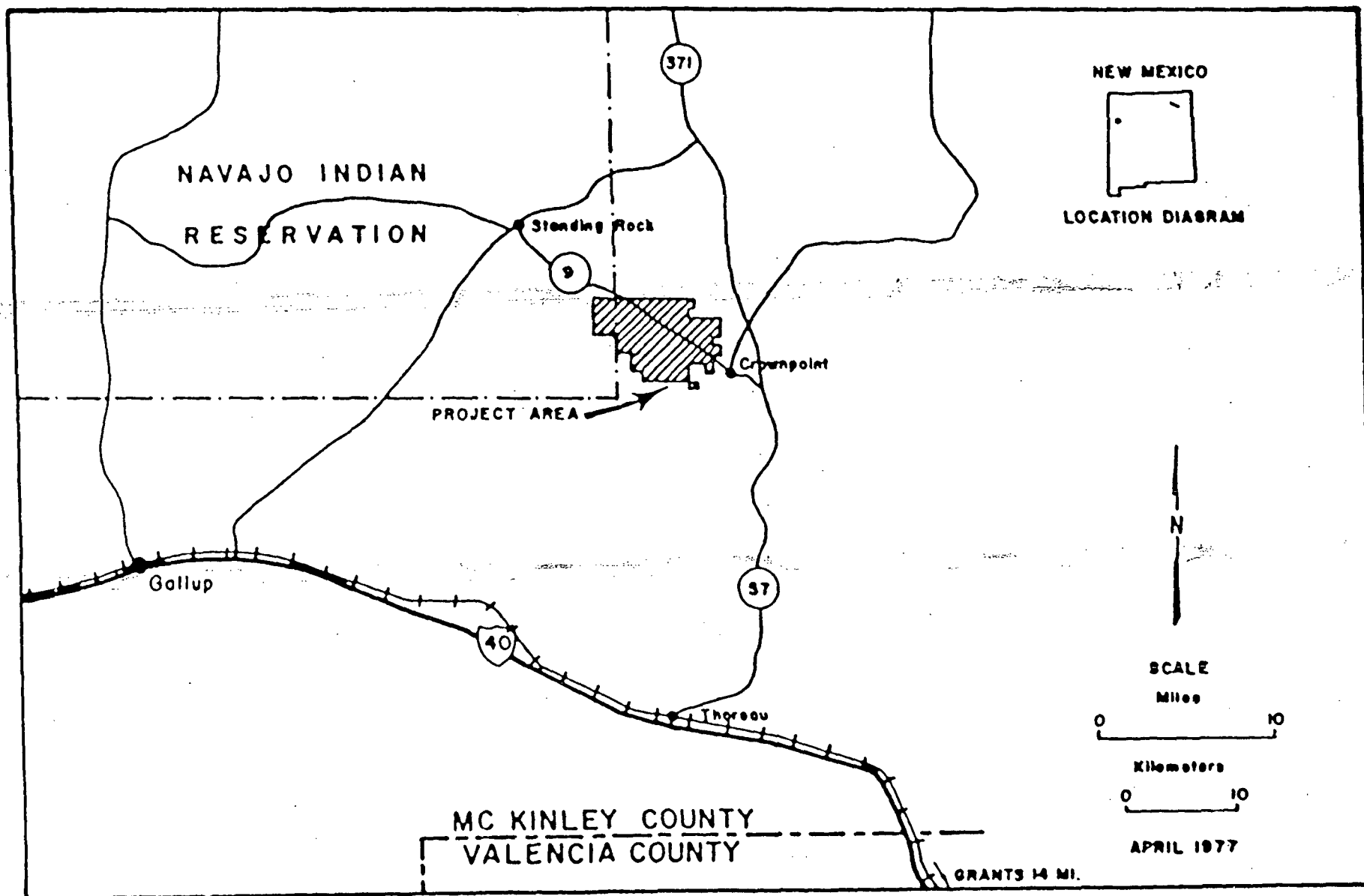
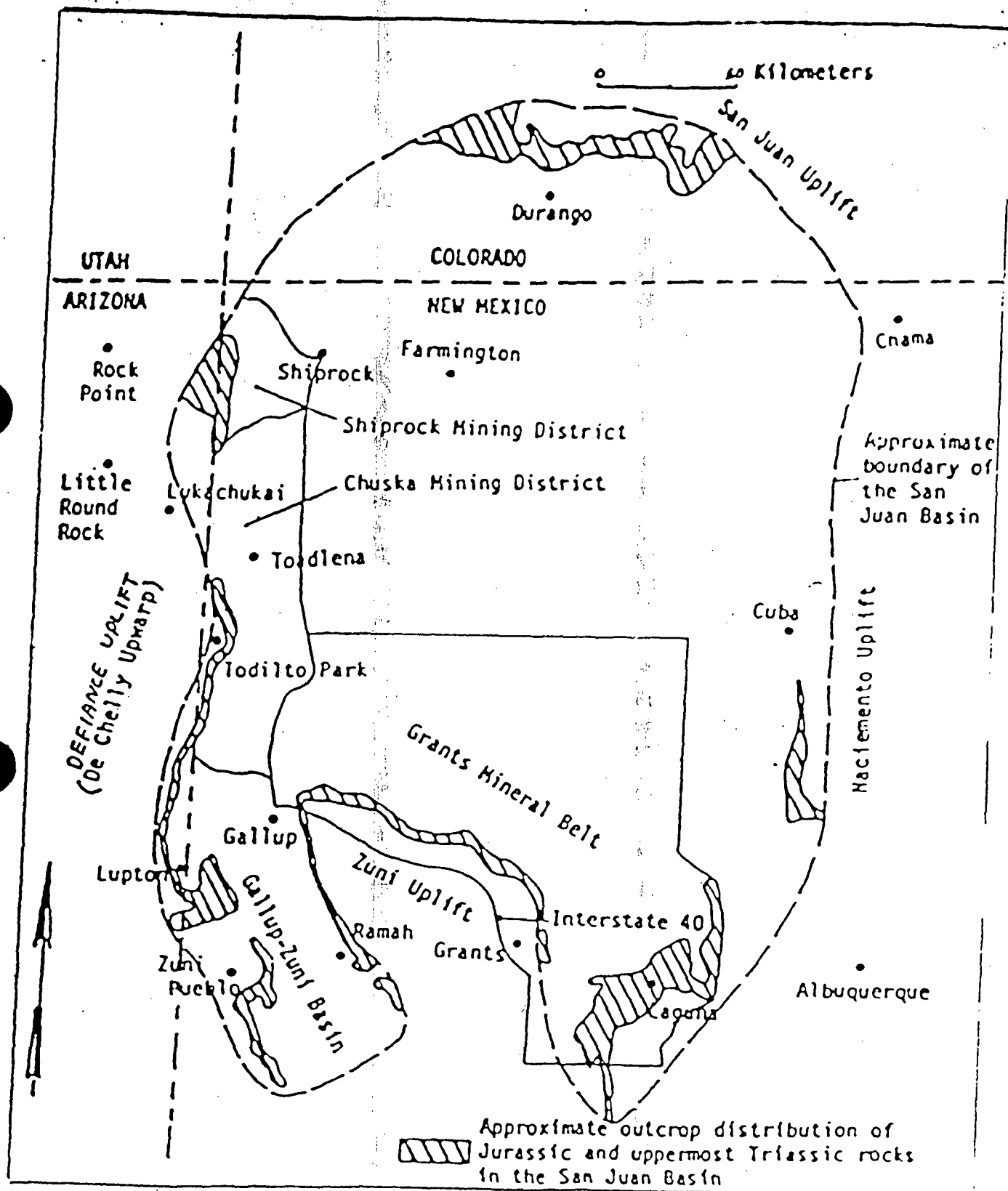


Figure 1. Crownpoint Project Area

Figure 2



Index map of the San Juan Basin and adjacent areas showing major tectonic features, outcropping uppermost Triassic and Jurassic sedimentary rocks (lined), and uranium mining areas.

Location Map of the Grants Mineral Belt.

(after Pierson and Green, 1977).

Figure 3 presents a generalized description of the formations outcropping on the southwestern side of the San Juan Basin, including the project site.

2.2.2 Site Geology

Formations exposed on the project site and immediate vicinity are mapped on Figure 4. The Westwater Canyon Member of the Middle Jurassic Morrison Formation contains the orebody in which in-situ R&D operations were conducted.

The Westwater Canyon Member consists of interbedded fluvial, red, tan and light gray arkosic sandstone, claystone and mudstone. The Westwater Canyon Member is approximately 50 feet thick near the ISL site. The Westwater Canyon Member is characterized by sandstone containing cross-bedding, pebbles and silicified logs, and is a water bearing unit throughout the San Juan Basin. At the project site, uranium occurs in coarse-grained, poorly-sorted sandstone units.

The Recapture Creek Member, the lower member of the Morrison Formation, underlies the Westwater Canyon (refer to Figure 3). This formation consists primarily of thin beds of siltstone and sandstone. No uranium deposits of any significance occur in the Recapture Member.

The Brushy Basin Member, the upper member of the Morrison Formation, overlies the Westwater Canyon (refer to Figure 3). The Brushy Basin contains mudstone and sandstone and intertongues with the Westwater. The Brushy Basin is approximately 150 feet thick at the ISL site, and contains no uranium deposits of any significance.

2.2.3 Uranium Mineralization

Typically, uranium mineralization is deposited by reduction and subsequent precipitation in a "roll front," which is C-shaped in vertical section with the leading edge pointing downdip. The Crownpoint deposit is a typical "roll front" deposit with discernible oxidation-reduction boundaries in the host rock. The principal uranium mineral has been identified as uranite (UO_2). Most of the uranium ore has been identified in a sandstone strata approximately 30 feet in thickness.

The uranium ore commonly occurs as lenticular, tabular or coalescing masses in the Crownpoint vicinity. The ore bodies are usually oriented parallel to the paleo-channel trends,

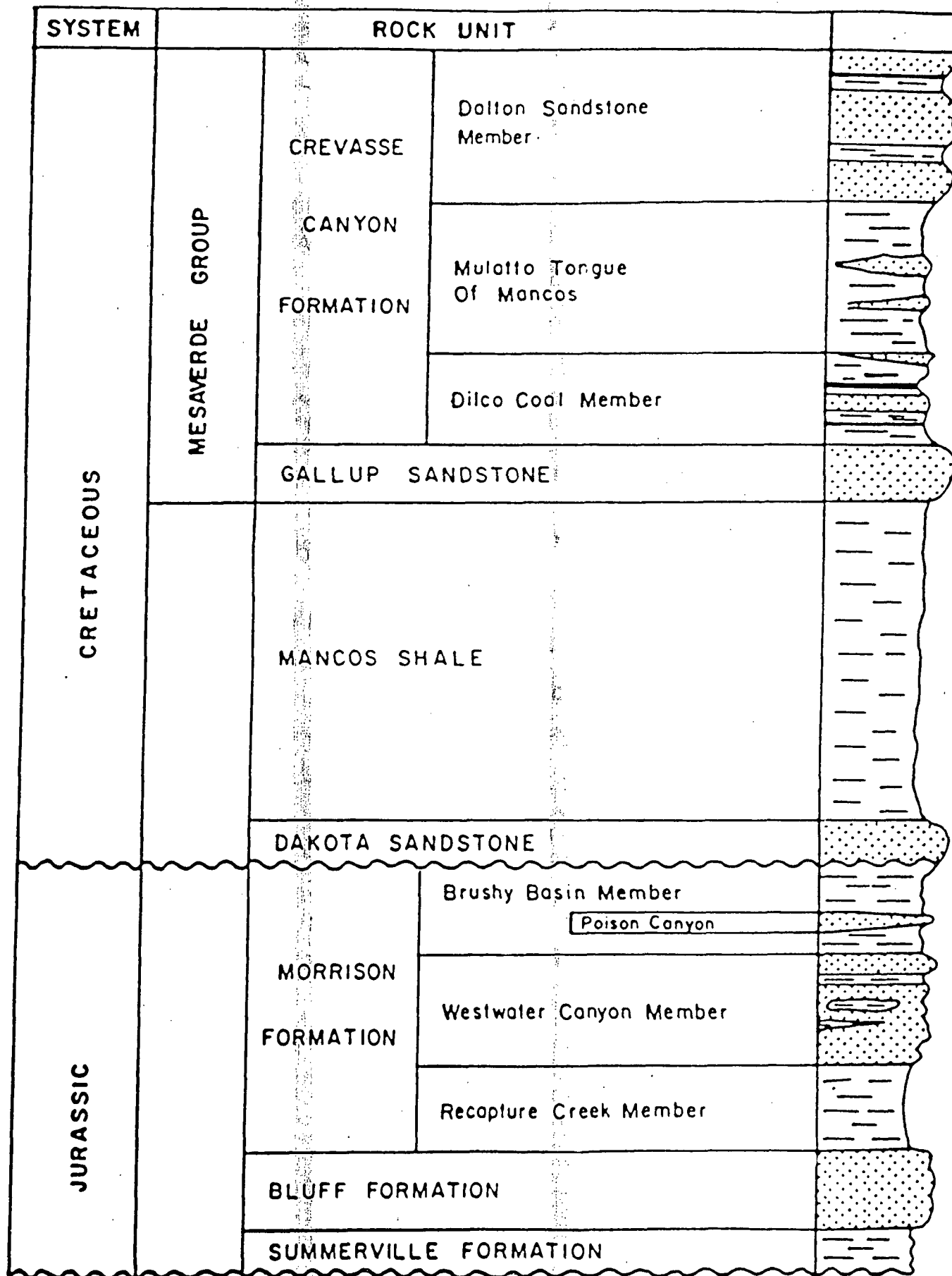
Figure 3

Stratigraphic section, Church Rock area, McKinley County, New Mexico

AGE	GROUP	FORMATION	MEMBER	LITHOLOGY	THICKNESS (Feet)
Upper Cretaceous	Mesa-verde	Menelee Formation			800 +
		Point Lookout Sandstone			0-150
		Cress Canyon Formation	Basal Sand Member		100-300
			Basal Sand Member		0-180
			Sandstone Member		130-150
			Shale Member		45-100
			Sandstone Member		120-180
		Gallup Sandstone	Sandstone		65-200
			Sandstone		
	San Rafael	Manos Shale			500-700
		Delata Sandstone	Basal Sand Member		20-60
			Shale Member		60-130
			Sandstone		50-150
Upper Jurassic	Morrison	Morrison Formation	Sandstone		0-100
			Shale		100-250
			Sandstone		0-150
	San Rafael	Cow Springs Sandstone			300-500
		Summerville Formation			20-130
		Tadousa Limestone			2-30
		Entrada Sandstone	Sandstone		200-250
			Sandstone		35-65
			Sandstone		80-140
Upper Triassic	Chinle Formation	Chinle Formation	Sandstone		
			Sandstone		
			Sandstone		
			Sandstone		
			Sandstone		
			Sandstone		
			Sandstone		
		Moenkshi (?)			0-50

(after Chenoweth and Holen, 196

Figure 4



STRATIGRAPHIC COLUMN
 SEDIMENTARY UNITS PRESENT IN SEC. 9-T.17 N.-R.13 W.

either northwest-southeast or west-east. The ore may occur in channel thicks as well as near shale-sand contacts of intervening mudstones. On a smaller scale, ore may be localized along bedding planes, clay gall horizons, fossil log jams, cross-bedding or other primary sedimentary structures.

Migrating uranyl dicarbonate complexes, (possibly $\text{UO}_2(\text{CO}_3)_3^{4-}$) in the ground-water system were adsorbed by the organic matter. The UO_2^{+2} was captured by an ion exchange or chelation process, and the organically bound uranium was readily reduced and internally distributed. Some organic matter would be oxidized, but much more would be freed to adsorb uranium complexes. Leventhal (1979) notes organic matter may concentrate uranium 10,000 times from water.

The width of the orebody is extremely variable. Average depth is approximately 2,000 feet to the mineralized zone, but can be as much as 2,100 feet in a downdip direction.

2.3 Ground-Water Hydrology

2.3.1 Regional Flow System

Ground water in the region occurs both in unconsolidated sediments and in bedrock aquifers. Except for alluvial deposits in valley areas, unconsolidated deposits have not been developed as sources of ground water. The occurrence of ground water in bedrock aquifers is largely dictated by structure and stratigraphy associated with the San Juan Basin. Flow in these aquifers generally is downdip.

2.3.1.1 Bedrock Aquifer System

Regional aquifers have been grouped into "multiple aquifer" systems in northwestern New Mexico on the basis of hydrologic interrelationships. One of these regional systems underlies the Crownpoint Project and includes the Morrison Formation and the Dakota Sandstone.

The Dakota Sandstone is overlain by the Mancos Shale, a thick aquiclude. The Mancos Shale underlies and intertongues with the Mesaverde Group, which includes several aquifers of regional significance: the Gallup Sandstone, the Crevasse Canyon Formation, the Point Lookout Sandstone and the Menefee Formation (refer to Figure 2), all of which are utilized as water sources in McKinley County.

Regional water movement is northward, generally downdip. movement of ground water in the Mesaverde Group is impeded by low permeabilities (generally less than 10 gpd/ft²), by facies changes and by thinning of the aquifers downdip.

Recharge to the aquifers is by precipitation and by runoff in ephemeral stream channels in the outcrop areas. The Jurassic and Cretaceous rocks crop out in narrow bands on the south and west sides of the San Juan Basin divide.

Ground-water discharge is believed to occur to the San Juan River. Some discharge to springs occurs within the region, where fractures provide avenues for upward movement, but no such springs are known within the project area vicinity.

Alluvial deposits are used as aquifers in places within the region, but they are generally limited and are mostly less than 50 feet thick. The permeability of alluvial deposits is higher than that of older materials, allowing rapid infiltration of storm runoff and snowmelt.

2.3.2 Site Hydrogeology

Detailed information on the ground-water hydrology of the site was obtained by conducting several multiple well aquifer tests. The tests were made to determine drawdown, capacity, direction of flow, and establish control boundaries.

2.3.2.1 Aquifers

In the vicinity of the Crownpoint Project area, the Westwater Canyon Member of the Morrison Formation is the principal aquifer, in that potential yield of good-quality water is greater than for other aquifers in the area. It is also the host rock for most of the uranium ore. Most wells in the vicinity of the Crownpoint Project, however, are in the Mesaverde Group, of which the most commonly used aquifer is the Gallup Sandstone.

The basal unit of the Morrison Formation is the Recapture Creek Member and it consists of of siltstone, shale and fine-grained sandstone, which does not yield significant amounts of water.

The Westwater Canyon Member overlies and in places intertongues with the Recapture Creek Member and consists of poorly sorted, fine- to coarse-grained sandstone

containing claystone and mudstone. At the Crownpoint Project, the formation is about 260 feet thick. Dip of the formation is northward at about 100 ft/mi.

The Brushy Basin Member of the Morrison Formation overlies and intertongues with the Westwater Canyon Member. It consists of 150 feet of gypsiferous and bentonitic mudstone containing lenses of coarse sandstone and a few thin beds of limestone. It has been shown from testing to be a confining layer for water in the underlying Westwater Canyon Member.

2.3.2.2 Aquifer Test Results

An aquifer pump test in the Westwater Canyon Member of the Morrison Formation was made on the proposed pilot ISL site (see Appendix A) in February, 1978.

Seven observation wells (see Appendix A), Wells 9U-208, 9U-210, 9U-218, 9U-220, 9U-221, 9U-222 and 9U-224, were drilled and equipped to monitor the water level in the Westwater aquifer during pumping operations. Wells 9U-208, 9U-210, 9U-218 and 9U-220 were also designed to be used as injection wells in the pilot test. The pumped well, Well 9U-214, was located at the center of the injection-recovery well array for the ISL pilot testing. An eighth well, Well 9U-207, was constructed specifically to determine if the Dakota and Westwater Canyon members are in direct pressure communication in the area affecting the pilot project. They are separated by the Brushy Basin Member.

The pump test was comprised of a 72-hour constant yield (79 gpm) test followed by a 72-hour recovery period. Water level measurements in the observation wells were obtained with water level recorders.

The pump test results also indicated that the net sandstone contributing to flow on a regional basis can vary as a result of the interbedding of the shale and sandstone members of the Westwater Canyon aquifer. Transmissivity was found to vary from 1100 gallons per day per foot (gal/d/ft) to 2200 gal/d/ft, for an average of 1400 gal/d/ft. This change is due to both thickness and permeability changes in the area tested during pumping operations. A pressure decline of approximately 0.5 feet was noted in the Dakota Sandstone well during the pumping

operation. The results of the aquifer test are presented in Appendix A of this report.

A 13-day constant yield test was made in the Westwater Canyon sandstone in Section 16, approximately 2 miles southeast of the pilot leach area on Mobil property in March-April, 1977. A transmissivity of about 2000 gal/d/ft and a storage coefficient of 1×10^{-4} were indicated.

There was not any indication of geological boundaries (i.e., faults, fractures) being encountered in either of the two pump tests. The time length of the tests suggests the area of influence in each test overlapped. The order of magnitude of the hydrologic properties indicated are similar and support the contention that the Westwater is a very large regional aquifer.

2.3.3 Baseline Ground-Water Quality

2.3.3.1 Regional

Chemical analyses of ground water in the region indicate that sodium sulfate is the predominant type of water. The absence of calcareous rocks in the Upper Cretaceous and Tertiary rock has resulted in the lower concentrations of calcium and bicarbonate. In general, ground water is of low quality by drinking water standards. Much of the ground water is not suitable for irrigation because of its high salinity.

2.3.3.2 Mining Area

Chemical and radiochemical composition of ground water from the mining area is typical of the ground-water quality in the region. The water contains sodium sulfate, with calcium and bicarbonate as secondary constituents. Total dissolved solids (TDS) range between 250 and 10,000 mg/l. Sulfate concentrations range between 40 and 1,800 mg/l, while chlorides range from 5 to 1,100 mg/l. Radioactive constituents in the orebody are not pronounced, with radium-226 ranging up to 500 pCi/l. the present ground water in much of the orebody is of fair quality and is, in most cases, suitable for a variety of uses.

2.3.3.3 ISL Site

Baseline chemical and radiochemical analyses of ground water from wells in the Crownpoint ISL R&D site are summarized in Appendix B. Ground water from the site is typical of regional waters in that it is fair quality sodium sulfate water. As indicated in Appendix B, chemical composition is moderately variable with TDS concentrations ranging from 200 to 400 mg/l, sulfate concentrations ranging from 40 to 100 mg/l, and chloride concentrations ranging from 50 to 100 mg/l.

3.0 HISTORY OF OPERATIONS

3.1 Description of the In Situ Leaching Process

If hydrogeologic conditions are favorable, in situ leaching of uranium is presently the foremost technical and cost effective mining method in use today. There are many advantages to this method, and the environmental impacts from in situ leaching are much less severe than the impacts from conventional mining methods. The potential for the greatest impact of the in situ method is the contamination of ground water in the host aquifer. In most cases, the ground water can be restored to baseline quality or premining use category. The in situ leaching method also will permit economical recovery of deep, low-grade roll-front deposits that are not economically recoverable with conventional methods. The extent to which in situ techniques are effective is limited by the hydrologic and mineralogic characteristics of the ore zone.

Basically, the in situ leaching method involves: (1) the injection of a leach solution (called the lixiviant) into a permeable uranium ore body via injection wells to mobilize the uranium; (2) the recovery of the pregnant solution via recovery wells; and (3) the separation of the uranium from the leach solution by ion exchange. The mobilization of uranium in the ore zone involves oxidation of tetravalent uranium to hexavalent uranium and subsequent anionic complexing of the hexavalent uranium. In a carbonate lixiviant, uranium is oxidized by oxygen and complexed with carbonate ions to form mobile complexes of uranyl dicarbonate and uranyl tricarbonates. The leaching process also introduces other chemical reactions in the ore body, causing mobilization of some ions and precipitation of others. After the leaching phase is completed, the aquifer must be restored so that the ground-water quality is within baseline variability or at least within the premining use category. To achieve this objective, residual lixiviant must be removed from the host aquifer. This can be accomplished by pumping the residual lixiviant out of the aquifer and discharging the solution to the

surface (commonly called ground-water sweep) or by pumping residual lixiviant out of the aquifer and injecting the solution back into the aquifer after treatment (recirculation). Water discharged to the surface during a ground-water sweep must either be discharged to an evaporation pond or treated to meet water quality standards before releasing to surface waters. Reverse osmosis and electrodialysis are commonly used water treatment procedures.

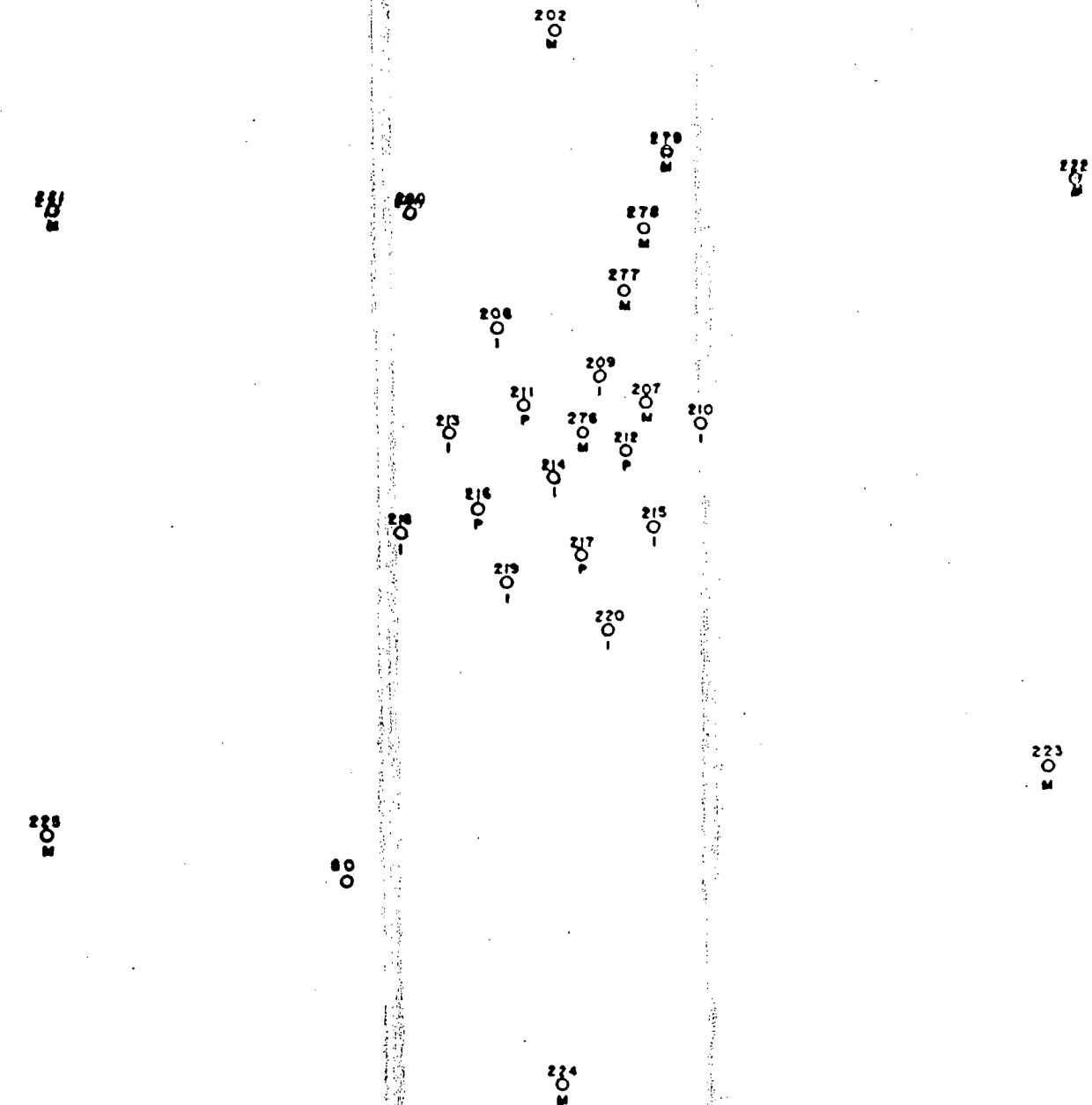
There are many geochemical processes that complicate restoration procedures. One process is the adsorption of undesirable ions on formation clays during leaching and the slow release of these ions into the ground water during restoration and stability phases of operation. To remove these contaminating ions from the clays during restoration, solutions containing high concentrations of exchangeable ions are often injected into the aquifer. Another process which complicates restoration is the slow release of contaminants that have precipitated or co-precipitated during leaching or previous restoration activity. One problem associated with the Crownpoint ISL site is the release and solubility of molybdenum during the leaching process. References providing more complete descriptions of the geochemical and mass transport mechanisms associated with aquifer restoration include Guilinger and others (1979), Kidwell and Humenick (1981), Markos and Bush (1981), Runnels and others (1983), and Thompson and others (1978).

3.2 Well Field Design and Operation at the Crownpoint ISL Site

The site is comprised of one in situ leach well pattern consisting of 9 injection wells and 4 production (recovery) wells; numerous monitoring wells; a pilot plant; and two evaporation ponds. Figure 5 illustrates the locations of wells pertinent to the analysis. The purpose of this section is to provide an account of the operational history of all well patterns at the site.

Chemical injection at the Crownpoint site began on November 6, 1979. The initial injection rate was 73 gpm and was gradually reduced to 55 gpm. Uranium production, after a 3-month period, reached 100 ppm and remained at this level throughout the life of the project. Concurrent with uranium production, molybdenum was liberated in the well field. Its concentrations were very near that of uranium. Due to this, a separation circuit was devised to remove the molybdenum from the production stream, thereby maintaining the uranium production and the ion exchange (IX) resin beads at an optimum performance level.

Figure 5



LEGEND

ALL WELLS HAVE PREFIX "9U"

I= INJECTION WELL

P= PRODUCING WELL

M= MONITOR WELL

0 100 200
SCALE IN FEET

N

CROWNPOINT PROJECT
McKINLEY CO., NEW MEXICO
SECTION 9 WELLFIELD

The R&D well field leaching was terminated on October 1, 1980. At this time, it was concluded that approximately 15 percent of the uranium had been recovered from the mining zone. Water quality data at this point in time, indicated that most of the parameters sampled in the well field had been elevated.

Following the mining period, Mobil initiated a restoration effort consisting of fifteen stages. The restoration work began in October of 1980, and ended in October of 1986.

Stage 1 involved well field recirculation without the injection of lixiviant. During this 1-month period, well field water was circulated through the ion exchange columns to remove uranium. As a consequence of this action and the molybdenum strip circuit, molybdenum was also reduced. Waste waters were routed to the evaporation ponds.

Stage 2 lasted from the first week of December until December 24, 1980. During this time period, a lime water softener was utilized to reduce water hardness. This process prepared the well field water for reverse osmosis treatment.

Stage 3 involved six days of ground-water sweep at a rate of 260 gpm. Approximately 2.2 million gallons of water were swept through the well field and discharged to the waste evaporation ponds.

Stage 4, which took place from December 30, 1980, until the end of January, 1981, did not directly involve the well field. During this restoration phase, waste pond water was run through the water softener and back to the pond to reduce hardness.

Stage 5 involved the utilization of reverse osmosis. The unit was installed in late January, 1981, and operated until July, 1981. Water from the well field was run through the unit at approximately 70 gpm. It was at this time in the restoration process that molybdenum was targeted as a problem parameter.

Stage 6 lasted from July, 1981, until May, 1982. During this period, lime was added to the reverse osmosis permeate to reduce dissolved molybdenum. This process resulted in a molybdenum reduction from 32 mg/l to 9.7 mg/l.

Stage 7 utilized the ion exchange columns in combination with a ground-water sweep operation. From May, 1982, to November, 1982, the well field was pumped at 40 gpm, routed through the ion exchange columns for the removal of uranium and molybdenum and pumped back into the well field. At this point in the restoration process, all

major cations and anions were below restoration values. However, molybdenum remained above agreed to restoration values.

Stage 8 began on November 8, 1982, and continued until April 15, 1983. During this time period, sodium sulfide was added to the water coming from the IX columns. The object of this process was to eliminate dissolved oxygen from the well field water and re-establish the reducing environment which would make molybdenum unavailable for dissolution into the well field waters.

Stage 9 began on April 15, 1983, and terminated on July 14, 1983. During this period, the well field was allowed to "sit-and-soak." This phase allowed an equilibrium to establish itself throughout the well field due to the prior addition of sodium sulfide.

Stage 10 was a ground-water sweep. The well field was pumped, beginning on July 14, 1983, until January 13, 1984, at rates varying from 20 to 40 gpm. During the initial 10 weeks of this time period, the well field was pumped and the evaporation ponds filled with approximately 1 million gallons of water. During the remainder of the time, the ground-water sweep program maintained a 1 gpm bleed to the evaporation ponds. During this 5-month period, molybdenum concentrations did not change significantly and remained to be the single elevated parameter above restoration target values in the well field.

Stage 11 began on January 18, 1984, and ended on May 1, 1984. During this period, the well field ground water was pumped at a rate of 34 gpm and routed through a reverse osmosis unit. Twenty-nine gpm was reinjected to the well field, while the remaining 9 gpm was discharged to the evaporation ponds.

Stage 12 began on May 1, 1984, and extended until March 18, 1985. During this period, hydrogen sulfide gas (reducing agent) was injected into the well field. This was another attempt at reducing the well field environment and thereby taking molybdenum out of the solution. At the conclusion of this stage of restoration, six wells showed lower concentrations of molybdenum, three wells remained constant and four wells rose slightly.

Stage 13 involved a "sit-and-soak" period. During the period of March 18, 1985, until April 15, 1986, the well field was allowed to equilibrate with the hydrogen sulfide injection. Laboratory data indicated that ten wells showed a decrease in molybdenum concentrations and three wells showed a slight rise.

Stage 14 began on April 15, 1986, and ended on May 20, 1986. During this period, ground water in the well field was recirculated to

ensure flushing of any well cleaning fluids and equal dispersion of the residual hydrogen sulfide.

Stage 15 began on May 20, 1986, and ended November 10, 1986. During this period, the well field was left idle.

The restoration process utilized at the Crownpoint site involved many stages. It was apparent by Stage 5 that the dissolved salts in the well field waters were responding to the restoration efforts and that molybdenum would be a restoration problem. As an overview of the restoration progress, Table 1 shows water quality based upon annual average of values for the well field.

On November 20, 1986, stability monitoring began and continued until July 20, 1987. The stability period has shown through monthly sampling that the well field is stable, with the exception of a slightly elevated molybdenum species.

4.0 IMPACTS OF ISL OPERATIONS ON GROUND-WATER QUALITY

4.1 Water Quality and Geochemistry

Although influenced by precipitation-dissolution reactions and ion exchange phenomena, concentrations of major cations and anions are useful indicators of the presence of residual lixiviant. Due to their high mobilities relative to trace metals and radionuclides, major ions are removed most easily during restoration. Reactions that do occur are usually predictable and provide insight into the more complex reactions involving trace elements. In addition, concentrations of major ions in individual wells tend to be more representative of spatial variation in the aquifer than concentrations of trace elements.

Concentrations of trace elements and radionuclides are important to analyses of environmental impacts, but are usually much more difficult to interpret than concentrations of major ions. Mobilities are highly dependent on solution Eh, pH, and ionic strength, and are governed by complex adsorption, ion exchange, oxidation-reduction, coprecipitation, and solid-solution reactions. Concentrations in wells may reflect very localized conditions not representative of the aquifer (e.g., localized mineralization, contaminated well screens, etc.).

Elevated concentrations of molybdenum have been observed in a number of wells throughout the site. To reduce concentrations of trace elements (specifically molybdenum) from prerestoration levels to restoration target levels, trace elements often must be diluted to a

Table 1. - Historical Water Quality Data for the Crownpoint Insitu Leach Site

Chemical Constituent	New Mexico Standard mg/liter	Restoration Standard mg/liter	1981 Average of Values	1982 Average of Values	1983 Average of Values	1984 Average of Values	1985 Average of Values	1986 Average of Values
Aluminum, dissolved	5.0	5.0	0.500	0.700	0.550	0.500	0.500	0.808
Arsenic	0.1	0.1	0.086	0.073	0.069	0.057	0.032	0.014
Barium	1.0	1.0	0.227	0.200	0.325	0.262	0.215	0.277
Boron	0.75	0.75	0.191	0.155	0.088	0.108	0.215	0.238
Cadmium	0.01	0.036	0.005	0.005	0.005	0.005	0.007	0.006
Chloride	250.0	250.0	127.273	156.000	372.500	115.5	111.5	54.538
Chromium	0.05	0.074	0.004	0.005	0.005	0.007	0.011	0.005
Cobalt, dissolved	0.05	0.05	0.016	0.020	0.020	0.020	0.026	0.021
Copper, dissolved	1.0	1.0	0.007	0.005	0.005	0.005	0.012	0.008
Cyanide	0.2	0.780	0.005	0.005	0.005	0.005	0.009	<0.005
Fluoride	1.6	1.6	0.336	0.309	0.413	0.500	0.508	<0.5
Iron, dissolved	1.0	5.50	0.130	0.018	0.015	0.065	0.372	0.146
Lead, dissolved	0.05	0.063	0.005	0.022	0.009	0.005	0.006	0.016
Manganese, dissolved	0.2	0.456	0.217	0.053	0.142	0.048	0.096	0.035
Molybdenum, dissolved	1.0	1.0	27.667	9.076	13.250	8.231	4.803	1.118
Mercury, total	0.002	0.002	0.0002	0.0019	0.0001	0.0001	0.0001	0.0003
Nickel, dissolved	0.2	0.2	0.030	0.020	0.070	0.021	0.021	0.022
Nitrate (as N)	10.0	10.0	0.050	0.075	0.050	0.941	0.050	0.556
PH	6 to 9	6 to 9	6.665	8.402	*	8.438	8.446	9.062
Phenols	0.005	0.047	0.005	0.012	0.003	0.002	0.004	0.008
Combined Ra-226 & 228	30.0	97.2	*	30.525	*	22.077	48.677	59.939
Selenium, dissolved	0.05	0.05	0.017	0.149	0.067	0.017	0.032	0.006
Silver, dissolved	0.05	0.05	0.007	0.005	0.005	0.005	0.006	<0.005
Sulfate (as SO ₄)	600.0	600.0	131.091	44.182	46.500	81.538	80.846	47.615
TDS (at 180 C)	1000.0	1000.0	623.182	529.727	785.000	479.231	556.923	356.154
Uranium (as U)	5.0	5.0	*	0.166	0.370	0.590	0.303	0.319
Zinc, dissolved	10.0	10.0	0.014	0.031	0.014	0.027	0.027	0.039

NOTE:

* Data not available.

Source: Mobil Mining and Minerals Company, November 14, 1986

much higher degree than major ions. However, the effectiveness of trace element removal is reduced further by the limitations of water treatment procedures at low concentrations, the dissolution of precipitates found during leaching, desorption and ion exchange processes and oxidation and mobilization of redox-sensitive species (Bell and others, 1983).

5.0 EVALUATION OF ALTERNATIVES

5.1 Introduction

As part of this report, alternatives have been evaluated. At this stage, there are two alternatives which are addressed, and they will be discussed below.

5.2 No Further Remedial Action

This alternative would result in Mobil initiating decommissioning of the plant and well field and reclamation of the site in accordance with 10 CFR Part 40. It is considered that the concentration of the redox-sensitive trace element (molybdenum) would gradually approach baseline as natural conditions are eventually established within the aquifer.

5.3 Additional Aquifer Restoration

The use of additional restoration methods has been evaluated, and these are described in the following text. The additional restoration synopsis would probably involve the utilization of one or more of the described methodologies.

1. Traditional methods of aquifer restoration, such as ground-water sweep and recirculation. These would probably result in little improvement in the overall ground-water quality at the site. Concentrations of redox-sensitive species may actually increase due to a re-establishment of oxidizing conditions in the aquifer.
2. Injection of reductants. Although this is a potentially viable method for lowering concentrations of redox-sensitive species, the technique does not always give entirely satisfactory results in the field. This is evident from past restoration programs implemented at the Irigaray and Exxon mines in Wyoming and the Ferret mine in Nebraska. The above mentioned facilities were similar in circumstance to the Mobil site and a parallel can be drawn here.

3. Restoration of trace elements through natural processes. Due to the unknowns and the risks involved, this appears to be the preferable method for restoration of molybdenum. It has been shown at the Irigaray and Exxon facilities that natural flushing is a viable alternative.

It is apparent from past restoration efforts (described in the Mobil November 1986 Restoration Report), that molybdenum levels were reduced to their concentrations by a combination of restoration methods (ground-water sweep and reductant treatment).

It is highly unlikely, as indicated by the Mobil monitoring data, that additional ground-water sweep and reductant treatment will provide any more reduction in molybdenum concentration at the Mobil site. Natural restoration processes such as mineral precipitation and adsorption that occur between the residual lixiviant and the aquifer sediment will eventually reduce the concentration of molybdenum from solution. Reducing conditions exist downgradient from the ore zone and under these conditions, the redox-sensitive trace element molybdenum will form a relatively insoluble compound. As a consequence, molybdenum solution concentration will be lowered, perhaps to the restoration level or lower, after a period of contact with the aquifer sediment adjacent to the leached ore zone. The transport of the trace element molybdenum at its present level would be very slow at best. Calculations for transport indicate that ground water in the Westwater Canyon Formation moves at a rate which is approximately 15 feet per year in a North-Northwesterly direction. Accordingly, it would take ground water on the order of hundreds of years to move 1 mile. This, together with the fact that over time the trace element molybdenum will undergo dilution, would indicate that any problems associated with elevated concentrations of molybdenum at present are minimal and temporary. The limited extent of contamination, together with the slow movement of ground water in the Westwater Canyon Formation, suggest that the most realistic approach is to allow natural conditions to restore water quality at the Mobil site. The potential for agricultural use of this water also appears to be very small, as evidenced by Mobil's evaluation of ground-water use (Mobil, 1988).

6.0 PROPOSED NRC ACTION

Due to the extreme depth of the affected zone, the potential for human use of the ground water, the limited areal extent of mining and the cost and limited success of additional restoration, the NRC has determined that further remedial action would result in minimal improvement to the ground water in the aquifer. Therefore, the proposed administrative action is to terminate Mobil Oil Corporation's Source Material License

SUA-1479 after successful decommissioning of the Crownpoint ISL R&D site
in accordance with 10 CFR Part 40.

Thomas T. Olsen
Thomas T. Olsen, Project Manager
Licensing Branch 1
Uranium Recovery Field Office
Region IV

Approved by:

Edward F. Hawkins
Edward F. Hawkins, Chief
Licensing Branch 1
Uranium Recovery Field Office, Region IV

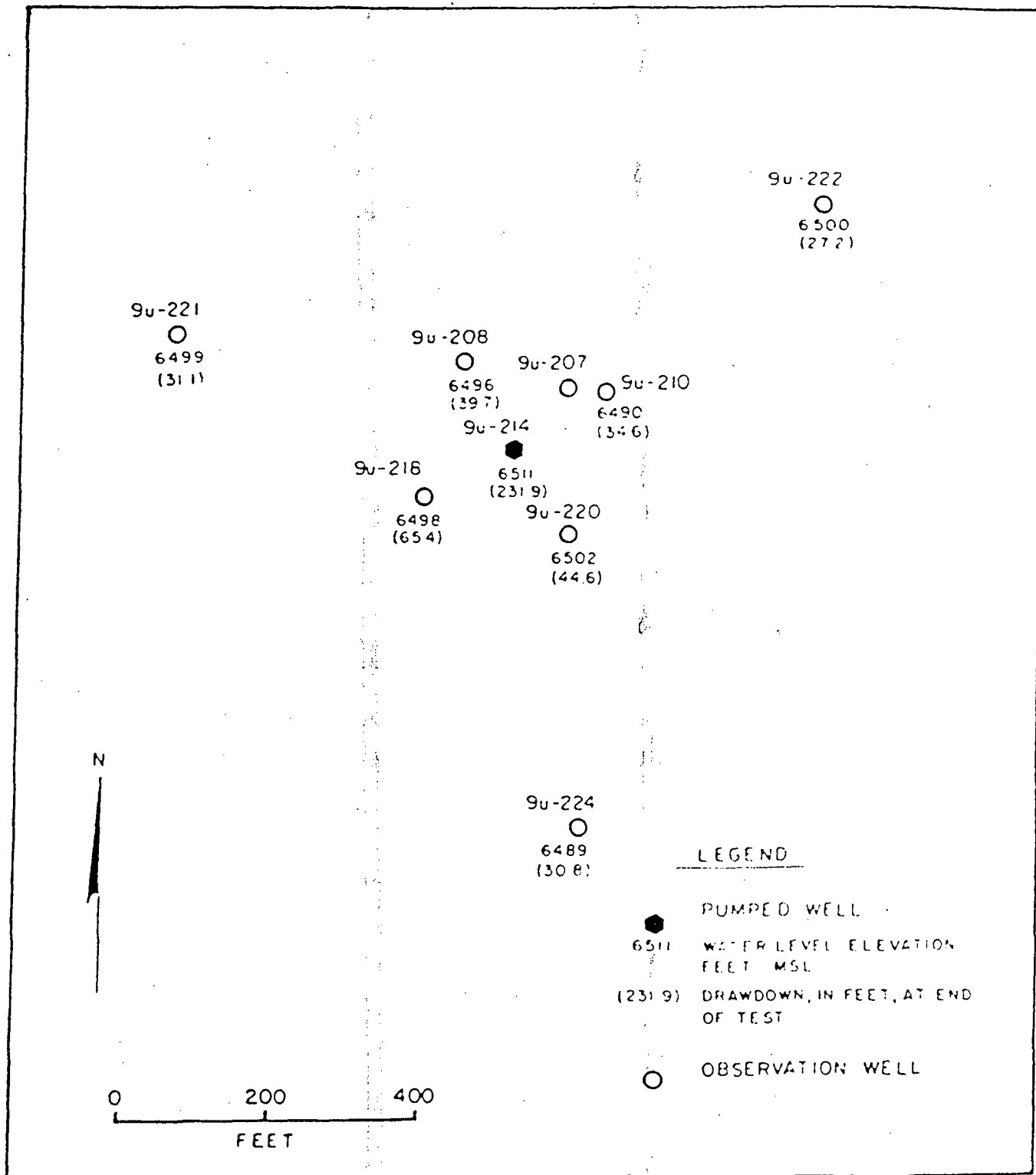
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APPENDIX A

Aquifer Test Data



HYDROLOGY TEST CONFIGURATION

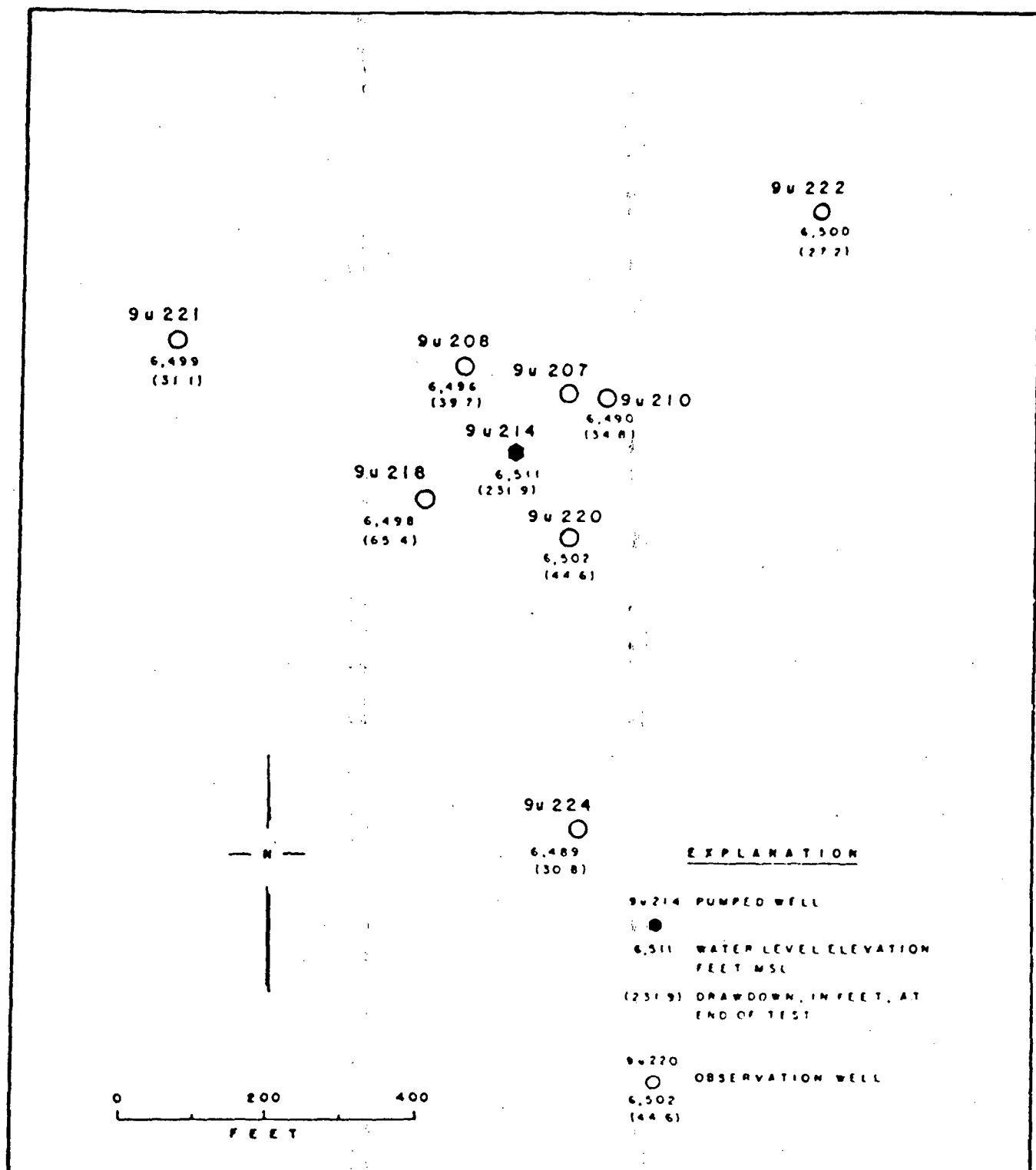
--PRE-PUMPING WATER LEVELS
FEBRUARY 6, 1978

<u>WELL</u>	<u>ELEVATION OF MEASURING POINT (Ft, msl)</u>	<u>DEPTH TO WATER (Ft)</u>	<u>WATER LEVEL ELEVATION (Ft, msl)</u>
9u214	6708.1	197.1	6511.0
9u208	6699.8	203.6	6496.2
9u210	6703.1	213.6	6489.5
9u218	6705.2	206.8	6498.4
9u220	6721.1	219.3	6501.8
9u221	6688.9	189.8	6499.1
9u222	6717.5	217.5	6500.0
9u224	6724.8	235.7	6489.1
9u207	6705.1	31.7	6673.4

CONSTRUCTION DETAILS FOR
PUMPED WELL 9u214 AND OBSERVATION WELLS

<u>WELL</u>	<u>TOTAL DEPTH (Feet)</u>	<u>AQUIFER DEPTH (Feet)</u>		<u>PERFORATED INTERVAL (Feet below land surface)</u>
		<u>From</u>	<u>To</u>	
9u214	2,100	1,890	2,100	1,946 - 1,969
9u208	2,115	1,893	2,115	1,946 - 1,974
9u210	2,107	1,902	2,107	1,948 - 1,976
9u218	2,103	1,896	2,103	1,946 - 1,972
9u220	2,113	1,903	2,113	1,956 - 1,982
9u221	2,065	1,887	2,065	1,936 - 1,966
9u222	2,149	1,925	2,149	1,972 - 2,000
9u224	2,096	1,907	2,096	1,959 - 1,989
9u207 ^{1/}	1,788	1,639	1,768	1,640 - 1,752

^{1/} Dakota Sandstone monitor well



SUMMARY OF HYDROLOGIC DATA FOR
MONITOR WELL NETWORK, PUMP TEST WELL 9u214
FEBRUARY 6-9, 1978

<u>WELL</u>	<u>DISTANCE FROM PUMPED WELL (Feet)</u>	<u>DRAWDOWN AT END OF TEST (Feet)</u>
9u214	-	231.9
9u208	140	39.7
9u210	140	34.8
9u218	140	65.4
9u220	140	44.6
9u221	500	31.1
9u222	540	27.2
9u224	530	30.8
9u207	107	

AVERAGE PUMPING RATE FOR THE 3-DAY
PERIOD WAS 79 GALLONS PER MINUTE

SUMMARY OF AQUIFER PARAMETERS FOR
PUMP TEST AT PILOT TEST SITE

<u>WELL</u>	<u>TRANSMISSIVITY (GPD/FT)</u> ^{1/}			<u>STORAGE</u> ^{2/}	
	<u>Cooper-Jacob</u>	<u>Theis</u>	<u>Horner</u>	<u>Cooper-Jacob</u>	<u>Theis</u>
9u214	1,200	--	1,100	--	--
9u208	1,400	1,800	1,300	1×10^{-4}	2×10^{-4}
9u210	1,400	1,500	1,200	3×10^{-4}	2×10^{-4}
9u218	1,000	1,200	1,100	3×10^{-5}	1×10^{-5}
9u220	1,200	1,600	1,200	1×10^{-4}	2×10^{-5}
9u221	1,400	1,400	1,200	4×10^{-5}	3×10^{-5}
9u222	2,200	1,400	1,500	1×10^{-5}	3×10^{-5}
9u224	1,100	1,300	1,100	8×10^{-5}	6×10^{-5}
DISTANCE DRAWDOWN		1,600		3×10^{-5}	

^{1/} Gallons per day per foot width of aquifer
at 1:1 hydraulic gradient

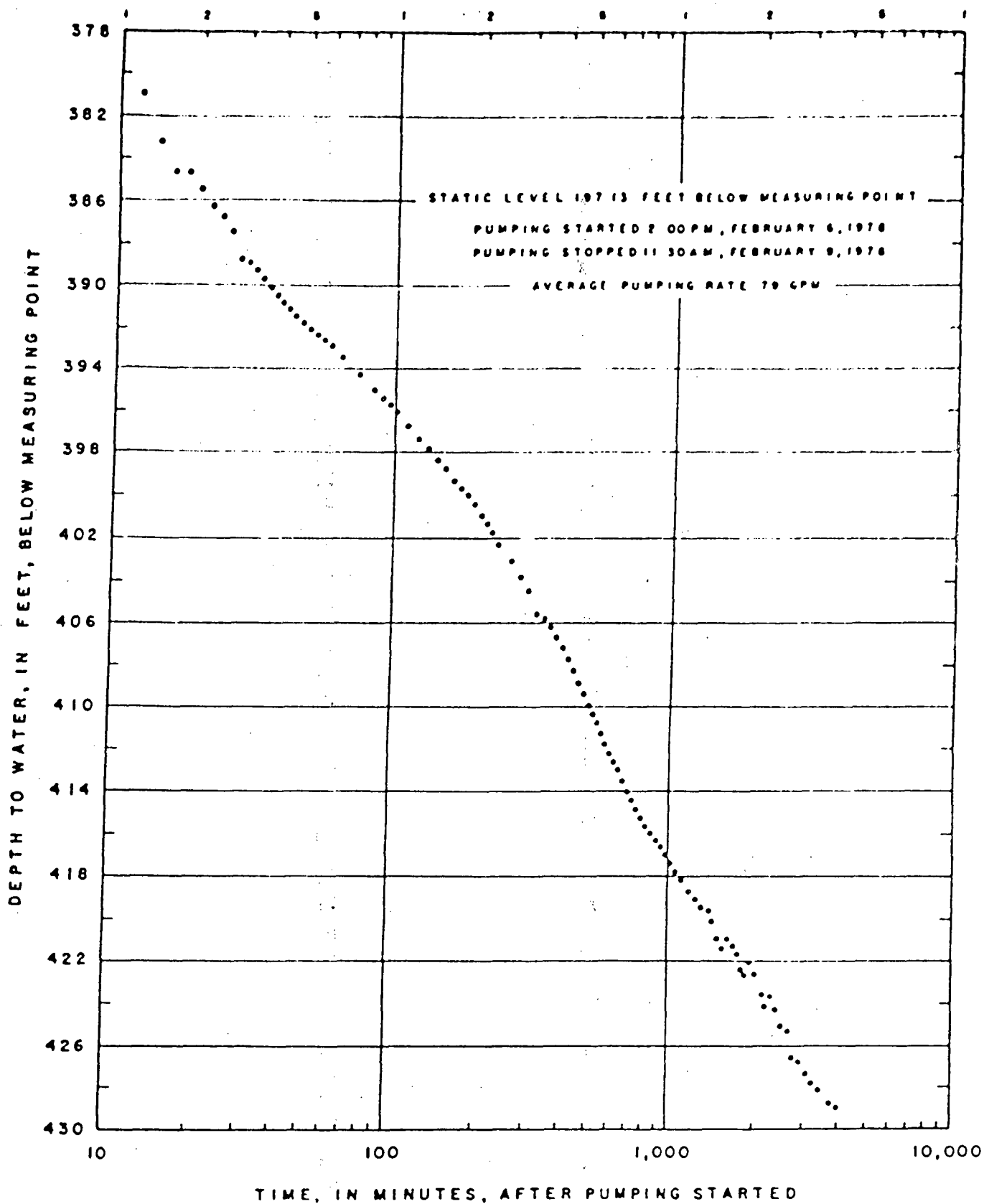
^{2/} Dimensionless; ratio of volume of water
released per unit area of aquifer per
unit decline in head

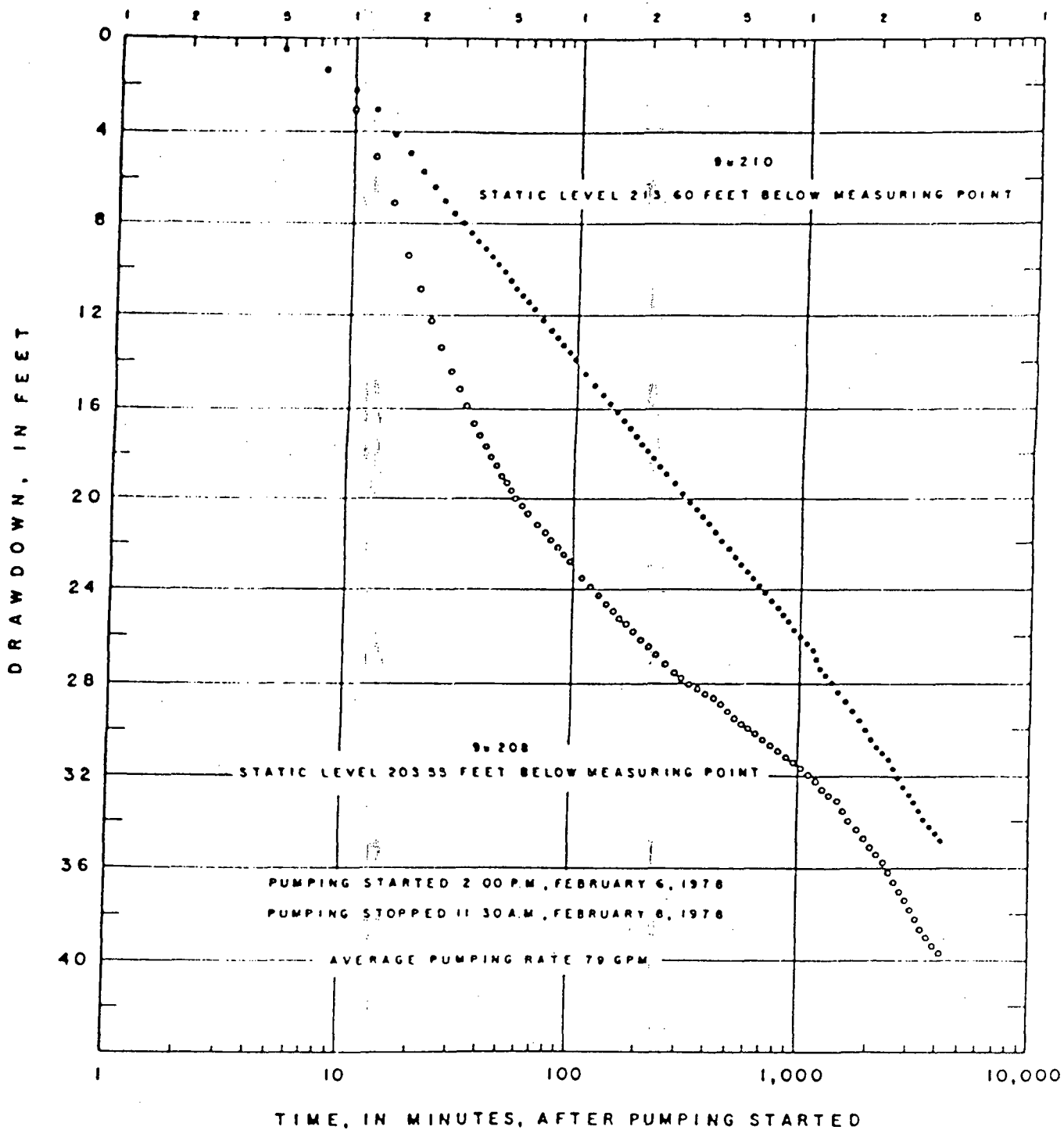
SUMMARY OF AQUIFER PARAMETERS FOR
PUMP TEST 9u214, FEBRUARY 6-9, 1978

WELL	TRANSMISSIVITY (GPD/FT) ^{1/}			STORAGE ^{2/}	
	Semi-log	Log-Log	Recovery	Semi-log	Log-log
9u214	1,200	--	1,100	--	--
9u208	1,400	1,800	1,300	1×10^{-4}	2×10^{-4}
9u210	1,400	1,500	1,200	3×10^{-4}	2×10^{-4}
9u218	1,000	1,200	1,100	3×10^{-5}	1×10^{-5}
9u220	1,200	1,600	1,200	1×10^{-4}	2×10^{-5}
9u221	1,400	1,400	1,200	4×10^{-5}	3×10^{-5}
9u222	2,200	1,400	1,500	1×10^{-5}	3×10^{-5}
9u224	1,100	1,300	1,100	8×10^{-5}	6×10^{-5}
DISTANCE DRAWDOWN				3×10^{-5}	

^{1/} Gallons per day per foot width of aquifer
at 1:1 hydraulic gradient

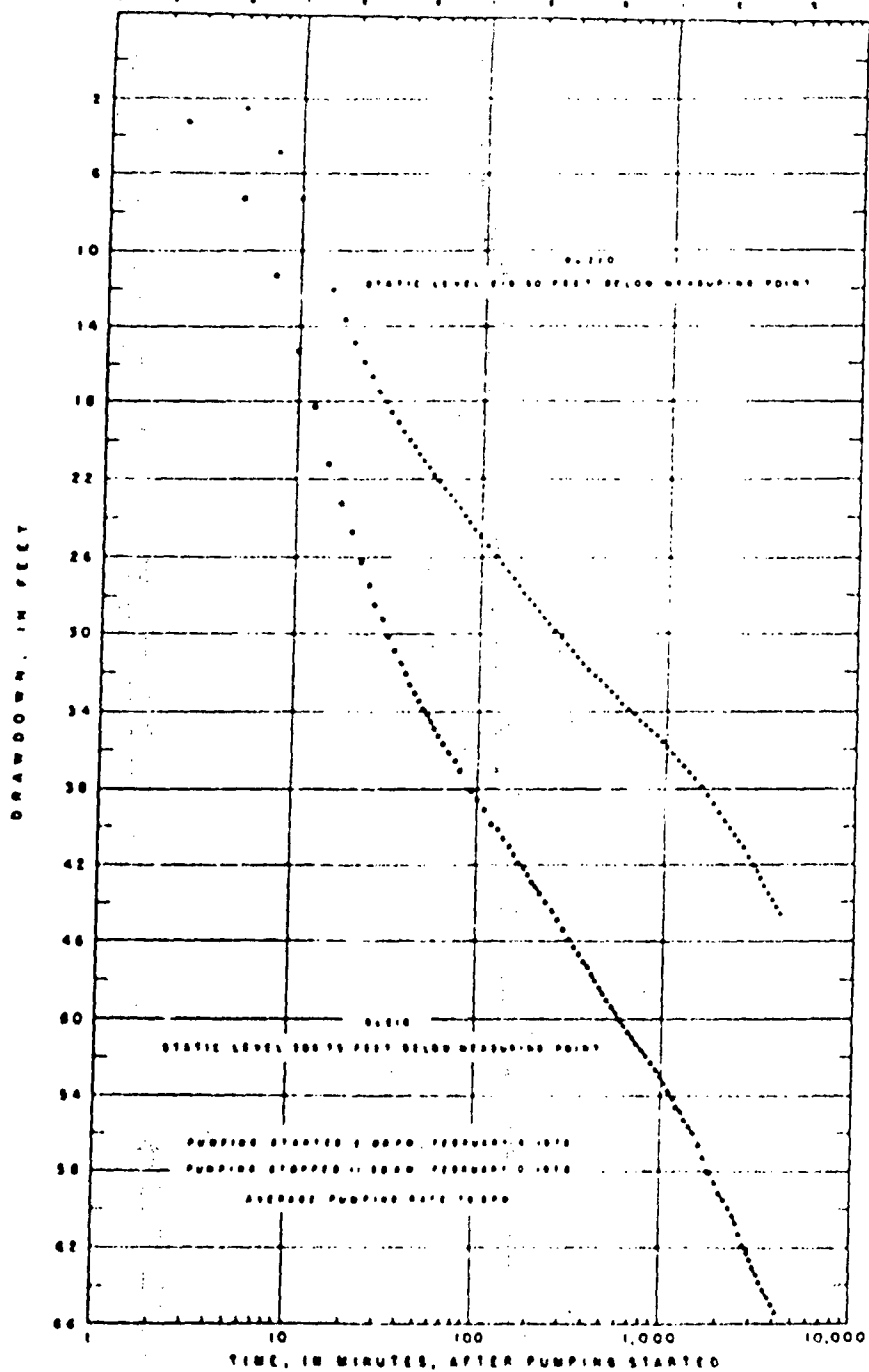
^{2/} Dimensionless; ratio of volume of water
released per unit area of aquifer per
unit decline in head



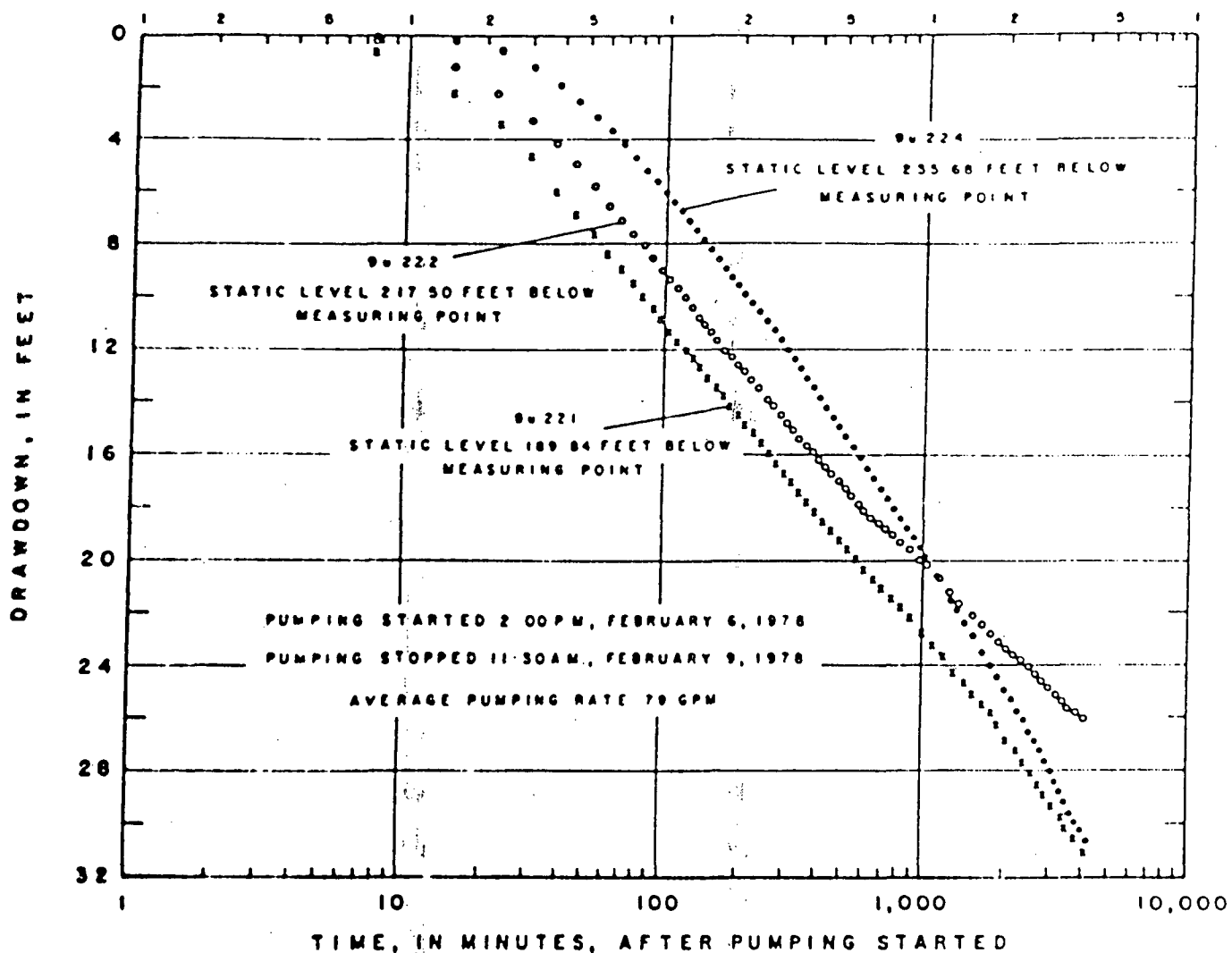


DRAWDOWN GRAPH FOR OBSERVATION WELLS

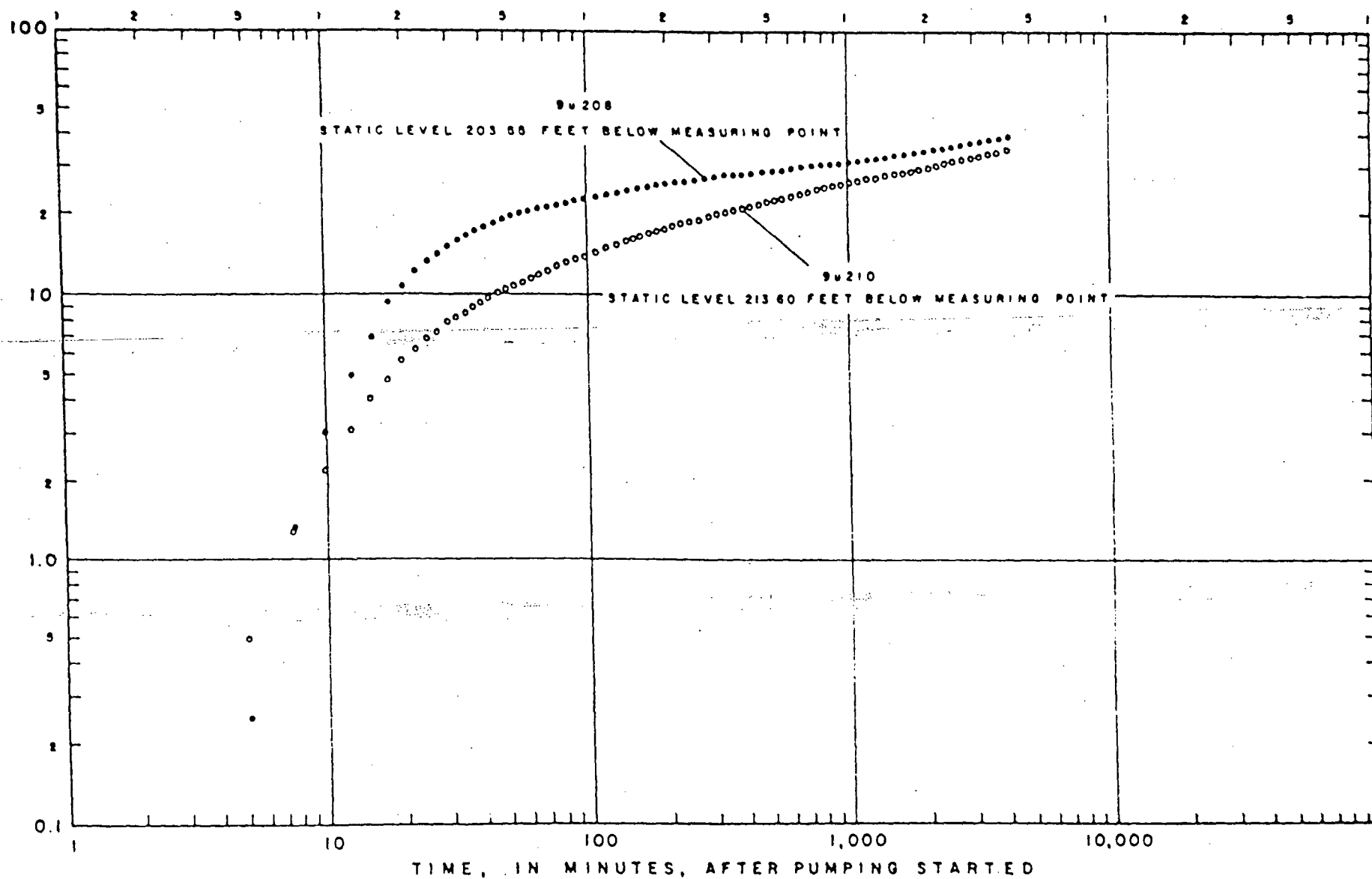
9-208 AND 9-210



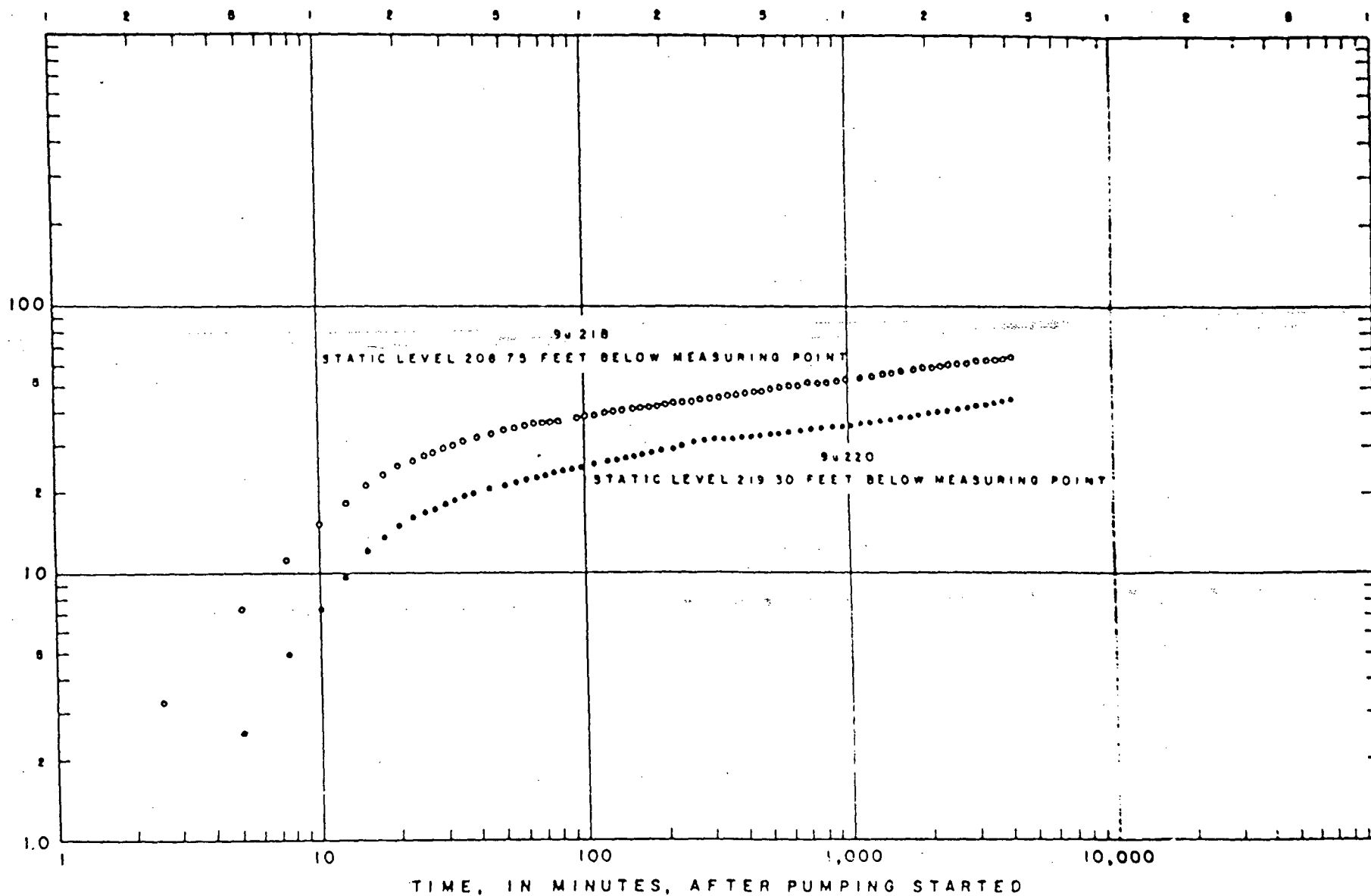
DRAWDOWN GRAPH FOR OBSERVATION WELLS



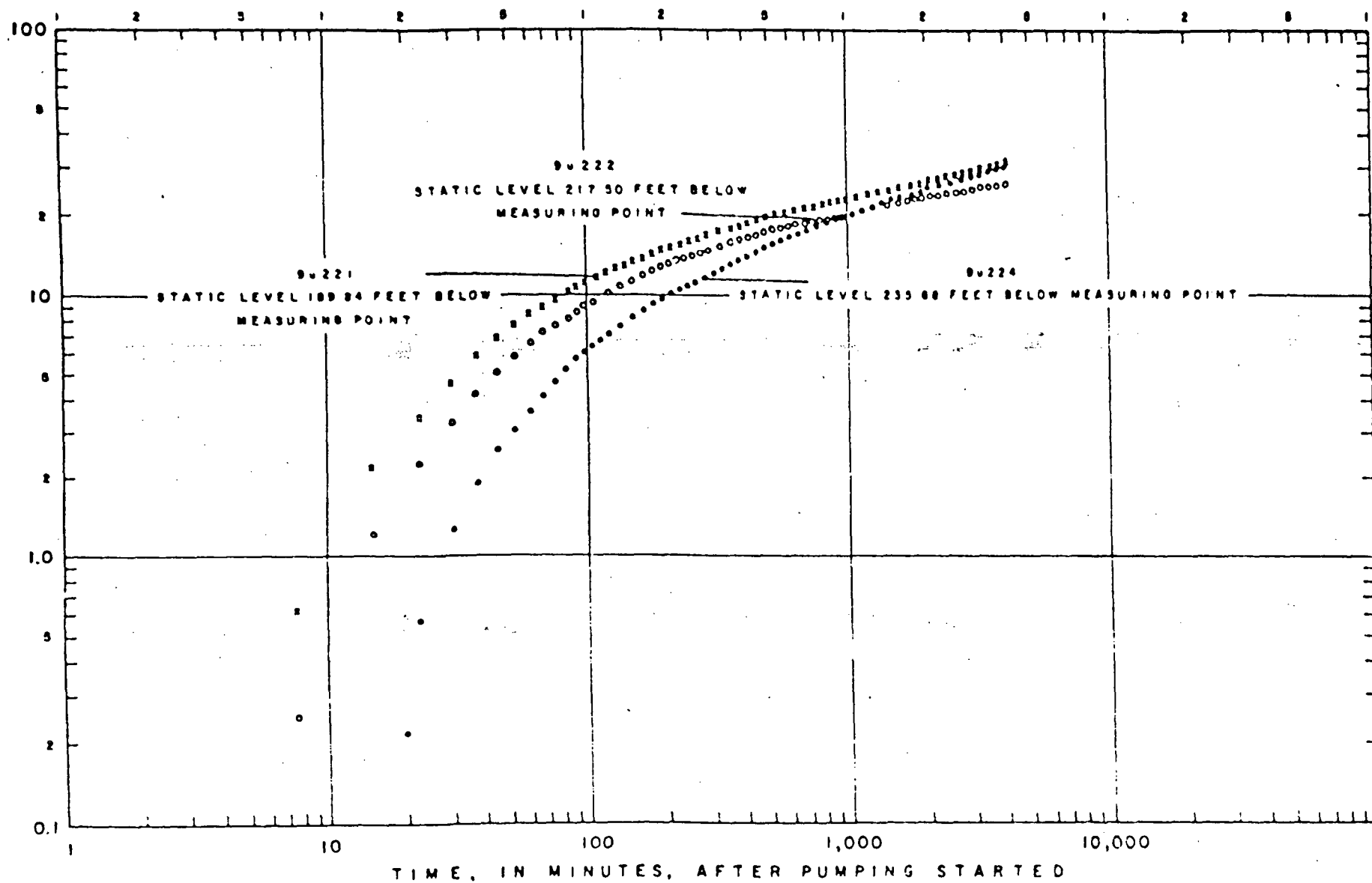
DRAWDOWN GRAPH FOR OBSERVATION WELLS
9u221, 9u222, AND 9u224



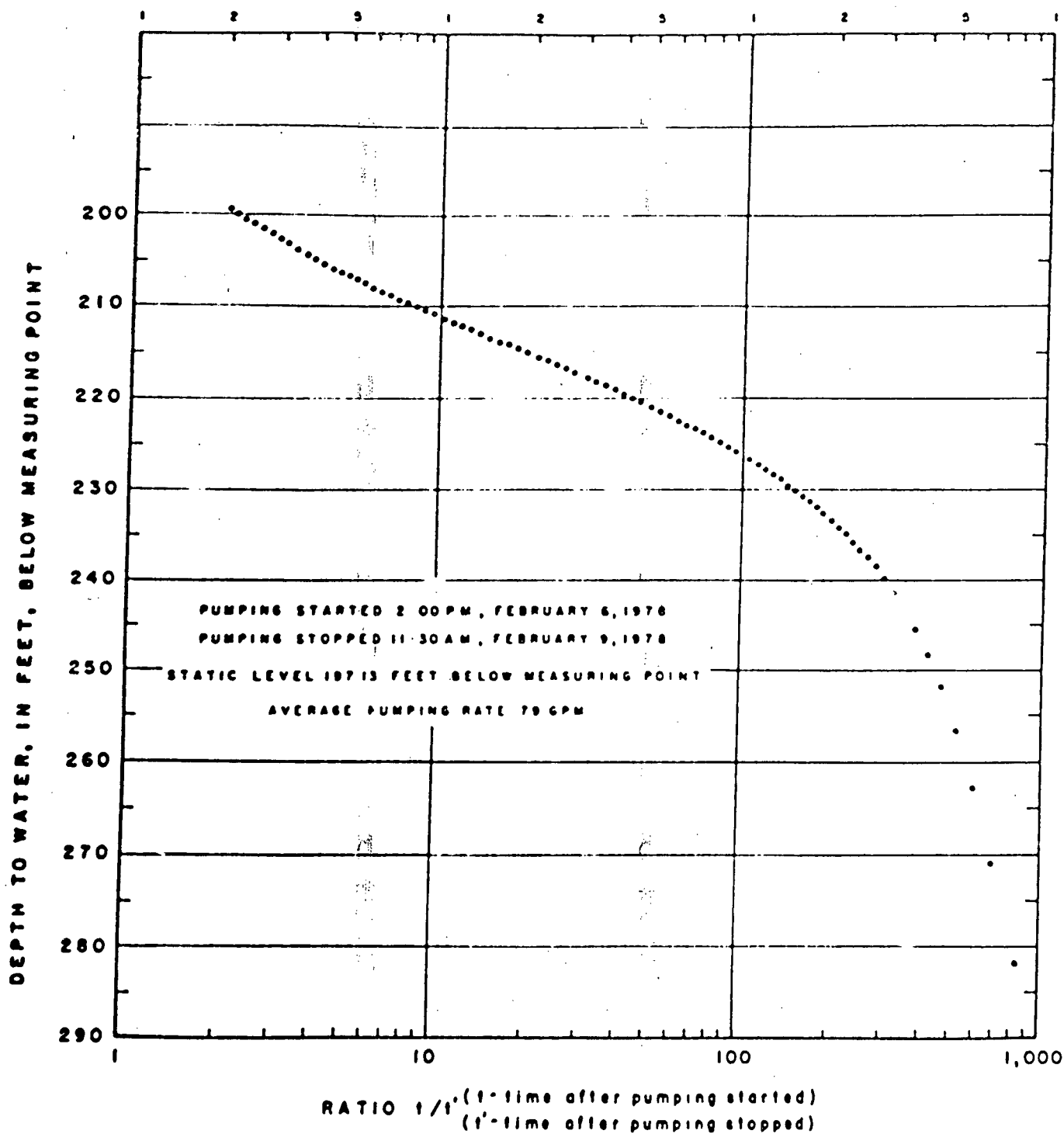
LOG-LOG GRAPH OF WATER LEVEL DRAWDOWN IN
OBSERVATION WELLS 9u208 AND 9u210



LOG-LOG GRAPH OF WATER LEVEL DRAWDOWN IN
OBSERVATION WELLS 9u218 AND 9u220

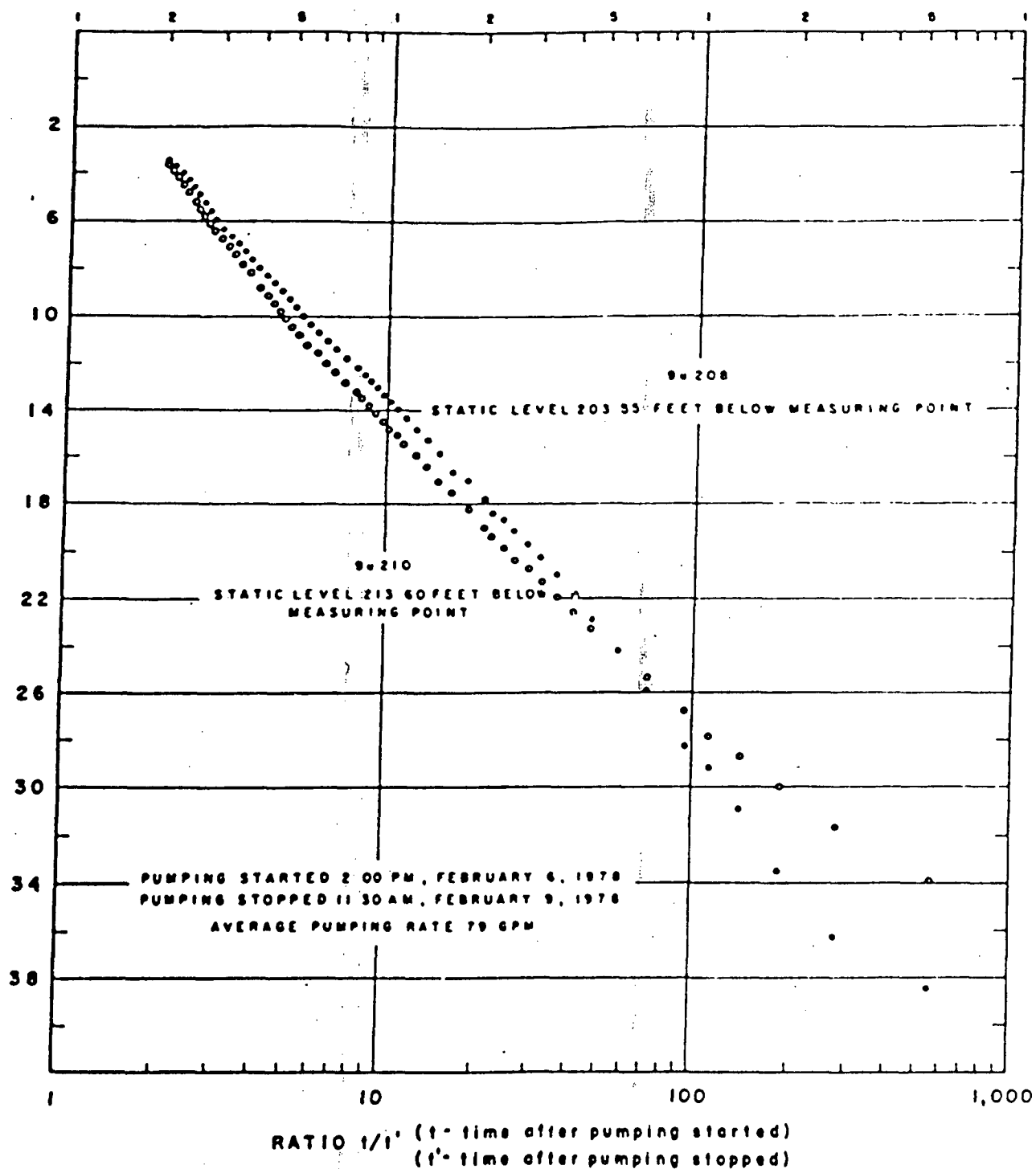


LOG-LOG GRAPH OF WATER LEVEL DRAWDOWN IN OBSERVATION
WELLS 9u221, 9u222, AND 9u224



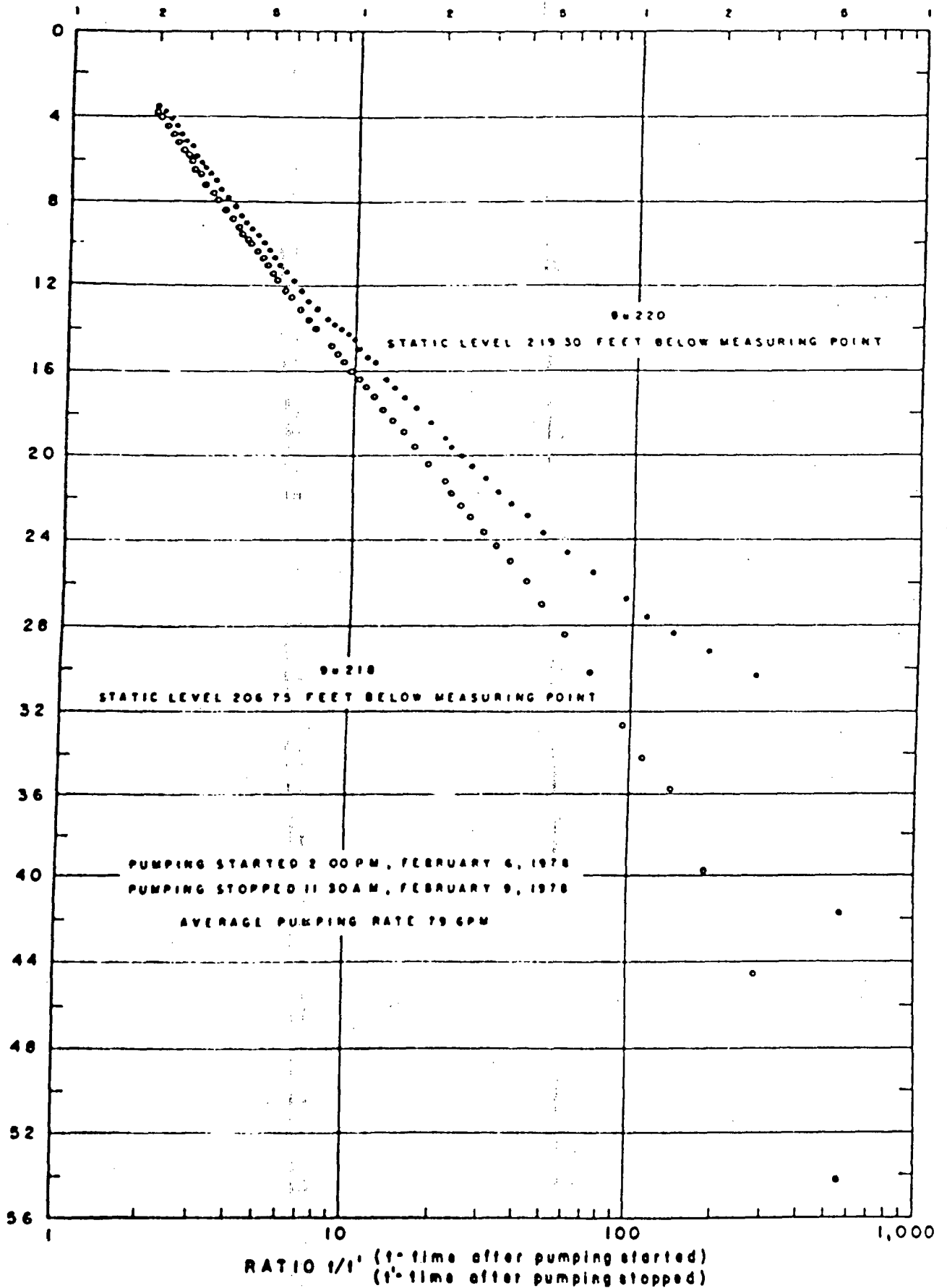
RECOVERY GRAPH FOR PUMPED WELL 9u214

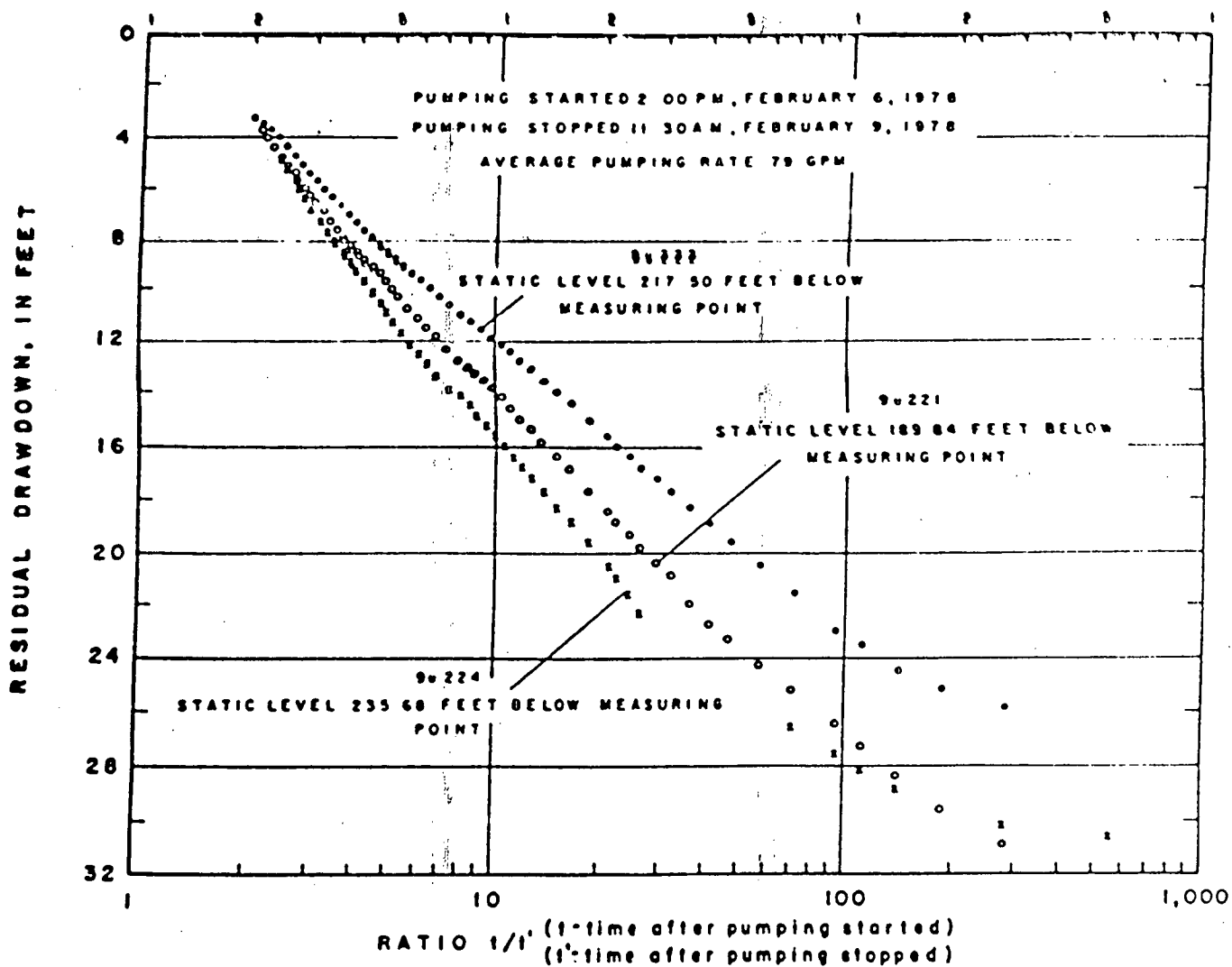
RESIDUAL DRAWDOWN, IN FEET



RECOVERY GRAPH FOR OBSERVATION WELLS
9u208 AND 9u210

RESIDUAL DRAWDOWN, IN FEET





RECOVERY GRAPH FOR OBSERVATION WELLS

9u221, 9u222, AND 9u224

APPENDIX B

Baseline Ground-Water Data

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	AVERAGE	ALUMINUM mg/l			NMWQCC STANDARD	RESTORATION VALUE
		MEAN	MEAN + 3 σ	MAXIMUM VALUE		
208	0.2	0.2	1.3	1.6	5.0	5.0
209	0.1					
210	0.3					
211	0.1					
212	0.1					
213	0.2					
214	0.3					
215	0.2					
216	0.4					
217	0.1					
218	0.2					
219	0.1					
220	0.5					
202	0.1	<0.5	<0.5	<0.5	5.0	5.0
221	0.3				5.0	5.0
222	0.2				5.0	5.0
223	<0.1				5.0	5.0
224	0.6				5.0	5.0
225	0.1				5.0	5.0
207	0.3				5.0	5.0
277	<0.5				5.0	5.0
278	<0.5				5.0	5.0
279	<0.5					
280	<0.5					
276-A	<0.5				5.0	5.0
276-B	<0.5				5.0	5.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	ARSENIC mg/l					NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE			
208	0.002	0.004	0.025	0.04	0.100	0.10	
209	0.003						
210	0.017						
211	0.003						
212	0.002						
213	0.003						
214	0.003						
215	0.002						
216	0.003						
217	0.005						
218	0.003						
219	0.002						
220	0.004						
202	0.003						
221	0.003				0.100	0.100	
222	0.002				0.100	0.100	
223	0.003				0.100	0.1	
224	0.002				0.100	0.100	
225	0.003				0.100	0.100	
					0.100	0.100	
207	0.002				0.100	0.100	
277	0.008	0.005	0.015	0.01	0.100	0.100	
278	0.003						
279	0.005						
280	0.003						
276-A	0.002				0.100	0.100	
276-B	0.006				0.100	0.100	

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	AVERAGE	MEAN	BARIUM mg/l		NMWQCC STANDARD	RESTORATION VALUE
			MEAN + 3 σ	MAXIMUM VALUE		
208	0.1	0.2	0.7	0.6	1.0	1.0
209	0.2					
210	0.1					
211	0.3					
212	0.2					
213	0.2					
214	0.1					
215	0.1					
216	0.1					
217	0.2					
218	0.2					
219	0.1					
220	0.1					
202	0.2	0.1	0.1	0.1	1.0	1.0
221	<0.1					
222	0.1					
223	0.1					
224	0.1					
225	0.1					
207	<0.1					
277	<0.1					
278	0.1					
279	<0.1					
280	<0.1					
276-A	0.1	<0.1	<0.1	<0.1	1.0	1.0
276-B	<0.1					

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	AVERAGE	MEAN	MEAN + 3 σ	BORON mg/l MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	0.1	0.1	0.5	0.4	0.75	0.75
209	0.1					
210	0.1					
211	0.1					
212	0.1					
213	0.1					
214	0.1					
215	0.1					
216	0.2					
217	0.1					
218	0.1					
219	0.2					
220	0.1					
202	0.2	0.1	0.1	0.1	0.75	0.75
221	0.2				0.75	0.75
222	0.2				0.75	0.75
223	0.1				0.75	0.75
224	0.1				0.75	0.75
225	0.1				0.75	0.75
207	0.3				0.75	0.75
277	0.1	0.1	0.1	0.1	0.75	0.75
278	0.1					
279	0.1					
280	0.1					
276-A	0.1	0.1	0.1	0.1	0.75	0.75
276-B	0.1				0.75	0.75

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	CADMIUM mg/l					NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE			
208	<0.001	0.007	0.036	0.03	0.01	0.01	0.036
209	<0.001						
210	0.005						
211	0.009						
212	0.004						
213	0.007						
214	0.008						
215	0.007						
216	0.011						
217	0.009						
218	0.007						
219	0.011						
220	0.004						
202	0.001						
221	0.011				0.01		0.010
222	0.007				0.01		0.011
223	0.011				0.01		0.010
224	0.005				0.01		0.011
225	<0.001				0.01		0.010
					0.01		0.010
207	0.001				0.01		0.010
					0.01		
277	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01
278	<0.01						
279	<0.01						
280	<0.01						
276-A	<0.01				0.01		0.010
276-B	<0.01				0.01		0.010

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	CHLORIDE mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	37.2	25.3	99.8	146.0	250	250.0
209	19.8					
210	28.0					
211	31.2					
212	8.8					
213	13.9					
214	20.4					
215	37.8					
216	10.2					
217	47.0					
218	15.5					
219	21.0					
220	30.1					
202	9.4	7.3	11.1	9.0	250	250.0
221	8.5				250	250.0
222	5.6				250	250.0
223	5.8				250	250.0
224	26.3				250	250.0
225	9.2				250	250.0
207	30.0				250	250.0
277	6.0				250	250.0
278	7.0				250	250.0
279	7.0					
280	9.0				250	250.0
276-A	6.0					
276-B	95.3				250	250.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

CHROMIUM
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	0.002	0.005	0.074	0.190	0.05	0.074
209	0.002					
210	0.002					
211	0.002					
212	0.003					
213	0.003					
214	0.001					
215	0.004					
216	0.002					
217	0.002					
218	0.032					
219	0.002					
220	0.002					
202	0.003					
221	0.013				0.05	0.050
222	0.007				0.05	0.050
223	0.003				0.05	0.050
224	0.002				0.05	0.050
225	0.002				0.05	0.050
225	0.002				0.05	0.050
207	0.003				0.05	0.050
277	<0.05				0.05	0.050
278	<0.05					
279	<0.05					
280	<0.05					
276-A	<0.05				0.05	0.050
276-B	<0.05				0.05	0.050

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

COBALT
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	<0.05	<0.05	<0.05	0.06	0.05	0.05
209	<0.05					
210	<0.05					
211	<0.05					
212	<0.05					
213	<0.05					
214	<0.05					
215	<0.05					
216	<0.05					
217	<0.05					
218	<0.05					
219	<0.05					
220	<0.05					
202	<0.05				0.05	0.05
221	<0.05				0.05	0.05
222	<0.05				0.05	0.05
223	<0.05				0.05	0.05
224	<0.05				0.05	0.05
225	<0.05				0.05	0.05
207	<0.05				0.05	0.05
277	<0.06	<0.06	<0.06	0.08	0.05	0.05
278	<0.06					
279	<0.06					
280	<0.06					
276-A	<0.06				0.05	0.06
276-B	<0.06				0.05	0.06

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	AVERAGE	COPPER mg/l			NMWQCC STANDARD	RESTORATION VALUE
		MEAN	MEAN + 3 σ	MAXIMUM VALUE		
208	0.010	0.003	0.029	0.07	1.0	1.000
209	<0.001					
210	0.005					
211	<0.05					
212	<0.05					
213	0.002					
214	0.001					
215	0.019					
216	<0.05					
217	<0.001					
218	0.001					
219	0.013					
220	0.002					
202	0.001	0.040	0.058	0.05	1.0	1.000
221	0.029					
222	0.010					
223	0.015					
224	0.030					
225	0.025					
207	0.005					
277	0.04					
278	0.04					
279	0.04					
280	0.04					
276-A	0.04	0.040	0.058	0.05	1.0	1.000
276-B	0.04					

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	CYANIDE mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE		
208	0.083	0.097	0.780	1.4	0.2	0.780
209	0.100					
210	0.050					
211	0.200					
212	0.175					
213	0.150					
214	0.050					
215	0.133					
216	0.020					
217	0.120					
218	0.050					
219	0.180					
220	0.067					
202	0.020					
221	0.017				0.2	0.200
222	0.017				0.2	0.200
223	0.380				0.2	0.200
224	0.017				0.2	0.380
225	0.200				0.2	0.200
					0.2	0.200
207	0.050				0.2	0.200
277	<0.005	<0.005	<0.005	<0.005	0.2	0.200
278	<0.005				0.2	0.200
279	<0.005					
280	<0.005					
276-A	<0.005				0.2	0.200
276-B	<0.008				0.2	0.200

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

FLOURIDE
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.44	0.43	0.93	0.92	1.6	1.60
209	0.62					
210	0.38					
211	0.34					
212	0.37					
213	0.46					
214	0.42					
215	0.51					
216	0.33					
217	0.34					
218	0.42					
219	0.71					
220	0.26					
202	0.45				1.6	1.60
221	0.27				1.6	1.60
222	0.28				1.6	1.60
223	0.41				1.6	1.60
224	0.26				1.6	1.60
225	0.49				1.6	1.60
207	0.35				1.6	1.60
277	0.30	0.30	0.30	0.30	1.6	1.60
278	0.30					
279	0.30					
280	0.30					
276-A	0.30				1.6	1.60
276-B	0.40				1.6	1.60

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	IRON mg/l		MEAN	MEAN + 3 σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE						
208	1.29	}	0.64	5.50	8.50	1.00	5.50
209	0.18						
210	1.88						
211	0.06						
212	0.08						
213	0.41						
214	0.43						
215	0.83						
216	0.34						
217	0.08						
218	0.59						
219	0.19						
220	1.46						
202	2.05					1.00	2.05
221	0.14					1.00	1.00
222	0.24					1.00	1.00
223	0.42					1.00	1.00
224	2.46					1.00	2.46
225	0.19					1.00	1.00
207	2.20	}	0.16	0.51	0.38	1.00	2.20
277	0.08					1.00	1.00
278	0.35						
279	0.15						
280	0.09						
276-A	0.06					1.00	1.00
276-B	0.04					1.00	1.00

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

LEAD
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	0.001	0.003	0.063	0.170	0.05	0.063
209	0.004					
210	0.002					
211	< 0.001					
212	0.006					
213	0.001					
214	0.001					
215	0.001					
216	0.001					
217	0.001					
218	0.029					
219	0.001					
220	0.001					
202	0.001				0.05	0.050
221	0.007				0.05	0.050
222	0.001				0.05	0.050
223	0.002				0.05	0.050
224	0.001				0.05	0.050
225	0.001				0.05	0.050
207	0.003				0.05	
277	< 0.01	< 0.01	< 0.01	< 0.01	0.05	0.050
278	< 0.01					
279	< 0.01					
280	< 0.01					
276-A	< 0.01				0.05	0.050
276-B	< 0.01				0.05	0.050

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

MANGANESE
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.181	0.066	0.456	0.94	0.2	0.456
209	0.062					
210	0.108					
211	0.052					
212	0.009					
213	0.044					
214	0.041					
215	0.150					
216	0.018					
217	0.022					
218	0.069					
219	0.050					
220	0.031					
202	0.096	<0.01	0.013	0.02	0.2	0.20
221	0.027					
222	0.016					
223	0.010					
224	0.050					
225	0.006					
207	0.121					
277	<0.01					
278	<0.01					
279	<0.01					
280	0.01					
276-A	<0.01	0.19			0.2	0.20
276-B	0.19					

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	MOLYBDENUM mg/l					NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE			
208	0.291	0.238	0.661	2.3	1.0	1.0	1.0
209	0.078						
210	0.582						
211	0.020						
212	0.165						
213	0.209						
214	0.044						
215	0.077						
216	0.078						
217	0.066						
218	0.486						
219	0.673						
220	0.272						
202	0.099						
221	0.012				1.0		1.0
222	0.011				1.0		1.0
223	0.052				1.0		1.0
224	0.010				1.0		1.0
225	0.329				1.0		1.0
					1.0		1.0
207	0.003				1.0		1.0
277	0.042	0.033	0.042	0.046	1.0	1.0	1.0
278	0.033						
279	0.036						
280	0.021						
276-A	0.020				1.0		1.0
276-B	0.007				1.0		1.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

TOTAL MERCURY
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	0.00087	0.00053	0.00194	0.0055	0.002	0.0020
209	0.00040					
210	0.00094					
211	0.00018					
212	0.00013					
213	0.00088					
214	0.00080					
215	0.00042					
216	<0.00004					
217	0.00008					
218	0.00008					
219	0.00024					
220	0.00080					
202	0.0010				0.002	0.0020
221	0.00083				0.002	0.0020
222	0.00010				0.002	0.0020
223	0.00002				0.002	0.0020
224	<0.00004				0.002	0.0020
225	<0.00004				0.002	0.0020
207	<0.00004				0.002	<0.0020
277	<0.00003	<0.00003	<0.00003	<0.00003	0.002	0.0020
278	<0.00003					
279	<0.00003					
280	<0.00003					
276-A	<0.00003				0.002	0.0020
276-B	<0.00004				0.002	0.0020

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

NICKEL
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3 σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	0.01	0.02	0.11	0.10	0.2	0.20
209	0.02					
210	0.02					
211	0.03					
212	0.02					
213	0.02					
214	0.02					
215	0.02					
216	0.03					
217	0.04					
218	0.02					
219	0.03					
220	0.03					
202	0.01				0.2	0.20
221	0.02				0.2	0.20
222	0.03				0.2	0.20
223	0.03				0.2	0.20
224	0.03				0.2	0.20
225	0.03				0.2	0.20
207	0.02				0.2	0.20
277	0.03	0.02	0.08	0.06	0.2	0.20
278	0.04					
279	<0.02					
280	<0.02					
276-A	0.03				0.2	0.20
276-B	<0.02				0.2	0.20

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

NITRATE (asN)
mg/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	0.08	0.08	0.69	1.9	10.0	10.0
209	0.08					
210	0.12					
211	0.08					
212	0.22					
213	0.08					
214	< 0.10					
215	0.10					
216	0.09					
217	0.04					
218	0.07					
219	0.11					
220	0.05					
202	0.08				10.0	10.0
221	0.07				10.0	10.0
222	0.07				10.0	10.0
223	0.04				10.0	10.0
224	0.32				10.0	10.0
225	0.12				10.0	10.0
207	0.08				10.0	10.0
277	< 0.04	0.05	0.23	0.15	10.0	10.0
278	< 0.04					
279	0.08					
280	0.14					
276-A	< 0.04				10.0	10.0
276-B	< 0.05				10.0	10.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

pH						
<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	7.9	7.4	N/A	9.1	6 to 9	6 to 9
209	7.4					
210	7.3					
211	7.8					
212	8.0					
213	7.4					
214	7.4					
215	7.2					
216	7.8					
217	8.3					
218	7.4					
219	7.3					
220	7.8					
202	7.6	8.2	N/A	9.2	6 to 9	6 to 9
221	7.9					
222	7.9					
223	7.8					
224	7.5					
225	7.6					
207	7.2					
277	8.9					
278	8.7					
279	8.6					
280	9.0					
276-A	8.8				6 to 9	6 to 9
276-B	7.6					

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	PHENOLS mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	0.004	0.011	0.047	0.066	0.005	0.047
209	0.010					
210	0.010					
211	0.020					
212	0.023					
213	0.012					
214	0.008					
215	0.011					
216	0.011					
217	0.016					
218	0.004					
219	0.012					
220	0.009					
202	0.010	0.004	0.008	0.007	0.005	0.010
221	0.004				0.005	0.005
222	0.009				0.005	0.009
223	0.015				0.005	0.015
224	0.009				0.005	0.009
225	0.020				0.005	0.020
207	0.004				0.005	0.005
277	0.003				0.005	0.008
278	0.004					
279	0.005					
280	0.003					
276-A	0.003	0.009			0.005	0.005
276-B	0.009				0.005	0.009

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

COMBINED DISSOLVED
RADIUM 226 & RADIUM 228 pCi/l

WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	<32.3	<21.6	<97.2	89.4±3.0	30.0	97.2
209	<48.2					
210	4.5					
211	<43.8					
212	<6.9					
213	<4.2					
214	<11.6					
215	<58.4					
216	3.8					
217	<6.6					
218	<12.3					
219	<29.0					
220	<23.7					
202	<1	2.4	8.3	7.2±5.8	30.0	30.0
221	<2.2				30.0	30.0
222	<1				30.0	30.0
223	<1				30.0	30.0
224	<1.1				30.0	30.0
225	<8.3				30.0	30.0
207	<1.1				30.0	30.0
277	5.1				30.0	30.0
278	1.6					
279	0.5					
280	2.5					
276-A	0.6	2.4			30.0	30.0
276-B	2.4				30.0	30.0

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	SELENIUM mg/l				NMWQCC STANDARD	RESTORATION VALUE
	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	<0.01	<0.01	<0.01	0.01	0.05	0.05
209	<0.01					
210	<0.01					
211	<0.01					
212	<0.01					
213	<0.01					
214	<0.01					
215	<0.01					
216	<0.01					
217	<0.01					
218	<0.01					
219	<0.01					
220	<0.01					
202	<0.01	0.015	0.025	0.022	0.05	0.05
221	<0.01				0.05	0.05
222	<0.01				0.05	0.05
223	<0.01				0.05	0.05
224	<0.01				0.05	0.05
225	<0.01				0.05	0.05
207	<0.01				0.05	0.05
277	0.014				0.05	0.05
278	0.013					
279	0.019					
280	0.014					
276-A	0.016	0.005			0.05	0.05
276-B	0.005				0.05	0.05

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

SILVER
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	<0.01	<0.01	<0.01	0.02	0.05	0.05
209	<0.01					
210	<0.01					
211	<0.01					
212	<0.01					
213	<0.01					
214	<0.01					
215	<0.01					
216	<0.01					
217	<0.01					
218	<0.01					
219	<0.01					
220	<0.01					
202	<0.01				0.05	0.05
221	<0.01				0.05	0.05
222	<0.01				0.05	0.05
223	<0.01				0.05	0.05
224	<0.01				0.05	0.05
225	<0.01				0.05	0.05
207	<0.01				0.05	0.05
277	<0.005	<0.005	<0.005	<0.005	0.05	<0.005
278	<0.005				0.05	0.05
279	<0.005				0.05	0.05
280	<0.005				0.05	0.05
276-A	<0.005				0.05	0.05
276-B	<0.005				0.05	0.05

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

WELL NUMBER	AVERAGE	SULFATE mg/l			NMWQCC STANDARD	RESTORATION VALUE
		MEAN	MEAN + 3σ	MAXIMUM VALUE		
208	52	40	138	158	600	600
209	16					
210	59					
211	30					
212	22					
213	61					
214	66					
215	30					
216	24					
217	23					
218	51					
219	18					
220	50					
202	51	30	43	37	600	600
221	40					
222	37					
223	33					
224	36					
225	28					
207	217					
277	32					
278	26					
279	32					
280	31					
276-A	36				600	600
276-B	111					

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
McKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

TOTAL DISSOLVED SOLIDS
mg/l

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	390	373	589	701	1,000	1,000
209	355					
210	388					
211	366					
212	325					
213	390					
214	443					
215	383					
216	316					
217	386					
218	376					
219	370					
220	338					
202	412	318	340	325	1,000	1,000
221	331				1,000	1,000
222	315				1,000	1,000
223	309				1,000	1,000
224	326				1,000	1,000
225	331				1,000	1,000
207	601				1,000	1,000
277	322				1,000	1,000
278	317				1,000	1,000
279	308					
280	323					
276-A	342				1,000	1,000
276-B	558				1,000	1,000

MOBIL OIL CORPORATION
PILOT IN SITU LEACH TEST SITE
SECTION 9 T17N, R13W
MCKINLEY COUNTY, NEW MEXICO

BASELINE GROUNDWATER DATA

TOTAL URANIUM mg/l						
WELL NUMBER	AVERAGE	MEAN	MEAN + 3σ	MAXIMUM VALUE	NMWQCC STANDARD	RESTORATION VALUE
208	0.023	0.013	0.062	0.082	5	5.0
209	0.006					
210	0.014					
211	0.007					
212	0.010					
213	0.008					
214	0.007					
215	0.014					
216	0.008					
217	0.005					
218	0.009					
219	0.010					
220	0.043					
202	0.002					
221	0.005				5	5.0
222	0.008				5	5.0
223	0.006				5	5.0
224	0.007				5	5.0
225	0.012				5	5.0
207	0.007				5	5.0
277	<0.002	<0.002	<0.002	0.003	5	5.0
278	<0.002					
279	<0.002					
280	<0.002					
276-A	<0.002				5	5.0
276-B	0.002				5	5.0

BASELINE GROUNDWATER DATA

<u>WELL NUMBER</u>	<u>AVERAGE</u>	<u>MEAN</u>	<u>MEAN + 3σ</u>	<u>MAXIMUM VALUE</u>	<u>NMWQCC STANDARD</u>	<u>RESTORATION VALUE</u>
208	<0.01	0.01	0.19	0.51	10.0	10.0
209	<0.01					
210	0.01					
211	<0.01					
212	0.01					
213	<0.01					
214	<0.01					
215	0.01					
216	0.01					
217	0.01					
218	<0.01					
219	0.12					
220	0.01					
202	0.01	0.03	0.05	0.03	10.0	10.0
221	0.01					
222	0.01					
223	<0.01					
224	0.02					
225	<0.01					
207	0.02					
277	0.03					
278	0.02					
279	0.02					
280	0.03					
276-A	0.04	0.03			10.0	10.0
276-B	0.03					

APPENDIX C

Current Water Quality and Molybdenum Analyses

Current Water Quality - Crownpoint Section 9 Wellfield
July 1987

<u>Chemical Constituent</u>	<u>New Mexico Standard mg/liter</u>	<u>Restoration Standard mg/liter</u>	<u>July 1987 Average mg/liter</u>
Aluminum, dissolved	5.0	5.0	0.692
Arsenic	0.1	0.1	0.018
Barium	1.0	1.0	0.208
Boron	0.75	0.75	0.277
Cadmium	0.01	0.036	<0.005
Chloride	250.0	250.0	52.462
Chromium	0.05	0.074	0.005
Cobalt, dissolved	0.05	0.05	0.011
Copper, dissolved	1.0	1.0	<0.005
Cyanide	0.2	0.780	<0.005
Fluoride	1.6	1.6	<0.546
Iron, dissolved	1.0	5.50	0.035
Le. i, dissolved	0.05	0.063	0.007
Manganese, dissolved	0.2	0.456	0.008
Molybdenum, dissolved	1.0	1.0	1.49
Mercury, total	0.002	0.002	0.0014
Nickel, dissolved	0.2	0.2	<0.02
Nitrate (as N)	10.0	10.0	0.254
PH	6 to 9	6 to 9	9.454
Phenols	0.005	0.047	0.006
Combined Ra-226 & 228	30.0	97.2	20.577
Selenium, dissolved	0.05	0.05	0.006
Silver, dissolved	0.05	0.05	0.005
Sulfate (as SO4)	600.0	600.0	65.846
TDS (at 180 C)	1000.0	1000.0	366.154
Uranium (as U)	5.0	5.0	0.102

CROWNPOINT
STABILITY SAMPLING MOLYBDENUM

WELL NO.	NOVEMBER 87		DECEMBER 86		JANUARY 87		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY	
	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM
208	1.2		2.0				2.1	1.79	2.3	1.62					2.2	1.78		
209	3.2						1.3	1.05			1.0	.87				.77	.60	
210	.17						.25	.2			.22	.16				.23	.30	
211	2.3				3.9	2.88	3.9	4.05					3.1	2.66	3.1	1.68		
212	.37				.28	.21	.33	.27					.26	.22		.29	.26	
213	1.1		1.7				2.0	2.11							2.9	2.01	3.00	2.99
214	.91		1.2				.97	.87			.85	.63				.50	.61	
215	1.7				1.9	1.05	1.2	1.29							.93	1.28	.98	.74
216	7.2				4.1	3.13	4.2	3.24					2.9	2.87		3.2	3.13	
217	3.7				2.8	.83	3.0	2.35					1.1	.86		2.3	1.95	
218	.29		.55				.24	.26							.23	.20	.30	.24
219	2.6						1.3	1.40					.62	.72		1.1	.42	
220	.019						1.2	1.25							1.2	1.10	1.5	1.19
AVE	1.90		1.36		2.59	1.62	1.01	1.0	1.63	1.53	1.09	.82	1.59	1.46	1.31	1.15	1.49	1.30

AC - ACCU-LABS

IM - INTERMOUNTAIN

cm7
8/25/87

CROWNPOINT
STABILITY SAMPLING MOLYBDENUM

WELL NO.	NOVEMBER 87	DECEMBER 86	JANUARY 87		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY	
	AC	AC	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM	AC	IM
208	1.2	2.0					2.1	1.79	2.3	1.62					2.2	1.78
209	3.2				1.3	1.05	.55	.98	1.0	.87					.77	.60
210	.17				.25	.2	.17	.14	.22	.16					.23	.30
211	2.3		3.9	2.88			3.9	4.05			3.1	2.66			3.1	1.68
212	.37		.28	.21			.33	.27			.26	.22			.29	.26
213	1.1	1.7					2.0	2.11					2.9	2.01	3.00	2.99
214	.91	1.2					.97	.87	.85	.63					.50	.61
215	1.7		1.9	1.05			1.2	1.29					.93	1.28	.98	.74
216	7.2		4.1	3.13			4.2	3.24			2.9	2.87			3.2	3.13
217	3.7		2.8	.83			3.0	2.35			1.1	.86			2.3	1.93
218	.29	.55					.24	.26					.23	.20	.30	.24
219	2.6				1.3	1.50	1.3	1.40			.62	.72			1.1	.42
220	.019				1.2	1.25	1.1	1.08					1.2	1.10	1.5	1.19
AVE	1.90	1.36	2.59	1.62	1.01	1.0	1.63	1.53	1.09	.82	1.59	1.46	1.31	1.15	1.49	1.30

AC - ACCU-LABS

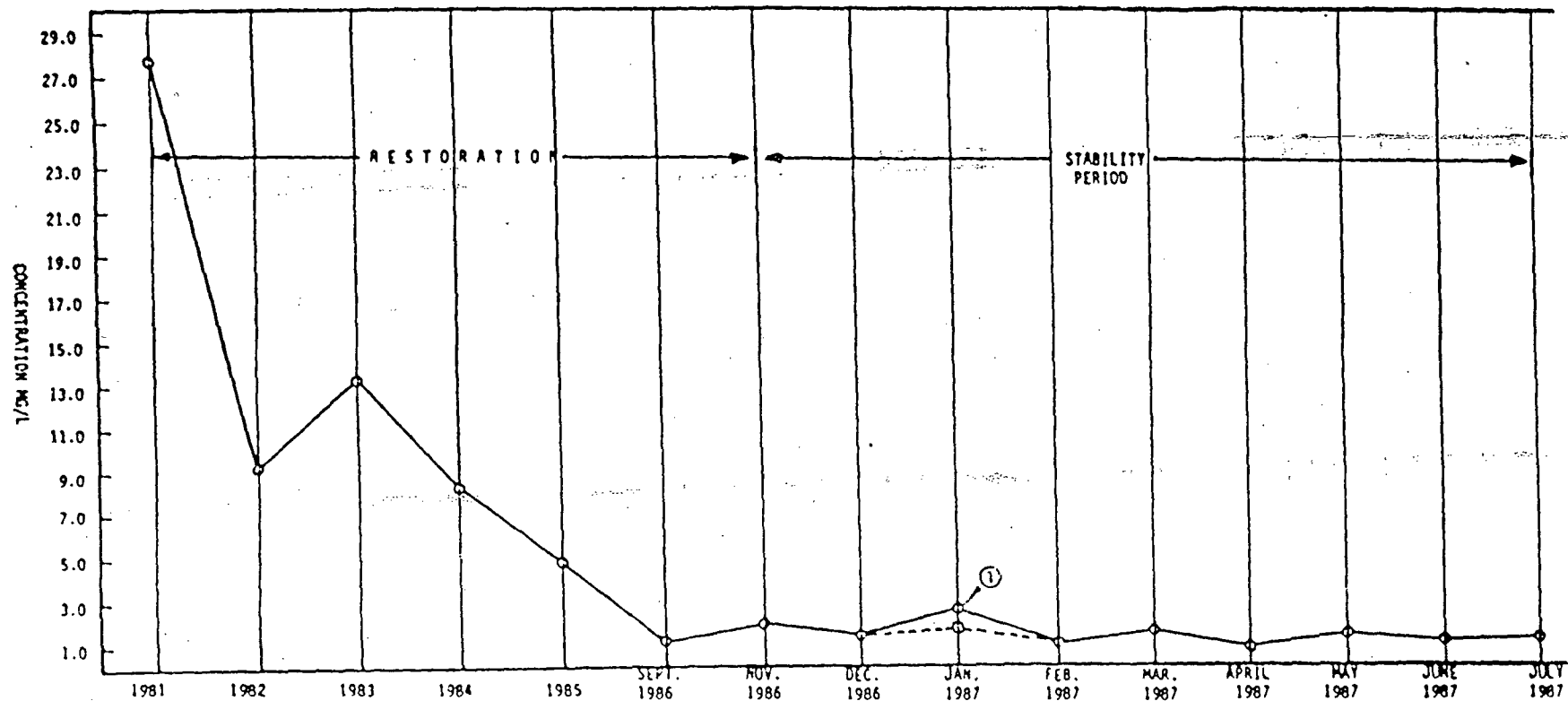
IM - INTERMOUNTAIN

cm7

8/25/87

CROWNPOINT SECTION 9

MOLYBDENUM ANALYSES



- AVERAGE MOLYBDENUM
- CHECK LAB ANALYSIS
- ① LABORATORY ANALYTICAL DISCREPANCY



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

May 1, 1998

Mr. Bennie Cohoe, Executive Director
Navajo Nation Environmental Protection Agency
P.O. Box 9000
Window Rock, AZ 86515

SUBJECT: FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CROWNPOINT,
NEW MEXICO *IN SITU* LEACH URANIUM MINING PROJECT

Dear Mr. Cohoe:

I am writing in response to your June 30, 1997, letter addressed to Mr. Robert D. Carlson of my staff regarding Navajo Nation Environmental Protection Agency's (NNEPA's) comments on the Final Environmental Impact Statement (FEIS) for Hydro Resources, Inc. (HRI's) proposed *in situ* leach uranium mining project at Crownpoint, NM. In this letter, you requested that the U.S. Nuclear Regulatory Commission (NRC) staff's attention be directed to the comments attached therein, and to contact you if there were any questions.

Based on the NRC staff's review of this document, I believe that most of NNEPA's comments were addressed in either the FEIS, the Safety Evaluation Report, the source materials license issued to HRI, or during the staff's review of other related license application documents submitted by the licensee. The details of many areas that NNEPA commented on, such as waste retention ponds or liquid waste disposal options, have not yet been submitted by HRI because the licensee has not determined which disposal option(s) it will choose. As the NRC conducts its review of these areas, we will take your comments into consideration. The specific concerns expressed by NNEPA in other areas, such as emergency response, can be handled best through a memorandum of agreement between HRI and the local response authorities. Additionally, HRI will be required to obtain all necessary permits and licenses for areas or activities outside of the NRC's regulatory authority (e.g., underground injection permits, construction permits, etc.) prior to injection of lixiviant. For each of these areas of concern, the NRC has emplaced specific license conditions to ensure that HRI complies with these requirements.

If you have any questions concerning this subject, please contact Mr. Carlson of my staff at (301) 415-8165.

Sincerely,

A handwritten signature in cursive script, reading "Joseph J. Holonich", is written above the typed name.

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 20, 1998

Lynne Sebastian, Ph.D., State Historic
Preservation Officer
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87501

SUBJECT: DETERMINATION OF EFFECT FOR THE CHURCH ROCK SECTION 8 AND
CROWNPOINT SECTION 12 PORTIONS OF THE CROWNPOINT, NEW
MEXICO PROJECT

Dear Dr. Sebastian:

In response to a letter from Glenna Dean of your staff, dated November 20, 1997, and pursuant to National Historic Preservation Act (NHPA) requirements, the staff of the U.S. Nuclear Regulatory Commission (NRC) is consulting with your office for purposes of making a determination of effect regarding Section 8, a portion of the proposed Hydro Resources, Incorporated (HRI) uranium mining project located about seven miles north of Church Rock, New Mexico (Sections 8 and 17, T16N, R16W), and Section 12 (T17N, R13W), an area located about two miles north of Crownpoint, New Mexico. These areas were surveyed, as reflected in the report prepared by the Museum of New Mexico's Office of Archaeological Studies *Cultural Resources Inventory* (1997) (OAS Report), which your office has reviewed. Separate NHPA consultations will be conducted prior to any additional undertakings which HRI may pursue under its NRC license.

The NRC staff concurs with the OAS Report regarding the archaeological sites on Section 8 and Section 12 found eligible for inclusion in the *National Register of Historic Places*. More specifically, the NRC staff agrees that these sites qualify as historic properties, and are thus eligible for inclusion, based on their potential to contribute important information to the understanding of regional prehistory or history (Criterion D for listing in the *National Register of Historic Places*, 36 CFR § 60.4). No traditional cultural properties were identified at or near any of the project areas identified above (Sections 8, 17, and 12).

The NRC staff has applied 36 CFR § 800.5 ("Assessing effects") and 36 CFR § 800.9 ("Criteria of effect and adverse effect"), and proposes to determine that any HRI undertakings on Sections 8 and 12, as described above, would have no effect on the historic properties located therein. The NRC staff seeks your concurrence on this proposed finding of no effect, which is based on the following:

- Sections 8 and 17 (T16N, R16W), and Section 12 (T17N, R13W) have been surveyed for archaeological resources and traditional cultural properties. Historic properties eligible for inclusion in the *National Register* were identified on Section 8 and Section 12. No such properties were identified on Section 17.
- All eligible and potentially eligible historic properties on Sections 8 and 12 would be fenced, as necessary, to preclude intrusion during any construction, mining, or other ground-disturbing activity. The recommended fencing (as identified in the OAS Report) would serve both as a mechanical equipment barrier and to discourage casual foot traffic trespass. Fencing would remain in place throughout construction and mining phases, and it would not be removed until after site reclamation processes have been concluded following completion of mining. This protective measure will assure that the characteristics of the historic properties will not be changed by the undertaking. If unanticipated circumstances arise such that an effect on any eligible or potentially eligible historic property cannot be avoided, consultation with your office and other appropriate parties will be reopened.
- All ground-disturbing activities within the vicinity of the historic properties (the areas as identified in the OAS Report) will be monitored by an archaeologist. Within the HRI project areas surveyed in the OAS Report, the site archaeologist will have authority to stop ground-disturbing activity in the event that previously undetected subsurface cultural resources are identified. The development of treatment protocols for the unexpected discovery of human remains will be initiated as necessary within the framework of 36 CFR § 800.11, the Native American Graves Protection and Repatriation Act, and existing New Mexico State regulations or Navajo Nation regulations (as applicable) regarding treatment of unmarked burials and protection of human remains.
- As discussed in the OAS Report, adequate consultation with local traditional practitioners has occurred and no traditional cultural properties have been identified in or near Sections 8, 17, and 12.

As reflected in the enclosed letter to Dr. Alan Downer, the Navajo Nation's Historic Preservation Officer, dated May 20, 1998, the NRC staff is consulting with his office regarding Section 17, the portion of HRI's Church Rock site located on land held in trust for the Navajo Nation. The NRC staff will consider any written comments your office submits within 15 days of your receipt of this letter with respect to the Section 17 findings discussed in the enclosed letter.

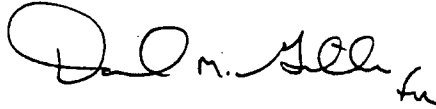
If your office has any questions, please contact Mr. Robert Carlson, NRC's Project Manager of the HRI mining project, at (301) 415-8165. If no response from your office is received within 30 days of your receipt of this letter with respect to Sections 8 and 12, the NRC staff will assume that your office concurs in the proposed determination that any HRI undertakings on Sections 8 and 12 would have no effect on the historic properties located there. If your office so concurs,

Dr. L. Sebastian

-3-

or does not otherwise submit any objections to the NRC staff's proposed determination, then pursuant to 36 CFR § 800.5 (b), the staff would consider the NHPA process to be concluded with respect to Sections 8 and 12.

Sincerely,

A handwritten signature in black ink, appearing to read "J. J. Holonich", with a stylized flourish at the end.

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: Service list attached

Dr. L. Sebastian

-4-

cc: for letter dated 5/20/98

Office of Commission Appellate
Adjudication
Mail Stop O-16G15
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Chief Administrative Judge
B. Paul Cotter, Jr., Esq.
Presiding Officer
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Mail Stop T-3F23
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Secretary (2)
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Lila Bird, Executive Director
Water Information Network
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Mitchell W. Capitan, President
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Dr. L. Sebastian

-5-

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Anthony J. Thompson, Esq.
Paul Gormley, Esq.
Counsel for Hydro Resources, Inc.
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Jon J. Indall
Comeau, Maldegen, Templeman
and Indall, LLP
141 East Palace Avenue
Santa Fe, New Mexico 87504-0669



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

May 20, 1998

Mr. James Copeland
Bureau of Land Management
Farmington District Office
1235 La Plata Highway
Farmington NM 87401

SUBJECT: HISTORIC PROPERTIES ON PORTIONS OF THE HYDRO RESOURCES, INC.
URANIUM MINING PROJECT AREAS

Dear Mr. Copeland:

As indicated in the enclosed letter to Dr. Lynne Sebastian, dated May 20, 1998, the U.S. Nuclear Regulatory Commission (NRC) staff is consulting with the New Mexico State Historic Preservation Officer (SHPO) pursuant to the National Historic Preservation Act (NHPA). The consultation regards a portion of the proposed Hydro Resources, Incorporated (HRI) uranium mining project located in Sections 8 and 17 (T16N, R16W) about seven miles north of Church Rock, New Mexico; and Section 12 (T17N, R13W), located about two miles north of Crownpoint, New Mexico. NHPA Section 106 and the regulations through which it is implemented (36 CFR 800) require federal agencies to take into account the effects of undertakings on any historic properties eligible for, or listed in, the *National Register of Historic Places*.

As documented in the Museum of New Mexico's Office of Archaeological Studies report (OAS Report) (see letter addressed to your office dated June 19, 1997, enclosing a copy of the OAS Report), historic properties eligible for inclusion in the *National Register* were found in Section 8 (T16N, R16W) and Section 12 (T17N, R13W). No such properties were found on Section 17 (T16N, R16W). No traditional cultural properties were identified at or near any of these project areas. As discussed more fully in the enclosed letter to Dr. Sebastian, the NRC staff proposes to determine that any HRI undertakings on Sections 8 and 12, as described above, would have no effect on the historic properties located there.

The NRC staff will consider any written comments you submit within 15 days of your receipt of this letter with respect to this proposed determination of no effect.

The NRC staff is also consulting with Dr. Alan Downer, the Director of the Navajo Nation Historic Preservation Department, as reflected in the enclosed letter to him dated May 20, 1998. This consultation regards the above-described Section 17, on which no historic properties eligible for inclusion in the *National Register* were found. Regarding this finding, the NRC staff will consider any written comments you submit within 15 days of your receipt of this letter.

J. Copeland

-2-

If you have any questions, please contact Mr. Robert Carlson, NRC's Project Manager of the HRI mining project, at (301) 415-8165.

Sincerely,



Joseph J. Holonich, Chief *fu*
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated *

cc: Service list attached *Copies of the enclosures are included in your package

cc: for letter dated 5/20/98

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J. Copeland

-4-

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141 East Palace Avenue
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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

May 20, 1998

Alan S. Downer, Ph.D., Director
Navajo Nation Historic Preservation Department
ATTN: Mr. Peter Noyes
P.O. Box 4950
Window Rock, AZ 86515

SUBJECT: HYDRO RESOURCES, INC.'S URANIUM MINING PROJECT,
CHURCH ROCK SECTION 17 - NO HISTORIC PROPERTIES FOUND

Dear Dr. Downer:

In my letter to you dated January 31, 1997, the staff of the U.S. Nuclear Regulatory Commission (NRC) requested National Historic Preservation Act (NHPA) consultation with your office regarding HRI's activities to occur on Navajo Tribal lands. Pursuant to the subsequent agreement entered into in April 1997, between the Navajo Nation and the National Park Service, for NHPA purposes you became the historic preservation officer with respect to undertakings occurring on Navajo Tribal lands, in addition to retaining responsibility for administering the Navajo Nation historic preservation laws on various tribal lands, and those lands held in trust for the Navajo Nation.

As stated in the enclosed letter to New Mexico's State Historic Preservation Officer (SHPO), dated May 20, 1998, the NRC staff is consulting with New Mexico's SHPO for purposes of making a determination of effect regarding Section 8, a portion of the proposed HRI uranium mining project located about seven miles north of Church Rock, New Mexico (Sections 8 and 17, T16N, R16W), and Section 12 (T17N, R13W), an area located about two miles north of Crownpoint, New Mexico. Sections 8, 12, and 17 were surveyed, pursuant to NHPA requirements, as reflected in the report prepared by the Museum of New Mexico's Office of Archaeological Studies *Cultural Resources Inventory* (1997) (OAS Report). The NRC staff sent your office a copy of the OAS Report in June 1997.

The NRC staff is consulting with your office regarding the above-described Section 17, land which is held in trust for the Navajo Nation. The NRC staff concurs with the OAS Report's finding that no historic properties (i.e., cultural properties as defined in the Navajo Nation Cultural Resources Protection Act) eligible for listing in the *National Register of Historic Places* or in the *Navajo Nation Register of Cultural Properties and Cultural Landmarks* are located within Section 17. The OAS Report found that the only cultural resources identified in Section 17 are isolated occurrences unlikely to yield information beyond that already documented in the survey performed. Pursuant to 36 CFR § 800.4 (d), the NRC staff considers the NHPA Section 106 process to be concluded with respect to the Section 17 area surveyed in the OAS Report, based on the finding that no historic properties are located within Section 17. Pursuant to § 101(d) of the Navajo Nation Cultural Resources Protection Act (NNCRPA), the NRC staff requests approval to implement the undertaking (as described above and in previous communications) on Section 17, again based on the above-described findings.

Dr. A. Downer

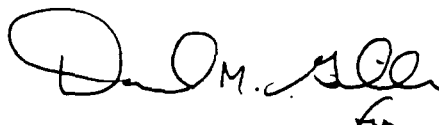
-2-

As stated in the enclosed letter, with respect to Section 17 and the other HRI project areas surveyed in the OAS Report, the site archaeologist will have authority to stop ground-disturbing activity in the event that previously undetected subsurface cultural resources are identified. The development of treatment protocols for the unexpected discovery of human remains will be initiated as necessary within the framework of 36 CFR § 800.11, the Native American Graves Protection and Repatriation Act, and existing New Mexico State regulations or Navajo Nation regulations (as applicable) regarding treatment of unmarked burials and protection of human remains.

Separate NHPA Section 106 and NNCRPA consultations will be conducted with your office prior to any additional undertakings which HRI may pursue under its NRC license on lands falling within your NHPA and/or NNCRPA jurisdiction.

If your office has any questions, please contact Mr. Robert Carlson, NRC's Project Manager of the HRI mining project, at (301) 415-8165. If no response from your office is received within 30 days of your receipt of this letter with respect to Section 17, the NRC staff will assume that your office, for NNCRPA purposes, approves HRI's undertaking on Section 17. The NRC staff will consider any written comments your office submits within 15 days of your receipt of this letter with respect to the findings regarding Sections 8 and 12 discussed in the enclosed letter to New Mexico's SHPO.

Sincerely,



Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: Service list attached

Dr. A. Downer

-3-

cc: for letter dated 5/20/98

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Dr. A. Downer

-4-

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Santa Fe, New Mexico 87504-0669



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 20, 1998

Ms. Jenni Denetsone, Area Realty Officer
Bureau of Indian Affairs
Navajo Area Office
Real Estate Services
PO Box 1060
Gallup, NM 87305-1060

SUBJECT: HISTORIC PROPERTIES ON PORTIONS OF THE HYDRO RESOURCES, INC.
URANIUM MINING PROJECT AREAS

Dear Ms. Denetsone:

As indicated in the enclosed letter to Dr. Lynne Sebastian, dated May 20, 1998, the U.S. Nuclear Regulatory Commission (NRC) staff is consulting with the New Mexico State Historic Preservation Officer (SHPO) pursuant to the National Historic Preservation Act (NHPA). The consultation regards a portion of the proposed Hydro Resources, Incorporated (HRI) uranium mining project located in Sections 8 and 17 (T16N, R16W) about seven miles north of Church Rock, New Mexico; and Section 12 (T17N, R13W), located about two miles north of Crownpoint, New Mexico. NHPA Section 106 and the regulations through which it is implemented (36 CFR 800) require federal agencies to take into account the effects of undertakings on any historic properties eligible for, or listed in, the *National Register of Historic Places*.

As documented in the Museum of New Mexico's Office of Archaeological Studies report (OAS Report) (see letter addressed to your office dated June 19, 1997, enclosing a copy of the OAS Report), historic properties eligible for inclusion in the *National Register* were found in Section 8 (T16N, R16W) and Section 12 (T17N, R13W). No such properties were found on Section 17 (T16N, R16W). No traditional cultural properties were identified at or near any of these project areas. As discussed more fully in the enclosed letter to Dr. Sebastian, the NRC staff proposes to determine that any HRI undertakings on Sections 8 and 12, as described above, would have no effect on the historic properties located there.

The NRC staff will consider any written comments you submit within 15 days of your receipt of this letter with respect to this proposed determination of no effect.

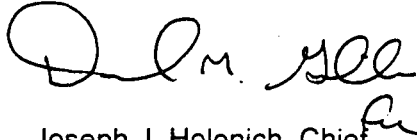
The NRC staff is also consulting with Dr. Alan Downer, the Director of the Navajo Nation Historic Preservation Department, as reflected in the enclosed letter to him dated May 20, 1998. This consultation regards the above-described Section 17, on which no historic properties eligible for inclusion in the *National Register* were found. Regarding this finding, the NRC staff will consider any written comments you submit within 15 days of your receipt of this letter.

J. Denetsone

-2-

If you have any questions, please contact Mr. Robert Carlson, NRC's Project Manager of the HRI mining project, at (301) 415-8165.

Sincerely,

A handwritten signature in black ink, appearing to read "J. M. Holonich", with a stylized flourish at the end.

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
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Enclosures: As stated *

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Farmington District Office
1235 La Plata Highway, Suite A
Farmington, New Mexico 87401

IN REPLY REFER TO:
8100 (07600)

JUN 1 1998

Mr. Robert Carlson
Nuclear Regulatory Commission
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555-0001

Dear Mr. Carlson:

On May 26, 1998, we received a letter from Mr. Joseph J. Holonich dated May 20, 1998. The letter concerns historic properties on portions of the Hydro Resources Inc. uranium mining project areas near Church Rock and Crownpoint, New Mexico. Public Lands administered by the Farmington District of the Bureau of Land Management are administered in the NE1/4 and the W1/2 of Section 8, T. 16 N., R. 16 W. As we currently understand the project, no mining activities are proposed for Public Lands at this time, and no sites on Public Lands appear threatened. In the event that mining activities extend unto Public Lands, we agree that as long as significant or potentially significant cultural properties are avoided the undertaking will have no effect on the properties located there.

We have no comments regarding cultural resources on non-Public Lands involved in this undertaking.

Our records are unclear if our review of the survey report was ever sent to your office. A letter was drafted but we can not tell if it was ever finalized and mailed. For your information, we are providing those comments at this time. If this is the first you have seen of these, please accept our apologies. We do not think that any of the comments affect the undertaking at this time, nor are they in conflict with your proposed determination of no effect for this undertaking.

The report appears thorough and we appreciate the way it is structured to allow easier review by the pertinent agencies. The various site illustrations are clear and well done.

* Page 87: The first paragraph seems to be out of place, and apparently belongs after the third paragraph.

* Figure 24: The site "key" is incomplete.

* Isolates #6, 7, 36, 88, and 89 should most likely have been recorded as sites. Although they are not currently threatened, future actions in those areas should treat those locations as sites until appropriate documentation is completed. If IO #6 and 7 retain no integrity as suggested in Table 31 of the report, then a simple recording of the features and a determination that they are not eligible for the National Register of Historic Places will be relatively straight forward. Testing at IO #36, 88, and 89 would help clear up the suspicions that they may or may not be cultural sites.

* Table 32

LA 26162: Anasazi component not described in text of report; Navajo component is labeled Gobernador Phase in Table 53

LA 116115: Navajo component is best left as unknown, rather than Gobernador Phase

LA 116118: Navajo component is best left as unknown, rather than Gobernador Phase

LA 117316: Out of sequence in the table. A good line drawing of the images in the text of the report would be helpful.

LA 117317: A good line drawing of the image in the text of the report would be helpful.

* Site Records: The site records for Navajo sites LA 26158, 26162, 88877, 116113, 116115, 116118, and 117314, are miscoded with regard to the *Periods of Occupation*. The New Mexico Cultural Resource Information System (NMCRIIS) manual should be followed for the correct terminology. Correct options for the *Periods Of Occupation* include Pre or Post Pueblo Revolt, Pre-Reservation, Early, Middle, or Late Reservation, Recent and unspecified Navajo. Gobernador is a phase designation and goes in the category of *Associated Phase/Complex Name*.

The identification of Gobernador Phase sites on BLM lands seems very tenuous. None of the architecture reported is diagnostic to the phase. The ceramics found at LA 88877 would indicate either a Gobernador or possibly a Cabezón Phase occupation.

What is the basis for the site boundary at LA 116115? No artifacts were located so why is the site boundary so much larger than the feature?

* National Register Eligibility: The eligibility summary presented in Table 53, unlike Table 32, does not distinguish between the various components of the sites recorded. Separate components of the same site, when evaluated, may or may not be contributing elements of the eligibility of the sites for the National Register. Our impressions from the report and site record regarding eligibility are as follows:

* Eligible: LA 26158 (Anasazi component), LA 88874, LA 116115, LA 116118 (Anasazi component),
LA 117314 (Anasazi component).

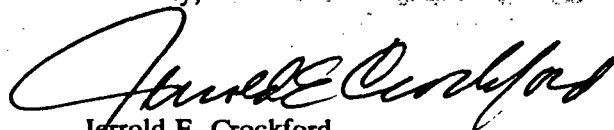
* Not Eligible: LA 26158 (historic component), LA 116113, LA 116116 (historic component), LA 116119, LA 116120 (historic component), LA 116121, LA 117314 (historic component), LA 117315, LA 117316, LA 117317, LA 117318, LA 117319.

* Need Data: LA 26162, LA 88873, LA 88874, LA 88878, LA 116116 (Anasazi component), LA 116117, LA 116118 (historic component), 116120 (Anasazi component).

* Treatment: We agree with the general treatment options for BLM sites outlined on pages 118 and 119.

If you have any questions contact Jim Copeland at 505-599-6335, or jcopelan@nm.blm.gov.

Sincerely,



Jerrold E. Crockford
Acting Land Resources Team Leader

cc:
Museum of New Mexico, OAS
NMHPD, SHPO
Navajo Nation HPD



GARY E. JOHNSON
GOVERNOR

STATE OF NEW MEXICO
**OFFICE OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION**

VILLA RIVERA BUILDING
228 EAST PALACE AVENUE
SANTA FE, NEW MEXICO 87501
(505) 827-6320

3 June 1998

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
United States Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Holonich:

This is in response to your letter of 20 May 1998, received by this office 27 May 1998, which made recommendations about site eligibility based on opinions offered by the Museum of New Mexico, Office of Archaeological Studies (OAS), in their survey report for the Hydro Resources, Inc. (HRI) leach uranium mining facility proposed near Crownpoint, New Mexico (Archaeology Notes 214). Your letter also recommends a finding of "no effect" for the proposed mining activities.

Forty-one archaeological sites were found in Sections 8 (T16N, R16W) and 12 (T17N, R13W). No archaeological sites were found in Section 17 (T16N, R16W). My previous letter of 20 November 1997 supported the recommendations put forward by OAS, but included five sites on BLM land (LA 116116, 116117, 116119, 116121, and 117317) and one site on private land (LA 116129) whose eligibility cannot be determined with current information. Under National Historic Preservation Act definitions, these six sites are not technically "historic properties" as they are not definitively eligible for listing in the National Register of Historic Places.

Point 2 on page two of your letter states that "All eligible and potentially eligible historic properties on Sections 8 and 12 would be fenced, as necessary, to preclude intrusion during any construction, mining, or other ground-disturbing activity." This wording would appear to include sites LA 116116, 116117, 116119, 116121, 116129, and 117317 whose eligibility remains undetermined without additional information. If HRI intends to avoid these six sites and protect them with fencing, their eligibility can remain undetermined. If HRI cannot avoid these six sites, or if mining plans change, determining eligibility becomes a point still in need of resolution.

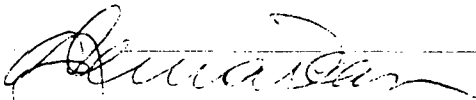
This office recommends that the eligibility of sites LA 116116, 116117, 116119, 116121, 116129, and 117317 be determined. Failing that, this office concurs that the project will have no effect on these six sites provided they are also fenced and avoided by construction, mining, or other ground-disturbing activities.

This office concurs that the proposed mining project will have no effect on the following eligible archeological sites, provided they are fenced and avoided by construction, mining, or other ground-disturbing activities:

LA 26158	LA 88875	LA 116123
LA 26159	LA 88876	LA 116124
LA 26160	LA 88877	LA 116125
LA 26162	LA 88878	LA 116126
LA 26163	LA 116111	LA 116127
LA 26164	LA 116112	LA 116128
LA 70610	LA 116114	LA 116130
LA 88871	LA 116115	LA 117314
LA 88872	LA 116118	LA 117316
LA 88873	LA 116120	LA 117319
LA 88874	LA 116122	

Please contact me with any questions you might have on these comments.

Sincerely,



Glenna Dean
State Archaeologist

Log 55442



THE NAVAJO NATION

THOMAS E. ATCITY
PRESIDENT

June 24, 1998

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington D.C. 20555-0001

Dear Mr. Holonich:

The Cultural Resources Compliance Section of the Historic Preservation Department received your letter dated May 20, 1998 on June 4, 1998. Your letter referred to consultation on Navajo Tribal lands, and then specified Section 17 -- a section of trust land -- and requested consultation with the Navajo Nation Historic Preservation Officer pursuant to Section 106 of the National Historic Preservation Act under the authority of the April 1997 agreement. We have deemed your request as applicable to and appropriate to any and all lands within the exterior boundaries of the Navajo Nation (including sections 8, 12, and 17) and are responding accordingly. Further, your letter requested approval pursuant to the Navajo Nation Cultural Resources Protection Act for Navajo Nation lands. With this letter we provide approval pursuant to the NNCRPA and offer the following comments regarding the entirety of the project.

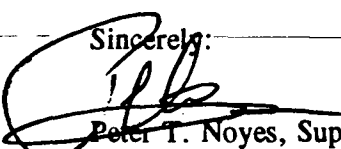
- 1) We concur, based on the information previously provided, with your proposed determinations of eligibility for each of the properties described in the OAS report.
- 2) We further concur that the undertaking described in your May 20 letters to Alan Downer and Lynne Sebastian at the New Mexico State Historic Preservation Office will have no effect on properties listed on or eligible to the National Register of Historic Places, provided that:

A) All of the eligible properties are avoided by any and all ground disturbing activity by a minimum of 50 feet; and

B) In the event of a discovery ["discovery" means any previously unidentified or incorrectly identified cultural resources including but not limited to archaeological deposits, human remains, or locations reportedly associated with Native American religious/traditional beliefs or practices], all operations in the immediate vicinity of the discovery must cease and the Navajo Nation Historic Preservation Department shall be notified at 520-871-7132.

We thank you for your interest in the history and heritage of the Navajo Nation. Should questions arise, please contact the Historic Preservation Office as indicated below.

Sincerely:


Peter T. Noyes, Supervisor
Cultural Resource Compliance Section
Historic Preservation Department
P.O. Box 4950
Window Rock, Navajo Nation, AZ 86515
(520) 871-7132



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 10, 1998

Mr. Richard F. Clement, Jr., President
Hydro Resources, Inc.
2929 Coors Blvd., NW
Suite 101
Albuquerque, NM 87120

SUBJECT: RESPONSES TO STAFF'S NATIONAL HISTORIC PRESERVATION ACT
LETTERS DATED MAY 20, 1998

Dear Mr. Clement:

By letters dated June 1, 3, and 24, 1998, the U.S. Nuclear Regulatory Commission (NRC) staff received responses to the subject letters from the Bureau of Land Management (BLM), the Office of the New Mexico State Historic Preservation Officer (NMSHPO), and the Navajo Nation Historic Preservation Department (NNHPD), respectively. These responses are discussed below. As of the date of this letter, no other responses have been received.

The NMSHPO concurred with the NRC staff's proposed finding that Hydro Resources, Inc. (HRI) undertakings on Section 8 at the Church Rock site, and Section 12 north of Crownpoint, would have no effect on the historic properties located therein which are eligible for inclusion in the National Register of Historic Places -- provided such properties "are fenced and avoided by construction, mining, or other ground-disturbing activities."

The NMSHPO had comments concerning six other potentially eligible sites (LA 116116, 116117, 116119, 116121, 116129, and 117317) located on Sections 8 and 12. Five of the six sites are on the public lands portion of Section 8 (i.e., the northeast quarter and western half of Section 8). These public lands are administered by the BLM and are not part of HRI's proposed mining area (although HRI owns patented Federal mining claims on these lands). LA 116129 is located on Section 12 land owned jointly by HRI and a private individual. The only potential mining-related use of the lands on which the six sites are located would be for application of treated waste water. Such use of these land parcels is one of several waste water disposal options available to HRI, as discussed in Sections 2.1.2 and 4.2.1 of the Final Environmental Impact Statement for the proposed Crownpoint, New Mexico, *in situ* leach uranium mining project. Should irrigation operations come within 100 feet of any of the sites identified above, placement of protective fencing around the site would be necessary.

The BLM's response states that if HRI's mining activities expand beyond the southeast quarter of Section 8 onto Section 8 public lands, "we agree that as long as significant or potentially significant cultural properties are avoided the undertaking will have no effect on the properties located there." Any such expansion of the mining area would first require HRI to submit a license amendment application to the NRC.

The NNHPD response asserts that the Navajo Nation has jurisdiction over the above-described Sections 8 and 12, in addition to control of the trust lands on Section 17 at HRI's Church Rock

site. Other than this assertion of jurisdiction, the NNHPD response largely agrees with the NMSHPO's concurrence on the NRC staff's no effect finding, except the NNHPD specifies that the proposed protective fencing on Sections 8 and 12 be placed so as to create buffer areas extending 50 feet around each eligible historic property. Regarding Section 17, the NNHPD response expressed no disagreement with the NRC staff's finding that no historic properties are located there, and approved HRI's undertaking pursuant to the Navajo Nation Cultural Resources Protection Act (NNCRPA).

Until the jurisdictional issues are resolved by the litigation now pending in the United States Court of Appeals for the Tenth Circuit, the effect of the NNHPD comments regarding Sections 8 and 12 will be uncertain.

Based on the NMSHPO concurrence discussed above, and pursuant to 36 CFR § 800.5 (b), the National Historic Preservation Act (NHPA) process is concluded with respect to Sections 8 and 12. Additionally, based on the NNHPD approval discussed above, the NNCRPA process is concluded with respect to Section 17. Accordingly, HRI may proceed with its planned mining-related activities in these areas to the extent authorized by its NRC Materials License SUA-1508. However, if HRI cannot meet any of the following conditions, it must notify the NRC immediately and cease ground-disturbing activities in the affected area.

1. Activities must be restricted to Sections 8 and 17 (T16N, R16W) and Section 12 (T17N, 13W), which constitute the areas covered under this NHPA/NNCRPA consultation. Additional NHPA and/or NNCRPA consultations will be required prior to any additional undertakings which HRI may pursue under its NRC license on other lands.
2. All eligible and potentially eligible historic properties on Sections 8 and 12 will be fenced, as necessary, to preclude intrusion during any construction, mining, or other ground-disturbing activity. The recommended fencing (as identified in the Museum of New Mexico, Office of Archaeological Studies, "Cultural Resources Inventory of Proposed Uranium Solution Extraction and Monitoring Facilities at the Church Rock Site and of Proposed Surface Irrigation Facilities North of the Crownpoint Site, McKinley County, New Mexico" (OAS Report), dated 1997) would serve both as a mechanical equipment barrier, and to discourage casual foot traffic trespass. Fencing would remain in place throughout construction and mining phases, and it would not be removed until after site reclamation processes have been concluded following completion of mining. This protective measure will assure that the characteristics of the historic properties will not be changed by the undertaking.
3. All ground-disturbing activities within the vicinity of the historic properties (the areas as identified in the OAS Report) will be monitored by an archaeologist who will have authority to stop ground-disturbing activity in the event that previously undetected subsurface cultural resources are identified. If such a find occurs, the NRC (Mr. Robert Carlson, 301-415-8165), the NNHPD (520-871-7132), and the NMSHPO (505-827-6320) must be notified within 24 hours of the find. The

R. Clement, Jr.

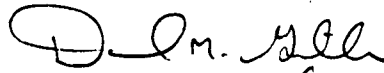
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development of treatment protocols for the unexpected discovery of human remains will be initiated as necessary within the framework of 36 CFR § 800.11, the Native American Graves Protection and Repatriation Act, and applicable New Mexico and Navajo Nation regulations regarding treatment of unmarked burials and protection of human remains.

Should unanticipated circumstances arise such that an effect on any eligible or potentially eligible historic property cannot be avoided, NHPA and/or NNCRPA consultations must be reopened.

If you have any questions concerning this subject, please contact Mr. Robert Carlson of my staff at (301) 415-8165.

Sincerely,



Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

cc: HRI Service List
B. Saulsbury, ORNL

HRI Mailing List - Letter dated July 10, 1998

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