

## TELECOPIER COVER SHEET

## NEW MEXICO ENVIRONMENTAL LAW CENTER

1405 Luisa St, Suite 5  
Santa Fe, New Mexico 87505

Date: December 6, 1996

To: Ms. Shirley Ann Jackson, Chair  
U.S. Nuclear Regulatory CommissionMr. Joseph J. Holonich, Chief  
High-Level Waste and Uranium Recovery Projects Branch,  
Division of Waste Management  
Office of Nuclear Material, Safety and Safeguards  
U.S. Nuclear Regulatory CommissionFrom: Susan G. Jordan  
(505) 989-9022

Sender's Fax Number: (505) 989-3769

NUMBER OF PAGES INCLUDING COVER SHEET: 40

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CLARIFICATION OF INFORMATION REQUEST 24  
CULTURAL RESOURCES

ISSUE: Cultural Resources

DISCUSSION:

A traditional cultural property (TCP) generally is defined as one eligible for the National Register of Historic Places, because of its association with the cultural practices or beliefs of a living community that are (a) rooted in that community's history and (b) important in maintaining the continuing cultural identity of the community (paraphrased from U.S. Department of the Interior 1990). In other words, the property must have been used in historic or prehistoric times and must still be important to the cultural continuity of the community. Although such properties were afforded some protection by the American Indian Religious Freedom Act of 1978 and were sometimes considered in National Environmental Policy Act (NEPA) assessments, the National Historic Preservation Act, as amended through 1992 (NHPA) specifically identify TCPs as being eligible for listing on the National Register.

A TCP survey is necessary to fulfill NRC's legal obligations under NEPA to predict the potential for impacts to cultural resources and determine, if necessary, appropriate mitigation measures. This information is also necessary to fulfill NRC's obligations under the NHPA. To achieve the purposes of these acts, surveys must be performed in time to implement appropriate mitigation.

As noted in the letter from Hammack to Pelizza (1993), existing Class I, II, and III surveys should provide sufficient archaeological information for the EIS, while Class III surveys are needed to complete the Section 106 process. The letter also notes that no TCP surveys have been performed for these areas and that there is no information on which to base impact assessments. Hammack suggests performing TCP surveys, one at a time, when the Class III archeological surveys are performed before mining begins at each of the three properties. We agree that this would meet the requirements of Section 106, but delaying surveys until this late in the process would mean that TCP information would not be available for the EIS. Additionally, this information is necessary for the NRC to address public comments received on the draft EIS pertaining to religious beliefs and traditional cultural practices. Specifically, NRC does not have the definitive information on cultural practices to address public comments cataloged as AA7, AA15, AP6, AT13, and CZ2.

Unlike archaeological sites, TCPs are often difficult to recognize because they look like ordinary features of the landscape to all but the practitioners of the relevant culture or religion. They may be mountain peaks, rocky outcrops, or water bodies, for example, or other less dramatic features. Because TCPs are usually context-dependent, nearby activities can damage a TCP even if the actual site is not disturbed.

TCPs are not identified by archaeological surveys, but by different identification methods, which are ethnohistoric and ethnographic in nature. The steps for identifying TCPs are (1) identifying the traditional communities and groups (in this case tribes) that have ties to the area(s) in question. (2)

making contact with the appropriate authorities and other person(s) within these groups, (3) conducting background research, and (4) conducting interviews and field surveys as necessary. *National Register Bulletin 38* is widely recognized as the resource explaining the process of identifying and determining the significance of TCPs. The *Bulletin* also identifies the professional qualifications needed by the persons who conduct TCP surveys. Additionally, the "Navajo Nation Policy to Protect Traditional Cultural Properties" (1991) should be consulted.

Because of their proximity and current occupation of the land, the Navajo should be consulted. Other tribes, especially Puebloans, might have TCPs in the area and should also be consulted. The Hopi and the Zuni are on record as having cultural ties to the area. Contact with other Pueblo tribes could be facilitated through an umbrella organization of Pueblo tribes located in Albuquerque.

**ACTION NEEDED:** Prepare summary reports from each cultural resources director of the Navajo, Hopi, Zuni, Acoma, Laguna, and other potentially affected tribes that describe: 1) any traditional cultural properties identified by each tribe to be present at or near each of the three sites and 2) the potential impacts of the proposed project to each of those properties. The methods used in preparing each report should follow those set forth in the National Park Service's *National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties*.

#### References

- Hammack, Laurens C. 1993. CASA (Complete Archaeological Service Associates), Cortez, Colorado, July 27. NRC Public Document Room Accession Number 9310050278.
- Navajo Nation Historic Preservation Department 1991. "Navajo Nation Policy to Protect Traditional Cultural Properties."
- U.S. Department of the Interior 1990. *National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties*. National Park Service, Washington, D.C.



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

February 9, 1996

Hydro Resources, Inc.  
12750 Merit Drive  
Suite 1020, LB 12  
Dallas, Texas 75251

Attention: Mr. Mark Pelizza, Environmental Manager

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION; WATER RESOURCES PROTECTION AND COST/BENEFIT ANALYSIS; SAFETY ANALYSIS REVIEW AND ENVIRONMENTAL REVIEW FOR THE HYDRO RESOURCES, INC. (HRI) URANIUM SOLUTION MINING LICENSE APPLICATION, CROWNPOINT, NEW MEXICO

Dear Mr. Pelizza:

As stated in our January 11, 1996 request for additional information, the U.S. Nuclear Regulatory Commission staff, with the assistance of Oak Ridge National Laboratory (ORNL), is transmitting the enclosed request for additional information for water resources protection and cost/benefit analysis review areas. Enclosure 1 to this letter contains the requests for additional information in these two areas. Enclosure 2 contains the Description of Proposed Action and Alternatives (DOPAA), which forms the basis for the alternative action evaluation in the final Environmental Impact Statement (EIS). The enclosed DOPAA is included as a reference for your responses to the cost/benefit information requests.

The water resource protection issues described in Enclosure 1 contain a broad range of environmental and safety concerns. However, the NRC staff views the following three main issues as especially critical to the continued licensing review and for completing the final EIS:

- a demonstrated ability to restore the groundwater after solution mining, as detailed in comments 49, 50, and 51;
- the ability to conduct solution mining close to a public water supply at Crownpoint, as described in comments 73, 74, and 75; and
- the effects of old mine tunnels on vertical and horizontal control of potential excursions at the Church Rock property, as described in comment 87.

The NRC's review of HRI's proposed Crownpoint and Unit 1 operations is based on the assumption that the town of Crownpoint will continue to operate the existing water wells for supplying drinking water to the community. If this situation changes, HRI must provide an analysis to address the potential impacts the proposed activities may have on any new water supply wells.

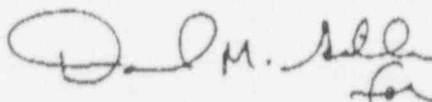
9602140148 (P)

M. Pelizza

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In order to support the review schedule, please provide your response to the issues identified in Enclosure 1 within 60 days of the date of this letter. If you are unable to meet this date, please provide your schedule for responding within 10 days of receipt of this letter. If you have any questions concerning this letter, please contact the NRC Project Manager, Mr. Michael Layton at (301) 415-6676.

Sincerely,



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

Enclosures: As stated  
Docket No.: 40-8968  
Casework Nos.: X60529, X60576  
cc: James Saulsbury, ORNL

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

ISSUE: Water Resource Protection

Comments Applicable to  
Crownpoint, Unit 1, & Church Rock Sites

49. License Area Boundary

DISCUSSION: NRC considers that solution mining activities can occur anywhere within the designated license area boundary. The applicant has provided several maps outlining its current mineral lease holdings in the vicinity of the town of Crownpoint. The lease in Section 25 contains the graveyard for the town and several leases appear to encompass residences within the town. These and other portions of the leases may not be realistically developed, because of prior surface usage.

ACTION NEEDED: The applicant must provide a legal description and revised maps showing the potential license area boundaries for all properties specific to solution mining activities. These activities include, but are not limited to: wellfield development, process facility construction, and monitoring well installation.

50. Degradation of Crownpoint Water Supply Wells By Restored Solution Mine Ground Water

DISCUSSION: Given the location of the license boundaries, ground water degraded by solution mining activities, even after restoration, might degrade the town of Crownpoint water supply. Mining in the Crownpoint mine units would occur on minerals operating leases in Section 24, extending eastward into Sections 19 and 29, T17N R12W (Reference 1, page 1-3). Pumping from the town of Crownpoint water supply wells causes ground water under the Crownpoint mine units to flow towards the water supply wells in Crownpoint (Reference 1, page 3-12). The town of Crownpoint is supplied by 5 wells BIA-5, BIA-3, BIA-6, NTUA-1, and NTUA-2. All of these wells pump water from the West Water Canyon Member. Two of the wells, NTUA-2 and BIA-5, are located no more than 2,640 ft. (1/2 mile) outside the licensed boundary. Well BIA-3 is located approximately 1,760 ft. outside the licensed boundary. Well BIA-6 is located just outside the boundary, and well NTUA-1 is located inside the boundary (Reference 2, Figure 2.3-1, page 27). The Crownpoint site is located so close to the town of Crownpoint, that pumping from the town wells causes the water levels under the Crownpoint site to move up and down (Reference 2, pages 47-54). The Crownpoint site is located on three sides of the town of Crownpoint (north, east, and west) (Reference 1, page 1-5). This means that water moving into the wells from the north, east, and west will be processed by solution mining activities and then could move a relatively short distance to the town of Crownpoint water supply wells.



**FINAL DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES**

**THE CROWNPOINT URANIUM SOLUTION MINING PROJECT  
CROWNPOINT, NEW MEXICO  
PROPOSED BY HYDRO RESOURCES, INC.**

Prepared for the  
U.S. NUCLEAR REGULATORY COMMISSION  
ROCKVILLE, MARYLAND

January 1996

Prepared by the  
OAK RIDGE NATIONAL LABORATORY  
Oak Ridge, Tennessee 37831  
managed by  
LOCKHEED MARTIN ENERGY SYSTEMS  
for the  
DEPARTMENT OF ENERGY  
under Contract No. DE-AC05-84OR21400

*Crownpoint DOPAA*

include operations affecting approximately 205 ha (510 acres) of ore reserves. HRI anticipates that uranium recovery activities at the Crownpoint site would occur over approximately 19 years.

#### 2.1.4.4 Site Development

Initially, HRI proposes to operate well fields only at the Church Rock site (Figure 2.10), and to transport yellowcake slurry to the Crownpoint facility for drying and packaging. Mining would begin at the Unit 1 and Crownpoint sites in the late-1990s (Figure 2.11).

During initial production, HRI proposes to conduct demonstration projects at each site, producing uranium from an initial well field, and then immediately restoring the well field. These demonstrations would be intended to confirm reclamation cost data for bonding purposes.

## 2.2 ALTERNATIVE 2 (MODIFIED ACTION)

Under Alternative 2, the NRC would issue HRI a license for the construction and operation of a modified version of the proposed project (Section 2.1). The modified project could consist of alternatives to the proposed project in three primary areas: sites for ISL mining, sites for yellowcake drying and packaging, and liquid waste disposal methods.

### 2.2.1 Alternative Sites for ISL Mining

HRI proposes to conduct ISL mining at the Church Rock, Unit 1, and Crownpoint sites. However, potential impacts to public health and safety or the environment might indicate that ISL mining should not be conducted at all three sites. Alternative sites for ISL mining include:

- the Church Rock site only
- the Unit 1 site only
- the Crownpoint site only
- the Church Rock and Unit 1 sites only
- the Church Rock and Crownpoint sites only
- the Unit 1 and Crownpoint sites only



The primary difference between these alternatives and the proposed project is that ISL mining would occur at only one or two of the proposed sites. Thus, the potential environmental impacts of mining at the sites listed above will be addressed as subunits of the proposed project in the FEIS.

### 2.2.2 Alternative Sites for Yellowcake Drying and Packaging

HRI proposes to dry and package all yellowcake produced by the project at the central processing facility at Crownpoint. However, potential impacts to public health and safety or the environment might indicate that an alternative site should be selected for yellowcake drying and packaging.

Alternative sites include:

- the proposed Church Rock processing facility
- the proposed Unit 1 processing facility
- HRI's existing ISL facility at Kingsville, Texas
- the Ambrosia Lake uranium mill located north of Milan, New Mexico (Figure 1.1)

The primary difference between these alternatives and the proposed project is that yellowcake slurry would be transported by truck to a location other than the Crownpoint processing facility. The FEIS examines the potential environmental impacts of these alternatives for drying and packaging.

### 2.2.3 Alternative Liquid Waste Disposal Methods

HRI's proposal for disposing of liquid wastes generated by the project is described in Section 2.1.2.4. Generally, HRI proposes to dispose of liquid wastes through a combination of evaporation ponds, aquifer reinjection, land application, and reinjection into the Westwater Canyon sandstone outside the mining area. The FEIS examines the impacts of HRI's proposal and alternative liquid waste disposal methods, including various combinations of evaporation ponds, deep-well injection, land application, and surface discharge.

NUREG-1508  
BLM NM-010-93-02  
BIA EIS-92-001

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# Draft Environmental Impact Statement

to Construct and Operate the  
Crownpoint Uranium Solution Mining Project  
Crownpoint, New Mexico

Docket No. 40-8968  
Hydro Resources, Inc.

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Manuscript Completed: October 1994  
Date Published: October 1994

Uranium Recovery Field Office  
U.S. Nuclear Regulatory Commission  
Denver, Colorado 80225

in Cooperation With

Albuquerque District  
U.S. Bureau of Land Management  
Albuquerque, New Mexico 87107

Navajo Area Office  
U.S. Bureau of Indian Affairs  
Gallup, New Mexico 87301



9411-160004 ZPP

After the applicant concludes the mining operation and demonstrates complete aquifer restoration, wells would be plugged and abandoned, the processing facilities would be decontaminated or decommissioned; all contaminated materials would be removed to a licensed waste disposal site; and all disturbed areas would be surveyed, decontaminated to acceptable levels, recontoured, revegetated, and released for unrestricted use.

## Alternatives Considered

Including the proposed project (Alternative 1), the review group considered the following alternatives:

For Alternative 1, the applicant would conduct its operations as described in its submittals with no significant changes resulting from regulatory review. The applicant would construct well fields and use existing and new surface facilities as processing plants for extracting uranium from aqueous mining solutions. Uranium would be recovered using ion exchange technology, then precipitated, and concentrated. All uranium slurry produced would be dried using a single dryer located in the central processing plant. Uranium slurry would be transferred from the satellite Church Rock and Unit 1 facilities to Crownpoint for further processing. Afterward, ground-water quality would be restored, wells would be plugged and abandoned, each site would be decontaminated or decommissioned, contaminated material would be removed to a licensed waste disposal site, and all disturbed areas would be reclaimed for unrestricted use.

For Alternative 2, the applicant would conduct mining operations using well fields and surface processing facilities at each site in generally the same manner outlined for Alternative 1. Selecting Alternative 2 would rely upon a finding that Alternative 1 is generally acceptable, but requires minor changes and additions, or more specific information for approval. Certain aspects of the authorized operations, facilities, or equipment would differ from those proposed. These differences would enable the operations to comply with certain regulatory requirements, and would alleviate minor deficiencies in the applicant's proposal, or provide regulating agencies and the public with reasonable assurance that authorized activities would protect public health and safety, and the environment.

For Alternative 3, the applicant would mine uranium using another method which could logically be employed at the proposed sites. Surface or open pit mining methods were not evaluated because the ore bodies are too deep within the ground. This alternative would likely require constructing a new uranium mill owing to the excessive haul distance to the one remaining mill near Grants, New Mexico.

For Alternative 4, no Federal licensing, permitting, or leasing would occur at either the Crownpoint or Church Rock locations. This alternative would not affect private minerals operating leases. In regard to the required source material license, other mining methods could be employed, but this would require another license application addressing ore processing and tailings management.

The review group evaluated the applicant's proposed operations in relationship to the above alternatives. The conclusions were:

- Conventional mining and milling would not be economically viable, either now or in the foreseeable future. Additionally, mill construction and tailings management would likely lead to environmental effects significantly more adverse than under Alternatives 1 or 2.
- Based upon geological and hydrogeological data stemming from pilot demonstration projects, aquifer tests performed by the applicant, and independent geologic literature, geological and hydrogeological conditions appear to meet the criteria for solution mining, as specified in Section 2.2.1 of this DEIS. These criteria include amenability of the ore to mining using ISL techniques, vertical confinement of the ore zone aquifer, and ability to restore ground-water quality.
- The applicant provided detailed aquifer restoration data from two pilot projects, as well as laboratory simulations. These tests indicate that the ore-bearing aquifer can be restored to baseline conditions.
- The applicant's proposal would result in less solid waste for disposal than any other mining technique.
- The applicant's proposal will minimize ground-water consumption.

The review group determined that the applicant's proposal to conduct solution mining to extract uranium in the lease areas is generally acceptable. Alternative 2 would be selected to emphasize regulatory requirements, impose operating restrictions, and specify monitoring, record-keeping, and reporting requirements to minimize environmental impacts.

## Existing Environmental Conditions and Concerns

After reviewing the applicant's environmental reports, related submittals, and independent information sources, the review group identified the following major categories of environmental concern, including issues for which analyses and assessment were necessary:



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street

San Francisco, CA 94105-3901

February 27, 1995

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Joseph J. Holonich, Chief  
High-Level Waste and Uranium Recovery Branch  
Division of Waste Management  
Office of Nuclear Material Safety and Safeguards  
Mail Stop TWFN 7J-9  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Holonich:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) to Construct and Operate the Crownpoint Uranium Solution Mining Project, McKinley County, New Mexico. Our review and comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 C.F.R. 1500-1508, and Clean Air Act §309.

The DEIS evaluates alternatives for construction and operation of facilities to recover uranium at three separate locations in McKinley County, New Mexico. The preferred alternative involves construction of injection and extraction wells, ion exchange plants, retention ponds, and support facilities. In situ leach mining and ion exchange would be conducted to recover uranium at each of the three sites. A central plant would provide drying and packaging of the "yellowcake" for transport offsite. Uranium recovery activities would be conducted at the Church Rock, Unit 1, and Crownpoint sites for eight, 17, and 19 years, respectively.


We have rated this DEIS as EO-2 -- Environmental Objections-Insufficient Information (see enclosed "Summary of Rating Definitions and Follow-Up Actions"). Our objections to the proposed project are based on its proximity to domestic supply wells and residences and insufficient hydrogeologic modelling and field testing to ensure a completely closed system. Additional information is needed in the Final Environmental Impact Statement (FEIS) regarding the results of hydrogeologic modelling and field tests, including the potential for, and environmental impacts of, contaminated groundwater migrating off-site as a result of injection activities; aquifer restoration; and effects of drawdown of supply wells for the City of Crownpoint. We believe that additional studies must be performed at the project sites

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and this information provided in the FEIS. The FEIS should also include additional information regarding permitting, spill response, management of sludges and other process wastes, and Radionuclide National Emissions Standards for Hazardous Air Pollutants. Our specific comments are attached.

We appreciate the opportunity to review this DEIS. Please send two copies of the FEIS to this office at the same time it is officially filed with our Washington, D.C., office. If you have any questions, please contact me at (415) 744-1584, or have your staff contact Jeanne Geselbracht at (415) 744-1576.

Sincerely,



David J. Farrel, Acting Chief  
Office of Federal Activities

Enclosures

2376/95-016

cc: Sadie Hoskie, Navajo Nation EPA  
BLM, Albuquerque  
BIA, Gallup  
Peg Rogers, Navajo Nation Dept. of Justice  
Judith Espinosa, State of New Mexico Environment Dept.  
Yvonne Vallette, EPA Region 6

## SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

### Environmental Impact of the Action

#### LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

#### EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

#### EO-Environmental Objections

This EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

#### EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of environmental quality, public health or welfare. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

### Adequacy of the Impact Statement

#### Category 1-Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

#### Category 2-Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

#### Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

\*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."



Crownpoint Uranium Solution Mining DEIS  
EPA Comments - February, 1995

### General Comments

Hydro Resources, Inc. (HRI) has applied to the Nuclear Regulatory Commission (NRC) for a license to construct and operate facilities to recover uranium in three separate locations. HRI's project involves the installation and operation of "Class III" uranium mining injection wells regulated under the Safe Drinking Water Act (SDWA), 42 U.S.C. §300f et seq. The following parcels of land meet the definition of "Indian lands" set forth at 40 C.F.R. §144.3: Church Rock area - Section 17, T16N, R16W (held in trust by the United States for the benefit of the Navajo Nation (tribal trust)); all of Unit 1 area, including northwest 1/4 of Section 24, T17N, R13W (allotments held in trust for individual Indians (allotments)); Crownpoint area - southern 1/2 of Section 19, T17N, R12W (tribal trust), and western 1/2 of Section 29, T17N, R12W. As such, HRI's Class III injection wells on Indian lands are subject to the requirements found at 40 C.F.R. Parts, 124, 144, 146, 147, subpart HHH, and 148. Therefore, among other things, HRI is required to submit a permit application and a request for an aquifer exemption for the wells on the Indian lands (as described above) to EPA-Region 9.

HRI has not submitted a permit application to EPA for the Crownpoint area. On October 23, 1992, HRI submitted a permit application and a request for an aquifer exemption to EPA-Region 9 for the Unit 1 area of the proposed project. After EPA-Region 9 informed HRI that EPA could not grant the exemption because there is a drinking water supply well within HRI's proposed project, on July 13, 1993, HRI withdrew its permit application for the Unit 1 area. To date, despite being notified by EPA (twice in writing), HRI has failed to submit a permit application (and a request for an aquifer exemption) for the Church Rock area. HRI cannot begin construction of its wells until it receives its Class III UIC permit. In the event that HRI does construct (or operate) its UIC wells without the proper EPA-issued permits (and aquifer exemptions), HRI will be subject to criminal and/or civil enforcement pursuant to section 300h-2 of the SDWA 42 U.S.C. §1423. EPA recommends that NRC not sign a Record of Decision or approve HRI's license until HRI has applied for all appropriate permits and exemptions from EPA-Region 9.

EPA requests that NRC, to the extent allowed under its laws and regulations, include in any license a provision in which HRI agrees to indemnify the U.S. for the costs of any environmental damage and/or remediation. Similarly, we request that the Bureau of Land Management and Bureau of Indian Affairs include, in any minerals operating lease, a provision in which HRI agrees to



Crowpoint Uranium Solution Mining DEIS  
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indemnify the U.S. for the costs of any required environmental damage and/or remediation.

EPA considers these indemnity provisions very important. At other mining sites the Federal and State agencies have borne much or all of the cost of necessary cleanups because responsible parties were not able and/or willing to pay these costs. EPA would like to prevent a future requirement for the expenditure of federal fiscal resources.

### Groundwater

The proposed technology of injecting solutions into uranium bearing strata has been practiced in New Mexico for many years. However, such in-situ operations have caused groundwater contamination since the control of oxidants in strata is difficult, and once oxidation begins, it mobilizes uranium in aquifers. Furthermore, lixiviant movement through the strata also mobilizes heavy metals, and their control is often quite difficult because treatment of dilute metals (e.g., arsenic, selenium, vanadium) in large masses of groundwater is not well understood or is very costly.

In the recovery process, uranium would be oxidized and dissolved by the lixiviant solution injected into the ore zone. The dissolution of uranium would continue as long as the production zone remains in an oxidized state. Even if injection ceases for any reason, the recovery wells must remain in full operation to prevent the migration of any dissolved uranyl species or trace metals from the mining zone. The FEIS should address this issue in detail.

The Westwater Canyon Member of the Morrison formation is an important regional aquifer. On page 3-9, the DEIS states that some of the sandstone units in the area are known to exhibit jointing and fracturing in the subsurface. Such fracturing could lead to water movement throughout the Westwater unit in a fashion very difficult to model. Furthermore, the DEIS references Reed and Werts (1967), which concluded that the Old Church Rock mine experienced excessive water seepage owing to fracture zones in the Westwater Canyon sandstones. Since such fracturing appears to exist, it appears that the formation is not confined.

The DEIS reports that the injection pressure at the well head would not exceed 0.40 psi per foot of well depth. 40 C.F.R. §146.33 (a)(1) stipulates that "injection pressure at the wellhead shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone."

Crownpoint Uranium Solution Mining DEIS  
EPA Comments - February, 1995

In light of the exhibited jointing and fracturing in the subsurface (DEIS, p. 3-9), it is probable that pressure increases may lead to propagation of existing fractures. HRI must submit results of field tests and investigations to verify: (1) the maximum injection pressure or fracture gradient for the Westwater formation; and (2) the cumulative effects of multiple injection wells on the fracturing or propagation of fractures in the production zone. This information should be included in the FEIS.

Lixiviant solution injected into the ore zone oxidizes and dissolves the uranium present. In the ore, the principal products of interest to HRI that result from the reactions are a soluble uranyl tricarboxylate complex  $[Na_4UO_2(CO_3)_3]$  and a bicarbonate complex  $[UO_2(CO_3)_2]^{2-}$ . In such an oxidizing environment, other uranyl (+VI) species, (i.e.,  $UO_2^{2+}$ ,  $UO_2CO_3^0$ ,  $UO_2SO_4^0$ , and  $UO_2OH^+$ ) are also mobilized and transported. EPA believes it is critical that all mobilized uranyl species be recovered in the ion exchange (IX) units. Moreover, all monitoring well samples must be analyzed for total uranium. Analyzing for the uranyl tricarboxylate and bicarbonate complexes only would not be sufficient.

HRI proposes to establish baseline groundwater quality in the production zone and in overlying aquifers as part of the Aquifer Restoration Plan. HRI should be aware that, according to 40 C.F.R. §147.3014(b), EPA may require monitoring wells to be completed into underground sources of drinking water (USDWs) below the injection zone.

The DEIS indicates that both the Church Rock and Crownpoint lease areas were developed earlier for uranium mining using underground methods, leaving behind open mine shafts. The open shafts may provide possible conduits for fluid migration from the ore zone to overlying USDWs. Commingling of pregnant lixiviant with water in overlying USDWs would degrade the water quality. The shafts and any wells or holes that exhibit the potential to promote fluid migration should be plugged in a manner which will not allow the movement of fluids either into or between USDWs. This should be discussed in the FEIS and HRI's permit application referenced in our "General Comments."

According to the DEIS (p. 3-12), the natural potentiometric surface of the Westwater aquifer in the Crownpoint area slopes north-north eastward. The pumping from drinking water supply wells in the City of Crownpoint has caused the aquifer gradient in the vicinity of the processing plant to slope eastward toward Navajo Tribal Utility Authority (NTUA) No. 1. Competing water production between the water supply wells in the City of



Crownpoint Uranium Solution Mining DEIS  
EPA Comments - February, 1995

Crownpoint and the uranium mining recovery wells may cause the uranium-enriched pregnant solution to migrate off site. Should the cones of depression (drawdown) for the water supply wells encompass the uranium mining zone, and if the capture zones of the supply wells are large enough to cause water flowing from the mine zone to accumulate at any of the supply wells, any chemical species (uranium, radium, and trace metals) would collect in the water supply wells. NTUA No. 1 could potentially serve as a sink for a large volume of pregnant lixiviant migrating off site. HRI must perform and submit results of a study to determine the effect of mining operations on the City of Crownpoint's drinking water supply wells. The FEIS should include this information.

According to the DEIS (p. 3-16), HRI performed a two day pump test near Crownpoint. The information regarding the test results is inconclusive and insufficient. Data showing observed drawdowns in the monitoring wells and the effects on the Crownpoint water supply wells are needed. Also, the EPA believes that a single two day pump test yields insufficient data to determine the integrity of a confining layer. A two day test may not be sufficient to show communication between a confining layer and an aquifer. Because of the time delay for water to enter the pumped aquifer, an aquifer may appear nonleaky over several hours or days of pumping. A pump test run for a longer period of time may have invoked the transmission of water across the confining layer and shown the confining layer to be leaky and not impermeable. We recommend that HRI conduct additional pump tests and include the results in the FEIS.

Likewise, pump test data for the Church Rock site are lacking in the DEIS (p. 3-16). The DEIS only mentions wells completed in the Dakota and Cow Springs aquifers. Information on the duration of the test and whether any monitoring wells were completed within the mineralized zone should be included in the FEIS.

The DEIS states that as long as pumping continues in the well fields contaminant flow would be toward the recovery wells and away from other portions of the aquifer. This would be true only if aquifer drawdown could easily be predicted, and there were complete control over the pressures at all wells and uniform cones of depression around each well. It is unlikely that such conditions would exist in the field. Controlling down hole pressure at in-situ operations is often difficult and frequently very different from modelled results.

The DEIS (p. 4-2) indicates that the expected aquifer drawdown during the project would be 40 feet for the Church Rock site and 50 feet for the Crownpoint site. The model prepared by Geraghty and Miller for HRI used an 8-year and 7-year production and