RAS 2655

ShawPittman

A Law Partnership Including Professional Corporations

Frederick S. Phillips
202.663.8877
frederick.phillips@shawpittman.com

DOCKETED
USNRC

'01 JAN 23 P12:16

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

January 22, 2001

Nuclear Regulatory Commission
Office of the Secretary
One Whiteflint North
11555 Rockville Pike
Rockville, MD 20852

Re: In the Matter of Hydro Resources, Inc.,
<u>Docket No. 40-8698-ML; ASLBP No. 95-706-01-ML</u>

Dear Sir or Madam:

Enclosed for filing in the above-referenced case please find an original and three (3) copies of the Reply of Hydro Resources, Inc. ("HRI") to Intervenors' Response to HRI's Cost Estimate for Decommissioning and Restoration Action Plan. Please file stamp and return one of the copies in the enclosed postage prepaid envelope.

Very truly yours,

[signature]

Frederick S. Phillips

Enclosure

cc: Anthony J. Thompson, Esq.
David C. Lashway, Esq.

SECY-02

Template=SECY-049

DOCKETED
USNRC

January 22, 2001

'01 JAN 23 P12:17

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD PANEL

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Presiding Officer Thomas S. Moore

In the Matter of:	)	
	)	
HYDRO RESOURCES, INC.	)	Docket No. 40-8968-ML
P.O. Box 15910	)	ASLBP No. 95-706-01-ML
Rio Rancho, New Mexico 87174	)	

**REPLY OF HYDRO RESOURCES, INC. ("HRI")
TO INTERVENORS' RESPONSE TO HRI'S COST ESTIMATES FOR
DECOMMISSIONING AND RESTORATION ACTION PLAN**

I. INTRODUCTION

Hydro Resources, Inc. ("HRI"), licensee herein, respectfully submits this Reply To Intervenors' Response To HRI's Cost Estimates For Decommissioning And Restoration Action Plan. By Memorandum and Order, CLI-00-08, dated May 25, 2000 (the "Order"), the Nuclear Regulatory Commission ("Commission") requested that HRI submit, within 180 days after service of the Order, "a decontamination, decommissioning and reclamation plan with cost estimates on which a surety will be based."[1] The Commission further stated, "[T]he plan in the first instance need only address the Section 8 site where HRI plans to begin operations first."[2]

In accordance with the Commission's Order, on November 21, 2000, HRI submitted the requested restoration action plan ("RAP") and cost estimates for implementing same. As

[1] CLI-00-08 at 16.

requested by the Commission, the RAP and cost estimates addressed only Section 8 of the Crownpoint Uranium Project ("CUP"), where HRI plans to begin the CUP *in situ* leach ("ISL") mining operation. The RAP and accompanying cost estimates were prepared by the HRI personnel responsible for groundwater restoration at Section 8, based upon their personal experience implementing successful groundwater restoration at two ISL mines in Texas operated by HRI's sister company, URI.[3] HRI submits that the RAP and associated cost estimates for Section 8 submitted by HRI on November 21, 2000, present a detailed and realistic framework for achieving groundwater restoration at Section 8, consistent with applicable NRC requirements codified at 10 C.F.R. § 40, Appendix A, Criterion 9, and with the Commission's Order in CLI-00-08.

II. ARGUMENT

A. HRI's Plan Adequately Addresses Section 8 As Required By The Commission's Order.

Intervenors' lead argument is that "HRI's plan is incomplete because it addresses only Section 8."[4] HRI's plan is directly responsive to the Commission's request as articulated in Order CLI-00-08: the Commission requested that HRI provide a restoration plan and cost estimates for Section 8 and that is precisely what HRI has done. As the parties have addressed in prior proceedings before Presiding Officer Bloch and the Commission, HRI's plans for the foreseeable future extend only to Section 8. Moreover, HRI's license, at LC 10.28, prohibits

Footnote continued from previous page

[2] Id. (footnote omitted).

[3] As discussed in HRI's November 21, 2000 submittal and as reflected in the letters from the Texas Department of Health attached hereto as Exhibit 1, URI has restored groundwater at two Texas ISL sites to the satisfaction of the state agency charged with making such determinations.

HRI from conducting any operations beyond Section 8 until HRI has made an acceptable restoration demonstration at Section 8 to NRC. This demonstration, of course, will determine the adequacy of the nine pore volumes presently required by HRI's license, which in turn (and consistent with LC 9.5 and Appendix A requirements), will determine whether any adjustment to the surety is required. HRI's and NRC's recognition that the CUP was to be a phased project is made clear by these conditions to HRI's license. The Commission's Order requiring HRI to provide a RAP and cost estimates limited to Section 8 recognizes that a RAP and cost estimates for the entire CUP is neither practical nor necessary to protect the public welfare and satisfy Criterion 9 where, as here, the license contemplates a phased-project approach, and requires adjustments to cost estimates and the surety, as warranted, during the course of the project.

B. The Opinions Presented By Intervenors' Witnesses Are Based On Speculation And Are Not Based Real-World Experience Or Any Familiarity With The Section 8 Site.

Intervenors expend several pages arguing that HRI's plan underestimates the number of pore volumes that will be required to restore Section 8 groundwater and employs the wrong horizontal and vertical "flare factors."[5] Intervenors go on to argue that, as a consequence of these alleged miscalculations, HRI underestimates the total volume of water required for the restoration effort and the time required to complete that effort.[6] As support for their argument, Intervenors rely upon the affidavit testimony of Dr. Abitz and Mr. Ingle. HRI submits that the

---

Footnote continued from previous page

[4] Intervenors' Brief at 11.

[5] *Id.* at 13-18.

[6] *Id.*

testimony offered by Messrs. Abitz and Ingle is wildly speculative and more than a little misguided.

HRI does not contest Abitz' and Ingle's qualifications to opine conceptually on the difficulties associated with restoring uranium-contaminated groundwater. Neither Abitz nor Ingle, however, offer or possess any basis for their criticism of HRI's plan for groundwater restoration at the Section 8 site. Intervenors' Brief underscores this point: "As Mr. Ingle testifies, a reasonable estimate of pore volumes cannot be determined without a site-specific evaluation of the horizontal flare factor. . ."[7] Notwithstanding this recognition of reality, Intervenors present as fact Ingle's sheer speculation that it is "reasonable to expect that the volume of water needed to restore Section 8 would be double what HRI has estimated."[8]

Abitz, likewise, offers opinions about issues specific to HRI's plan for the Section 8 site without any basis for doing so. Abitz concludes that Section 8 groundwater restoration will take much longer than estimated by HRI[9], basing his conclusion entirely on Ingle's speculation that a higher flare factor might be appropriate[10] and on his "comparison of restoration characterisitics of the Fernald project against those projected for Section 8."[11] The fact is that both Abitz and Ingle offer opinions based on utterly unjustified comparisons of vastly different situations. Abitz' admitted reliance on his familiarity with the Fernald site to reach conclusions regarding Section 8 ignores the fact that the Section 8 operations are proposed for a roll-front uranium

---

[7] Intervenors' Brief at 18.

[8] *Id.* (citing Ingle Testimony at 13).

[9] Abitz Testimony at 13.

[10] *Id.*

[11] Intervenors' Brief at 18 (citing Abitz Testimony at 9-10).

deposit in a heavily mineralized, exempt aquifer; this is not remotely similar to the situation at Fernald. Similarly, Ingle states his opinions regarding Section 8 based on his experience with ISL projects in Wyoming, but he cannot, at this time, account for likely significant differences in wellfield engineering design and in the fundamental geometry of the ore bodies. Until more is known regarding these factors, no meaningful comparison can be made between projects.

Simply stated, both Abitz and Ingle seem to acknowledge that site-specific factors are critical to evaluating the realities of groundwater restoration at Section 8, yet both offer opinions nearly devoid of any basis in the particular facts of HRI's proposed operations at Section 8 or groundwater conditions there. Rather than analyzing the specific mineralization and hydrogeology of the site at issue, both Abitz and Ingle extrapolate from their experiences with sites and mining operations that may have very little or nothing in common with HRI's proposed operations at Section 8.

Nevertheless, Ingle opines that there are "three main areas of technical deficiencies in the HRI Plan."[12] Ingle identifies these deficiencies as: 1) the Plan's cost estimates are too low; 2) the Plan makes erroneous assumptions regarding "plant and equipment operating efficiencies and about restoration through-flow" and also that there are "significant discrepancies" between information included in the RAP and information submitted previously by HRI, and 3) the Plan does not include all of the elements that are included in plans of some ISL operators in Wyoming.[13]

[12] Ingle Testimony at 7.

[13] *Id.*

Dr. Abitz, who claims no particular expertise in or experience with ISL mining, appears to rely primarily on his experience with attempted groundwater restoration at the Fernald site in Ohio to justify his testimony concerning the adequacy of HRI's RAP.[14] Abitz identifies essentially four concerns with HRI's RAP: 1) HRI underestimates groundwater restoration costs "when compared with the reality of costs of groundwater restoration at the Fernald site;" 2) the RAP does not account for the costs of adding a reducing agent to the Reverse Osmosis ("RO") water; 3) restoration will take longer and require more labor than estimated by the RAP; and 4) HRI proposes an improper procedure for plugging and abandoning wells at the site.[15]

C. HRI's Plan Is Based Upon The Experience Of HRI Personnel And Their Successful Restoration Of Groundwater At ISL Sites Operated By HRI's Sister Company And Is, Pursuant To License Conditions, Subject To Adjustment As Conditions May Warrant.

HRI presents the testimony of Mark S. Pelizza and Richard A. Van Horn, Vice President of Health, Safety and Environmental Affairs with Uranium Resources, Inc. and Senior Vice President in charge of Operations for Uranium Resources, Inc.[16], respectively, in response to the opinions offered by Messrs. Ingle and Abitz.[17] As detailed in their affidavits, Mr. Pelizza and Mr. Van Horn each have direct responsibility for operations and groundwater restoration at URI's ISL operations in Texas.[18] More specifically, Mr. Pelizza supervises all radiological and

[14] *See, generally,* Abitz Testimony and Attachment A thereto; *see, also,* Abitz Testimony at 4, paragraph 6.

[15] Abitz Testimony at 3-4.

[16] Uranium Resources, Inc., is the parent company of both URI, Inc. (conducting ISL operations in Texas) and HRI (licensee herein, proposing to conduct ISL operations at Section 8).

[17] The affidavits of Mark Pelizza and Richard Van Horn are attached hereto as Exhibits 2 and 3, respectively.

[18] *See, generally,* Pelizza Testimony and Van Horn Testimony attached hereto as Exhibits 2 and 3, respectively.

non-radiological occupational health, safety and environmental programs for all operations conducted by HRI and URI in New Mexico, Texas, and Wyoming.[19] Mr. Pelizza also had primary responsibility for developing HRI's RAP for Section 8 and the cost estimates therefor. Mr. Van Horn is personally responsible for directing the day to day operations at URI's ISL sites in south Texas, including the groundwater restoration at the Kingsville Dome and Rosita mine sites.[20] The RAP and associated cost estimates developed for the CUP Section 8 site were based primarily on URI's *actual experience* in its south Texas operations.[21]

The real-world, real ISL mining/restoration experience related in the testimony provided by Mr. Pelizza and Mr. Van Horn stands in contrast to the speculative, theoretical opinions offered by Messrs. Ingle and Abitz. Where both Ingle and Abitz share their opinions that the RAP underestimates the time, labor, and costs required for ISL site groundwater restoration, Mr. Van Horn[22] and Mr. Pelizza[23] present the actual time, labor requirements, and costs of the groundwater restoration they have successfully implemented at URI's ISL operations in south Texas.

Ingle's complaint that HRI's RAP employs erroneous assumptions regarding operating efficiencies also are refuted by URI's experience, as testified to by Van Horn[24] and, at length, by

[19] Pelizza Testimony at 2.

[20] Van Horn Testimony at 2.

[21] *Id.*

[22] *Id.* at 3-7.

[23] Pelizza Testimony at 18-22, 25-28.

[24] Van Horn Testimony at 4-7.

Pelizza.[25] Ingle opines that the HRI RAP lacks "fundamental components of (an) acceptable financial assurance plan,"[26] stating that the RAP fails to account for "certain RO operation and maintenance and separate disposal costs," "costs associated with . . . groundwater sweep," the costs of using chemical reductants, "and costs for proper plugging and abandonment of ore delineation holes."[27] Abitz essentially echoes these concerns.[28] Ingle asserts that the RAP underestimates the amount of groundwater that will have to be treated in connection with the Section 8 operation[29] and Abitz adopts Ingle's speculation without further evaluation or comment.[30]

Mr. Pelizza and Mr. Van Horn respond to and refute each of the concerns raised by Messrs. Abitz and Ingle. "Fundamental components" not costed in the RAP are items not required for site restoration and, based on the experience of Mr. Pelizza and Mr. Van Horn with restoration of other ISL sites, are not necessary for restoration at Section 8.[31] Similarly, and as discussed above, each of the concerns and speculations raised by Abitz and Ingle are addressed by Pelizza and Van Horn based on their actual knowledge of the Section 8 site and their personal experience restoring ISL sites, under similar conditions, in south Texas. Groundwater volume

---

[25] Pelizza Testimony at 14-20.

[26] Ingle Testimony at 23.

[27] *Id.* at 23-24.

[28] Abitz Testimony at 11-12, 15-16.

[29] Ingle Testimony at 8-15.

[30] Abitz Testimony at 13 ("Mr. Ingle argues convincingly . . . .").

[31] For example, Mr. Pelizza testifies that the RAP does not include cost estimates for groundwater sweep and reductants because HRI does not intend to employ them here. Pelizza Testimony at 21. Likewise, Ingle's concerns about "significant downtime" and the need for backup equipment are unfounded, as discussed by Mr. Van Horn. Van Horn Testimony at 4.

requiring treatment, equipment and personnel operating efficiencies, and the time, personnel, and cost elements of successful site restoration are evaluated by Pelizza and Van Horn based on their actual experience successfully performing ISL site restoration. To the extent that conditions at Section 8 may vary from those contemplated by the RAP, HRI's license and applicable NRC regulations require that HRI maintain a minimum 15 percent contingency as part of its surety funding and that the surety amount be updated annually, to NRC's satisfaction, to reflect inflation adjustments and any changed conditions.[32]

III. CONCLUSION

HRI submits that its previously submitted Restoration Action Plan and associated cost estimates for restoration of the Section 8 *in situ* leach mining area of HRI's proposed Crownpoint Uranium Project are consistent with the NRC's "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities"[33] and Criterion 9 of Appendix A, Part 40.[34] Moreover, HRI's license, at LC 9.5, which provides for the annual reassessment of the adequacy of HRI's surety,[35]

---

[32] *See*, 10 C.F.R. Part 40, Appendix A, Criterion 9 and HRI license condition LC 9.5.

[33] Division of Low-Level Waste Management and Decommissioning, U.S. Nuclear Regulatory Commission, October 1988.

[34] The requirement establishes the need for a surety which covers specific decomissioning and reclamation activities committed to by the operator in his license. The surety mechanism is not intended to be a floating liability which guarantees the performance of whatever standards are in place fifteen or twenty years in the future. NUREG-0706, Vol. II, p. A-107 (September 1980).

[35] 10 C.F.R. Part 40, Appendix A, Criterion 9. See also; [An] Adjustment provision that requires a periodic review of surety adequacy. The amount of the surety should be adjusted to recognize any increases or decreases resulting from inflation, changes in engineering plans, activities performed and any other conditions affecting costs. This will yield a surety that is at least sufficient at all times to cover the costs of decomissioning and reclamation of the areas that are expected to be disturbed, before the next license renewal.

Footnote continued on next page

ensures that HRI, under supervision of NRC Staff, will annually review HRI's financial assurance instruments and adjust them up or down as conditions and experience warrant.

For all of the foregoing reasons, HRI respectfully requests that the Commission approve HRI's Section 8 RAP.

Respectfully submitted this 22nd day of January, 2001.

Anthony J. Thompson
Frederick S. Phillips
SHAW PITTMAN
2300 N. Street, N.W.
Washington, D.C. 20037
202.663.8000

COUNSEL TO HYDRO RESOURCES, INC.

Document #: 1068081 v.1

Footnote continued from previous page

This provision will provide an incentive to design systems involving staged reclamation, whereby costs for the surety mechanism are reduced. *Id*. at Vol. I, p.14-10.

TEXAS WATER COMMISSION

February 11, 1988

RECEIVED FEB 16

Mr. Mark S. Pelizza
Environmental Manager
Uranium Resources, Inc.
12377 Merit Drive
Suite 750, LB14
Dallas, Texas 75251

Re: Restoration Determination of Production Area No. 1 of the Longoria Mine Site, Permit No. UR02222-011

Dear Mr. Pelizza:

The Texas Water Commission has received the restoration data for Production Area No. 1 of the Longoria Mine Site. A review of the data indicates that Production Area No. 1 has been restored in accordance with the specifications contained in permit number UR02222-011 as required by 31 TAC Section 331.107. Your are hereby authorized to cease any restoration activities, including monitoring, at Production Area No. 1.

Within 120 days of receipt of this letter closure of the wellfield shall be accomplished in accordance with the approved plugging and abandonment plans for this Production Area. Any modifications to the plugging and abandonment procedure must be approved in writing by the Commission.

Please notify the Commission prior to commencing plugging activities to provide the opportunity for TWC personnel to be present. If you have any questions please contact Dale P. Kohler of the In Situ Uranium Mining Unit at (512) 463-8278.

Sincerely,

Barry D. Pruett
Director, Water Rights & Uses Division

DK:jt
cc: TWC Dist 11 Office - Weslaco
Mr. David Lacker - Texas Department of Health
Bureau of Radiation Control

? AS WATER COMMISSION

February 11, 1988

Mr. Mark S. Pelizza
Environmental Manager
Uranium Resources, Inc.
12377 Merit Drive
Suite 750, LB14
Dallas, Texas 75251

Re: Restoration Determination of Production Area No. 2 of the Longoria Mine Site, Permit No. UR02222-021

Dear Mr. Pelizza:

The Texas Water Commission has received the restoration data for Production Area No. 2 of the Longoria Mine Site. A review of the data indicates that Production Area No. 2 has been restored in accordance with the specifications contained in permit number UR02222-021 as required by 31 TAC Section 331.107. Your are hereby authorized to cease any restoration activities, including monitoring, at Production Area No. 2.

Within 120 days of receipt of this letter closure of the wellfield shall be accomplished in accordance with the approved plugging and abandonment plans for this Production Area. Any modifications to the plugging and abandonment procedure must be approved in writing by the Commission.

Please notify the Commission prior to commencing plugging activities to provide the opportunity for TWC personnel to be present. If you have any questions please contact Dale P. Kohler of the In Situ Uranium Mining Unit at (512) 463-8278.

Sincerely,

Harry D. Pruett
Director, Water Rights & Uses Division

DK:jt
cc: TWC Dist 11 Office - Weslaco
Mr. David Lacker - Texas Department of Health
Bureau of Radiation Control

TEXAS WATER COMMISSION

Paul Hopkins, Chairman
John O. Houchins, Commissioner
B. J. Wynne, III, Commissioner

J. D. Head, General Counsel
Michael E. Field, Chief Examiner
Karen A. Phillips, Chief Clerk

Allen Beinke, Executive Director

February 10, 1988

Mr. Mark S. Pelizza
Environmental Manager
Uranium Resources, Inc.
12377 Merit Drive
Suite 750, LB14
Dallas, Texas 75251

Re: Restoration Determination of Production Area No. 1 of the Benavides Mine Site, Permit No. UR02312-011

Dear Mr. Pelizza:

The Texas Water Commission has received the restoration data for Production Area No. 1 of the Benavides Mine Site. A review of the data indicates that Production Area No. 1 has been restored in accordance with the specifications contained in permit number UR02312-011 as required by 31 TAC Section 331.107. Your are hereby authorized to cease any restoration activities, including monitoring, at Production Area No. 1.

Within 120 days of receipt of this letter closure of the wellfield shall be accomplished in accordance with the approved plugging and abandonment plans for this Production Area. Any modifications to the plugging and abandonment procedure must be approved in writing by the Commission.

Please notify the Commission prior to commencing plugging activities to provide the opportunity for TWC personnel to be present. If you have any questions please contact Dale P. Kohler of the In Situ Uranium Mining Unit at (512) 463-8278.

Sincerely,

Harry D. Pruett
Director, Water Rights & Uses Division

DK:jt
cc TWC District 11 Office - Weslaco
Mr. David Lacker - Texas Department of Health
Bureau of Radiation Control

TEXAS WATER COMMISSION

May 16, 1991

Ben
TWC→URI

Mr. Mark Pelizza
URI, Inc.
12377 Merit Drive
Suite 750, LB14
Dallas, Texas 75251

Re: Restoration Determination of Production Area No. 2 of the Benavides Mine Site, Permit No. UR02312-021

Dear Mr. Pelizza:

The Texas Water Commission has received the restoration data for Production Area No. 2 of the Benavides Mine Site. A review of the data indicates that Production Area No. 2 has been restored in accordance with the specifications contained in permit number UR02312-021 as required by 31 TAC Section 331.107. Your are hereby authorized to cease any restoration activities, including monitoring, at Production Area No. 2.

Within 120 days of receipt of this letter closure of the wellfield shall be accomplished in accordance with the approved plugging and abandonment plans for this Production Area. Any modifications to the plugging and abandonment procedures must be approved in writing by the Commission.

Please notify the Commission prior to commencing plugging activities to provide the opportunity for TWC personnel to be present. If you have any questions please contact Dale P. Kohler of the Ground Water Section at 512/371-6322.

Sincerely,

James Kowis for

Harry D. Pruett, P.E.
Director, Water Rights & Uses Division

URI INC
URI DALLAS
MAY 17 1991
RECEIVED

HDP/DPK/km

cc: TWC District Office #11 - Weslaco
David Lacker - Texas Department of Health
Bureau of Radiation Control

:AS WATER COMMISSIO.

June 5, 1989

TWC 7 URI

Mr. Mark S. Pelizza
Environmental Manager
Uranium Resources, Inc.
12377 Merit Drive
Suite 750, LB14
Dallas, Texas 75251

Re: Restoration Determination of Production Area No. 3 of the Benavides Mine Site, Permit No. UR02312-031

Dear Mr. Pelizza:

The Texas Water Commission has received the restoration data for Production Area No. 3 of the Benavides Mine Site. A review of the data indicates that Production Area No. 3 has been restored in accordance with the specifications contained in permit number UR02312-031 as required by 31 TAC Section 331.107. You are hereby authorized to cease any restoration activities, including monitoring, at Production Area No. 3.

Within 120 days of receipt of this letter closure of the wellfield shall be accomplished in accordance with the approved plugging and abandonment plans for this Production Area. Any modifications to the plugging and abandonment procedure must be approved in writing by the Commission.

Please notify the Commission prior to commencing plugging activities to provide the opportunity for TWC personnel to be present. If you have any questions please contact Dale P. Kohler of the In Situ Uranium Mining Unit at (512) 463-8278.

Sincerely,

(for)

Harry D. Pruett
Director, Water Rights & Uses Division

DPK:aa

cc: TWC District 11 Office - Weslaco
Mr. David Lacker - Texas Department of Health
Bureau of Radiation Control

URI, INC.
URI, DALLAS
JUN 8 1989
RECEIVED

TEXAS WATER COMMISSION

October 31, 1986

Ben
Corr
TWC → URI

Mr. Mark S. Pelizza
Environmental Manager
Uranium Resources, Inc.
Suite 735, Promenade Bank Tower
1600 Promenade Center
Richardson, Texas 75080

Re: Restoration determination, Uranium Resources, Inc., Benavides Mine Site, Permit No. UR02312-041, Duval County

Dear Mr. Pelizza:

The Texas Water Commission has received the three consecutive sampling sets as required by 31 TAC Section 331.107. A review of the restoration data indicates that Production Area No. 4 at the Benavides Mine Site has been restored in accordance with the specifications contained in permit number UR02312-041 and as required by 31 TAC Section 331.107. You are hereby authorized to cease any restoration activities including monitoring at this production area.

Within 120 days of receipt of this letter, closure of the wellfield shall be accomplished in accordance with the approved plugging and abandonment plans submitted as part of the permit application. Any modification to plugging and abandonment plans must be approved in writing by the Commission. Please notify the Commission prior to conducting plugging activities.

If you have any questions, please call Mr. Dale Kohler of the Commission's Ground Water Conservation Section at (512) 463-8278.

Sincerely,

Larry R. Soward
Executive Director

cc: TWC District 11, Weslaco
Mr. David Lacker, Chief, Bureau of Radiation Control, Texas Department of Health

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before Chief Administrative Judge Thomas S. Moore

In the Matter of	)	
	)	
HYDRO RESOURCES, INC.	)	Docket No. 40-8958-ML
12750 Merit Drive	)	
Dallas, Texas 75250	)	ASLBP No. 95-706-01-ML
	)	

AFFIDAVIT OF MARK S. PELIZZA
RESPONDING TO AFFIDAVITS OF STEVEN INGLE AND RICHARD ABITZ

Before me, the undersigned notary on this day appeared Mark S. Pelizza, a person known or identified to me, and who after being duly sworn deposes and says the following:

A. PERSONAL

My name is Mark S. Pelizza; I am over the age of 18 years, have never been convicted of a felony and am otherwise fully competent to make this affidavit. The factual matters set out herein are within my personal knowledge or my corporate knowledge within my official capacity as set out herein. The opinions set out herein are based upon data and analytic techniques reasonably and customarily used by qualified environmental professionals to form opinions and draw scientific inferences for the purposes of important health, safety, environmental and regulatory decisions.

B. PROFESSIONAL QUALIFICATIONS[1]

I am Vice President of Health, Safety and Environmental Affairs with Uranium Resources, Inc., parent company to HRI, Inc. and URI, Inc. I have served in this position for three years. Prior to being named Vice President, I served Uranium Resources, Inc. as Environmental Manager with similar corporate environmental responsibilities. I have been employed with Uranium Resources, Inc. for 21 years. I have been employed as a health, safety and environmental professional with the in situ uranium industry for 23 years. I have taken an active leadership role with various professional trade organizations in developing the current in situ uranium industry rules, regulations and policies, cooperating with federal and state regulatory agencies in doing so. In support of my background a current resume is attached.

During my employment with Uranium Resources, Inc., I have personally supervised all radiological and non-radiological occupational health, safety and environmental programs for all operations conducted by HRI/URI in New Mexico, Texas, and Wyoming. This includes radiological and non-radiological occupational and environmental baseline data collection, operational programs, restoration/reclamation programs and regulatory liaison. I have first hand knowledge of the technical issues that were addressed in ENDAUM and SRIC's Expert Opinion Pertaining to the Restoration Action Plan ("RAP").

I have personally supervised all radiological and non-radiological health, safety and environmental permitting activities associated with the Crownpoint Uranium Project ("CUP") since the CUP was conceived. In this capacity, all environmental studies, reports, papers, permit and license applications and regulatory requirements have either been completed by me or under my supervision. I have been HRI's representative at numerous public presentations regarding the project over the past decade. I have been HRI's regulatory liaison throughout the

[1] Mark Pelizza's qualifications have been litigated in this Subpart L hearing. The Presiding officer has found

project. I have first hand knowledge of the Crownpoint Uranium Project ("CUP") developmental history, and am very familiar with the environmental framework under which HRI will be required to operate.

C. QUALIFICATIONS OF HRI AND AFFILIATES

1. Uranium Resources, Inc., the parent company of HRI, Inc. and URI, Inc. (Texas), is the oldest ISL uranium production company in the United States. Uranium Resources, Inc. began business in 1977 and soon began uranium production at the Longoria and then Benavides Projects in South Texas. These two properties have been depleted and restored to the satisfaction of state regulatory agencies.[2] Uranium Resources, Inc. has also conducted pilot operations in Wyoming. Currently URI, Inc. is conducting groundwater restoration activities at the Kingsville Dome Project and Rosita Project in Texas under the supervision of Mr. Rick VanHorn and myself. These projects are commercial in situ uranium operations that are similar[3] to that proposed at Churchrock section 8. URI uses reverse osmosis technology at both locations and URI staff manages all technical and financial components. As such URI, Inc., and specifically URI managerial and professional staff, have direct knowledge of the technical and financial implications of restoration of an ISL site.

D. RESPONSE TO AFFIDAVIT OF MR. INGLE

1. I discussed the concept of pore volume in detail in my Affidavit Pertaining to Water Quality Issues that was submitted in support of the Groundwater Issues filing dated February 19, 1997. Mr. Ingle had not indicated that he reviewed this Affidavit in his testimony. In that

---

Pelizza qualified (LBP-99-18, p.-- & LBP-99-30, p.23).

[2] Texas is an agreement state for the purposes of regulating radioactive materials, meaning that NRC has delegatd to the state primary authority for regulatory radioactive materials. The Texas Department of Health ("TDH") is the state agency which administers this Texas agreement state program. In the case of URI's approved reclamation and license termination of the Benavides and Longoria projects, TDH sought and received concurrence from NRC regarding the adequacy of reclamation before giving final approval.

[3] Both projects were commercial operations with nominal annual production capacity of 1 million pounds. Similar leach solution was used and similar restoration requirements and technology is utilized.

Affidavit I described the term "pore volume" (PV) as a term of convenience that has been conceived by the ISL industry to describe the quantity of free water in the pores of a given volume of rock. The units are provided in gallons. A PV provides a unit of reference that is used to describe the amount of circulation that is needed to leach an ore body or to describe the times water must be flowed through a quantity of depleted ore to achieve restoration. Hence, PV is a useful tool for calculating ISL project economics and restoration costs.

A PV is calculated by determining the three dimensional volume of the rock (that is also the ore zone) and multiplying this number by the percent pore space. Different operators have used different methods to determine the volume of the ore zone. For example, some use a simple "pattern method" where pattern dimensions[4] are used to determine the area of the ore and then the area is multiplied by screen thickness[5] to determine the volume of rock in the five spot. The pore volume of the five spot is calculated by multiplying the volume of rock by the percent porosity and then converting to the units of measurement (i.e. gallons). The total PV of a mine unit is calculated by adding all the five spot patterns in the mine unit. HRI uses the "ore volume" method where they map the extent of economic ore within a mine unit and digitize the area of the mapped ore to provide the area. This area is then multiplied by the average ore thickness to provide the three dimensional volume of the ore that is to be leached. This volume is converted to a PV by multiplying the ore volume by the percent porosity and then converting to the units of measurement (i.e. gallons). Each method provides similar results. <u>See</u> the example in Attachment 3 that describes the PV calculation for the Churchrock Section 8 location.

---

[4] For example if an ISL operator uses a 50 ft. by 50 ft. five spot pattern consisting of four injection wells at the corners and one injection well in the center, the <u>area</u> of the pattern is 2500 ft^2.

[5] In the above example, if the screen thickness was 10 ft., then the <u>volume</u> of ore in the five spot is 25,000 ft^3.

"Flare" factors or pore volume factors[6] are multipliers that are commonly used by the ISL industry to account for leach solution outside of the specific boundaries of the calculated ore PV. Different operators have used different factors, as there is no set rule for determining a flare factor. It is generally accepted, however, that flair[7] should be recognized in cost estimates.

HRI used pore volume increase factors of 1.5 for horizontal flare and 1.3 for vertical flare. These factors have been calculated by URI engineers based on operating experience at other restoration demonstrations and commercial operations and have been adequate for monitoring and reporting restoration progress at other operations. These factors were also used throughout the CUP licensing process. Multiplying the mapped area of the ore by 1.5 yields the adjusted horizontal area. Likewise, vertical increase adjustment or flare is calculated by multiplying the measured average ore thickness by 1.3. This yields the anticipated affected vertical area. Multiplying the adjusted horizontal times the adjusted vertical by porosity provides the adjusted pore volume for bonding purposes. This number is in turn multiplied by the assumed number of pore volumes to determine water treatment and disposal volumes and costs. During the Churchrock restoration demonstration that is described in LC 10.28, HRI will use these factors to determine the number of pore volumes that are processed during restoration.

The pore volume calculation that was presented for review in the hearing process and those that were utilized in the RAP are the same. HRI was consistent in the use of a horizontal increase factor of 1.5 and a vertical increase factor of 1.3 in both the hearing presentations and the RAP. As described in the preceding paragraph, when determining pore volume size, HRI

---

[6] As used in this Affidavit, "dispersion factor" is a synonym for flair or increase factor.

[7] Flare outside of the ore zone is the norm. In the subsurface water moves in a radial pattern from injector to extractor in its path across the target ore. By choosing patterns carefully flair is minimized. However, as an expected component of ISL mining the flair factors are included in the bonding calculation as a deliberate cost contingency. There is a limit on acceptable flair; the horizontal monitor wells. If fluid is detected in the horizontal monitor wells it is no longer simply flair but then becomes an excursion. An excursion requires immediate corrective action to draw it back to the mine zone or the bonding must be increased to compensate for the increase in restoration cost. (See L.C. 10.13, which requires a bond increase if corrective action is not completed in 60 days)

determined the surface area by utilizing the mapped ore body outline, not pattern dimensions. There are no patterns developed at the Churchrock site. Conversely, Mr. Ingle's PRI example utilized pattern dimensions as an input to the model he describes. As will be described further in this Affidavit, using the ore outline vs. pattern areas has the potential of providing very different results.

2. The methods utilized in the RAP to calculate pore volume and adjusted pore volume are consistent with the methods used for the Mobil Pilot in New Mexico, which in turn were the basis for the NRC evaluation in the FEIS, and are consistent with the methods used by HRI throughout the CUP licensing process, and for HRI's submittals during the Subpart L hearing. Contrary to Ingle's assertion at 17, HRI's pore volume and adjusted pore volume calculators, and the adjustment factors employed, were not generic or arbitrary, but rather were consistently proposed, evaluated, litigated and applied throughout the NRC licensing process and this Subpart L proceeding.

HRI presented the NRC with the Summary Report for the Mobil Section 9 In Situ Leach Pilot as a part of the License Application support materials because the Pilot was a substantial field demonstration, and provided empirical results, for the ISL development that is proposed for the CUP. This Report was a compilation of the information from Mobil Oil Company's files and records that were developed when the Pilot was conducted. A copy of the Summary Report is shown in Attachment 1.

The cumulative restoration analyses are shown in Attachment C of the Summary Report. As shown, Mobil processed 59,173,469 gallons during restoration, which equated to 16.7 adjusted pore volumes. Attachment C also shows the formula for how the adjusted pore volume was calculated using the pattern area, screen thickness, porosity, a <u>Horizontal Dispersion Factor</u> of 1.5, and a <u>Vertical Dispersion Factor of</u> 1.3. The methods of pore volume analysis utilized in the Summary Report were incorporated by NRC in Section 4.3.1 of the FEIS impact evaluation which ultimately resulted in the staff determination that 9 pore volumes would be required for surety calculations and for impact evaluation. (See FEIS p. 4-40). It is important that HRI continue to use the previously evaluated pore volume variables in the RAP, and in future restoration analyses for the NRC, so that can projected and actual performance and costs can be measured consistently.

HRI has presented similar pore volume estimates during the license application review process. Specifically, in response to NRC Request for Further Information, Question 59, August 15, 1996, pertaining to Ground water Consumption, HRI supplied NRC with a pore volume calculation for the Churchrock Section 8 site that was similar to the one presented in the RAP Section 2.a[8]. (See Q/59 in Attachment 2). Consistent with the methodology used throughout the Crownpoint Project licensing process, HRI utilized the ore body outline, not pattern dimensions, to determine the affected surface area and used a horizontal increase factor of 1.5. These were the same values utilized by NRC to conduct the evaluation of water consumption in the FEIS pp. 4-57 through 4-60. HRI's proposed dispersion factors are consistent with those which had been systematically evaluated in the FEIS p. 4-122[9].

With the exception of the porosity adjustment described in the footnote, HRI has presented identical pore volume estimates throughout the Subpart L hearing process. Specifically, Attachment 3 to my Groundwater Affidavit submitted to the Presiding Officer in support of HRI's Opposition to Intervenor's Groundwater Presentation describes the PV calculation for the Churchrock Section 8 location. (See Attachment 3 herein). This calculation

---

[8] Based on professional judgment, HRI increased the estimated porosity from .21 in Q/59 to .25 in the RAP. This resulted in a more conservative estimate in the RAP All other factors are the same.

[9] The FEIS cited a combined horizontal and vertical dispersion factor of 1.95. HDF = 1.5. VDF = 1.3. Therefore: 1.3 x 1.5 = 1.95.

was the same as that used in the RAP. HRI was consistent in presenting the same material in the RAP as was reviewed by the Presiding Officer in the hearing process.

In summary, HRI used the same methods to calculate adjusted pore volumes in the RAP cost estimate as those that NRC reviewed in HRI submittals, that NRC used in the FEIS impact evaluation, and that were placed into evidence by the HRI in the course of the Subpart L hearing process.

3. The parameters used to calculate pore volumes must be applied consistently. A pore volume is a term used to describe the quantity of free water in the pores of a given volume of rock, that is then applied to measure number of gallons of water that must be flushed during the ISL production or restoration process. Dispersion, flair or increase factors are typically added because the rock volume from which the pore volume is calculated is not bound or enclosed. It is the cost of processing the gallons of water that creates restoration cost. Consistently calculated pore volumes are an important technique that allows comparing predicted and actual restoration results. Subjective, mid course changes to pore volume variables such as dispersion factors will make the adjusted pore volume reference number larger or smaller and make future comparisons of results against previous evaluations difficult. As a relevant example, in the Mobil Section 9 test illustrated in Table 1 below, 59,173,469 gallons were processed during restoration that were determined to be 16.7 pore volumes. HDF of 1.5 and VDF of 1.3 were used. Increasing the HDF to would give the appearance of a test where fewer pore volumes were circulated. Regardless of the HDF the gallons processed and the cost of the test remain unchanged.

Table 1. - Illustration of Affect HDF Changes have of PV's

GALLONS PROCESSED	HDF	VDF	PORE VOLUME
59,173,469	1.5	1.3	16.7
59,173,469	2	1.3	12.6
59,173,469	2.5	1.3	10
59,173,469	3	1.3	8.4

By subscribing to the Ingle theory and increasing the horizontal dispersion factor, Mobil known number of gallons that were processed would represent less pore volumes. Had NRC evaluated the same Mobil test using larger dispersion (flair) and less pore volumes, then the result of their evaluation as described in the FEIS would have been that fewer pore volumes were needed to achieve the same level of restoration and HRI would have been required to use a smaller pore volume number in the initial bond calculation. This example simply illustrates that consistency with previous methods of PV calculation is the important factor for HRI in developing the RAP. It is important for HRI to utilize the same variables that were submitted during the license application review process and that were evaluated in the EIS. It is against this defined pore volume that NRC can gauge compliance with LC 9.4 and determine if an increase or decrease of surety is warranted in the future. The PV adjustment factor(s) which are correctly used in the RAP should remain unchanged and, if necessary, as a result of future operating information, NRC should make adjustments to the *number* of pore volumes to account for per gallon increases (or decreases) and the resultant surety adjustments.

4. HRI's Materials License SUA-1580 LC 9.5 will assure adjustments in the number of pore volumes as needed. SUA-1580 LC 9.5 specifically states:

"Surety for groundwater restoration of the initial well fields shall be based on 9 pore-volumes. Surety shall be maintained at this level until the number of pore volumes required to restore the groundwater quality of a production-scale well field has been established by the restoration demonstration described in LC 10.28. If at any time it is found that well field restoration requires greater pore-volumes or higher restoration costs, the value of the surety will be adjusted upwards."

LC 10.28 specifically requires:

"Prior to injection of lixiviant at either the Unit 1 or Crownpoint site, the licensee shall submit NRC-approved results of a groundwater restoration demonstration conducted at the Church Rock site. The demonstration shall be conducted on a large enough scale, acceptable to the NRC, to determine the number of pore volumes that shall be required to restore a production-scale field."

The RAP was prepared as a first step in an iterative regulatory process where NRC will monitor the quantity of water and resulting cost for groundwater restoration at the Crownpoint Uranium Project. Initially NRC required and HRI provided costs for 9 pore volumes using methods to determine this pore volume requirement as described in the FEIS. HRI will conduct requisite demonstrations specified in LC 10.28 and report to NRC. As part of the report process, HRI will calculate the pore volume of the affected test area using the same methods that were proposed in the License Application, evaluated in the FEIS, reviewed in the Subpart L hearing process, and proposed in the initial RAP cost estimate, to verify the pore volumes used to achieve restoration in a commercial wellfield. If more water than was projected to achieve restoration requires processing, then it will be reflected in more pore volumes (or if it can be demonstrated by field evidence by an increase in dispersion factor[10]), as previously defined and HRI's cost estimate and surety will increase. Increases in dispersion factors or number of gallons flushed through the system will both be accounted for in the pore volume number as defined throughout the licensing process.

5. HRI's estimate is conservative because it includes the volume of the entire ore zone, rather than just the well patterns. There have been no injection wells, extraction wells or patterns developed at the Churchrock project where pore volumes can be calculated using the same method as was done at the PRI site. Additionally, the wellfields that HRI will install may be configured so that dispersion is reduced even more than originally anticipated[11]. Until the well pattern configuration is finalized it is simply impossible to conduct the numeric modeling that was referenced in the Ingle Affidavit.

As stated in paragraph 1 above, in the case of the Church Rock site, HRI depended on the "ore area" method where the extent of ore within a mine unit was digitized to provide the area. This area is then multiplied by the average ore thickness to provide the three dimensional volume of the ore that is to be leached. This volume is converted to a PV by multiplying the ore volume by the percent porosity and then converting to the units of measurement (i.e. gallons). It is important to note that the ore area method will always provide a larger volume than the pattern method. This is because the wellfield patterns are developed within the ore, and the wellfield patterns' injection/extraction flow regime is optimally designed to flare into the ore to maximize ore contact by leach solutions and minimize the required number of wells.

At this stage of the Church Rock mine planning, it is impossible to determine what percentage of the orebody will be developed. This will be determined by economic conditions and the grade cutoffs, and the type of well patterns that will be utilized when the ore is developed. It is important to emphasize that HRI considered the whole orebody in generating cost estimates within the RAP, rather that individual wellfield patterns. This provides a conservative element to HRI's method of pore volume estimation. This conservatism is evident in item 6, below.

---

[10] It does not matter if the number of pore volumes is increased in response to more gallons flowed or if the dispersion factor increases in response to more gallons flowed, the net result will be the surety amount will increase.

[11] Not only does the type of pattern affect dispersion, but the unique geometry of the ore body is also important. In other words, a long narrow wellfield with a line of wells or patterns may be subject to much more dispersion than a large blocky wellfield with side by side patterns. This is because if there are adjacent patterns, dispersion will result into another pattern. At the Churchrock site, all of the reserves will be limited to one-quarter section of land. Being a compact orebody will lend itself to large blocky wellfields, which may result in low dispersion potential and low PV adjustment multipliers. However, at this time it is impossible to verify these numbers because there

6. Mr. Ingle's testimony ends with Table 2. - Comparison of HRI's estimated DDR Costs with Likely or Possible Costs of DDR. Ingle's comparisons to HRI in the area of groundwater restoration are utterly unrealistic. Mr. Ingle based his cost comparison on his evaluation of groundwater restoration costs at the PRI Highland site. Below I have constructed a Table 2 that compares important project variables for PRI's Highland Uranium Project in Wyoming[12] against similar project variables for HRI's Churchrock project[13]. I did this to bring into context the comparative size, and corresponding scope of reclamation, of these two projects. In this table I have shown the actual surety amount for PRI, and proposed surety amount from the HRI RAP. Finally I have included the Total "Likely and Possible" surety suggested by Mr. Ingle.

Table 2 – Comparison of Key Project Variables and Reclamation Costs

Project Variables	PRI*	HRI**	Ingle***
Number of wells (all)	~4141	~483	---
Acres of wellfield patterns	~189	~30	---
Years of operation	13	4-5	---
Cumulative production (million lbs. U_3O_8)	~13	~5	---
Average throughput (gallon per minute)	9000	4000	---
Number of satellites	3	1	---
Size of adjusted pore volume (billion gallons)	~2.71	~1.3	~2.5
Restoration amount (million dollars)	$21.12	$9.5	$23.9

* Actual from HRI discussions with PRI staff.
** Planned
*** Affidavit of Dec. 19, 2000

Reviewing the data in Table 2 in the context of number of wells, acres of wellfield pattern, years of operation and throughput[14], and number of satellite locations, the PRI Highland project exceeds the size of the HRI Churchrock project by three times or more. The PRI Highland adjusted pore volume is about two times greater than that estimated by HRI for the

are no wellfield patterns. It is equally impossible for Mr. Ingle to draw a conclusion based on lack of site specific evidence.

[12] The PRI Highland Project is used throughout the Ingle Affidavit as a model for how restoration costs should be calculated.

[13] Mr. Ingle in his Affidavit, p. 31, states "there is considerable relevant and analogous uranium ISL restoration experience in Wyoming to draw from to develop credible cost estimates".

Churchrock site[15]. Mr. Ingle's suggestion that the adjusted pore volume for the HRI Churchrock site will be similar to PRI completely ignores the much smaller overall scale of the Churchrock Project compared to the Highland. Finally, Mr. Ingle's "Likely and Possible" approach concludes that the HRI surety should be larger than PRI, in spite of the fact that the PRI project is at least three times the size of the fully developed project proposed by HRI. It is likely that Ingle discrepancy results because: 1) he did not recognize that HRI used the ore body outline method to determine rock volumes (See **5** above) and, 2) that HRI utilized 50% more pore volumes than PRI (See **7** below).

7. In reviewing the adequacy of HRI surety amount for the Churchrock Project, Ingle neglected the conservative number of pore volumes that NRC is requiring of HRI compared to the number of pore volumes for the Wyoming examples that his agency regulates. As was discussed in **3** above, restoration gallon estimates can either by increased by increasing the size of the dispersion or flair factors that are used to adjust pore volumes or by increasing the number of pore volumes. Comparing HRI's Churchrock project to the three Wyoming examples shown in Table 3 shows that the quantity of pore volumes used by HRI to calculate the surety amount is 50% greater than are used in the Wyoming examples. It would have been appropriate for Mr. Ingle to recognize this level of conservatism in his analysis of HRI's surety.

Table 3 – Comparison of Surety Pore Volume Requirements at ISL Sites

Company/Project	P.V. GWS	P.V. R.O.	P.V Total
PRI/Highland	1	5	6
Cogema/Christianson	1	5	6
Rio Algom/Smith	0	6	6
HRI/Churchrock	0	9	9

[14] Throughput needs to be viewed together with years of operation. While the Highland per minute throughput is ~ 2 times Churchrock, operations have been conducted for many more years. Therefore, more than twice as much mining has been conducted by PRI at the Highland site.

8. Mr. Ingle's representation that the PRI pore volume example represents universal Wyoming DEQ policy is not consistent with recent actions that the agency has taken with other operators. The State of Wyoming regulates two other commercial ISL operations in addition to PRI[16]. The Rio Algom Smith Ranch Project is the most recently permitted and constructed commercial ISL operation in Wyoming. This operation has recently undergone an extensive review by the Wyoming DEQ for surety amounts. According to file documents on this review (See Documents in Attachment 5) Wyoming DEQ allowed Rio Algom to use horizontal dispersion factors of 1.7 to satisfy groundwater restoration surety requirements. No vertical dispersion factor was required by DEQ for the Rio Algom surety. This would make Rio Algom's *combined* dispersion or flair factor 1.7 versus the *combined* dispersion or flare used by HRI 1.95 (I,e, 1.5 X 1.3 = 1.95). In addition to a smaller combined dispersion factor, as stated in **7** above, the DEQ required that Rio Algom post bond for six pore volumes of flow. HRI's RAP and associated cost estimate surety plan are based on nine pore volumes. Mr. Ingle is critical of HRI's NRC mandated assumptions used in surety calculation yet his agency has approved smaller dispersion factors and fewer pore volumes in a surety review just last year.

9. Based on my conversation with the manufacturer, I have determined that the efficiency of the brine concentrator equipment is approximately 98% depending on water quality. The efficiency of the brine concentrator represents operation ranges and will have no material affect on the rate of restoration, operating costs, or quantity of solids generated. The vendor has proposed that HRI utilize a 3.2 gpm rotary dryer, which would accommodate the full-anticipated range of reject from the brine concentrator.

---

[15] As stated in 5 above, it is anticipated that if HRI was to use wellfield patterns rather that ore boundary areas then the pore volume and adjusted pore volumes would be smaller and more proportional to PRI when compared to well field pattern acreage.

[16] Cogema Irigary/Christenson Ranch and Rio Algom Smith Ranch.

The efficiency of the brine concentrator is incidental to overall project costs and surety issues. However, after reading Mr. Ingle's discussion of the RAP numbers, I spoke with the BC manufacturer to obtain additional information. According to the manufacturer, one should expect approximately 2 percent brine from the brine concentrator. As stated in the RAP, this would equal approximately 2.5 gpm. The manufacturer recommended a dryer of 3.2-gpm capacity, which will be sufficient to accommodate 2.5 gpm. I agree with Mr. Ingle in that the quantity of reject in the RAP operating tabulation should be raised to 2.5 gpm. This adjusted quantity of brine will be reflected in the final version of the RAP along with any other NRC required adjustments to the plan.

The 2.5 gpm amount represents a 1.5-gpm increase over what was included in the RAP. This will have an insignificant impact on restoration timing. Nominal restoration flow is 580 gpm; 1.5 gpm is a small fraction of this flow. There will be no impact on the BC operating expenses. As noted previously, the rotary dryer will be sized at 3.2 gpm and not affected by the 1.5-gpm increase. There will be no impact on solids disposal because the reject will contain the same quantity of dissolved solids in a slightly larger quantity of reject fluid (i.e. TDS per unit of reject will be less).

10. HRI increased the restoration equipment capacity in the RAP to accommodate the 9-pore volume requirement of license condition 9.5 versus HRI's initially planned 4-pore volume budget number. The budget model described in this RAP used 1,330,327,106 gallons of water to size duration of the restoration program and the chosen equipment capacity. The RO unit was sized to operate at a nominal capacity of 580 gallons per minute. This design rate has been utilized by URI at similar ISL facilities with excellent results. The sizing will allow concurrent restoration to proceed at approximately the same rate production wellfields are depleted. (i.e.

with mining and restoration going on concurrently and proceeding at similar rates). Had 4 pore volumes been assumed in the RAP the RO would have been sized smaller.

HRI has not changed the estimated restoration water quantity from what was described in the FEIS p. 4-58[17]. We have sized the equipment to allow full 9 pore volumes to be treated over the duration of the mine life as specified by NRC.

11. HRI clearly explained that the capital cost of reverse osmosis and brine concentration equipment would be absorbed by operations. Specifically stated in 2.a of the RAP:

"The central assumption in this RAP is that groundwater restoration is conducted using reverse osmosis ("RO") and brine concentration ("BC") water treatment methods. RO and BC will be used to treat water during production operations and be used for groundwater restoration conducted in the pilot demonstration and during concurrent restoration that will be ongoing with production activities. Because the cost of restoration equipment such as wellfield pumps, ponds, the RO unit, the BC unit, laboratory equipment, trucks, and field equipment must be incurred for production process operations, they are assumed to be operational capital and are not included as capital requirements in any of the RAP budget lines. NRC will be able to verify the availability of the restoration equipment during routine inspections."

My statement "BC costs are included within the O & M budget in Attachment E-2-1" is correct. "O & M" refers to operation and maintenance, not capital. In the O & M budget the most substantial expense charged directly to brine concentration is: row 72 - utilities – electric. Row 81 provides for replacement of miscellaneous valves, etc. and row 88 for disposal of brine concentration solids.

12. HRI's estimate of TDS concentrated in brine is correct. I agree with Mr. Ingle that TDS of lixiviant (i.e. production level) will range between 1,500 and 5,500 mg/l and that at 5,500 mg/l, the RO reject would exceed 4800 mg/l. However, the objective of restoration is to reduce TDS levels, not maintain them at production levels. Production level TDS simply are not appropriate to the analysis of levels that will be generated during full cycle restoration.

---

[17] Note that the 9 pore volume quantity indicated for the Churchrock site in the FEIS p. 4-58 includes quantity for both Section 8 and Section 17. The Section 8 only quantity would represent about one half that projected in the FEIS p. 4-58.

During restoration, while early TDS values may be similar to those found in leach solution, they quickly drop off with initial restoration efforts. This fact is illustrated by TDS from the Mobil Section 9 Pilot that is presented in Attachment 1 and Attachment 4 to this Affidavit. Mobil began the restoration effort with TDS at 5500 mg/l. However, after one pore volume, TDS fell below 2000 mg/l, and after 2 pore volumes the TDS fell to approximately 1000 mg/l, below the low range contemplated in the FEIS (Table 4.5 at 4-16). The TDS then drops progressively during the remaining seven pore volumes of restoration flow. Therefore, for the majority of the restoration period, TDS is less than the lowest level that is projected in leach solution. The Mobil example shows the highest TDS concentration of all the examples analyzed in the FEIS. As shown in FEIS Table 4.8 at 4-32, the highest lixiviant concentration for the Churchrock core studies was 1520 mg/l, much lower than the Mobil test.

Based on my experience reviewing restoration results at URI projects, during restoration I would anticipate the RO reject concentration to be approximately four times the concentration of the average feed. Consistent with the results in the Mobil test, I believe that 4000 mg/l is a reasonable estimate for the purpose of estimating solid waste amounts. Any material changes that become apparent from actual field results and the restoration demonstration would instigate the adjustments required by LC 9.5.

13. HRI's estimate of wells in the RAP Section E.4 is consistent with that number shown in Figure 1.4-8, the wellfield illustration in the COP Rev. 2.0. According to the COP p. 40 "The layout of the wellfield is shown on Figure 1.4-8.... Fully developed, it will consist of multiple injection, and production wells which will feed into approximately 19 metering houses."

HRI did not specify in the COP the exact number of wells that were anticipated because at that time the exact number was (it remains) unknown. In fact, a precise well number will not be known until more delineating drilling is conducted and the wellfield is actually designed. At this time the number of wells shown on Figure 1.4-8 in the COP on the Section 8 property is a reasonable number to use in estimating the RAP budget. As with other budget items, HRI would keep NRC apprised of the exact number of wells according to the provisions of LC 9.5. In the event more wells are drilled, the costs would be calculated using the Budget method shown in Attachment E-4-1 of the RAP.

14. The method planned by HRI to plug and abandoned wells has proven to be successful at other ISL sites and is currently accepted at ISL operations in Texas where wells are at similar depths as those that are planned at the Churchrock location. The Texas Natural Resources Conservation Commission, to which EPA has delegated primary authority for the Underground Injection Control program in Texas, has determined that the method for plugging and abandonment proposed by HRI for Section 8 is acceptable for similar wells in Texas.

The positive placement method of plugging shallow wells is simple, and successful plugging is easily verified. Cement, with a higher specific gravity than water, is simply poured into the well and allowed to displace groundwater into the formation. Cement quantity in the well is verified by volumetric calculation. The method has the benefit of eliminating rig time and eliminating the potential for removing stuck pipe that would be used to pump cement from the bottom up to the surface.

15. HRI will conduct restoration operations 24 hours per day, seven days per week, and will provide surety adequate to cover that. The operating statistics in the RAP Section E.2, Attachment E-2-1 (row 19) make it clear that HRI must operate 24 hours per day, seven days per week, to meet the performance criteria.

It appears that Mr. Ingle interprets the fact that HRI listed only one person per job title to mean that the Company will operate only one shift. As clearly stated in the RAP:

"HRI assumed employment of technical professionals whose expertise is needed on a limited basis during the restoration mode. Anticipated positions are listed in the Restoration

Budget rows 1-15. However, to justify their full time status and utilize their time on the job, it is assumed that they are required to provide a multitude of services, i.e., every employee will be wearing multiple hats. As such, individual job descriptions are difficult. For example, in the restoration mode, a qualified geologist will be required to verify the configuration of restoration patterns to assure efficient results. While this task requires unique geological expertise, the time commitment by the geologist to this task may only be several hours per week. Therefore, to maximize the use of the geologist time, he or she will be assigned to many other tasks for which he or she will be qualified such as lab analyst, well sampler, and plant operator. HRI also plans to maintain several other technical disciplines on staff such as radiation safety specialist, and engineers. In the restoration mode they will also perform their primary function and a number of secondary roles."

URI, HRI's sister company in Texas, currently has two commercial mines in full-scale restoration. These mines each have RO units operational at a nominal 580 gpm, and industrial waste disposal wells and associated equipment in place of brine concentration. These operations are running smoothly with fewer personnel than are planned for the Churchrock location. To compare personnel at ongoing restoration locations with what is planned for the Churchrock location, I have prepared Table 3 below.

Table 3 – Labor Comparisons URI & HRI

		HRI	URI	URI
		Churchrock	**KVD**	**Rosita**
Management and Accounting				
Salaried	Operations Manager	1	1/2	1/2
Salaried	Environmental Manager	1	0	0
Plant Personnel				
Salaried	Plant Super/Engineer	0	1	1
Salaried	Radiation Officer	1	1	1
Salaried	Chemist	1	1	0
Salaried	Plant Foreman	0	0	1
Wage	Electrician	1	0	0
Wage	Plant Operator	1	1	0
Wellfield Personnel				
Salaried	Foreman	1	0	1
Wage	Truck Driver	1	1	0
Wage	Wellfield Operators	1	1	1
Wage	Pump Hoist Operators	1	1	1
Engineering & Geologic Personnel				
Salaried	Senior Geologist	1	0	0
Salaried	Engineer		1/2	1/2
	Total #	11	8	7

URI is able to perform restoration at the Texas locations with individuals serving multiple roles and through equipment automation. As stated above, an individual with the job title "plant operator" for example, may also serve time as lab technician on a limited basis. Additionally, once the restoration process has reached steady state, URI's restoration machinery is largely automated[18]. At night, the process runs unmanned with automatic shutdown in the case of leaks or other equipment malfunction. Because the equipment is simply water treatment equipment, the level of hazard is low and the result of a temporary shutdown of equipment is insignificant. Consequently, HRI is confident operating in the automated mode.

16. HRI will not need special operators for the RO/BC. The RO/BC operation will be one of several responsibilities for the shift operator. Based on URI's experience, it is difficult to imagine what an operator would do for an entire shift operating just a RO. Properly equipped and automated, they run themselves and require only periodic shutdown and maintenance. Per the manufacturer, operations of the BC require approximately 4 hours of general overview per shift. These duties will be integrated into the normal shift routine. Mr. Ingle's assumption that a full time RO and BC operator will be required is simply unfounded and contrary to the manufacturer's instruction and URI's operating experience.

17. HRI's cost for brine concentrator solids is calculated correctly. HRI cost calculation for brine disposal is presented in Attachment E-5-2. It was assumed that sludge from the brine concentrator would be disposed of in <u>bulk</u> at the rate of $2.04 per cubic foot ($55 per yard). This is the rate stated in the Part 10, item (i) of the IUC Disposal Agreement. Part 10, item (ii) costs do not apply to bulk shipments. HRI would expect to minimize unloading time because the trucks would be sole sourced and dumped by HRI.

18. The pay category for a geophysical well logger is not required. The geophysical logger is used during production operations only. No need for a geophysical logger is envisioned during restoration because there are no mineral exploration or new wells planned.

---

[18] It will also become increasingly important to operate production operations in an automated mode. Automated

19. Electrical cost estimates are reasonable in the RAP. Electrical costs will be negotiated with utilities as one of the last steps in project development, and may differ from current rates. As shown in attachment E-2-4, electric rates are currently anticipated to be about $0.075/kw. This is the number HRI used for the RAP. In fact, our current costs in New Mexico are $0.061/kw. The $0.0875 reference in the electrical pump cost calculation is higher than the quote shown in attachment E-2-2. HRI will amend this number in the revised report with any other modifications that the NRC may require.

20. As stated in RAP Section E.2.d., Environmental analyses are anticipated miscellaneous operational costs for outside laboratory analysis. These are anticipated analytical costs based on historic results from other operations. They are not the same as stability costs that were itemized separately in RAP E.3.

21. RO disposal costs are included in the RAP. Backwash solids are collected in evaporation ponds. Pond decommission costs are budgeted in Attachment E-8-1.

22. Groundwater sweep costs. At this time HRI does not intend to employ groundwater sweep and did not propose or provide a cost estimate for groundwater sweep in this RAP.

23. Cost of Reductant. At this time HRI does not intend to use reductant and did propose or provide a cost estimate for the use of reductants in this RAP.

24. Plugging and Abandonment of ore delineation holes is not anticipated during decommissioning activities. HRI will plug and abandon all ore delineation holes before leaching operations begin. This is a necessary step to prevent vertical excursions. We do not anticipate any ore delineation holes will require plugging as part of closure activities and did not propose or provide a cost estimate for the plugging of ore delineation holes.

---

technologies are becoming more available and even more dependable than with human operators.

25. Pond leakage is not anticipated at the CUP because of redundant liner provisions. As specified in the COP § 2.3.1, the ponds at the Crownpoint Project will be equipped with two synthetic liners and a leak detection system for the life of the pond. In the event of a leak in the top liner it will be detected in the leak detection system before a leak can occur in the second liner. The potential for contamination below the second liner is remote.

26. Back up equipment is not proposed or required. In the event of routine or non routine maintenance or repairs HRI would plan to shut operations down, perform the needed maintenance or repair, and resume operations.

27. HRI will adopt the Administrative Contingency that is required by NRC. The 15% Contingency/Profit factor that was included in the RAP Section F. Surety Funding Schedule is based on the 15 percent contingency that is described in LC 9.5 of HRI approved License. Should the NRC require a greater contingency, HRI will adjust its surety accordingly.

28. Annual inflation adjustment requirements are included in LC 9.5 and should not be contemplated for the long term in the initial surety amount. LC 9.5 requires an annual update to the surety amount as follows:

"Annual updates to the surety amount, required by 10 CFR Part 40, Appendix A, Criterion 9, shall be provided to the NRC at least 3 months prior to the anniversary date of the license issuance. If the NRC has not approved a proposed revision 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing arrangement, prior to expiration, for 1 year. Along with each proposed revision or annual update of the surety the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation (i.e., using the approved Urban Consumer Price Index), maintenance of a minimum 15 percent contingency, changes in engineering plans, activities performed, and any other conditions affecting estimated costs for site closure."

HRI will be required to provide annual increases for inflation as part of the annual review process. This license condition precludes the need to speculate on inflation adjustments years out.

28. Stability analytical costs are stated correctly in the RAP. The stability sample budget was based on the sampling frequency described in the COP § 10.4.5. The COP states that "Stability will be determined by three sample sets taken at two month intervals from the original baseline wells…".

29. Mechanical Integrity Testing will be conducted as part of routine operations during restoration by site staff. No additional cost is expected or budgeted.

30. Computer data processing is provided for in Row 59 of the budget in RAP Attachment E-2-1.

E. RESPONSE TO AFFIDAVIT OF DR. ABITZ

1. Comparing the Fernald groundwater restoration project to the Churchrock ISL project or to any other *uranium-mining* project is not a reasonable comparison. The *only* common feature to both locations is the presence of uranium in groundwater. Dr. Abitz provides no other reason to believe that there are any other similarities at the two sites. In fact, there is strong evidence that the sites are different physically.

Dr. Abitz does not make any comparison of the natural geology, mineralogy or geochemistry at the Fernald site with that at the Churchrock Section 8 site. While I do not know the Fernald site, I would expect that the differences are significant. What is very apparent is that the Churchrock property contains a naturally occurring uranium ore body that will be extracted using the proposed ISL process. That is the purpose of the CUP; to extract uranium that is currently in the ground and naturally occurring in the area and in the native waters. I believe that there is no uranium ore body at the Fernald site, and that the groundwater contamination resulted from leakage from a manufacturing facility rather than as a result of a natural occurring site condition like at the Churchrock site. I will describe below some of the water quality features that are on record in this hearing process.

The geochemistry at the Churchrock site is unique to uranium ore mineralization zones. Uranium deposition in the Churchrock area, and in roll front uranium deposits in general, result from strong natural reducing conditions that render uranium insoluble. For this reason, uranium accumulated in a small area in economic concentrations suitable for mining. For the very same reason, uranium in the vicinity of the Churchrock type of uranium ore body cannot migrate far from the geochemical reductant (i.e. it becomes re-reduced and precipitates out of solution). Thus, once solubilized, uranium does not remain soluble far from the ore zone. See FEIS discussion p.4-39. I do not think that this condition exists at the Fernald site.

No water supplies are threatened under any reasonable circumstance at the Churchrock location. The mine is remotely located. There is no water well that could be impacted. To the best of my knowledge, these conditions do not exist at Fernald.

2. Dr. Abitz presented no evidence comparing the regulatory regime governing the Fernald site with that governing the Churchrock ISL. Activity at the Churchrock facility will be highly regulated as an ISL uranium mine. EPA or a delegated state agency regulates ISL mining through regulations such as 40CFR140 through 148. NRC regulates these operations through its own regulatory program.

Mining at the Churchrock ISL mine and at all ISL uranium mines requires an EPA aquifer exemption. The exemption allows ISL mining in what would otherwise be classified a underground source of drinking water ("USDW"). By exempting the aquifer, EPA recognizes that the area is mineralized and not suitable as a source of drinking water. As part of the CUP development, HRI must receive an aquifer exemption as described in 40 CFR 144.8 before any mining can occur[19]. I don't believe that the Fernald site would qualify for an EPA aquifer

[19] This is specifically provided for in 40 CFR 144.8 as follows:

> "An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in § 146.3 may be determined under 40 CFR 144.8 to be an "exempted aquifer" if it meets the following criteria:

exemption because it does not contain producible minerals. Thus, groundwater restoration at Fernald likely is subject to a set of requirements quite different from those applicable to Churchrock. Dr. Abitz should recognize this fundamental regulatory distinction before he attempts to perform linear correlation and normalization analysis of restoration efforts and costs.

3. The Churchrock water quality has had drinking water limitations demonstrated. Section 5 of the Pelizza Affidavit Pertaining to Groundwater Issues dated February 19, 1997, was devoted to Churchrock Water Quality. There it was established that Churchrock water quality was high in naturally occurring radionuclides and high in naturally occurring baseline concentrations of uranium. In fact, it appears that the premining concentration of uranium at the Churchrock site will control the restoration standard for the area. The Presiding Officer[20] and the Commission[21] have both noted this fact in their orders in this Subpart L hearing proceeding. Dr. Abitz refuses to recognize this fact.

4. Dr. Abitz states that the initial, maximum uranium contamination level at the Fernald site is 1.0 mg/l. The Churchrock premining concentration of uranium in the water exceeds the Fernald pre-restoration level because uranium is naturally occurring at the Churchrock site.

5. Dr. Abitz raises a concern that uranium contamination in the groundwater below Section 8 would reach levels of 50 mg/l to 250 mg/l, making restoration efforts more difficult. Dr. Abitz does not understand that these are the levels of uranium in production lixiviant, which is

---

(a) It does not currently serve as a source of drinking water; and

(b) It cannot now and will not in the future serve as a source of drinking water because:

(1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.

(2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical;

(3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or

(4) It is located over a Class III well mining area subject to subsidence or catastrophic collapse; or

[20] LBP-99-30, p.36-37.

[21] CLI-00-12, p. 6-7.

subject to economic recovery. Uranium in the 50 to 250 mg/l range are only found in early "flush" production while oxygen is actively being introduced to the system. Two factors cause lower levels of uranium after production is complete but before restoration begins. First, the uranium ore body has been economically depleted (i.e. the uranium has been mined). Second, once oxygen injection stops, uranium reverts to the reduced state, becomes less soluble in the groundwater, and precipitates. At the beginning of restoration activity uranium concentrations usually are found to be approximately 10 mg/l, not 50mg/l to 250 mg/l as suggested by Abitz.

6. Dr. Abitz is concerned about higher quantity of TDS in the groundwater after mining and that these higher levels of TDS will prolong restoration efforts at the Churchrock location as compared to Fernald. However, as shown in Attachment 4, restoration efforts are very efficient in removing the higher concentrations of dissolved constituents in the first two pore volumes. As shown on the chart in Attachment 4, it is in the lower TDS concentrations, where parameter values become asymptotic, that less result is seen for a give restoration effort. This phenomenon would be equally true at Fernald as at Churchrock. Dr. Abitz's assertion is simply wrong.

7. Dr. Abitz claims that the Fernald estimated total cost for reducing the uranium contamination by less than two orders of magnitude over the 10- to 15- year restoration period is in the range of $78 million to $117 million. He then suggests that there may be a linear relationship between the costs at Fernald and Churchrock. Dr. Abitz provides no facts or other basis for comparison. He does not explain how the physical environment at Fernald compares with that at Churchrock, how the respective operations compare, how the infrastructure compare, how electricity rates compare, how and where the water is pumped, what applicable regulatory requirements are, or any other factors necessary to reasonably compare the two situations.

8. Abitz, like Ingle, opines that HRI should budget for the addition of reductant. Though HRI has not precluded the use of reductant as a viable approach to reducing final uranium values to lower concentrations, HRI is not proposing reducing agents at this time. I am aware that reducing agents have been successfully used at other ISL sites and am aware of successful restoration without the use of reducing agents. HRI will have to weigh the use of reductant with certain occupational safety concerns. I personally have corporate responsibility over Health, Safety and Environmental Affairs. H_2S in the ISL process raises a dangerous occupational safety issue that HRI would prefer to avoid, if possible.

9. I agree that the restoration cost spreadsheet in Attachment E-2-1 should use a 30-day month. The impact on the cost calculation, however, will be minor. HRI will adjust this spreadsheet in the final version of the RAP along with any other NRC required adjustments to the plan.

10. Downtime will occur. As stated in Paragraph 25 of my responses to Mr. Ingle, downtime due to repair and maintenance is expected. The operating efficiency will be an important consideration to report to NRC as part of the annual surety update that is required by LC 9.5. At this time there is simply not enough operating data to specify what the efficiency will be.

11. HRI stands by its estimate of personnel requirements during restoration as set forth in RAP Attachment E-2-1. Labor costs for Fernald cannot be compared with estimates for Churchrock based on the sketchy information provided by Dr. Abitz. As I stated in my response to the Ingle Affidavit, (See 14 above), and Mr. Van Horn stated in his Affidavit at 2, HRI labor costs are based on the Company's experience conducting similar ISL restoration operations. Dr.

Abitz has not presented any evidence that labor requirements at Fernald and Churchrock are linear.

12. HRI's estimate of cost items in RAP, Attachment E-2-1, Lines 80-84 and 89-91, are based on the Company's experience conducting similar ISL restoration operations. Mr. Van Horn verifies these costs in his affidavit. Dr. Abitz presents inadequate information to justify comparing maintenance costs at Fernald with those estimated for Churchrock

13. As stated in 13 in response to the Ingle Affidavit, HRI's proposed method to plug and abandon wells has proven to be successful by other ISL operators and is currently accepted at ISL operations in Texas where wells are at similar depths as those that are planned at the Churchrock location. Dr. Abitz has not provided any evidence to demonstrate that the plugging method has caused difficulty at other sites or that the method would not be successful at the Churchrock location. Abitz claims that HRI's proposed method is "inconsistent with industry practices and government recommendations" but fails to provide specifics and fails to rebut hundreds of examples where the direct placement method of plugging wells has been used by in situ miners to the satisfaction of regulatory agencies. Abitz claims that this method is not adequate to protect public health and the environment, yet presents no evidence to support this statement.

14. Abitz at 25 claims that "below Section 8, groundwater quality in the proposed mined ore zone will be of very poor quality and under greater hydrostatic pressure relative to overlying ground water…". Dr. Abitz's statement regarding groundwater quality seems to be in conflict with earlier statements in his affidavit (See Abitz at 7). Dr. Abitz presents no evidence for his assertion that the mine zone is under greater hydrostatic pressure relative to overlying ground water. In fact, at the Churchrock site, water level measurements show that the opposite is true[22].

15. This concludes my testimony.

[22] See FEIS p. 3-35

AFFIRMATION

I declare on this 18 day of January, 2001, at DALLAS, Texas, under penalty of perjury that

the foregoing is true and correct.

Mark S. Pelizza

Sworn and subscribed before me, the undersigned, a Notary Public in and for the State of Texas, on this 18 day of January, 2001, at Dallas, Texas.

My commission expires on 2-19-2005.

ELESIA ATHERTON
Notary Public, State of Texas
My Commission Expires
February 19, 2005

Notary Public

(SEAL)

Attachment 1

Mobil Section 9 Summary Report

SECTION 9 PILOT

SUMMARY REPORT

BY

HRI, INC.
DALLAS, TEXAS
MARCH 12, 1993

Section 9 Pilot
Summary Report

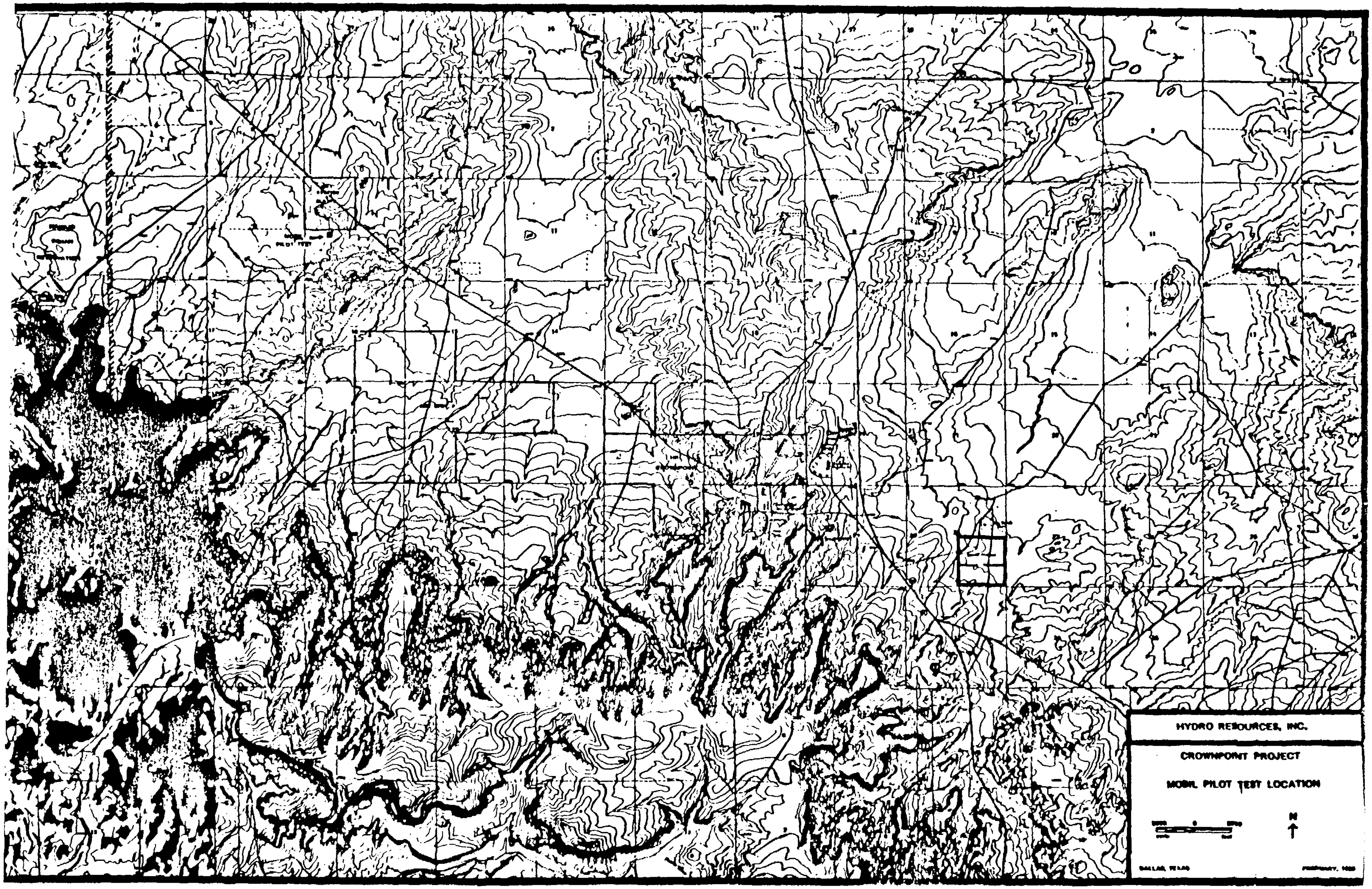
Introduction

The Mobil, Section 9 Pilot was a uranium in-situ leach test located in T17N, R13W, Section 9, approximately one mile north of the proposed HRI UNIT I area (Figure 1). Mobil utilized a mild sodium bicarbonate leach solution, similar to that being proposed by HRI in an injection/extraction configuration consisting of four interconnected five spot patterns (Figure 2). A complete overview of the Section 9 pilot is within Attachment A.

Geologically, the Mobil pilot was conducted in the Jurassic Westwater formation; (Figure 3) the same geologic formation, and aquifer which HRI proposes all operations in the Churchrock and Crownpoint areas. Different, however, is the geologic age of deposition of the uranium mineral within the Westwater. The Section 9 ore is Cretaceous in age, the ore which is being proposed for in-situ leach by HRI, is Tertiary age. This difference is fundamentally important because the Cretaceous ore has high molybdenum content and the Tertiary ore does not. This is illustrated in the core analysis from various properties including UNIT I, Crownpoint, and Section 9 in Attachment E. The only environmental problem encountered in the Section 9 pilot test was the high Moly content which was leached out of the ore zone, and the inability to restore the Moly values to 1 ppm or less. Being absent in the ore, Moly will not be leached at HRI's properties, and not create a similar environmental problem. This is clearly demonstrated in the molybdenum core leach plots in Attachment D. Also, ground water in the location of the Churchrock mine workings, which experienced severe oxidation conditions during mining, displays no molybdenum in the ground water.

Source of Data

The information reported upon herein was derived from Mobil's files and records, which were developed during the operation of the pilot. Certain items, such as the Overview within Attachment A, Baseline Ground Water data within Attachment B, and Core Sheets within Attachment E are copies directly from Mobil's files to assure their authenticity. The restoration tabulation within Attachment C is compiled from several sources within Mobil's files including status reports, lab sheets, which can be produced upon request. This data includes tabulations from various wells and well averages from the actual pilot wellfield and is representative of water


HYDRO RESOURCES, INC.
CROWNPOINT PROJECT
MOBIL PILOT TEST LOCATION
N

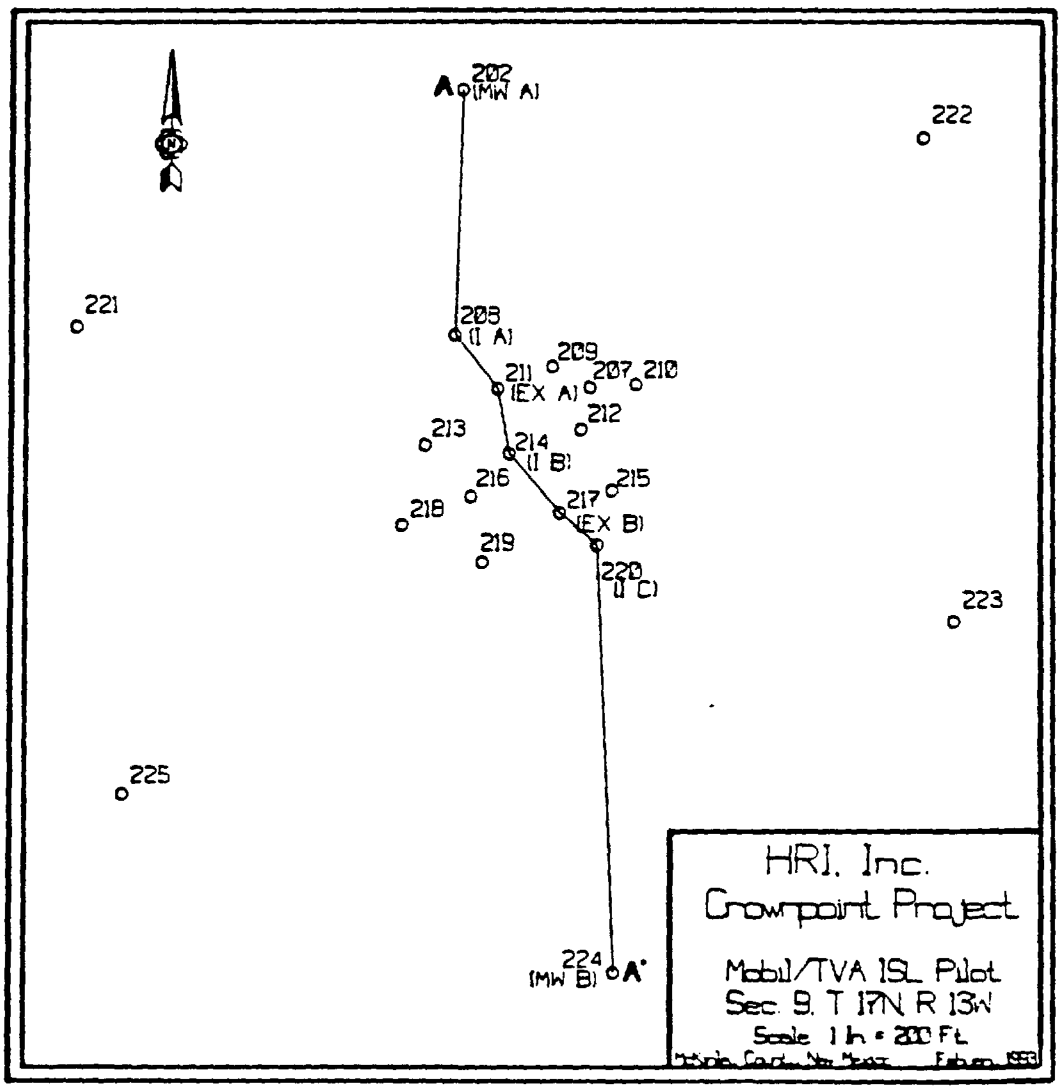
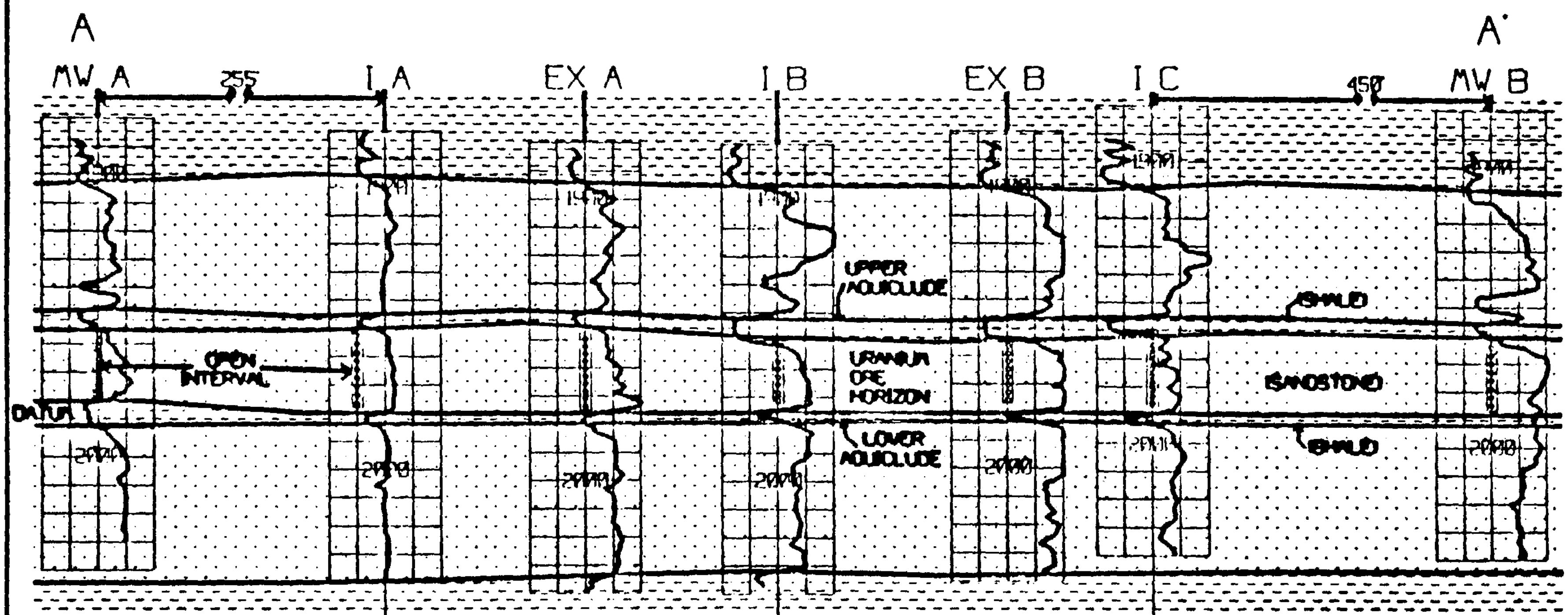

A
202
(MW A)
222
221
208
(I A)
209
207
210
211
(EX A)
212
213
214
(I B)
216
215
218
217
(EX B)
219
220
(I C)
223
225
224
(MW B)
A'
HRI, Inc.
Crowpoint Project
Mobil/TVA ISL Pilot
Sec. 9, T 17N R 13W
Scale 1 In = 200 Ft.

FIGURE 2

MOBIL/TVA ISL PILOT

SEC 9. T 17N. R 13W



ORGANIC CARBON
1952.5-1953' 0.46%
1967.5-1968' 0.32%
1976.5-1977' 0.27%

ORGANIC CARBON
1968.5-1969' 1.70%
1969.5-1970' 0.35%

ORGANIC CARBON
1967.5-1968' 0.18%
1968.5-1969' 0.23%
1976.5-1977' 0.20%
1979.5-1980' 0.21%
1981.5-1982' 0.10%

FIGURE 3

HRI
Crownpoint Project
Stratigraphic Cross Section
Vertical Scale: 1" = 60'
Horizontal Scale: 1" = 60'

quality from time to time. The restoration plots in Attachment D are direct graphical representations of the data shown in Attachment C.

Observations of Pre-Restoration Water Quality

Post leach TDS was much higher (2 times higher) than HRI predicts will result from the proposed HRI leaching activities. Based on the high salt, (sodium, chloride, sulfate) concentrations, we feel the higher than expected TDS resulted in plant design flaws, which allowed them to transfer from the plant to the wellfield. These salts, and especially chloride, are introduced to the wellfield when the ion exchange resin is not adequately washed of eluant brine following the stripping cycle. Proper plant design at the proposed HRI operations will prevent this problem.

Besides TDS, other parameters, which were elevated above New Mexico health standards during the pilot included arsenic, iron, manganese, molybdenum, radium, selenium and uranium.

As shown in Attachment B, iron and manganese were two parameters which exceeded health standards during baseline conditions. Also, these parameter standards are secondary, i.e., they do not pose a toxicity hazard, only an aesthetic nuisance. Radium, although not addressed in Attachment B, is ubiquitous to uranium orebodies, and is known to generally exceed health standards in this geochemical environment.

The molybdenum, and especially the uranium concentrations, were high upon the completion of the leach phase because only 15% the orebody was leached at completion of the pilot, a circumstance which would never be duplicated during a commercial operation.

General Results of Restoration

As shown within Attachment C, with the exception of molybdenum, arsenic and manganese, all parameters were restored in 4.79 pore volumes circulation or sweep. Of this total volume, .86 was circulated without any treatment, therefore, restoration was achieved in 3.93 pore volumes of ground water sweep and R.O. treatment. This is nearly identical to the results of the core studies presented within the Churchrock and Crownpoint Applications. The arsenic and manganese concentrations were restored shortly thereafter. It should be noted that uranium and Moly restoration began with extremely high values because the orebody was not leached to completion.

The molybdenum restoration was problematic and concentrations were never reduced to the 1 ppm standard. As stated in the introduction, HRI does not anticipate a problem with moly in the proposed operation because the element is not present in the ore. This is clearly exhibited in core analysis (Attachment E), and core studies (Attachment D). Additionally, in the event that trace levels of molybdenum were to occur in the leach solution, HRI's plan would be to selectively remove the material from the leach solution during operations and essentially mine (remove from the geologic environment) moly as a commodity, to depletion, concurrent with uranium, and preclude the environmental dilemma which was caused by partial depletion in the Section 9 test. The accelerated depletion of moly has been clearly demonstrated by Mobil's core leach testing of high moly ore from the pilot area. Moly, because of its higher reactivity to leaching with oxidized bicarbonate solutions is depleted before uranium, when the leach phase is extended toward completion (see Attachment F, Published report on Mobil Section 9 pilot...Voght, T.D., In-Situ Leaching of Crownpoint, New Mexico VI - The Section A Pilot Test, Jor Pet Tech., Dec. 1984, pp. 2243-2254.) Here the molybdenum is depleted by 50 pore volumes of throughput while the uranium remained in the 50-60 ppm range, i.e., the molybdenum was restored to health standards by depletion from the rock mass well before economic cutoff grade for uranium mining was reached.

Organic Carbon

The presence of organic carbon has been mentioned as a possible inhibitor to restoration. Mobil Crownpoint's test does not indicate that this will be a problem. Figure 3, Wellfield Cross Section, indicates organic content from cores taken from the wellfield operational wells. Organic carbon was analyzed ranging from 0.10% to 1.70% of the operational zone. These values are typical for the ore horizons encountered throughout UNIT I, Crownpoint and Churchrock. The pilot test, as well as core leach testing, showed no evidence that these levels of organic carbon posed restoration problems.

Summary

The Section 9 test resulted in excellent uranium values in the leach solutions, demonstrating amenability to commercial in-situ leach development. Thereafter, with the exception of molybdenum, restoration of the ground water was restored to previous use standards as has been the typical experience of the ISL industry using the sodium bicarbonate leach system in other parts of the country.

Based on the results of the Section 9 pilot, HRI does not envision any limiting problems with uranium leaching or the subsequent ground water restoration.

ATTACHMENT A

SECTION 9 PILOT OVERVIEW

EXHIBIT A

OVERVIEW OF ACTIVITIES

CROWNPOINT SECTION 9 PILOT INSITU LEACH TEST

A. Pre Insitu Leach Activities

1. Exploration drilling in early to late 1970's defined substantial quantities of uranium in the Westwater Canyon sands in the Crownpoint area at depth of about 2,000 feet.

2. Mobil's original plan for development was underground mining.

3. Decision was made to develop by Insitu leach methods using technology devised in Mobil's uranium mine in Texas.

4. A pilot scale plant and well field was constructed on Section 9 for the following purposes:

   a. To test a H_2O_2 alkaline bicarbonate leachate for recovering uranium from the Westwater Canyon at 2,000 feet depth.

   b. To demonstrate Mobil's ability to restore the ground water to restoration standards.

5. Well Field Development 1977-1978

   a. 13 wells in leach pattern - 4 five spots - wells on 100' centers.

      1. Pattern wells perforated in "B" sand generally 1,950 - 1,980 feet.

   b. 12 wells used as monitors.

      1. Monitors perforated in ore zone, other Westwater sands, and Dakota.

   c. Well construction: steel casing to 1,850 feet, fiberglass casing 1,850 to TD. All wells 5 1/2" diameter except one 7" well.

6. Insitu Leach Plant construction.

   a. Design capacity 75GPM - operating range 25-200GPM.

1. Leachate: $H_2O + CO_2 + NaOH + H_2O_2$ - injected into ore zone.

    A. Carbonate ion 1500-2000 PPM

    B. pH - 8.3

    C. H_2O_2 - 1500 - 2000 PPM

2. Uranium produced as uranyl tricarbonate $(UO_2(CO_3)_3$

    A. Uranium removed by ion exchange columns.

3. Barren leachate regenerated by chemical addition, then re-injected.

B. Injection of Leachate 11-6-79 to 10-1-80.

1. Injection rate 73GPM.

2. Production rate 75GPM.

    a. 2GPM "bleed" went to disposal pond - to eliminate excursions and better control fluid movement in wellfield.

3. Uranium & Moly heads reached 100PPM shortly after beginnng of injection.

4. End of leachate injection 10-1-80.

    a. - 15% of U had been leached.

C. Restoration Activities

STAGE 1: 10-1-80 to 12-1-80

Wellfield pumped - processed in plant. Barren lixiviant re-injected back into wellfield.

STAGE 2: 12-1-80 to 12-24-80

Water softening treatment - to reduce hardness & alkalinity so the RO unit would work right.

STAGE 3: 12-24-80 to 12-30-80

Groundwater sweep - 260GPM pumped to pond.

STAGE 4: 12-30-80 to late January 1981

Pond water treatment - pumped thru water softener and back to pond.

1. No restoration on wellfield at this time.

STAGE 5: Late January 81 to July 81

Groundwater sweep with RO treatment 70GPM.

1. Water thru softener then RO unit then re-injected.

STAGE 6: July 81 - May 82

Lime treatment & groundwater sweep.

1. Calcium hydroxide added to RO permeate.
2. Wellfield average Moly lowered from 32 to 9.7 mg/l.

STAGE 7: May - November 8, 1982

Ion Exchange & "clean water" ground water sweep.

1. Water from wellfield thru IX columns, then re-injected.
2. Use of lime & RO discontinued.
3. Major water quality parameters below restoration values except Moly which continued to decline.

STAGE 8: November 8, 1982 - April 15, 1983

Sodium Sulfide Treatment and ground water sweep.

1. Reducing agent (Na_2S) added to "clean" IX waters and injected into wellfield.
   a. To eliminate dissolved O_2 in aquifer and help precipitate Moly.

STAGE 9: April 15 - July 14, 1983

Sit and Soak - Wellfield shut in except for 1gpm bleed.

STAGE 10: July 14 - January 13, 1984

Ground water sweep - pumped to pond.

STAGE 11: January 18 - May 1, 1984

RO Treatment and ground water sweep.

1. Wellfield pumped thru RO unit - only slight decrease in Moly seen.

STAGE 12: May 1, 1984 to March 18, 1985

H_2S injection - 40,000 gal of 400mg/l H_2S injected into each well.

1. To further reduce the aquifer - cause Moly to precipitate as MoS_2 (Jordisite).

STAGE 13: March 18, 1985 to April 15, 1986

Sit and Soak: Only routine sampling was done.

1. Moly drop to 4.8 mg/l by September 1985.

STAGE 14: April 15 - May 20, 1986

Ground water circulation.

1. Rathole of each well evacuated to the pond. This to eliminate the possibility of sample contamination.

2. Wellfield water circulated to ensure uniform mixing of reduced fluids.

STAGE 15: May 20, 1986 to Present

Wellfield idle except for sampling which ended July, 1987. Presently awaiting restoration signoff.

D. September 86 Sampling.

1. All parameters are less than restoration values except minor variance in Moly (1.12 mg/l).

E. Stability Period - 9 mo. November 1986 - July 1987

1. All parameter continue to be below restoration values except Moly which was 1.49 mg/l in July 1987.

2. All values appear stabilized to a large degree.

3. All available technology has been used.

   a. It is unlikely the Moly can be lowered to a consistent less than 1.0 mg/l.

   b. The natural filtering action of aquifer will eventually mechanically trap the Moly in pore spaces in the aquifer.

F. Objectives

1. Get permits closed out.

2. P&A wellfield

3. Decommission Plant

4. Reclaim the surface.

5. Maintain leases, etc.

6. Wait for better market --> commercial development.

G. Present Activities

1. "Housekeeping". Removal of contaminated material no longer needed - pond sludge, etc.

GJL

ATTACHMENT B

BASELINE GROUND WATER

Baseline Groundwater Concentrations (mg/l) - Section 9, T17N, R13W, Wells (March 13, 1978)

Parameter	Dakota	Westwater Canyon									
	207	208	210	213	214	215	218	220	221	222	224
Bicarbonate	195	208	177	170	213	204	182	207	217	219	200
Aluminum	1.6	1.2	1.6	0.8	0.5	0.6	0.9	0.8	0.8	0.8	1.1
Arsenic	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium	<0.1	0.14	<0.1	<0.1	0.13	0.14	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Cadmium	0.002	<0.001	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.003
Calcium	24.0	70.2	18.2	4.5	3.2	20.4	6.6	3.8	7.6	3.6	4.1
Carbonate	0	0	0	0	0	0	0	0	0	0	0
Chloride	56.8	146.	61.2	12.5	25.1	96.7	15.1	16.1	13.1	10.7	15.6
Chromium	0.001	<0.001	0.001	0.004	<0.001	0.002	<0.001	0.004	0.004	0.002	0.003
Cobalt	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.017	0.003	0.002	0.002	<0.001	<0.001	0.001	0.010	0.002	0.002	0.003
Cyanide	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	0.36	0.82	0.49	0.69	0.29	0.61	0.57	0.29	0.32	0.29	0.25
Iron	8.0	7.2	8.5	0.75	0.44	3.7	1.6	8.2	0.4	1.1	8.2
Lead	0.007	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001
Magnesium	15	2.7	3.1	0.47	0.36	1.3	0.73	0.49	0.22	0.55	0.92
Manganese	0.25	0.94	0.38	0.054	0.029	0.50	0.14	0.085	0.13	0.071	0.071
Mercury, Total	<0.0004	0.0050	0.0055	0.0053	0.0048	0.0025	0.0046	0.0048	0.005	<0.0004	<0.0004
Molybdenum	<0.001	0.013	0.002	0.004	0.003	0.005	0.004	0.003	0.001	[illegible]	0.004
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	0.012	0.057	<0.01	<0.01	<0.01
Nitrogen, Ammonia	0.26	0.04	<0.01	0.01	<0.01	0.02	<0.01	<0.01	0.03	<0.01	<0.01
Nitrogen, Nitrate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pH	7.0	6.6	7.0	7.1	8.3	7.0	7.2	7.8	8.0	8.3	7.9
Phenols	0.006	0.004	0.010	0.044	0.005	0.006	0.003	0.014	0.002	0.003	<0.001
Potassium	3.6	1.4	0.9	0.8	0.7	1.0	0.7	0.8	0.5	0.5	0.5
Selenium	<0.01	0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silica	28.8	25.7	27.4	36.7	22.9	28.3	28.2	22.5	22.8	24.7	25.1
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	120	95	80	62	100	88	91	100	100	110	89
Solids, Total Dissolved	676	536	380	331	398	522	381	347	367	350	330
Specific Conductance (umhos/cm)	930	823	502	483	465	800	438	378	454	447	443
Strontium	2.09	2.14	1.47	0.33	0.30	0.84	0.25	0.34	0.18	0.16	0.14
Sulfate	272	34	38	38	36	33	31	32	38	39	37
Titanium	0.09	0.34	0.44	0.21	0.11	0.14	0.12	0.077	0.06	0.06	0.08
Total Organic Carbon	2.5	1.7	1.4	2.0	0.3	6.1	12.4	1.4	1.7	23.3	0.3
Vanadium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.04	0.02	0.02	0.02	<0.01	0.04	<0.01	<0.01	0.02	<0.01	<0.01
Anion/Cation Ration	0.81	1.10	0.92	0.95	1.13	1.09	1.10	1.02	1.02	0.99	1.18

ATTACHMENT C

RESTORATION RESULTS TABULATED

MOBIL SECTION 9 PILOT CUMULATIVE RESTORATION RESULTS

DATE	10-8-80	10-8-80			10-28-80			11-18-80		12-3-80			
. GAL.	0	374762	736639	1088626	1373375	1707067	2075608	2425021	2721818	3061598	3446723	3791287	4117896
P.V.	0	0.11	0.21	0.31	0.39	0.48	0.59	0.68	0.77	0.86	0.97	1.07	1.16
CALCIUM	320	326	317	304	280	231	276	291	282	277	306	310	282
MAGNESIUM													
SODIUM	1600	1650	1620	1510	1850	1780	1510	1580	1640	1470	1710	1730	1520
POTASSIUM													
CARBONATE													
BICARB	1005	1023	915	874	769	800	781	737	683	683	698	612	585
SULFATE	1176	1150	1275	1175	1150	1100	1100	1050	1075	1150	975	925	975
CHLORIDE	1800	1671	1548	1656	1760	1795	1755	1728	1714	1678	1860	1800	1787
NITRATE	0.17	0.17			<.05			<.05		<.05			
FLUORIDE	0.3	0.3			0.2			0.3					
SILICA													
TDS(180)	5500	5500			5100			5090		5000			
EC(25C)													
ALK													
PH	7.4												
ARSENIC	0.054	0.054			0.077			0.2		0.043			
BARIUM	0.1												
CADMIUM	0.01	0.01			<.01			<.01		<.01			
CHROM.	0.02	0.02			0.01			0.01		<.02			
COPPER	0.04	0.04			0.05			0.01		0.02			
IRON	0.02	0.02			0.55			1.3		0.74			
LEAD	0.005	<.005			<.005			<.005		<.005			
MANGANESE	5.85	5.85			5.46			5.05		0.5			
MERCURY	<.0001	<.0001			0.0034			0.0002		<.0001			
MOLY.	62	62			80			35		44			
NICKEL	0.09	0.09			0.12			129.1		0.06			
SELENIUM	4.6	4.6			2.8			0.96		0.55			
SILVER	0.02	0.02			<.02			0.04		<.02			
URANIUM	145	142	132	125	103	106	97	101	89	72	72	62	58
VANADIUM													
ZINC	0.39	0.39			0.26			0.14		0.09			
BORON	0.2	0.2			0.2			0.2		0.2			
AMMONIA													
RA(COMBIN	150	238.2			58.8					92.4			

MOBIL SECTION 9 PILOT CUMULATIVE RESTORATION RESULTS

DATE	10-8-80						1-29-81	2-4-81	3-18-81	5-6-81	6-15-81	7-7-81	8-3-81
J. GAL.	0	4117896	5007311	5384309	5757729	6126444	6632500	7518321	10278269	13883820	16985461	18200528	20150533
P.V.	0	1.16	1.41	1.52	1.62	1.73	1.87	2.12	2.90	3.92	4.79	5.14	5.69
CALCIUM	320	282	228	235	193	157	157		93	55			
MAGNESIUM													
SODIUM	1600	1520	1506	1460	1449	1070	1130		581	379			
POTASSIUM													
CARBONATE													
BICARB	1005	585	622	617	649	634	610		552	415			
SULFATE	1176	975	977	902	866	787	775		578	348			
CHLORIDE	1800	1787	1639	1405	1213	1010	978		559	174			
NITRATE	0.17						<.05	<.05	<.05	<.05	<.05	<.05	<.01
FLUORIDE	0.3						0.4	0.3		0.3	0.3	0.3	0.46
SILICA													
TDS(180)	5500						1840	1550	1140	1050	917	1180	960
EC(25C)													
ALK													
PH	7.4									7.2			
ARSENIC	0.054						0.22	0.13	0.125	0.16	0.125	0.1	0.108
BARIUM	0.1									<.02			
CADMIUM	0.01						<.01	<.01	<.01	<.01	<.01	<.01	<.001
CHROM.	0.02						<.01	<.02	<.02	<.02	<.02	<.02	<.02
COPPER	0.04						<.02	<.02	<.02	<.05	<.05	<.02	0.05
IRON	0.02						2.3	0.85	0.5	<.05	<.05	0.08	1.7
LEAD	0.005						<.005	<.005	0.008	<.005	0.013	0.006	0.06
ANGANESE	5.85						1.8	1.45	1.65	0.72	0.52	0.8	0.65
MERCURY	<.0001						0.0004	0.0002	<.0001	<.0001	<.0001	0.0001	0.0003
MOLY.	62						44	94	53	35	35	31	29
NICKEL	0.09						0.02	<.05	<.05	<.05	<.05	<.05	<.005
SELENIUM	4.6						0.34	0.1	0.19	0.086	0.025	0.008	<.005
SILVER	0.02						<.01	<.02	<.02	<.02	<.02	<.02	<.02
URANIUM	145	58	48	42	40	34	32		26	4			
VANADIUM													
ZINC	0.39						0.02	0.05	0.02	0.03	0.16	0.05	0.44
BORON	0.2						0.1	0.1	<.1	0.1	<.1	0.1	0.3
AMMONIA													
RA(COMBIN	150							47.3	51.8				

MOBIL SECTION 9 PILOT CUMULATIVE RESTORATION RESULTS

DATE	10-8-80	8-3-81	9-1-81	10-2-81	7-15-82	4-19-83	9-4-84	9-16-85
. GAL.	0	20150533	22372326	24450040	34361987	44036014	58332122	59173469
P.V.	0	5.69	6.31	6.90	9.70	12.43	16.46	16.70
CALCIUM	320				38	18	19	46
MAGNESIUM								
SODIUM	1600				156	181	163	141
POTASSIUM								
CARBONATE								
BICARB	1005				122	183	173	225
SULFATE	1176				43	69	81	85
CHLORIDE	1800				150	101	115	101
NITRATE	0.17	<.01	<.05	<.05	0.07	<.05	0.94	<.05
FLUORIDE	0.3	0.46	0.34	0.4	<.3	0.52	<.5	<.5
SILICA								
TDS(180)	5500	960	698	572	587	840	479	517
EC(25C)								
ALK								
PH	7.4				9.2	8.5	8.4	8.2
ARSENIC	0.054	0.108	0.091	0.105	0.079	0.137	0.057	0.032
BARIUM	0.1				0.2	0.32	0.26	0.22
CADMIUM	0.01	<.001	<.005		<.005	<.005	<.005	<.007
CHROM.	0.02	<.02	<.006	<.006	<.005	<.005	0.007	0.011
COPPER	0.04	0.05	<.008	<.005	<.005	<.005	<.005	0.012
IRON	0.02	1.7	<.15	<.01	<.02	0.015	0.06	0.37
LEAD	0.005	0.06	<.005	0.005	<.02	0.008	<.005	<.006
MANGANESE	5.85	0.65	0.36	0.26	0.051	0.14	0.048	0.096
MERCURY	<.0001	0.0003	0.0002	<.0001	<.0001	<.0001	<.0001	<.0001
MOLY.	62	29	33	24	9.7	13.25	7.65	4.8
NICKEL	0.09	<.005	<.03	<.02	<.002	0.07	0.02	<.02
SELENIUM	4.6	<.005	0.012	0.013	0.095	0.066	0.017	0.032
SILVER	0.02	<.02	<.01	<.005	<.005	<.005	<.005	<.006
URANIUM	145				0.54	0.42	0.59	0.28
VANADIUM								
ZINC	0.39	0.44	0.02	0.012	0.02	0.008	0.027	0.03
BORON	0.2	0.3	0.2	0.3	0.1	0.1	0.1	0.22
AMMONIA								
RA(COMBIN	150				46.7		34.1	37.4

MOBIL SECTION 9 PORE VOLUME CALCULATION

(AREA)(THICK)(POR)(CONV)(HDF)(VDF)= 3543348

WHERE:

AREA = 40488 FT2
THICK = 24 FT
POROSITY = .25
GAL CONVERSION = 7.48
HORIZONTAL DISPERSION FACTOR (HDF) = 1.5
VERTICLE DISPERSION FACTOR = 1.3

ATTACHMENT D

RESTORATION PLOTS

Attachment 2

NRC Request for Further Information Q/59

ADDITIONAL INFORMATION REQUEST
HYDRO RESOURCES, INC. IN-SITU LEACH URANIUM MINE
CROWNPOINT, NEW MEXICO

ISSUE: Water Resource Protection

Comments Applicable to
Crownpoint, UNIT I, and Churchrock

59. Ground Water Consumption

Discussion - None.

Action Needed: A process flow diagram which shows the estimated water consumption for the life of the project, should be prepared for each site. A discussion of the major assumption used to construct the diagram should also be prepared. If more than one type of restoration option is still being considered, such as deep well disposal or reinjection; process flow diagrams should be prepared for each option.

Response

Worksheets which tabulate the restoration water quantity volumes which are contained in a pore volume are within attachments 59-1 (Churchrock), 59-2 (Crownpoint) and 59-3 (UNIT I). The restoration volume is one component of water consumption during project life, the other component is wellfield production bleed. The wellfield production bleed at each property is a nominal 40 gpm.

The various ground water management considerations are described in Response 29.

Water quantities will be outlined for each property individually given three different water management assumptions as follows:

Assumption #1 - 100 Percent Ground water sweep

- No fluid reduction by R.O. ect.
- Bleed volume represents 1% of 4000 GPM nominal plant throughput.
- Restoration circulation of 4 pore volumes.

Assumption #2 - R.O. Treatment 3 parts product: 1 part reject

- Product returned to Westwater Fm.
- Disposal Well (s) required.
- Bleed and restoration volumes as in #1

Assumption #3 - Brine concentration R.O. reject 99 parts product: 1 part reject

- Product Returned to Westwater Fm.
- Disposal by evaporation
- Bleed and restoration volumes as in #1

Churchrock Project (7 Years Production)

	Ann Bleed (Gal)	Proj. Bleed (Gal)	Project. Rest. Water (Gal)
Assumption #1	21,024,000	147,168,000	762,809,636
Assumption #2	5,526,000	36,792,000	190,702,409
Assumption #3	52,560	367,920	1,907,024

Crownpoint Project (15 Years Production)

	Ann Bleed (Gal)	Proj. Bleed (Gal)	Project Rest. Water (Gal)
Assumption #1	21,024,000	315,360,000	1,007,498,616
Assumption #2	5,526,000	78,840,000	251,874,654
Assumption #3	52,560	788,400	2,518,746

UNIT 1 (17 Years Production)

	Ann Bleed (Gal)	Proj. Bleed (Gal)	Project Rest. Water (Gal)
Assumption #1	21,024,000	357,408,000	840,013,572
Assumption #2	5,526,000	89,352,000	210,003,393
Assumption #3	52,560	89,352	2,100,033

If NRC chooses to evaluate the impact of additional pore volumes, the numbers specified above can be increased directly by the desired pore volume number.

ATTACHMENT 59-1 VOLUME

CHURCHROCK WATER VOLUME

WORKSHEET

CHURCHROCK PROJECT - GROUNDWATER RESTORATION VOLUME CALCULATED BY ZONE

SECTION 8

ZONE	FT2	THICK	VOLUME	POR.	CONV	PV	HDF	VDF	RV
UA	318700	8.6	2740820	0.21	7.48	4305280.06	1.5	1.3	8395296.109
LA	404500	12.2	4934900	0.21	7.48	7751740.92	1.5	1.3	15115894.79
UB	329500	10.5	3459750	0.21	7.48	5434575.3	1.5	1.3	10597421.84
LB	555300	11.6	6441480	0.21	7.48	10118276.8	1.5	1.3	19730639.73
UC	658700	14.9	9814630	0.21	7.48	15416820.8	1.5	1.3	30062800.57
ULC	378200	10.5	3971100	0.21	7.48	6237803.88	1.5	1.3	12163717.57
LLC	321900	12.3	3959370	0.21	7.48	6219378.4	1.5	1.3	12127787.87
UD	124600	10.4	1295840	0.21	7.48	2035505.47	1.5	1.3	3969235.67
MD+LD	326500	12	3918000	0.21	7.48	6154394.4	1.5	1.3	12001069.08
SEC 8 TOTALS	3417900		40535890			63673776			124163863.2

SECTION 17

ZONE	FT2	THICK	VOLUME	POR.	CONV	PV	HDF	VDF	RV
Dakota	123023	7.5	922672.5	0.21	7.48	1449333.96	1.5	1.3	2826201.228
UUPC	22665	8.5	192652.5	0.21	7.48	302618.547	1.5	1.3	590106.1667
UPC	113140	7.3	825922	0.21	7.48	1297358.28	1.5	1.3	2529848.641
LPC	50751	8	406008	0.21	7.48	637757.366	1.5	1.3	1243626.864
UA	36220	5.6	202832	0.21	7.48	318608.506	1.5	1.3	621286.5859
LA	161163	8.2	1321536.6	0.21	7.48	2075869.69	1.5	1.3	4047945.898
UB	160090	9.1	1456819	0.21	7.48	2288371.29	1.5	1.3	4462324.006
LUB	186430	8.5	1584655	0.21	7.48	2489176.07	1.5	1.3	4853893.344
LB	175981	10.6	1865398.6	0.21	7.48	2930168.12	1.5	1.3	5713827.836
UC	181120	9.1	1648192	0.21	7.48	2588979.99	1.5	1.3	5048510.988
ULC	107214	6.8	729055.2	0.21	7.48	1145199.91	1.5	1.3	2233139.821
LC	169010	6.5	1098565	0.21	7.48	1725625.9	1.5	1.3	3364970.509
UD	142694	8.6	1227168.4	0.21	7.48	1927636.12	1.5	1.3	3758890.439
MD	75350	11.2	843920	0.21	7.48	1325629.54	1.5	1.3	2584977.595
LD	170394	11.2	1908412.8	0.21	7.48	2997734.83	1.5	1.3	5845582.911
UE	265391	10.2	2706988.2	0.21	7.48	4252137.06	1.5	1.3	8291667.276
LE	361312	7.7	2782102.4	0.21	7.48	4370126.45	1.5	1.3	8521746.577
SEC. 17 TOTALS	2501948		21722900.2			34122331.6			66538546.69
GRAND TOTALS	5919848		62258790.2			97796107.6			190702409.9

Attachment 3

Pore Volume Tabulation – Pelizza Hearing Affidavit

Attachment 3
Churchrock Pore Volume Calculation

CHURCHROCK SECTION 8 - PORE VOLUME CALCULATED BY ZONE

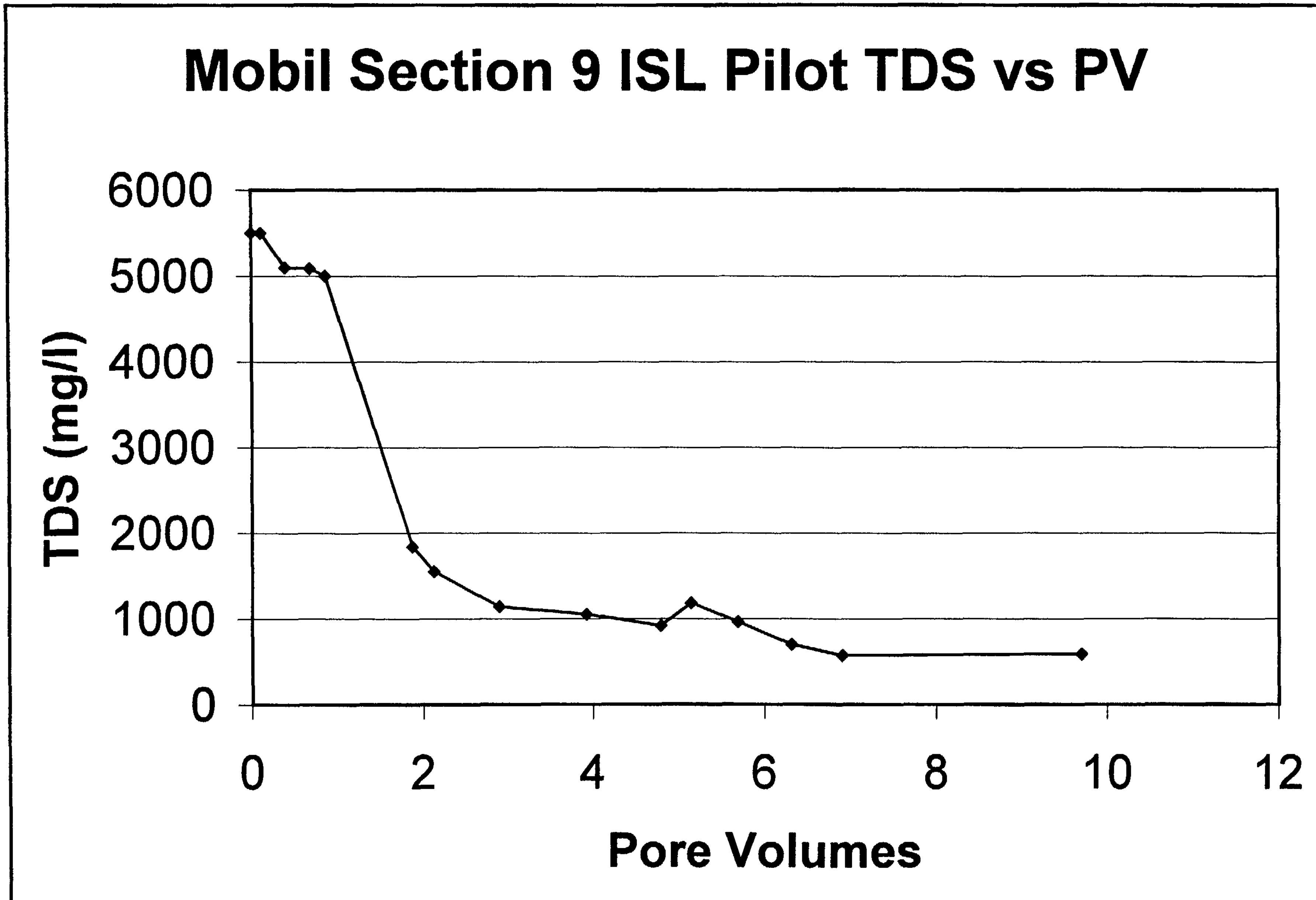
SECTION 8

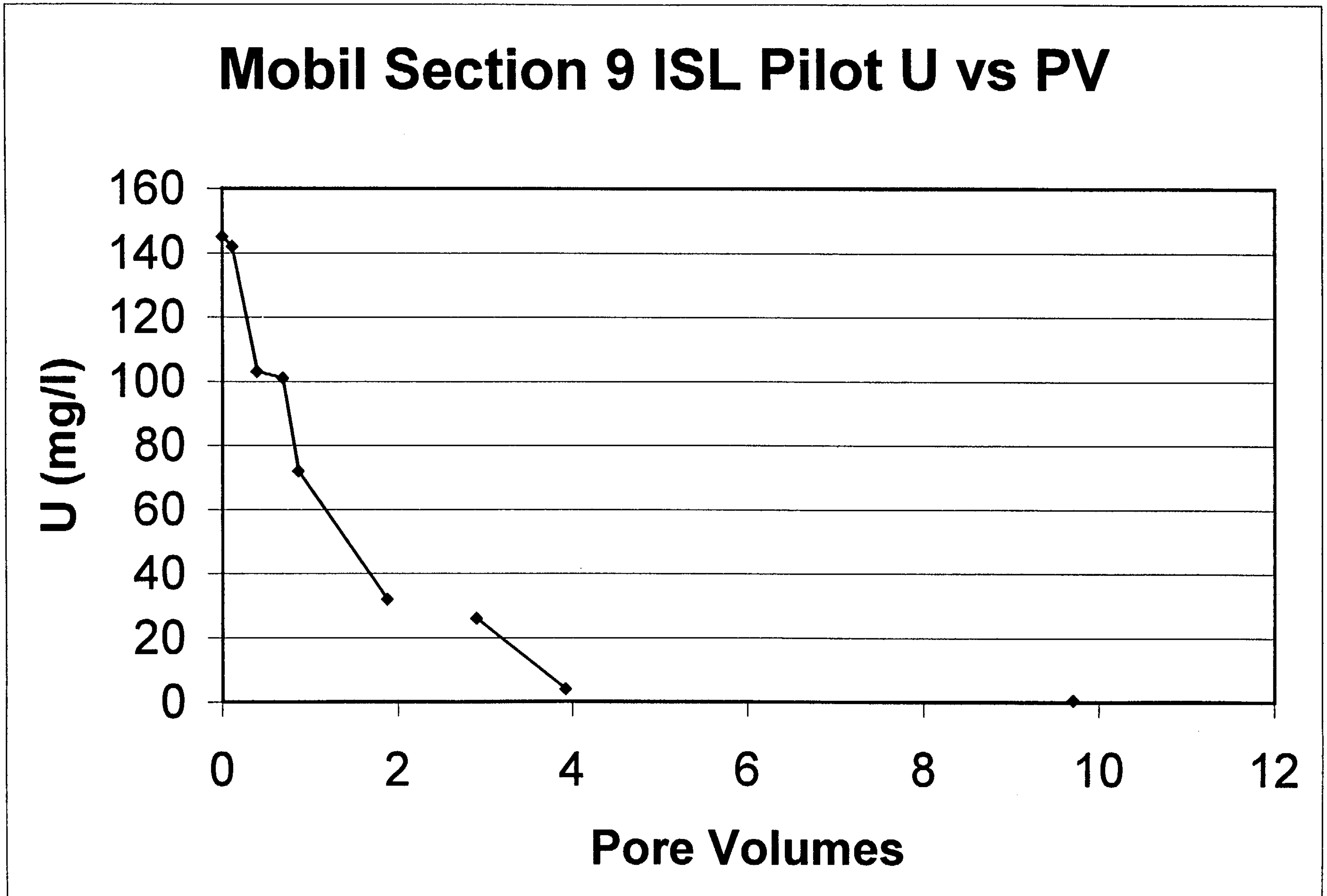
ZONE	Area (ft2)	Tk (ft)	Vol (ft3)	Por	gal/ft3	PV (gal)	H-PIF	V-PIF	CPV (gal)	9 X CPV
UA	318,700	8.6	2,740,820	0.25	7.48	5,125,333	1.5	1.3	9,994,400	89,949,601
LA	404,500	12.2	4,934,900	0.25	7.48	9,228,263	1.5	1.3	17,995,113	161,956,016
UB	329,500	10.5	3,459,750	0.25	7.48	6,469,733	1.5	1.3	12,615,978	113,543,805
LB	555,300	11.6	6,441,480	0.25	7.48	12,045,568	1.5	1.3	23,488,857	211,399,711
UC	658,700	14.9	9,814,630	0.25	7.48	18,353,358	1.5	1.3	35,789,048	322,101,435
ULC	378,200	10.5	3,971,100	0.25	7.48	7,425,957	1.5	1.3	14,480,616	130,325,545
LLC	321,900	12.3	3,959,370	0.25	7.48	7,404,022	1.5	1.3	14,437,843	129,940,584
UD	124,600	10.4	1,295,840	0.25	7.48	2,423,221	1.5	1.3	4,725,281	42,527,525
MD+LD	326,500	12	3,918,000	0.25	7.48	7,326,660	1.5	1.3	14,286,987	128,582,883
SEC 8 TOTALS	3,417,900		40,535,890			75,802,114			147,814,123	1,330,327,106

Area - Area of cut off grade mineralization.
Tk - Thickness of cut off grade mineralization.
Por - Estimated porosity of the rock.
PV - Straight pore volume without any correction.
H-PIF - Horizontal pore volume increase factor.
V-PIF - Vertical pore volume increase factor.
CPV - Corrected pore Volume.

Attachment 4

Mobil Section 9 Test – PV vs. TDS


Mobil Section 9 ISL Pilot TDS vs PV
TDS (mg/l)
6000
5000
4000
3000
2000
1000
0
0
2
4
6
8
10
12
Pore Volumes


Mobil Section 9 ISL Pilot U vs PV
160
140
120
100
80
60
40
20
0
U (mg/l)
0
2
4
6
8
10
12
Pore Volumes

Attachment 5

Rio Algom Surety Correspondence

The State
of Wyoming

Department of Environmental Quality

Jim Geringer, Governor

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

ADMIN/OUTREACH	ABANDONED MINES	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ. WASTE	WATER QUALITY
(307) 777-7758	(307) 777-6145	(307) 777-7391	(307) 777-7369	(307) 777-7756	(307) 777-7752	(307) 777-7781
FAX 777-3610	FAX 777-6462	FAX 777-5616	FAX 777-6937	FAX 777-5864	FAX 777-5973	FAX 777-5973

July 14, 2000

Mr. John Cash
Rio Algom Mining Corporation
Smith Ranch Facility
P.O. Box 1390
Glenrock, Wyoming 82637

**RE: TFN 3 5/232, Flare Factor Justification, Third Round Review,
Rio Algom Mining Corp., Permit No. 633**

Dear Mr. Cash:

Rio Algom Mining Corp. (RAMC) submitted responses to the Land Quality Division (LQD) second round review in a letter dated May 10, 2000. These responses were discussed in a meeting on May 11, 2000 in Cheyenne. RAMC has proposed a revised method to estimate the time and cost to restore their commercial wellfields, and has provided a technical justification for this method.

The LQD is requesting that the flare factor study be revised to include additional information. Permit No. 633 needs to be revised to include the flare factor study and discuss the methodology. The LQD is requesting that RAMC include in the permit a commitment to validate the results of the flare factor study upon completion of groundwater restoration in Wellfield 1. Please refer to the enclosed review for more detail.

If you have any questions, please contact me or Roberta Hoy at (307) 777-7756.

Sincerely,

Paula Cutillo
Senior Environmental Analyst
Land Quality Division

Enclosure

cc: Paul Goranson (OK City)

The State
of Wyoming

Department of Environmental Quality

Jim Geringer, Governor

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

ADMIN/OUTREACH	ABANDONED MINES	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ. WASTE	WATER QUALITY
(307) 777-7758	(307) 777-6146	(307) 777-7391	(307) 777-7369	(307) 777-7756	(307) 777-7752	(307) 777-7781
FAX 777-3610	FAX 777-6462	FAX 777-5616	FAX 777-6937	FAX 777-5864	FAX 777-5973	FAX 777-5973

August 7, 2000

John Cash
Rio Algom Mining Corporation
Smith Ranch Facility
P.O. Box 1390
Glenrock, Wyoming 82637

RE: 1999-2000 Annual Report Review, Rio Algom Mining Corp., Permit No. 633

Dear Mr. Cash:

Rio Algom Mining Corp. submitted the above referenced report in a letter dated June 18, 2000. One comment remains outstanding. The reclamation bond is acceptable. The bond has been set at $8,093,100.00. Rio Algom will receive a separate letter from the Director of the Wyoming Department of Environmental Quality with regard to correcting the bond.

If you have any questions, please contact me at (307) 777-7066.

Sincerely,

Paula Cutillo

Paula Cutillo
Senior Environmental Analyst
Land Quality Division

AUG 2000
RECEIVED

cc: Paul Goranson, RAMC (OK City)

MEMORANDUM

TO FILE: Inspection file, Permit No. 633, Rio Algom Mining Corp.

FROM: Paula Cutillo, District I Groundwater Hydrologist PC

DATE: July 24, 2000

SUBJECT: ~~1998-99~~ 99-00 Annual Report Review

Rio Algom Mining Corp. (RAMC) submitted the 1999-2000 Annual Report in a letter dated June 18, 2000. The following review addresses outstanding comments from previous annual report reviews and the groundwater restoration bond. The method for determining the flare factor and affected pore volume for each wellfield has been proposed by RAMC through TFN 3 5/232.

RAMC's bond amount will decrease this year even though production will likely increase and Wellfield 4a has been included in the bond. The decrease is primarily due to the implementation of RAMC's flare factor methodology and the removal of a contingency fee for additional wastewater disposal. RAMC has decreased the flare factor for each wellfield from the number mandated by LQD. In addition, the LQD previously requested that RAMC include a $1 million contingency in the bond until additional wastewater disposal capacity was constructed. RAMC installed the second deep disposal well this year. Therefore, the $1 million contingency is no longer necessary.

1997-98 ANNUAL REPORT REVIEW OUTSTANDING COMMENTS

2.3 Response acceptable. RAMC agreed to provide topsoil depth information in the Annual Report, per LQD NonCoal Rules and Regulations, Chapter II, Section 2(a)(i)(F)(II) and Permit No. 633, in letters dated May 8, 1998 and November 8, 1998. The 1999-2000 Annual Report contains topsoil depth information for areas disturbed during the 1999-2000 reporting period.(PC)

1998-99 ANNUAL REPORT REVIEW COMMENTS

11. Response acceptable. RAMC has referenced the location of vegetation monitoring data in Item 7(g).(PC)

12. Response acceptable. RAMC included wildlife monitoring results in Appendix B.(PC)

13. **Response not acceptable.** RAMC agreed to provide the average depth of drill holes by area, in the 1999-2000 Annual Report. The average depth of delineation drill holes is not stated in Section 10 of Appendix A. It is therefore not clear how this portion of the bond was calculated. Please provide this information.(PC)

1999-2000 ANNUAL REPORT REVIEW

Groundwater Restoration, Surety Bond, Appendix A, Section 7. RAMC has incorporated the results of the Flare Factor Study submitted under TFN 3 5/232. Section 7 of the 1999-2000 Annual Report references the study and includes a summary of the methodology. The groundwater restoration costs presented in Section 7 are acceptable.

wellfields in the State of Wyoming has not been analogous in time, cost or pore volume requirements, to the restoration of small-scale pilots. The results of the MLR model which are based on the Q-Sand Pilot restoration need to be validated with actual commercial wellfield restoration data. The completion of restoration in Wellfield 1 will provide an opportunity to validate the study predictions. Validation of the model is addressed further below.**(PC)**

1.10 Response acceptable. RAMC has not addressed the question of whether actual commercial wellfield restoration has been driven by conservative constituents such as chloride. However, RAMC has clarified that chloride did not drive the Q-Sand Pilot restoration because the target value of 250 mg/L was the Class I drinking water standard as opposed to the much lower baseline average.

As more commercial wellfields are restored, this data can be used to verify whether restoration will be driven by conservative constituents such as chloride. Validation of the study results is further addressed below.**(PC)**

1.11 Response acceptable. RAMC has clarified that the *net* production rates (production minus injection) are low relative to production and injection rates.**(PC for RH)**

1.12 **Response conditionally acceptable.**

a. RAMC has verified that there is an error in the noted statement in Section 3 on Page 16. The linear relationship shown on Figure 3-16 is valid only for well densities *greater* than 1.5e-04 wells/ft^2. Please correct the study accordingly.

b. The relationship represented in Figure 3-16 was discussed at length during the meeting on May 11, 2000. It was noted that the well densities for Wellfields 3 and 4 fall on the extrapolated portion of the line. During this meeting, RAMC agreed to not use flare factors which correlate to well densities less than 1.5e-04 wells/ft^2. Therefore, RAMC will not use a flare factor less than 1.5. The 1999-2000 Annual Report surety estimate is consistent with this agreement. Please revise the permit to include this commitment.**(PC)**

1.13 **Response conditionally acceptable.** RAMC has clarified that the Wellfield 1 simulation assumes that production and injection rates and overall wellfield balance remain steady throughout the simulation time. RAMC has stated that this assumption is conservative because the radius of influence represents the maximum affected area and the production and injection rates chosen represent historical maximum rates. Please revise the study to state the assumption.**(PC for RH)**

1.14 **Response conditionally acceptable.** RAMC has clarified that the flare factors noted on the figures in Attachment B were calculated by digitizing the particle clouds and using a CAD program to compute the area. Please revise the study to include this information. **(PC)**

1.15 **Response conditionally acceptable.** RAMC has noted that printouts of the computer files would be large and has proposed to provide the MODFLOW/MODPATH computer files on a diskette. Please submit the information in electronic form.**(PC for RH)**

1.16 Response acceptable. RAMC has not discussed restoration costs if a lower Kh/Kv ratio is used. The appropriateness of the 100/1 Kh/Kv ratio may be verified upon completion of restoration in Wellfield 1. Validation of the model is addressed further below.**(PC for RH)**

1.17 Response acceptable. RAMC has stated that they have taken a conservative approach to bonding for the cost to treat 6 pore volumes during restoration even though the geochemical modeling indicates that restoration can be achieved in 4 pore volumes. The LQD agrees that a conservative approach is justified until the model results are validated. Validation of the model is addressed further below.**(PC for RH)**

1.18 **Response conditionally acceptable.** RAMC has clarified that the flare factor noted on Figure C-2 was calculated by digitizing the particle cloud and using a CAD program to compute the area. Please revise the study to include this information.**(PC)**

1.19 Response acceptable. RAMC has explained that Figure 3-16 is a combination of Figures 3-8 and 3-9. Overall flare is reduced by a factor of 1 when the 100/1 Kv/Kh ratio is applied. RAMC has also stated that Figure 3-16 is to be used for RAMC wellfields other than Wellfield 1. Figure 3-16 alone would estimate the flare factor for Wellfield 1 to be 1.4. However, the 3-D modeling indicates the best estimate to be 1.7. RAMC has chosen the 1.7 flare factor for use in the bond as a conservative measure. Figure 3-16 cannot account for small variations in pattern geometry and its accuracy needs to be validated with actual commercial wellfield restoration data. Validation of the model is addressed further below.**(PC)**

1.20 **Response conditionally acceptable.** RAMC has provided the Gelhar and Wilson reference. Please include this reference in the study.**(PC)**

1.21 **Response not acceptable.** RAMC has stated that the results of this study could be applied to future wellfields if aquifer properties, well densities, and net production rates fell within the range of values investigated by the sensitivity analyses. RAMC needs to determine exactly what criteria must be met for the results of the study to be applicable to future wellfields. These criteria need to be included in the permit with the new method for estimating wellfield restoration costs. An alternative for wellfields not meeting the criteria also needs to be provided.**(PC)**

1.22 No response was necessary.**(PC for RH)**

2.1 Response acceptable. RAMC has verified that the new bonding methodology results in a significant increase in the total cost of groundwater restoration. The study itself does not need to be revised in regard to this comment.**(PC)**

2.2 Response acceptable. RAMC has stated to be consistent with the study, the Affected Pore Volume for Wellfield 1 will be revised to 68,920,890 gallons. RAMC has used this value in the 1999-2000 Annual Report surety estimate.**(PC)**

2.3 Response acceptable. RAMC has verified that the average open interval for wells in Wellfield 1 is 18ft. RAMC has stated that 18ft will be used in all future bond calculations. RAMC uses this value for Wellfield 1 in the 1999-2000 Annual Report surety estimate.**(PC)**

2.4 Response acceptable. The 3-D modeling estimated the flare factor for Wellfield 1 to be 1.7. RAMC chose this flare factor to be conservative.**(PC)**

2.5 Response acceptable. RAMC has stated the area was estimated and perimeter injection wells were counted so that Figure 3-16 could be used to determine flare factors for Wellfields 3 and 4. RAMC references the December 13, 1999 submittal for this data.

The December 13, 1999 submittal includes RAMC's calculated area for Wellfields 3 and 4 but does not include the number of peripheral injection wells. However, the 1999-2000 Annual Report surety estimate does include this information.**(PC)**

2.6 Response acceptable. RAMC has agreed to adjust restoration costs for inflation in the 1999-2000 Annual Report reclamation bond. The 1999-2000 Annual Report reclamation bond has been adjusted accordingly.**(PC)**

2.7 Response acceptable. RAMC has stated that they have taken a conservative approach to bonding for the cost to treat 6 pore volumes during restoration even though the geochemical modeling indicates that restoration can be achieved in 4 pore volumes. The LQD agrees that a conservative approach is justified until the model results are validated. Validation of the model is addressed further below.**(PC)**

CONCLUSIONS

- RAMC has proposed a revised method for estimating the cost to restore their commercial wellfields and has provided a technical justification for the new approach.
- The proposed method for estimating groundwater restoration costs needs to be validated with actual commercial wellfield restoration data.

RECOMMENDATIONS

- The LWC study should be revised to address the above comments.
- Permit No. 633 should be revised to:

  1. Include the flare factor study as an addendum or appendix;
  2. Summarize the revised method to be used by RAMC to estimate groundwater restoration costs. The permit should state that the flare factor for any wellfield will not be less than 1.5;
  3. State the calculated area, number of peripheral injection wells, total affected pore volume and flare factor for Wellfields 1, 3, and 4;
  4. State how groundwater restoration costs will be estimated for future wellfields; and
  5. Include a commitment to validate the method used to estimate groundwater restoration costs upon completion of restoration in Wellfield 1. Model validation should address the following:

     - The effectiveness of using Figure 3-16 to estimate flare factor and consequently, affected pore volume;
     - The impact of Ra-226 on restoration;
     - Comparison of flushing curves between a small-scale pilot, a commercial wellfield, and the model;
     - The role of conservative constituents such as chloride in driving restoration; and
     - The appropriateness of a 100:1 Kv/Kh ratio.

cc: Roberta Hoy, LQD

Attachment 6

URI/HRI Labor Comparison

LABOR COMPARISONS URI & HRI

			HRI Churchrock	URI KVD	URI Rosita
8		***Management and Accounting***			
9	Salaried	Operations Manager	1	1/2	1/2
10	Salaried	Environmental Manager	1	1/2	1/2
11		***Plant Personnel***			
12	Salaried	Plant Super/Engineer	0	1	0
13	Salaried	Radiation Officer	1	1	1
14	Salaried	Chemist	1	1/2	1/2
15	Salaried	Plant Foreman	0	0	1
16	Wage	Electrician	1	0	0
17	Wage	Plant Operator	1	1	0
18		***Wellfield Personnel***			
19	Salaried	Foreman	1	0	0
20	Wage	Truck Driver	1	1	1
21	Wage	Wellfield Operators	1	1	1
22	Wage	Pump Hoist Operators	1	1	1
23		***Engineering & Geologic Personnel***			
24	Salaried	Senior Geologist	1	0	0
25	Saleried	Engineer		1/2	1/2
26		Total #	11	7 1/2	6 1/2

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before Chief Administrative Judge Thomas S. Moore

In the Matter of	)	
	)	Docket No. 40-8958-ML
HYDRO RESOURCES, INC.	)	
12750 Merit Drive, Suite 720	)	ASLBP No. 95-706-01-ML
Dallas, Texas 75251	)	

AFFIDAVIT OF RICHARD A. VAN HORN
RESPONDING TO THE AFFIDAVITS OF STEVEN INGLE AND RICHARD ABITZ

Before me, the undersigned notary, on this day appeared Richard A. Van Horn, a person known or identified to me, and who after being duly sworn, deposes and says the following:

A. PERSONAL

My name is Richard A. Van Horn. I am over the age of 18 years, have never been convicted of a felony and am otherwise fully competent to make this affidavit. The factual matters set out herein are within my personal knowledge or my corporate knowledge within my official capacity as set out herein. The statements and opinions set out herein are based upon actual data resulting from the restoration operations at URI's two sites in South Texas.

B. PROFESSIONAL QUALIFICATIONS

I am Senior Vice President in charge of Operations for Uranium Resources, Inc., parent company to URI Inc. and HRI, Inc. I have been in this position since April of

1997, when I joined the company. Prior to my employment with Uranium Resources, I was employed by Energy Fuels Nuclear as Manager of Operations for their Plateau Mining Operations on the Colorado Plateau. From the period 1990 to 1994, I was Director of Operations for Umetco Minerals Corporation. In this position I was responsible for all aspects of the production of uranium and vanadium from the Colorado Plateau Operations. This included the operation and management of the White Mesa Mill at Blanding, Utah, the production of uranium and vanadium ores from the underground mines in Colorado and Utah, and the direction of reclamation activities for those mines.

In 1985 I transferred to Danbury, Connecticut. to accept the job of uranium business analyst and later became Director of Business Analysis for Umetco Minerals Corporation, a position held until transfer back to Colorado. Prior to that I held various management and engineering positions with Union Carbide, Umetco's parent, at their Uravan and Grand Junction, Colorado sites and at their tungsten facility at Tempiute, Nevada.

I hold an Engineer of Mines Degree from the Colorado School of Mines (EM 1973), and have worked continuously in the mining industry for the past 27 years, 18 years of which have been in the uranium business.

In my current position, I personally supervise and direct the day to day operations of all of our sites in south Texas. This has included the production of uranium using ISL techniques and now the restoration of the aquifers from which the uranium was produced. I therefore have first hand knowledge of actual production statistics and cost data as it applies to the on-going restoration at the Kingsville Dome and Rosita mine sites.

Our experience in south Texas has been the basis for most of the cost estimates that have gone into HRI's estimates for the Churchrock Section 8 site. The purpose of my testimony is to make clear the source of the estimates and to verify their accuracy that have been questioned by Mr. Ingle and Mr. Abitz.

C. RESPONSE TO THE AFFIDAVITS OF MR. INGLE AND MR. ABITZ

1. **CURRENT OPERATIONS SUMMARY:**URI, Inc. is currently conducting full scale groundwater restoration at its two sites in South Texas. The Kingsville site has been in full-scale restoration since November of 1999 and the Rosita site since October of 2000.

URI's South Texas operations are manned on a one-shift per day basis, seven days per week, 365 days per year. Restoration operations, including wellfield, RO and disposal well operations are carried out on a 24-hour per day basis, 365 days per year. In order to achieve this level of operation with this level of manning, the wellfield, RO and disposal well at both sites are all equipped with instrumentation that will effect a system shutdown if any of the following are detected:

- Low pressure in the wellfield extraction lines, indication of a possible leak.
- High pressure in the wellfield extraction lines, for pipeline protection
- High-pressure relief valve in the injection line. We are required to limit injection pressure to 120 psi at Kingsville and 100 psi at Rosita. This also provides line protection.
- Abnormal vibration on the disposal well pump. This is for protection of the disposal well pump.
- High disposal well injection pressure. We are limited by permit to 1000 psi at Kingsville and 870 psi at Rosita
- Low disposal well annulus differential pressure. We are required by permit to maintain at least a 100 psi differential pressure in the annulus
- Low disposal well annulus level
- Low tank levels in the RO product tank. This is for the protection of the RO product pump.
- Low tank level in the WDW feed tank. This is for pump protection
- And finally, an interconnect will not allow the RO to run if the disposal well is down.

Each RO unit is capable of treating 585 gpm of feed and is currently operating at 70 to 75% recovery rates. The RO at both sites is preceeded by two-stage sand filtration and by 1-micron cartridge filters. Both disposal wells are equipped with 150hp triplex pumps capable of delivering 216 gpm on an instantaneous basis, with feed supplied through a system of tanks and 1-micron bag filtration

The RO unit at each site is fully automated and for all practical purposes, runs itself. Although antiscalant is fed into the feed stream, membranes still gradually foul and require cleaning on a regular basis. A review of the last six months' operations show that membranes were cleaned about every four weeks. The process takes about 6 hours from start to finish and, when possible, is scheduled to occur when other maintenance is scheduled in the plant so as to minimize down time.

There is no need to incur "significant downtime" as suggested by Mr. Ingle if the filtration equipment is designed and operated correctly. Our primary sand filters are set up so that we can backwash "on the fly", or simultaneous with ongoing RO operation. Cartridge filters are also changed while the unit is operating. Solids trapped by the filters are flushed through the backwash process to one of our holding ponds, and do not pose a significant additional cost as suggested by Mr. Ingle. Rather they will be disposed of when the ponds are decommissioned and are included in that component of cost.

2. CURRENT MANPOWER REQUIREMENTS: Staffing for these operations is consistent with the above emphasis on automation, good practice and the realities of the current economy. Everyone at both sites works together to achieve the common goal of completing the restoration and are asked to wear multiple hats. The staffing summary in Table No. 1 should illustrate this.

There are two Operators at each site. These Operators typically work 10 to 12-hour shifts, 3-1/2 days per week. Their duties include the recording of all flow meter readings in the wellfield once per shift and RO and WDW readings at the start and end of their shift. They are responsible for balance in the wellfield, operation of the RO and WDW and the operation and cleaning of the filtration equipment and media.

Vacation and other time off for the Operators is covered by any one of the other employees at the site. Every one is versed in the operation of the equipment and can perform the duties of Operator if called upon. Kingsville personnel can be assigned to Rosita and vice versa to complete required wellfield construction or maintenance work when on site staffing increases are warranted.

These staffing levels may seem low to professionals working in the government sector, but in the real world, they are a fact of life. They are not "seriously deficient" as Mr. Ingle has suggested. They should not be increased by "5.8 times" as Mr. Abitz suggested, nor are they "low by a factor of three" as stated by Mr. Ingle

TABLE No. 1. CURRENT STAFFING LEVELS FOR URI OPERATIONS

TITLE	No.	STATUS	DESCRIPTION OF DUTIES
Operations Manager	1	Salary	Engineering, accounting and administrative support. Also operator & Mtce help
Chief Engineer	1	Salary	Engineering support and operator/mtce relief; purchasing and supply acquisition support
KINGSVILLE			
Site Superintendent	1	Salary	Formerly plant superintendent. Directs and performs wellfield and plant construction and mtce and performs Operator duties as required
Radiation Officer	1	Salary	Radiation and industrial safety, helps in the Lab.
Chemist	1	Salary	Formerly logging supervisor, now provides Laboratory support, logging and instrument tech support for both Kingsville and Rosita
Operator	2	Hourly	Operation duties plus help in the wellfield when available
Truck Driver/Sampler	1	Hourly	CDL driver, monitor well sampling, mechanic and wellfield help
Pump Hoist Operator	1	Hourly	Pump hoist and backhoe operator, wellfield construction and mtce
ROSITA	1		
Site Superintendent	1	Salary	Formerly Wellfield Superintendent, directs and performs wellfield and plant construction and maintenance. Performs operator duties as required
Wellfield Foreman	1	Salary	Directs and performs wellfield construction and maintenance and performs operator duties as required. Also helps with monitor well sampling
Plant Foreman	1	Salary	Directs and performs plant construction and mtce and performs operator duties as required. Also provides Lab support.
Radiation Officer	1	Salary	Formerly Senior Geologist, provides technical input for both sites and well as performance of RSO duties at Rosita. Also helps with monitor well sampling
Operator	2	Hourly	Operator duties plus help in construction and mtce as available. One is back=up CDL driver, other is former environmental tech and monitor well sampler
Total Workforce	15		

We are currently operating with the indicated staffing levels; we are getting the job done and are in full compliance with all regulations. We do not need separate operators for the RO nor do we need 24 hour coverage as Mr. Ingle has suggested. HRI's labor estimates are based on our actual operating experience in Texas, not conjecture. URI has demonstrated that through the use of technology, we can operate 24 hours per day with reduced staffing levels and not compromise anything.

3. OPERATING COSTS: As stated above, we have been operating with these staffing levels for the past six months. During that time, actual direct expenditures at both sites, including $100 M in capital expenditures at Rosita for upgrades to the RO and disposal well, compared against budget as follows:

TABLE No. 2. ACTUAL VERSUS BUDGET EXPENDITURES
URI SOUTH TEXAS RESTORATION ACTIVITIES

ALL AMOUNTS IN $ x 1000

	ACTUAL	BUDGET	VARIANCE
KINGSVILLE RESTORATION	358.1	351.0	(7.1)
ROSITA RESTORATION	224.8	265.9	41.1
ROSITA CAPITAL	96.3	100.5	4.2
TOTAL SOUTH TEXAS	679.2	717.4	38.3

As the Kingsville facility operated over the entire last six months, we can use it as an example of expected cost for ISL groundwater restoration activities using RO treatment. Individual cost categories for the Kingsville facility is shown in Table No. 3:

TABLE No. 3. Actual Kingsville Direct Costs 7/01/00 thru 12/31/00

COST CATEGORY	M $'s
LABOR	157.1
AUXILLARY COSTS	43.4
ENVIRONMENTAL	12.7
WELL COMPLETION	5.0
CHEMICALS	10.8
UTILITIES	60.0
WF HARDWARE MTCE	15.9
PLANT HARDWARE MTCE	13.9
ANCILLARY PLANT COSTS	12.1
VEHICLES	27.2
SUBTOTAL DIRECT SITE COSTS	358.1

Following is a brief description of what makes up the cost categories:

LABOR: Hourly and salary wages, including all taxes, workman's comp, life and medical insurance, and 401k plans
AUXILLARY COSTS: Telephone, postage, equipment rental, misc office costs, outside services (electrical contractors) and expense accounts
ENVIRONMENTAL: Environmental analysis
WELL COMPLETION: Backhoe rental, new well completion or rework costs
CHEMICALS: Hydrochloric, citric, versine, antiscalant, & copper sulfate
UTILITIES: Electricity and water
WF HARDWARE MTCE: submersible pumps and motors, WF electrical, PVC fittings and glue, and wellfield mowing
PLANT HARDWARE MTCE: Plant piping and valves, plant electrical, pumps, sand filters
ANCILLIARY PLANT COSTS: Disposal well, RO, RO membranes, laboratory costs
VEHICLES: Lease and repair costs for light trucks
BOND PREMIUMS: Fees for bonds posted with State agencies

Mr. Abitz suggested that based on his costs at Fernald, adjusted for differences in gallons processed, that the labor cost for Churchrock should be $767,133 per year. Averaging Kingsville's *total* direct cost of $358.1 M over six months gives an average direct cost of $59,700 per month or approximately $720,000 per year for *all* categories of direct cost at Kingsville, less than Mr. Abitz's *estimated labor cost alone*. His estimate is unreasonable when compared against either the actual labor costs at Kingsville of $315,000 per year or the HRI estimate of $513,000 per year. Based on the "more technically challenging" nature of the work at Kingsville and Churchrock, possibly Mr. Abitz should re-evaluate *his* staffing.

In summary, the costs projected for the groundwater restoration activities at Churchrock Section 8 are not "wildly unrealistic" as suggested by Mr. Abitz, but rather are reasonable given the actual operating experience of URI in South Texas.

4. This concludes my testimony.

AFFIRMATION

I declare on this 19th day of January 2001, at Corpus Christi, Texas, under penalty of perjury that the foregoing is true and correct.

Richard A. Van Horn

Sworn and subscribed before me, the undersigned, a Notary Public in and for the State of Texas, on this 19th day of January 2001, at Corpus Christi, Texas.

My commission expires on 03-01-2004.

JACKIE A. DOMINGUEZ
Notary Public
STATE OF TEXAS
My Comm. Exp. 03-01-2004

(SEAL)

Notary Public

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of: HYDRO RESOURCES, INC. P.O. Box 15910 Rio Rancho, New Mexico 87174	)))))))	Docket No. 40-8968-ML ASLBP No. 95-706-01-ML

CERTIFICATE OF SERVICE

I hereby certify that copies of the Reply of HYDRO Resources, Inc. ("HRI") to Intervenors' Response to HRI's Cost Estimate for Decommissioning and Restoration Action Plan in the above-captioned proceeding has been served on the following by electronic mail (as indicated) and on all parties by first class mail, postage pre-paid, on this 22nd day of January, 2001.

Administrative Judge
Thomas S. Moore, Presiding Officer
Atomic Safety and Licensing Board
Two White Flint North
11545 Rockville Pike
U.S. Nuclear Regulatory Commission
Rockville, Maryland 20852
BY FIRST CLASS MAIL AND EMAIL

Adjudicatory File
Atomic Safety and Licensing Board
One White Flint North
11555 Rockville Pike
U.S. Nuclear Regulatory Commission
Rockville, Maryland 20852
BY FIRST CLASS MAIL AND EMAIL

Office of the Secretary
Attn: Rulemakings and Adjudications Staff
One White Flint North
11555 Rockville Pike
U.S. Nuclear Regulatory Commission
Rockville, Maryland 20852
BY FIRST CLASS MAIL AND EMAIL

Office of Commission Appellate
Adjudication
One White Flint North
11555 Rockville Pike
U.S. Nuclear Regulatory Commission
Rockville, Maryland 20852
BY FIRST CLASS MAIL

Administrative Judge
Thomas D. Murphy
Special Assistant
Atomic Safety and Licensing Board
11545 Rockville Pike
U.S. Nuclear Regulatory Commission
Rockville, Maryland 20852
BY FIRST CLASS MAIL AND EMAIL

John Hull
Office of the General Counsel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
BY FIRST CLASS MAIL AND EMAIL

Administrative Judge
Robin Brett
U.S. Geological Survey
917 National Center
Reston, VA 20192

Geoffrey H. Fettus
Douglas Meikeljohn
New Mexico Environmental Law Center
1405 Luisa Street Suite 5
Santa Fe, NM 87505
BY FIRST CLASS MAIL AND EMAIL

Eric D. Jantz
DNA People's Legal Services, Inc.
P.O. Box 116
Crownpoint, NM 87313

Diane Curran Esq.
Harmon Curran Spielberg & Eisenberg
1726 M Street N.W., Suite 600
Washington, DC 20036
BY FIRST CLASS MAIL AND EMAIL

Mitchell W. Capitan, President
Eastern Navajo-Diné Against
Uranium Mining
P.O. Box 471
Crownpoint, New Mexico 87313
BY FIRST CLASS MAIL

W. Paul Robinson
Chris Shuey
Southwest Research and Information Center
P.O. Box 4524
Albuquerque, New Mexico 87106
BY FIRST CLASS MAIL

Herb Yazzie, Attorney General
Steven J. Bloxham, Esq.
Navajo Nation Department of Justice
P.O. Box 2010
Window Rock, AZ 86515
BY FIRST CLASS MAIL

Grace Sam
c/o Samuel D. Gollis
Hopi Legal Services
Highway 263 behind Hopi Judicial Complex
Keams Canyon, AZ 86034
BY FIRST CLASS MAIL

Anthony J. Thompson
Frederick S. Phillips
David C. Lashway
SHAW PITTMAN
2300 N Street, N.W.
Washington, DC 20037

Counsel for Hydro Resources, Inc.

Document #: 1042827 v.1