May 11, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE PRESIDING OFFICER

In the Matter of	)	
	)	Docket No. 40-8968-ML
HYDRO RESOURCES, INC.	)	
2929 Coors Road, Suite 101	)	Re: Leach Mining and Milling License
Albuquerque, New Mexico 87120	)	

NRC STAFF RESPONSE TO
QUESTIONS POSED IN APRIL 21 0RDER

In accordance with the Presiding Officer's request in his Memorandum and Order (Questions), dated April 21, 1999 (April 21 Order), the Staff files this response to the question posed regarding "Intervenors' (SRIC, ENDAUM and the Sams) concerns about groundwater, the adequacy of the Final Environmental Impact Statement, NUREG-1508, February 1997 (FEIS), and environmental justice." April 21 Order at 1. The answers are supported by the attached affidavits of William H. Ford and Robert D. Carlson, dated May 11, 1999, which are appended hereto as Staff Exhibits 1 and 2, respectively. These exhibits contain numerous citations to where information responsive to the Presiding Officer's inquiry is already contained in the FEIS.

As a preliminary matter, the Staff points out that some information sought by the April 21 Order is not known by the Staff. For example, with respect to Question 4, the Staff does not know the minimum price at which HRI would commence work on Church Rock Section 8 or the remainder of the mining project. *See* Affidavit of Robert D. Carlson, dated May 11, 1999, at 2. Also, the Staff is not aware of any negotiations regarding Navajo Nation taxes. *See id.* at 9.

In Question 5, the Presiding Officer asks, "In light of the financial situation of local governments, would environmental justice considerations require indemnification or assurances to local governments for possible losses [associated with local government capital expenditures that may not be recouped if the CUP suspended or terminated without going beyond Section 8]?" The Staff does not view environmental justice considerations as *requiring* payments or assurances to local governments. Rather, as noted in *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 100 (1998), the disparate impact analysis is the principal tool for advancing environmental justice under NEPA and the NRC "is to identify and weigh, or mitigate, the effects on low-income and minority communities." The Commission has twice stated that, because President Clinton's executive order expressly states that it merely underscores the provisions of existing law (*e.g.*, the National Environmental Policy Act, 42 U.S.C. § 4321 *et seq.*) and creates no new legal rights or remedies, it thus imposes no legal requirements on the Commission. *See Louisiana Energy Services, L.P.* (Claiborne Enrichment Center, CLI-98-3, 47 NRC at 102; *id.*, CLI-98-13, 48 NRC 26, 35-36 (1998). Consistent with NEPA, the HRI source material license, License SUA-1508, contains mitigation measures, such as the relocation of certain Crownpoint water supply wells (HRI License Condition (LC) 10.27), agreements between the licensee and local authorities, medical facilities, etc., regarding local emergency services (LC 9.13), and reimbursements to Crownpoint water supply operators (LC 10.16). *See* Carlson Affidavit at ¶ 8.

The Staff maintains its position that no supplementation of NUREG-1508 is needed since most, if not all of the information requested in Questions 1-7 is already in that

document.[1] In addition, the Presiding Officer has not issued a decision identifying which sections or subsections of the FEIS require supplementation. In the interest of expediting the proceeding, *see* April Order at 4, the Staff is transmitting copies of this response by e-mail in order to provide a format that will assist FEIS supplementation, if ordered.[2]

Respectfully submitted,

Mitzi A. Young
Counsel for NRC Staff

John T. Hull
Counsel for NRC Staff

Dated at Rockville, Maryland
this 11th day of May 1999

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[1] 10 C.F.R. § 51.92(a) states that: "If the proposed action has not been taken, the NRC staff will prepare a supplement to a final environmental impact statement for which a notice of availability has been published in the *Federal Register* . . . if: (1) There are substantial changes in the proposed action that are relevant to environmental concerns; or (2) There are new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." The regulations similarly provide that a supplement to an FEIS may be prepared, as a matter of discretion, when "in [the Staff's opinion], preparation of a supplement will further the purposes of NEPA." 10 C.F.R. § 51.92(b). In this proceeding, the proposed action -- issuance of the license -- has been taken and neither the fluctuations in uranium spot market prices nor the commencement of the mining at Church Rock Section 8 require supplementation of the FEIS. *See e.g.,* NRC Staff's Response to Intervenor Presentations On NEPA Issues (Purpose, Need, Cost/Benefit, Alternatives, and Supplementation), dated April 1, 1999, at 17-19.

[2] The various procedures for supplementing an FEIS are set forth in 10 C.F.R. §§ 51.92 and 51.93.

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In the Matter of	)	
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HYDRO RESOURCES, INC.	)	
2929 Coors Road, Suite 101	)	(Leach Mining and Milling License)
Albuquerque, New Mexico 87120	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF RESPONSE TO QUESTIONS POSED IN APRIL 21 ORDER" in the above-captioned proceeding have been served on the following by U.S. Mail, first class, or, as indicated by a single asterisk through deposit in the Nuclear Regulatory Commission's internal mail system, or, as indicated by double asterisks, by e-mail and U.S. Mail, first class, this 11th day of May, 1999:

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Counsel for NRC Staff

Staff Exhibit 1

UNITED STATES OF AMERICA
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BEFORE THE PRESIDING OFFICER

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	)	
HYDRO RESOURCES, INC.	)	Docket No. 40-8968-ML
2929 Coors Road, Suite 101	)	
Albuquerque, New Mexico 87120	)	

AFFIDAVIT OF WILLIAM H. FORD

I, William H. Ford, being duly sworn, declare as follows:

1. I am competent to make this affidavit, and the factual statements herein are true and correct to the best of my knowledge, information, and belief. The opinions expressed herein are based on my best professional judgment. This declaration will serve to present my understanding of the health, safety and environmental effects of *in situ* leach (ISL) uranium mining at the Crownpoint Uranium Project of Hydro Resources Inc. (HRI). A summary of my expertise pertaining to ISL issues has previously been submitted in this proceeding. Additionally, with respect to the FEIS excerpts included herein, I was the principal author of those excerpts.

2. Below, I answer questions 1, 2, and 3 propounded by the Presiding Officer in his order dated April 21, 1999 (April 21 Order).

Question 1

3. Question 1 states as follows:

> Based on the experience of Uranium Resources, Inc. (URI) and of the *in situ* leach mining (ISL) industry generally, as well as the laboratory work reported in the Final Environmental Impact Statement, NUREG-1508, February 1997 [FEIS], Tables 4.8 and 4.9 at pp. 4-32, 33, what *important* difficulties (including unlikely but foreseeable difficulties) may reasonably be considered for the Crownpoint Uranium Project (CUP) concerning restoration of ground-water quality at Church rock [sic] Section 8? What environmental costs may reasonably be expected to result from foreseeable difficulties?

April 21 Order, ¶ 1, at 1-2 (footnote omitted) (emphasis in original).

4. Given the poor water quality now present in the ore zone at Church Rock Section 8 as a result of uranium and radium concentrations, the chemical inability of these groundwater constituents to move outside the well field area, the requirement for a restoration demonstration, and the license provision for annual surety updates, it is extremely likely that after *in situ* leach mining is completed, the groundwater quality will be restored to acceptable levels so that the water use of the aquifer is maintained.

5. Based on Mobil Section 9 pilot data (discussed in detail in ¶¶ 16-23) in the 9-10 pore volume range as a cut-off to judge successful restoration (*see* ¶ 11), it is unlikely that groundwater restoration activities at the Church Rock site will achieve baseline concentrations for all groundwater parameters. During the Mobil demonstration, approximately 42% of the monitored parameters were returned to baseline concentrations after 9-10 pore volumes of restoration effort.

6. However, it is likely that most, if not all, of the groundwater parameters will achieve the secondary groundwater restoration goals stated in HRI License Condition 10.21. Approximately

74% of the parameters monitored in the Mobil demonstration met the secondary groundwater restoration goals after 9-10 pore volumes of restoration effort.

7. Regarding the six parameters that did not meet their respective secondary groundwater restoration goals during the Mobil demonstration after 9-10 pore volumes of restoration effort, half of them (calcium, sodium, and molybdenum) do not have primary or secondary drinking water standards, because they are not considered hazardous to humans. Molybdenum is primarily a concern for cattle uptake, while sodium and calcium are considered nutrients. At 9.7 pore volumes, total dissolved solids (TDS) concentrations were at 587 parts per million (ppm), which was close to the secondary drinking water standard for total dissolved solids of 500 mg/L. *See* HRI's 1993 summary of the Mobil data.[1] Therefore, it is very likely that the TDS secondary goal will be achieved at Section 8, even though it cannot be accomplished without leaving some of the major parameters which are not a threat to public health and safety at higher than background concentrations.

8. During the Mobil demonstration two parameters, radium and arsenic, did not achieve baseline, or meet their respective drinking water standards, after nine pore volumes of restoration effort. In addition, after nine pore volumes, uranium was not restored to baseline or the NRC standard of 0.44 mg/L. At the end of the mining phase of the Mobil demonstration, but prior to restoration, arsenic was for all practical purposes at the primary drinking water standard of 0.05 mg/L (*see* pregnant lixiviant column, FEIS Table 4-13) . During the restoration phase, arsenic concentrations fluctuated slightly above and below the primary standard. *See* Mobil Mining and

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[1] HRI's six-page "Section 9 Pilot Summary Report" (Pilot Report) is located at the end of Notebook 6.2 of the HRI Hearing File, and additionally includes Attachments A-F. The FEIS references this report as "HRI 1993b." *See* FEIS, at 7-5.

Minerals Company's 1986 report. At 9.7 pore volumes of restoration effort at the Mobil demonstration, the arsenic level was 0.079 mg/L, which is very close to the primary drinking water standard of 0.05 mg/L. *See id.*

9. Uranium and radium are two parameters that often make the water quality from the ore zone unsuitable for drinking water use, even prior to any *in situ* leach mining. At 9.7 pore volumes of restoration effort at the Mobil demonstration, uranium was nearly in compliance with the NRC standard, and radium concentrations were restored to anticipated baseline conditions. Moreover, parameters like arsenic, radium, molybdenum, and uranium are readily retarded by rock water interactions, as explained in ¶¶ 12-14, and 24, below. Therefore, it is extremely unlikely that after restoration activities, arsenic, radium, molybdenum, or uranium levels would impact water quality outside the restored well field area. These conclusions are supported by the FEIS excerpts set forth below.

10. FEIS Table 4.8 shows the results from two core leach tests conducted with ore samples from the Church Rock site. The Staff stated its concerns about relying on such small-scale core tests to represent a site-scale groundwater restoration demonstration. *See* FEIS, at 4-29. The core tests may have been influenced by the process of obtaining, transporting, storing, and testing the core. Furthermore, the groundwater chemistry used to represent water conditions underground may not accurately represent actual baseline water quality for that particular section of core. To help address these concerns, HRI is required to perform a groundwater restoration demonstration at its

Church Rock site.[2] In this regard, the FEIS states at page 4-39 as follows:

> In order to address concerns with the lack of a site-specific representative groundwater restoration demonstration, HRI proposes to complete a concurrent restoration demonstration at each of the three proposed project sites within 18 months of the date on which mining commences (HRI 1996b). The demonstration would include:
>
> 1. An isolated restoration demonstration pattern, completed in a mine unit, constructed to the same basic configuration as the proposed production well field pattern, and operated under the same conditions as the proposed mining procedures.
>
> 2. Leaching of the pattern would be run for at least 3 months under commercial activity conditions using leaching agency concentrations equal to or greater than those expected to be required for production.
>
> 3. After the leaching phase, a complete chemical description of the produced fluid would be obtained and a demonstration of a restoration would be initiated.
>
> 4. Sample analysis of fluids would be completed at least every week during the restoration demonstration to allow observation of the concentration of various restoration parameters. Progress reports would be submitted to NRC every 6 months after the demonstration was initiated.
>
> 5. Restoration would continue until the groundwater was restored to levels consistent with baseline.
>
> 6. With each progress report, the operator would calculate and submit the volume of groundwater affected. Factors to be considered would include aerial extent, formation thickness, and porosity. Upon the completion of the restoration demonstration, HRI would submit the data, analysis, and conclusions in a final report.
>
> 7. Authorization for expansion of mining into additional mine units would be contingent upon the results of the restoration demonstration within the 18-month period (HRI 1996b).

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[2] *See* HRI License Condition 10.28. Prior to conducting this groundwater restoration demonstration, HRI will have established the primary groundwater restoration goals, pursuant to HRI License Condition 10.21. Following groundwater restoration activities, HRI License Condition 10.21 states that for each listed parameter, the primary goal is that the water quality of groundwater should be no worse than the original baseline water quality of the impacted aquifer. HRI License Condition 10.21 also specifies the secondary groundwater restoration goals, which are based on public drinking water standards already in force.

11. The Staff explained in the FEIS its basis for requiring nine pore volumes to be used for HRI's Church Rock demonstration, as follows:

> Depending on the parameter and the test chosen, the pore volumes required to achieve the lower water quality of the secondary restoration goal or background ranged from less than 1 pore volume to greater than 28 pore volumes. However, plots of [total dissolved solids] TDS concentrations and specific conductivity values (an indirect measure of TDS) show little improvement with continued pumping after 8 to 10 pore volumes. The Mobil Section 9 pilot is the largest restoration demonstration conducted in the project area to date. During groundwater restoration activities in the Mobil demonstration, TDS concentrations were close to the secondary restoration goal of 500 mg/L after 6.9 and 9.7 pore volumes. On the basis of the data submitted by HRI, the staff conclude that practical production-scale groundwater restoration activities would at most require a 9 pore volume restoration effort. Accordingly the staff have calculated groundwater impacts assuming the use of 9 pour [sic] volumes for groundwater restoration. Furthermore, surety should 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 demonstrated by HRI.

FEIS, at 4-40.

12. Most of the parameters that caused problems with groundwater restoration at the Mobile Section 9 pilot site are the redox-sensitive chemical constituents, as discussed in the following FEIS excerpts:

> Contamination of groundwater from sodium-based alkaline lixiviant uranium leaching arises from (1) the addition of sodium bicarbonate and oxygen (lixiviant) to the groundwater, (2) the addition of chloride to the groundwater by the processing plant, and (3) the interaction of these chemicals with the mineral and chemical constituents of the aquifer being mined (most significantly uranium, potassium, sulfate, arsenic, selenium, molybdenum, and other trace metals) (Deutsch 1985).

FEIS, at 4-15. However, as explained in the FEIS excerpt below, redox-sensitive constituents such as uranium, molybdenum, selenium, and arsenic, should not migrate very far from the well field, if for some reason they are still elevated after groundwater restoration activities:

> A study sponsored by the NRC (Deutsch 1983) was conducted to investigate the ability of natural geochemical processes to restore water quality after ISL mining activities in an aquifer. Tests were conducted to simulate lixiviant migrating down-gradient from a mined

> area into the area of an aquifer where reducing conditions occur naturally. The study indicated that major ion concentrations elevated during ISL mining, such as sodium, chloride, and sulfate, are affected very little when the lixiviant migrates into the undisturbed reduced zone. As a result, concentrations tend to remain at the level to which the water was restored for some distance from the area of former mining. Conversely, redox-(oxidation/reduction) sensitive ions such as uranium, arsenic, selenium, and molybdenum precipitate from solution if the restored water moves into a reducing zone. Therefore, after restoration activities, if groundwater moves into a reducing area, concentrations of these ions should rapidly decrease in the groundwater.

FEIS at 4-39.

13. However, previous underground mining activities on Section 17, conducted by United Nuclear Corporation (UNC), may have influenced the natural reducing capacity of the aquifer near the old mine workings, as described in the FEIS as follows:

> An active uranium ore body is one where reducing conditions exist on one side of the ore body and oxidizing conditions exist on the other side. Current research (Deutsch 1985; Deutsch 1983) indicates that for active ore bodies, the redox-sensitive ions (such as uranium) which have been mobilized by uranium solution mining would rapidly be adsorbed and removed from groundwater when they encounter reducing conditions in the rock. So if the post-mining groundwater flow direction is from the oxidized side of the ore body to the reduced side, these ions should be rapidly attenuated after solution mining activities.
>
> However, as recognized by HRI (1996a), the dewatering effects of the old mine workings [on Section 17] have subjected the Westwater Canyon Member to oxidizing conditions. The implication is that for some distance around the old Church Rock mine working (i.e., into areas that were not mined by the underground operation), dewatering may have significantly diminished or eliminated reducing conditions in the aquifer. Therefore, uranium may move a longer distance than would normally be predicted before it encounters reducing conditions in the aquifer.

FEIS, at 4-57 to 4-58. The extent to which the aquifer under Section 8 could have been impacted by the dewatering effects of the UNC mine on Section 17 is uncertain. However, the non-linear nature of groundwater drawdown should mean that dewatering impacts should have decreased very

rapidly with distance from the old UNC mine. Therefore, it is reasonable to expect that the reductive capacity of the aquifer underlying Section 8 has only been marginally affected, if at all.

14. Moreover, with respect to radium, at the end of groundwater restoration efforts, this groundwater constituent would not tend to migrate very far in oxidizing or reducing conditions, because it has a high tendency to chemically react (adsorb) with solid material in the aquifer. This tendency for radium to adsorb is described in the FEIS, as follows:

> One of the common methods used to model geochemical absorption is through the use of the distribution coefficient commonly known as K_d (Freeze 1979). The K_d approach attempts to predict the partitioning of solutes between the liquid and solid phases in a porous medium. A K_d reflective of reducing conditions was conservatively chosen for radium because radium is more mobile under reducing conditions. Current groundwater flow modeling indicates that groundwater from the Crownpoint or Unit 1 site could flow through either the reduced or oxidized side of the roll front, or both. Radium K_ds for oxidizing environments fall in the range of 500 mL/g (Sheppard 1990; Allard 1979; Krishnaswami 1982; Serene 1982; Meijer 1995; Wescott 1995; Barney 1984). For reducing conditions in sandstone with low organic matter, Barney (1984) determined a radium-226 K_d of 55 mL/g. It was this lower K_d that was used to model the retardation of radium-226. Distribution coefficients of this magnitude indicate that for all practicable purposes radium-226 is immobile in the premining and post restoration groundwater chemistry.

FEIS, at 4-48. The FEIS additionally stated as follows regarding the restoration failure for radium-226 during the Mobil Section 9 pilot site test:

> After 16.7 pore volumes in the Mobil Section 9 pilot, radium had not been restored to the EPA drinking water quality standard of 5 pCi/L. HRI anticipates that the restored value for radium at the Church Rock, Crownpoint, and Unit 1 sites would be [above] baseline values (HRI 1996a). This is because HRI believes that average pre-mining well field radium concentrations would exceed the U.S. EPA and State of New Mexico drinking water standard for radium (HRI 1996a).
>
> HRI's beliefs are supported by radium concentration values gathered from sampling groundwater in the Westwater Canyon aquifer at the Unit 1 and Crownpoint sites. For the Unit 1 site, a maximum radium-226 value of 200 pCi/L and an average value of 10.3 pCi/L is reported (HRI 1996b). Both of these values exceed the EPA maximum concentration limit for radium (HRI 1993b). At the Crownpoint site, a minimum radium concentration of 0.1 pCi/L and a maximum value of 806 pCi/L is reported. Using data from Crownpoint site wells

CP-2, CP-3, CP-5, CP-6, CP-7, and CP-8, an average value of 65 pCi/L is calculated (HRI 1992b). This exceeds the U.S. EPA and State of New Mexico drinking water standards.

FEIS, at 4-37.

15. Should the Presiding Officer nevertheless determine that the FEIS needs to be supplemented (*see* April 21 Order, ¶ 6, at 4), I offer the following discussion:

16. The largest scale restoration demonstration in the CUP area was performed for the Mobil Section 9 pilot plant. Water containing lixiviant was passed through a small well field of nine injection wells and four production wells. The pore volume data from this demonstration is reported in the second column of FEIS Table 4.9, at page 4-33. More extensive data from the Mobil demonstration is reported in FEIS Table 4.13, at page 4-38.[3] Table 4.9 was constructed using data from HRI's Pilot Report, and reported results obtained by Mobil through September 16, 1985. Table 4.9 thus presents data taken during active restoration activities. FEIS Table 4.13 was constructed using data from Mobil Mining and Minerals Company's 1986 report, and reflects data from wells sampled in September 1986, at the end of restoration activities. The discrepancies (cited in the

[3] There are some discrepancies between FEIS Tables 4.9 and 4.13. For example, FEIS Table 4.9 shows nitrate and lead reaching baseline in less than one pore volume, whereas in FEIS Table 4.13 these parameters are shown as slightly above baseline at the end of restoration. Similarly, Table 4.9 shows zinc reaching baseline in seven pore volumes, but FEIS Table 4.13 shows zinc as being higher than baseline at the end of restoration. Additionally, data for silver levels was inadvertently excluded from FEIS Table 4.9, which should have indicated that silver was restored to baseline in less than 1.87 pore volumes. Cobalt, cyanide, and aluminum are listed in FEIS Table 4.13, but not in Table 4.9. These parameters are not expected to be significantly affected by the sodium bicarbonate lixiviant proposed for use at the CUP, and are thus not among the list of parameters to be monitored in HRI License Condition 10.21. FEIS Table 4.13 shows baseline data for ammonia, but it appears that since ammonia was not used in the lixiviant at the Mobil Section 9 pilot test, it was not sampled for by Mobil during or after restoration.

footnote) between the two tables thus appear to be the result of the fact that each is based on a different report, and each summarizes data collected at different locations and times.

17. I consider the data from the Mobil demonstration to be the most accurate information available, in terms of predicting baseline and post-restoration groundwater quality at HRI's Church Rock Section 8 site. Moreover, the Mobil data is the most complete of the data sets reported in FEIS Table 4.9. Accordingly, the following discussion of test results pertains only to the Mobil demonstration test data. To properly interpret this data, reference must also be made to the information in FEIS Tables 3.19, 4.6, 4.7, and 4.10, as discussed below.

18. As shown in the second column of FEIS Table 4.9, when read together with the third column of FEIS Table 4.13 (this latter column is headed "Restored" on FEIS page 4-38)[4], the average well field baseline concentration (which is HRI's primary groundwater restoration goal for each parameter, pursuant to HRI License Condition 10.21) was restored for bicarbonate, cadmium, chromium, copper, fluoride, iron, lead, manganese, nickel, selenium, silver, and zinc after 9.7, 6, 12, 1.8, 1, 1, 1, 16, 1.8, 5, 1.87, and 7 pore volumes of restoration effort, respectively.[5] After 16.7 pore volumes of restoration effort, average well field baseline concentrations could not be restored for aluminum, arsenic, barium, boron, calcium, chloride, mercury, molybdenum, radium-226, sodium, sulfate, total dissolved solids, and uranium, as reflected in FEIS Tables 4.9 and 4.13.

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[4] The column headed "Restoration standard" on FEIS Table 4.13, page 4-38, reflects restoration criteria previously established for the Mobil Section 9 Pilot test, but these criteria are not relevant to the CUP, and accordingly should be disregarded. The relevant public drinking water standards are listed in FEIS Table 4.7, at page 4-30.

[5] Table 4.9 also shows that it took 16 pore volumes for magnesium to reach baseline during the Mobil Section 9 pilot test. However, this reflects an error made when Table 4.9 was constructed. To my knowledge, magnesium concentrations were not reported as part of the Mobil Section 9 pilot test, as reflected by magnesium's absence from FEIS Table 4.13.

19. By contrast, FEIS Table 4.10, at 4-34 (second column), shows the number of pore volumes needed to restore the Mobil water quality parameters to the relevant drinking water standards (listed in FEIS Table 4.7, at 4-30), which are the secondary groundwater restoration goals pursuant to HRI License Condition 10.21. Compliance with these drinking water standards was achieved after various pore volume levels of restoration effort, as shown in FEIS Table 4.10. As reported there, for the monitored parameters of barium, cadmium, chromium, copper, fluoride, iron, lead, mercury, nickel, nitrate, and zinc, levels were in compliance at less than one pore volume of restoration effort; chloride was in compliance at 3.9 pore volumes; selenium was in compliance at five pore volumes; manganese, sulfate, and total dissolved solids, were in compliance at 9.7 pore volumes; and uranium was in compliance at 12 pore volumes.[6]

20. Some of the water quality parameters that could not be restored to the average well field baseline levels during the Mobil test are not subject to any primary or secondary drinking water

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[6] Only arsenic and radium-226 are reported in FEIS Table 4.10 as not being in compliance with the applicable drinking water standards at the end of the 16.7 pore volume data collection effort at the Mobile Section 9 pilot site. As to arsenic, there may be one or more errors in the reported data. Arsenic is reported in FEIS Table 4.13, at 4-38, as being restored to a concentration of 0.14 mg/L, which is larger than the 0.05 mg/L standard of the primary standard. *See* FEIS Table 4.7, at 4-30. However, this is a typographical error carried into the FEIS from the Draft Environmental Impact Statement. In Attachment 1 of the 1986 Mobil Mining and Minerals Company report (referenced in footnote "a" of FEIS Table 4.13), it is stated that arsenic was restored to 0.014 mg/L, which is less than 0.05 mg/L standard. However, according to HRI's Pilot Report, arsenic levels did not go below the 0.05 mg/L standard until 16.7 pore volumes of restoration effort.

standards. For example, calcium, sodium, and molybdenum,[7] fall into this category. There are no primary or secondary drinking water standards for calcium, sodium, or molybdenum, because these are not considered hazardous to humans. Molybdenum is primarily a concern for cattle uptake, while sodium and calcium are considered nutrients. Parameters like sodium and calcium can have a large impact on total dissolved solids (TDS) calculations. The FEIS explained as follows that if any parameters not subject to primary or secondary drinking water standards cannot be restored by HRI to the well field baseline average, HRI would need to request a license amendment:

> HRI has stated that, consistent with relevant statutory and regulatory provisions and the provisions of other NRC ISL licenses, if it found that it were impracticable to restore to primary or secondary goals, it might request a license amendment that would allow some change in restoration requirements on a parameter-by-parameter basis (HRI 1996g).
>
> If a groundwater parameter could not be restored to its secondary goal, HRI would have to make a demonstration to NRC that leaving the parameter at the higher concentration would not be a threat to public health and safety and that, on a parameter by parameter basis, water use would not be significantly degraded. This situation might possibly arise with respect to the TDS parameter at the proposed project. TDS is a measure of the total sum of all dissolved constituents, but it is most affected by the major constituents (sulfate, chloride, calcium, bicarbonate, carbonate, fluoride, sodium, and potassium). However, not all the major constituents have a secondary or primary drinking water standard (for example bicarbonate, carbonate, calcium, magnesium, potassium). Consequently, it is possible that after groundwater restoration, the TDS secondary goal might be achieved, but the secondary goal for individual major ions that contribute to TDS might not be achieved. If such a situation occurred, HRI would have to make a demonstration to NRC that leaving a parameter at higher than secondary goal concentrations would not be a threat to public health and safety and that water use would not be significantly degraded. For groundwater with TDS concentrations less than the secondary goal, NRC staff have assumed that worst-case groundwater restoration would return water quality to the secondary goal, even though it cannot be achieved without leaving some of the major

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[7] As indicated in FEIS Table 4.6, at 4-28, the primary and secondary restoration goals are the same (*i.e.*, well field baseline average) for parameters lacking a public drinking water standard. *See also* FEIS Table 4.7, at 4-30 (listing the primary and secondary drinking water standards in force for various parameters).

parameters at higher than background concentrations (i.e., between primary and secondary goal concentrations).

FEIS, at 4-27 to 4-29.

21. As is evident from the data reported in FEIS Table 4.13, uranium and radium proved to be the biggest restoration challenges during the Mobil pilot test. As reported in FEIS Table 4.13, at 4-38, at the end of the restoration effort for the Mobil pilot test in September, 1986, uranium had a concentration of 0.319 mg/L, which is less than the NRC standard of 0.44mg/L. Radium measured in 1986 had a concentration of 59.9 pCi/L,[8] which is higher than the 5.0 pCi/L EPA standard, and higher than the baseline value of 10.225 pCi/L now present at HRI's Church Rock site. *See* FEIS Table 3.19, at 3-36. Radium and uranium are the two parameters that often make the water quality in ore zones unsuitable for drinking water, even prior to any uranium extraction activities, and, as further discussed in paragraph ~~16~~ 22, below, this is the case at HRI's Church Rock site.

22. Regarding these two parameters, it must first be recognized that at the Mobil site, only 15 percent of the orebody was subjected to ISL mining. Since the orebody being mined was not leached to completion (contrary to the situation when Church Rock well fields would be subject to restoration activities), mobilized levels of uranium were quite high when the restoration effort began. *See* HRI's Pilot Report, at pages 4-5 (pages not numbered). Additionally, at HRI's Church Rock site, the mean level of radium-226 (10.225 pCi/L) already exceeds the 5 pCi/L EPA standard, and the mean level of uranium (1.8 mg/L) already exceeds the NRC's 0.44 mg/L standard. *See* FEIS Table 3.19, at 3-36 (reporting water quality data collected at HRI's Church Rock site), and HRI

[8] This 1986 radium level contrasts with Mobil's 1985 radium measurement of 37.4 pCi/L, as reported by HRI in its Pilot Report.

License Condition 10.21. These high ore-zone concentrations now present at HRI's Church Rock site reduce the difficulties in restoring the uranium and radium levels in the groundwater to baseline, since the baseline level for uranium and radium is already so high.

23. In this proceeding, I had previously stated in this regard as follows:

> The staff recognizes that for uranium and radium, greater than 12 and 16 pore volumes, respectively, was needed to achieve relevant Federal standards. However, at 9.7 pore volumes, post-mining concentrations were greatly reduced [referencing, in a footnote, HRI's Pilot Report]. After achieving 9.7 pore volumes, uranium was at 0.54 mg/L, which was nearly at the NRC standard of 0.44 mg/L. Admittedly, radium was at 46.7 pCi/L, which is higher than the 5.0 pCi/L EPA drinking water standard. Because the injection and production wells will be completed in the ore zone within the Westwater Canyon aquifer, the NRC staff has concluded that the baseline values for radium will be elevated above the EPA standards.

Affidavit of William Ford, dated February 20, 1998, submitted as Staff Exhibit 9 to "NRC Staff's Response To Motion For Stay, Request for Prior Hearing, And Request For Temporary Stay," at ¶ 42 (excerpt). HRI had similarly noted in its Pilot Report that radium is "ubiquitous to uranium orebodies, and is known to generally exceed health standards" in such geochemical environments. Pilot Report, at 4.

24. Moreover, movement of mobilized uranium, radium, molybdenum, and arsenic away from a well field is readily retarded by the type of rock-water chemical interactions discussed in the FEIS, at pages 4-39, 4-48, and 4-57 to 4-58 (quoted in ¶¶ 12,13, and 14, *supra*). For example, this lack of movement is shown by the fact that prior to uranium extraction, wells in the ore body record high concentrations of uranium and radium, while wells outside the ore body do not. By contrast, an anion like chloride, which is not prone to such retardation, is usually found in nearly the same concentrations in wells inside or outside the ore body. Thus, I believe it is highly unlikely that

uranium, radium, or arsenic will impact water quality outside the restored well field area at HRI's Church Rock section 8 site.

25. Accordingly, given (1) the high pre-mining levels of uranium and radium now in the ore zone at HRI's Church Rock site; (2) the chemical inability of these groundwater constituents to move outside the well field area; (3) the requirement for a restoration demonstration; and (4) the annual surety updates, I believe it is extremely likely that the groundwater quality will be restored to acceptable levels following ISL mining at HRI's Church Rock Section 8 site. Accordingly, the risk that groundwater at Church Rock Section 8 will be permanently impacted, or that other such environmental costs will result from any lixiviant excursions that may occur, I judge to be very low.

Question 2

26. Question 2 states as follows:

> Based on local geology, what assurance is there concerning the likelihood of the existence of shears, fractures, and joints that could transmit appreciable quantities of water above or below the Westwater aquifer? How much greater assurance may reasonably be anticipated prior to commencing ISL operations at Church rock [sic] Section 8? What environmental costs may reasonably be expected to result from foreseeable difficulties at Church Rock Section 8?

April 21 Order, ¶ 2, at 2 (footnote omitted).

27. There is little likelihood that any faults at the Church Rock site would act as vertical pathways for groundwater migration, because of the projected thickness and rock type of the overlying confining units. Furthermore, as well fields are constructed, testing will be performed to look for any faults or fractures that could act as vertical pathways. If open vertical fractures or faults are detected, the well field design can then be adjusted to account for these structures prior to *in situ* leach mining. Therefore, pre-lixiviant injection testing in well fields will further reduce the potential

for vertical excursions to occur from faults or fractures. Should a vertical excursion occur, the excursion will very likely not impact water quality, in any overlying aquifer beyond the well field area. This is because if any vertical excursions occur, they would most likely be caused by injection wells, and because upper aquifer monitor wells are located directly over the well fields. Therefore, any vertical excursions that might occur should be detected in a timely manner, limiting the volume of overlying aquifer impacted. Finally, if any vertical excursions occur, license conditions adequately ensure that the excursion would be corrected in a timely manner, thereby meeting the primary and secondary groundwater restoration goals. Therefore, the environmental risks, impacts, and costs associated with vertical excursions caused by faults and fractures at the Church Rock Section 8 site, should be very low. The following FEIS excerpts support these conclusions:

> Given the projected thickness and rock type of the overlying confining units, there should be little likelihood that any faults in the Church Rock site would act as vertical pathways for groundwater migration from the mining zone to an overlying aquifer. HRI has not discovered any faults within the Church Rock site (HRI 1993a). The overlying confining unit consists of weakly indurated clay and shale, so that there is little potential for faults to act as vertical pathways (i.e., the faults are less likely to be open) for groundwater migration to an overlying sand. However, the potential for faults to act as vertical pathways is not non-existent. This is because stratigraphic observations cannot detect a fault if it has minor stratigraphic displacement or determine if the fault is open to groundwater flow. Therefore, HRI would conduct pre-mining tests to confirm aquifer confinement. Pre-mining tests for confinement at the Church Rock site would be the same as those described for the Crownpoint site.

FEIS, at 4-55. The relevant Crownpoint site description referenced above is found at FEIS page 4-43, and states as follows:

> HRI has stated that after a mine area has been identified, monitor wells (both overlying and in the production zone) and baseline mining wells would be installed (HRI 1996b). A hydrologic test would then be designed and conducted by pumping a single well relatively central to the proposed mining area. This well would be pumped at a constant flow rate so that the pressure drawdown (cone-of-depression) caused by water production would stress the formation and any potential hydraulic boundaries or barriers, such as the overlying confining clays and possible non-sealing faults.

> If the proposed mine area is sufficiently small, then the stress induced by pumping from a single well would test potential barriers. However, if it is determined that the observed maximum water level drawdowns across the proposed mine area are inadequate to test for confinement, a second pump test would be conducted (HRI 1996b). This test would involve producing multiple wells concurrently across the area, and observing the composite effect of the resulting pressure drawdown on the various monitor wells.
>
> Plots of the water levels versus time of pumping would be made for the overlying monitor wells and evaluated for pressure responses to pumping from the mine zone. Maximum drawdowns would be tabulated for each of the production zone monitor wells to ensure that adequate response was achieved for those wells (HRI 1996b). A Mine Unit Hydrologic Test Document would be assembled and submitted to the New Mexico Environmental Department for review. In accordance with NRC requirements, the Mine Unit Hydrologic Test Document would be reviewed by an HRI Safety and Environmental Review Panel to ensure that the results of the hydrologic testing and the planned mining activities are consistent with technical requirements and do not conflict with any requirement stated in the NRC license (HRI 1996b). After appropriate review of the Mine Unit Hydrologic Test Document and subsequent authorization by the New Mexico Environmental Department and HRI's Safety and Environmental Review Panel, injection of lixiviant would begin in the new mining unit (there would be no field recirculation prior to adding oxygen). Water levels would be taken on all monitor wells prior to each routine, bi-weekly water sampling and reviewed for unusual water level changes denoting any hydraulic connection with the mining zone.

28. Additional detail on hydrologic testing procedures is also provided on pages 82-84, and page 94, of the Crownpoint Uranium Project Consolidated Operations Plan, Revision 2.0, dated August 15, 1997.

29. If, despite all of the precautions described or referenced above, a vertical excursion occurs during ISL mining, the FEIS describes the steps which would be taken, as follows:

> In the event that an excursion were not corrected within 60 days of confirmation, HRI would terminate injection of lixiviant within the well field until aquifer cleanup was complete, or would provide an increase to the reclamation surety in an amount that was agreeable to NRC and which would cover the full cost of correcting and cleaning up the excursion. The surety increase would remain in force until the excursion was corrected. The written 60-day excursion report would state and justify which course of action would be followed .

FEIS, at 4-22.

30. Should the Presiding Officer nevertheless determine that the FEIS needs to be supplemented (*see* April 21 Order, ¶ 6, at 4), I offer the following discussion:

31. There is little likelihood that any faults, shears, fractures, joints, or other such structures at the Church Rock site would act as vertical pathways for groundwater migration, due to the projected thickness and rock type of the overlying confining rock units at the site. Furthermore, during HRI's well field construction, HRI will perform pump testing to detect any minor structures that could act as vertical pathways, pursuant to HRI License Condition 10.23. If open vertical structures are detected during HRI's pump testing, the well field design would be adjusted as necessary to account for these structures. Therefore, by the time HRI is ready to inject lixiviant into the first well field at its Church Rock site (*i.e.*, before any groundwater is contaminated by HRI's ISL operations), a greater certainty will exist as to whether there are any minor faults, shears, fractures, joints, or other such structures there that could act as vertical pathways. Accordingly, by that time, HRI will have gained additional geologic and hydrologic knowledge of the site, further reducing the chance that unknown structures are present which could serve as significant lixiviant pathways in the event any vertical excursions occur.

32. During HRI's ISL operations, all overlying aquifers would be monitored at the Church Rock site every 14 days, pursuant to License Conditions 10.22 and 11.3. If a vertical excursion is confirmed pursuant to License Condition 10.12, the sampling frequency of the monitor wells on excursion is increased pursuant to License Condition 11.3. In this situation, additional wells are often drilled into the overlying aquifer to determine the extent of the excursion, and to help determine the cause of the excursion. *See* FEIS, at 4-17.

33. If a vertical excursion occurs, the escaped lixiviant would be detected by monitor wells completed in the overlying aquifers. At HRI's Church Rock site, these monitor wells would be completed in aquifers directly over the well field at a density of one well per eight acres, as explained in the FEIS, at page 4-56, and detailed in HRI License Condition 10.20. Compliance with these requirements means that the upper aquifer monitor wells would be placed within the well fields, which is where vertical excursions would occur. This is because vertical excursions are most likely to happen when vertical pathways exist within or close to injection wells. Therefore, I believe most vertical excursions would be detected by the monitor wells in a timely manner, thereby limiting the volume of overlying aquifer impacted. Moreover, HRI License Condition 10.13 provides incentive to promptly treat contamination from any vertical excursions.

34. An excursion is considered corrected when upper control limit parameter concentrations are reduced to their upper control limits, pursuant to HRI License Condition 11.3. However, final restoration of groundwater impacted by ISL mining (whether by normal operations or by excursions) is judged to be successful when it meets the primary or secondary groundwater restoration goals of HRI License Condition 10.21. Therefore, as I explained in the response to question 1, it is extremely likely that after cleanup of a vertical excursion, the groundwater quality would be restored to acceptable levels, thereby ensuring that the water use of the impacted aquifer is maintained.

35. Restoration of the groundwater quality is further assured by License Condition 9.5, which requires a yearly reevaluation of the restoration surety, so that the surety may be increased to account for the cleanup of groundwater impacted by a vertical excursion. Therefore, I believe the

risk is very low that groundwater in an aquifer affected by a vertical excursion would be permanently impacted.

36. Accordingly, given the requirements stated in HRI's license, as outlined above, the chance that vertical excursions will occur at the Church Rock Section 8 site, go undetected, and result in permanent impact to overlying or underlying aquifers, or otherwise produce significant environmental costs, I judge to be very low.

Question 3

37. Question 3 states as follows:

> Qualitatively and, if possible, quantitatively, what are the effects on the quality of water that may reasonably be foreseen at the closest private water wells to Church rock [sic] Section 8, resulting from the poorest foreseeable condition of groundwater after restoration is completed?

April 21 Order, ¶ 3, at 2. The FEIS describes the location of the nearest private well, as follows:

> With the exception of HRI-owned wells, there are no wells within the Church Rock site boundary. This site is far away from any towns, and any operating private wells in the area are widely dispersed. The nearest operating private well is located just outside the southern boundary of the site and is completed in the Dakota Sandstone.[9] There are no other wells within 1.6 km (1 mile) of the site.

38. The referenced private well is more than one-half mile south of the southern boundary of Church Rock Section 8, and is identified as well "16. 16. 17" in Figure 2.7-1 (titled "Water Wells Within 1 Mile") of HRI's 1993 revised environmental report for Church Rock.[10] The Dakota Sandstone aquifer is the second overlying aquifer above the Westwater Canyon aquifer. Therefore,

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[9] HRI's 1993 revised environmental report for Church Rock, at 86, inaccurately indicates that this well taps "the Westwater Formation." I have verified that the subsequent FEIS reference to the Dakota Sandstone is accurate.

[10] This 1993 HRI report is located in Notebook 6.1 of the HRI Hearing File. The FEIS references this report as "HRI 1993a." *See* FEIS, at 7-5.

only vertical excursions could possibly impact this private well, since the groundwater from which this well draws does not come from the aquifer to be mined by HRI at Section 8. Furthermore, it is not clear whether this private well is even being operated, as reflected in HRI's 1993 revised environmental report for Church Rock, at page 86.

39. Moreover, as stated in the FEIS:

> HRI believes that the lateral direction of groundwater flow in the Dakota Sandstone at the Church Rock site is northerly (HRI 1996a). However, lateral groundwater flow has not been determined accurately at this time due to the lack of sufficient monitoring wells (HRI 1996a).

FEIS, at 3-35. If the groundwater flow in the Dakota Sandstone aquifer is to the north, well 16.16.17 would not be impacted even by vertical excursions of lixiviant. In the unlikely event that the groundwater flow direction in the Dakota Sandstone aquifer is to the south, well 16.16.17 would still be very unlikely to be impacted by any vertical excursion, for the reasons stated in my response to Question 2.

40. The statements expressed above are true and correct to the best of my knowledge, information and belief.

William H. Ford

William H. Ford

Sworn and subscribed to before me
this 11th day of May, 1999

Circe E. Martin

Notary Public
My commission expires: 03/01/03

CIRCE E. MARTIN
NOTARY PUBLIC
MONTGOMERY CO., MD.

Staff Exhibit 2

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE PRESIDING OFFICER

In the Matter of	)	
	)	Docket No. 40-8968-ML
HYDRO RESOURCES, INC.	)	
2929 Coors Road, Suite 101	)	Re: Leach Mining and Milling License
Albuquerque, New Mexico 87120	)	

AFFIDAVIT OF ROBERT D. CARLSON

I, Robert D. Carlson, being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Material Safety and Safeguards in the Uranium Recovery and Low Level Waste Branch of the Division of Waste Management. I am the NRC Project Manager responsible for managing environmental and safety reviews concerning Hydro Resources, Inc.'s application to conduct an in-situ leach (ISL) mining project at Crownpoint, New Mexico, and have served in this capacity since August 1996. I participated in the preparation of NUREG-1508, Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint New Mexico, dated February 1997 (FEIS). Preparation of the FEIS was done, in part, with the assistance of contractor support personnel from Oak Ridge National Laboratory (ORNL). A statement of my professional qualifications was previously filed in this proceeding as an attachment to my February 20, 1998, affidavit (Staff Exhibit 3 to NRC Staff Response to Motion for Stay, Request for Prior Hearing, and Request for Temporary Stay, dated February 20, 1998.

2. The purpose of this affidavit is to respond to Questions 4-7 posed by the Presiding Officer in his Memorandum and Order (Questions), dated April 21, 1999 (April 21 Order). ORNL personnel assisted in identifying information responsive to the Presiding Officer's questions.

> 3. [Question] 4. What are the adjusted benefits of the CUP, as stated in the FEIS, for one or two prices of yellowcake that are at or above the minimum price at which HRI would commence work on this project? (This is important because the price of uranium fluctuates and a reasonable cost/benefit picture requires an assessment of benefits at more than one arbitrary price.)

The Staff does not know the minimum price that HRI would commence work on Section 8 or the rest of the mining project. The FEIS cost/benefit analysis assumes a price of $15.70 per pound of U_3O_8 (FEIS Section 5.1). The "adjusted benefits" of the proposed project, using a similar cost/benefit analysis using two realistic U_3O_8 prices (*e.g.*, minimum prices) based on the current spot market value of uranium can be examined as follows.

4. The first step in the analysis is to determine the "minimum" prices. The FEIS, at page 5-3, states:

> The important point relevant to assessing the project's potential benefits to the local community is that the benefits depend on HRI's costs being lower than the future price of U_3O_8, which has been quite volatile. If the price of U_3O_8 is less than the costs of operation, then operations may be discontinued. If this happens, there would be no economic benefits to the local community.

FEIS Table 5.1 (reprinted here as Table 1) indicates that HRI's production costs would vary from $9.38 to $11.83 per pound, depending on where the U_3O_8 is mined, processed, and dried. Thus, a conservative estimate of benefits would be to assume prices of $9 and $12 per pound. These prices are conservative because they "bound" HRI's production costs as well as the current spot market price ($10.85 per pound) as of May 3, 1999. **www.uxc.com/review/ux_prices.shtml** (Ux Consulting Company LLC website).

5. The second step is to examine the project's benefits using these two alternative U_3O_8 prices. As discussed in the FEIS, both the employment generated by the project and the taxes paid by HRI would depend on the production of U_3O_8. In turn, the amount of U_3O_8 produced would depend on the market price and the cost of production. Table 1 (FEIS Table 5.1), below, shows HRI's projected costs of producing U_3O_8 for the alternative operations.

Table 1. Average production costs per pound of U_3O_8 under alternative project designs

Alternative configurations	Church Rock	Unit 1	Crownpoint
Haul loaded resin to other site for processing and drying	$11.36	$10.46	$9.46
Ship yellowcake slurry to dryer at other site for drying	$11.32	$10.48	$9.40
Ship yellowcake slurry to Texas for drying	$11.83	$11.05	$9.87
Stand alone—all processing done at each site	$11.30	$10.51	$9.38

Source: HRI, *Response to Request for Additional Information, Issue 92: Cost/Benefit Analysis*

6. The most important local benefit would be opportunities for employment and earnings. The FEIS assumes that the project would create about 100 long-term jobs with an average annual salary of around $24,000. FEIS at 5-3, Section 5.1.2. The number of jobs and average salary might be lower with U_3O_8 prices of $9 and $12 per pound (as compared to $15.70 per pound), if HRI decides to hire less workers and pay less salary. The Staff has no information from HRI to make revised assumptions regarding these matters.

7. There could be between $630,000 (see Table 2, below, which is a modified version of FEIS Table 5.4) and $840,000 (see Table 3, below, which is a modified version of FEIS Table 5.4) in annual royalty income going to holders of leases, depending on production from Unit 1. (There would be no individual lease holders receiving royalties from production of the Church Rock site. However, HRI would have to pay royalties to private companies holding lease rights at the Church

Rock site, *e.g.*, United Nuclear Corporation.) As indicated in the FEIS, at page 5-4, Section 5.1.2, this income would be concentrated (in the hands of about 9 lease holders), and would probably not have a widespread effect.

Table 2. Annual project benefits (assuming U_3O_8 at $9 per pound)

	Navajo Nation	Local Navajo communities	McKinley County/ Non Navajo
Employment	NA	Of 100 long-term jobs that would not require highly specialized skills, local communities could get up to 100 depending on how well HRI executes its intention to hire local Navajo.	Total estimated long-term jobs less those going to Navajo (about 40 if Navajo get 100).
Earnings	NA	Average annual earnings for local employees would be about $24,000.	Average annual earnings for management/technical positions would be about $36,000.
Royalties	None	$630,000 annually (assuming 1 million pounds of yellowcake produced annually from allotment leases at $9/lb.). This would be distributed among 9 lessors of Unit 1 properties.	None.
Taxes	$540,000 annually for Business Activities Tax (assuming 2 million pounds of yellowcake at $9/lb. and contingent on legal jurisdiction to tax).	Cannot tax.	$270,000 annually for real property tax (assuming 2 million pounds of yellowcake at $9/lb.).
	$15,000 for construction tax (assuming $500,000 in drill rig contracts).	Cannot tax.	$55,000 for personal property (based on value of assets at Unit 1 and Crownpoint).
Other benefits	NA	Several jobs related to income expenditure in local community or incidental services required by project.	Several jobs related to expenditures in the local community or incidental services required by project.

Table 3. Annual project benefits (assuming U_3O_8 at $12 per pound)

	Navajo Nation	Local Navajo communities	McKinley County/ Non Navajo
Employment	NA	Of 100 long-term jobs that would not require highly specialized skills, local communities could get up to 100 depending on how well HRI executes its intention to hire local Navajo.	Total estimated long-term jobs less those going to Navajo (about 40 if Navajo get 100).
Earnings	NA	Average annual earnings for local employees would be about $24,000.	Average annual earnings for management/technical positions would be about $36,000.
Royalties	None	$840,000 annually (assuming 1 million pounds of yellowcake produced annually from allotment leases at $12/lb.). This would be distributed among 9 lessors of Unit 1 properties.	None.
Taxes	$720,000 annually for Business Activities Tax (assuming 2 million pounds of yellowcake at $12/lb. and contingent on legal jurisdiction to tax).	Cannot tax.	$360,000 annually for real property tax (assuming 2 million pounds of yellowcake at $12/lb.).
	$15,000 for construction tax (assuming $500,000 in drill rig contracts).	Cannot tax.	$55,000 for personal property (based on value of assets at Unit 1 and Crownpoint).
Other benefits	NA	Several jobs related to income expenditure in local community or incidental services required by project.	Several jobs related to expenditures in the local community or incidental services required by project.

8. As discussed in FEIS Section 5.1.3 and indicated in Tables 2 and 3 above, significant tax revenues would be collected by McKinley County and possibly the Navajo Nation regardless of the price of U_3O_8.

9. The potential costs of the proposed project to the local communities would not change from those discussed in the FEIS (Section 5.2), regardless of the price of U_3O_8.

10. [Question] 5. Because of financial and market uncertainties, it is foreseeable that Churchrock Section 8 will be the only section developed. What are the governmental needs that arise because of the CUP? Would local governments need to make any capital expenditures that might not be recouped if the CUP suspended or terminated mining operations without going beyond Section 8? In light of the financial situation of local governments, would environmental justice considerations require

indemnification or assurances to local governments for possible losses?[footnote: *See Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 100 (1998).]

The demand for public infrastructure and services (*i.e.*, "governmental needs") associated with the proposed project would decrease if Church Rock Section 8 were the only section of the project developed. Typically, increases in the demand for public infrastructure and services are related to increases in population.

11. As discussed in FEIS Section 4.9.2, HRI's proposed project may cause increases in population of about 25-40 people (less than 0.1 percent of the 1990 McKinley County population of 60,686) and such increases would not be significant. FEIS at 4-99. Therefore, the FEIS concludes that no significant or detrimental effects on housing, schools, utilities, or other public services would occur as a result of project-related population growth in Crownpoint or other communities in the project vicinity. This conclusion, which also relates to environmental justice considerations, would remain valid if Church Rock Section 8 were the only section developed by HRI since mining there is only projected to last six years, *see* FEIS at 4-97 to 4-98, and the resulting population increase would be less than that mentioned above.

12. With respect to HRI's proposed project, the most significant risk in terms of "governmental needs" would be the need to replace the town of Crownpoint's water supply wells *See* FEIS Section 4.3.1.1. If the entire project were developed, HRI would be required to pay for water supply well replacement and to reimburse the town of Crownpoint for operating costs that would occur because of the drawdown of the water table. *See* FEIS Section 4.3.3; Source Material License SUA-1508, License Conditions (LCs) 10.16 and 10.27. The FEIS concludes that little or no adverse effect would occur to the community because these required mitigation measures would

provide a process to assure that replacement wells are acceptable. The need to replace the wells would *only* stem from project development at the Crownpoint site, and *not* from development at Church Rock Section 8. Therefore, the conclusion that the need to replace Crownpoint water supply well is the most significant governmental needs risk remains valid if Church Rock Section 8 were the only section of the project developed.

13. Because project-related population increases would be less than predicted in the FEIS if Church Rock Section 8 were the only section of the project developed or due to lower uranium prices, there would be only slight changes in demand for emergency, fire, and police services. FEIS Section 4.9.4, at page 4-100, notes that "although the probability of accidents related to the project's operation is very low," responding to radiological hazards associated with the processed material "would result in the need for additional standby emergency services that currently are not required or available in the Church Rock area." As discussed in FEIS, HRI has made several commitments to address these issues which include providing "the local hospital with the proper equipment, on-going training for hospital staff, and a separate room equipped for decontamination (Pelizza1996a)." FEIS at 4-100. HRI's proposed mitigation measures have been found adequate for the entire project, and therefore would suffice if Church Rock Section 8 were the only section of the project developed.

14. Traffic on New Mexico Highway 566 would increase as project employees commute to Church Rock Section 8 during the work week. Because existing traffic on this road is very light, *see* FEIS at 4-100, the additional traffic associated with the project would not cause congestion or traffic problems. Average Annual Daily Traffic on Highway 566 (which extends north from I-40 through the town of Church Rock, then bypasses the Church Rock mining site and continues north into the

Navajo Indian Reservation property) from 1990 to 1994 was 3,490 vehicles. FEIS at 4-101. This volume of traffic is consistent with the Transportation Research Board's "peak hour Level of Service (LOS) rating of 'C,' which is characterized by stable traffic flows." *See* FEIS at 4-101. "Using the methodology in *Highway Capacity Manual* (Transportation Research Board 1985) for evaluating traffic flow on rural two-lane highways, at peak project [*i.e.,* the entire Crownpoint project] employment (assuming the addition of up to 100 vehicles at rush hour) the additional traffic would not degrade the existing LOS." FEIS at 4-101. Therefore, there would be even less traffic impacts associated with mining at Church Rock Section 8 only based on the reduced number of people/employees discussed in paragraph 11, above.

15. For the reasons discussed above and in FEIS Section 4.9, it is not likely that local governments would need to make any capital expenditures that might not be recouped if HRI suspended or terminated mining operations without going beyond Church Rock Section 8. Any "losses" to local governments could be addressed as part of socioeconomic mitigation measures required by the license. FEIS Section 4.9.6 discusses the mitigation of socioeconomic impacts provided for in the Staff-recommended action (Alternative 3). Such measures are addressed in LC 9.13 (HRI required to have applicable Memoranda of Agreements with local authorities, the fire department, medical facilities, and other emergency services), LC 9.14 (HRI required to obtain necessary permits and licenses from the appropriate regulatory authorities), LC 10.16 (HRI required to reimburse operators of the Crownpoint water supply wells for any increased costs caused by the project), and LC 10.27 (HRI required to replace the town of Crownpoint's water supply wells).

> 16. [Question] 6. What are the financial effects of uncertainties about the application of a tax on the CUP by the Navajo Nation? In light of these uncertainties and the possibility of litigation about this tax, are the parties willing to offer to begin

> negotiation with relevant governments? Have negotiations begun? Are negotiations producing results?
>
> As stated in FEIS Section 4.9.5.2:
>
> Potential tax collections by the Navajo Nation would be through the Navajo Business Activities Tax (BAT) and the BAT Construction Tax. . . .
>
> [These taxes] apply to activities on the Navajo Reservation and in areas outside the reservation if such areas meet the definition of "Indian country." The proposed project would not be located on the Navajo Reservation. However, the BAT could apply to the project's gross receipts if it is determined that the project would be within Indian country. The definition of Indian country may be viewed by some as vague and may ultimately be determined through litigation.

The above excerpt from Section 4.9.5.2 of the FEIS reflects that HRI is litigating such issues in the U.S. Court of Appeals for the 10th Circuit. While the Staff is of the opinion that the financial effects of uncertainties related to these taxes is unclear, the FEIS already recognizes that, for the Navajo Nation, if taxes are not applied to the project, there would be the loss of the potential tax revenues as reported in FEIS Table 4.29 on page 4-102.

17. The NRC Staff has no information as to whether the parties are willing to begin negotiations with relevant governments, whether negotiations have begun, or whether the negotiations are producing results.

> 18. [Question] 7. For Churchrock [sic] Section 8 . . .: What is your comparative analysis of the NRC Staff-Recommended Action to: (1) the non-action alternative, and (2) Alternative 2 (modified action) -- including a concise, descriptive summary of the advantages and disadvantages of the options? *See* CEQ "Memorandum to Agencies; Answers to 40 Most Asked Questions on NEPA Regulations," 46 Fed. Reg. 18,026; *see also* 40 C.F.R. § 1502.14 (Council on Environmental Quality, guidance). *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 98 (and 97-99) (1998). In your answers to this question, please consider the answers to the questions set forth above in your overall discussion. [footnote omitted]

Tables 4 through 15 (attached) provide the NRC Staff's comparative analysis for Church Rock Section 8 of the "NRC Staff-Recommended Action" alternative (Alternative 3) with the "No Action" alternative (Alternative 4) and the Modified Action alternative (Alternative 2). These tables summarize information in FEIS Sections 4.1 through 4.12.

19. In general, the NRC Staff-Recommended Action would have the advantage of allowing HRI to develop Section 8, while providing more environmental protection than the Modified Action (because of the additional mitigation measures recommended by Staff). The NRC Staff-Recommended Action would have the disadvantages of being more expensive for HRI than the Modified Action alternative and of creating impacts that would not exist under the No Action alternative.

20. The Modified Action alternative would have the advantage of allowing HRI to develop Section 8 at a lower cost than under the NRC Staff-Recommended Action, but would have the disadvantages of providing less environmental protection than the NRC Staff-Recommended Action (because there would be no additional mitigation measures recommended by staff) and of creating impacts that would not exist under the No Action alternative.

21. The No Action alternative would have the advantage of maintaining the status quo and avoiding the minimal impacts (to air quality and noise, geology and soils, groundwater, surface water, transportation risks, health physics and radiological risks, ecology, land use, socioeconomics, aesthetics, cultural resources and environmental justice) associated with development of Section 8. The disadvantages of the No Action alternative would be not allowing any uranium production from Section 8 and any of the beneficial socioeconomic impacts discussed in the FEIS. *See* FEIS Sections 4.9.1, 4.9.5, 5.1.2 and 5.1.3.

TABLE 4. AIR QUALITY AND NOISE (CHURCH ROCK -SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Air quality and noise impacts in Church Rock Section 8 will be relatively insignificant under both Alternatives 2 and 3.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): - Utilize dust suppression techniques to reduce fugitive dust from unpaved roads	Under Alternative 3, the NRC Staff's recommendation to utilize dust suppression techniques to reduce fugitive dust from unpaved roads was primarily for the Crownpoint and Unit 1 sites (i.e., Church Rock Section 8 has only a short stretch of unpaved roadway). However, construction and maintenance activities at the Church Rock well fields, and traffic on the facility grounds could result in creation of some fugitive dust, thereby necessitating use of some form of dust suppression technique.
ALTERNATIVE 4 (NO ACTION)	No impacts to air quality; no noise impacts.	

TABLE 5. GEOLOGY AND SOILS (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Geological and soils impacts at Church Rock Section 8 are expected to be minimal under both Alternatives 2 and 3. Under Alternatives 2 or 3, HRI has not determined which of its proposed groundwater restoration approaches or methods of waste water disposal it will utilize.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): 1. No construction of above grade wastewater retention ponds prior to NRC approval of embankment engineering system. 2. Maintain sufficient reserve capacity in retention pond system to enable transfer of contents among ponds. 3. Submit detailed site reclamation plan for NRC approval 12 months prior to shutdown. 4. Maintain adequate financial surety to cover reclamation costs.	Under Alternative 3, the NRC Staff imposes additional license requirements to ensure licensee compliance with regulatory requirements. - Reduces risk of surface water and soils being contaminated from structural failure of the retention ponds. - Reduces risk of surface water and soils being contaminated from over-topping of the retention ponds. - Ensures adequate safety evaluation review is conducted of licensee's reclamation plan. - Establishes adequate funding to ensure all groundwater restoration and surface reclamation costs are covered.
ALTERNATIVE 4 (NO ACTION)	No impacts to geology or soils.	

TABLE 6. GROUNDWATER (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Alternative 2 has a higher risk than Alternative 3 that groundwater could potentially be contaminated by vertical excursions and that the groundwater may not be properly restored
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI):	
	1. Perform well integrity tests on each injection and production well before use.	- Reduces risk of aquifer contamination from vertical excursions.
	2. Dispose of all liquid effluents from process buildings and other process waste streams in NRC-approved manner.	- Ensures licensee requirement to obtain NRC review and approval of any future liquid waste effluent disposal option.
	3. Do not exceed maximum flow rate of 15,000 Lpm (4000 gpm) at ion exchange plant.	- Ensures potential risk scenarios are within the scope of the EIS/SER review.
	4. Establish NRC-approved effluent and environmental monitoring program.	- Ensures licensee's environmental monitoring program meets NRC regulatory requirements.

TABLE 6. GROUNDWATER (CHURCH ROCK - SECTION 8) (Cont'd)

ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	5. Establish baseline water quality data at NRC-specified locations in well field.	- Improves baseline characterization and reduces risk of inadequate restoration.
	6. Collect sufficient water quality data and conduct sufficient hydrologic confinement tests to characterize the Cow Springs aquifer.	- Reduces risk of Cow Springs aquifer contamination from vertical excursions.
	7. Conduct acceptable groundwater restoration demonstration; determine number of pore volumes required for restoration; determine amount of surety based on demonstration.	- Reduces risk of inadequate groundwater restoration by setting an adequate level of surety.
	8.Conduct Westwater Canyon aquifer step-rate injection test.	- Reduces risk of contaminating overlying aquifers from vertical excursions caused by high injection pressures.
	9. In the event of vertical excursion, explore significant aquifers above Dakota sandstone aquifer for vertical excursions.	- Ensures that all aquifers contaminated by vertical excursions are identified and cleaned up.
	10. Develop NRC-approved groundwater restoration plan.	- Reduces risk that groundwater will not be adequately restored.
	11. Maintain adequate financial surety to cover groundwater restoration costs.	- Reduces risk that groundwater will not be adequately restored.
	12. Complete all wells to NRC-established specifications.	- Reduces risk of contaminating overlying aquifers from vertical excursions.
ALTERNATIVE 4 (NO ACTION)	No impacts to groundwater.	

TABLE 7. SURFACE WATER (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Surface water impacts in Church Rock Section 8 are expected to be minimal under both Alternatives 2 and 3. Under Alternative 2 no design details have been provided to NRC by HRI.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): - No construction of wastewater retention ponds prior to NRC approval of embankment engineering system.	Under Alternative 3, the licensee will be required to provide design details to the NRC Staff for approval of its waste water retention ponds prior to operation. The NRC Staff has provided additional guidance to HRI for design of surface water impoundments and erosion protection measures, which will further minimize any potentially adverse impacts from construction of the facility.
ALTERNATIVE 4 (NO ACTION)	No impacts to surface water.	

TABLE 8. TRANSPORTATION RISK (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Although the number of shipments of U_3O_8 and other materials would be the same under both Alternatives 2 and 3, transportation risk would be reduced under Alternative 3 because of additional NRC-required safety measures.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): 1. All delivery trucks must carry appropriate certifications of safety inspections. 2. All delivery trucks must hold appropriate licenses.	
ALTERNATIVE 4 (NO ACTION)	No increased transportation risk.	

TABLE 9. HEALTH PHYSICS AND RADIOLOGICAL IMPACTS (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Radiological impacts in Church Rock Section 8 are expected to be minimal under both Alternatives 2 and 3. HRI will restrict access to operating and restoring wellfields, which will reduce potential exposures to the public.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): 1. All U_3O_8 must be stored inside restricted area; liquid oxygen tanks must be located in well fields; other chemical storage tanks must be located on concrete pad near waste retention pond. 2. Maintain an area within restricted area boundary for storing contaminated materials prior to disposal; all contaminated waste must be disposed of at NRC- or Agreement State-licensed radioactive waste disposal site.	Under Alternative 3, HRI would be required to clean-up the wellfields (or any other part of the restricted area) after use before allowing unrestricted access. This will allow NRC staff to verify compliance with regulatory clean-up standards for those affected areas related to the mining process.
ALTERNATIVE 4 (NO ACTION)	No health physics or radiological impacts.	

TABLE 10. ECOLOGY (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Ecological impacts in Church Rock Section 8 are expected to be minimal under both Alternatives 2 and 3. The amount of land disturbed in Section 8 would be the same (between 140 and 150 acres) under Alternatives 2 and 3.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): 1. Revegetate disturbed areas with NRC-recommended seed mixture. 2. Follow NRC guidelines listed in FEIS for revegetating disturbed areas. 3. Implement methods for discouraging waterfowl use of project retention and evaporation ponds.	Under Alternative 3, impacts would be would be further reduced because revegetation guidelines recommended by the NRC Staff (which were adopted from the Navajo Nation EPA guidelines) were specifically designed for the terrestrial and meteorological environment in which the project would be located. Additionally, Alternative 3 includes measures to discourage waterfowl use of project ponds, which should reduce potential impacts to waterfowl in the area.
ALTERNATIVE 4 (NO ACTION)	No impacts to ecological resources.	

TABLE 11. LAND USE (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts same as under Alternative 3 (no grazing permits affected; no allottee lands affected).	Land use impacts in Church Rock Section 8 are expected to be minimal under both Alternatives 2 and 3. Surface rights to Section 8 of the project are owned by HRI, and therefore no grazing permits or allottee lands will be affected.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts same as under Alternative 2 (no grazing permits affected; no allottee lands affected).	
ALTERNATIVE 4 (NO ACTION)	No land-use impacts.	

TABLE 12. SOCIOECONOMICS (CHURCH ROCK -SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Adverse socioeconomic impacts from mining on Church Rock Section 8 are expected to be minor under both Alternatives 2 and 3. The number of jobs created (approximately 60), the amount of income generated (between $1-1.7 million annually), and the amount of tax revenues generated (at least $250,000) would be the same under both Alternatives 2 and 3.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): 1. Document intention to hire local Navajo in written project hiring plan. 2. Provide annual report concerning employment of local Navajo. 3. Develop memorandum of understanding with local governments to outline responsibilities for emergency medical response and training.	Under Alternative 3, beneficial effects would be increased because the Navajo hiring practices recommended by NRC Staff would help ensure that local residents benefit from the project. Alternative 3 also includes the additional measure of developing an MOU to ensure that local governments do not have to pay for increased fire and emergency medical services.
ALTERNATIVE 4 (NO ACTION)	No socioeconomic impacts.	Alternative 4 would mean the potential loss of jobs, royalties, increased salaries, and tax revenues to the local populace.

TABLE 13. AESTHETICS (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Impacts on aesthetics at Church Rock Section 8 are expected to be minimal under both Alternatives 2 and 3.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): - Develop and implement NRC-approved site reclamation plan.	Under Alternative 3, the long-term impacts (e.g., permanently disturbed land areas) would be minimized because of the development and implementation of an NRC-approved reclamation plan by the licensee -- which would include the revegetation guidelines discussed under ecological resources.
ALTERNATIVE 4 (NO ACTION)	No impacts to aesthetic resources.	

TABLE 14. CULTURAL RESOURCES (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Cultural resource impacts are expected to be minimal at Church Rock Section 8 for both Alternatives 2 and 3.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): - Develop and implement NRC-approved cultural resources management plan.	Under Alternative 3, cultural resource protection would be enhanced because of the development and implementation of an NRC-approved cultural resources management plan. The plan would include additional NRC Staff recommended measures in the event that HRI's policy of "total avoidance' is not practicable.
ALTERNATIVE 4 (NO ACTION)	No impacts to cultural resources.	

TABLE 15. ENVIRONMENTAL JUSTICE (CHURCH ROCK - SECTION 8)

ALTERNATIVES	IMPACTS	COMMENTS
ALTERNATIVE 2 (MODIFIED ACTION)	Impacts more significant than under Alternative 3 (no mitigation measures except those proposed by HRI).	Adverse environmental justice impacts are potentially significantly higher under Alternative 2 than under Alternative 3.
ALTERNATIVE 3 (STAFF-RECOMMENDED ACTION)	Impacts less significant than under Alternative 2 (staff-recommended mitigation measures plus those proposed by HRI): 1. In the event of lixiviant excursion, notify Navajo Nation, BIA, and BLM by telephone within 24 hours and by letter within 7 days. Provide written report within 60 days. 2. In the event of retention pond leak, notify Navajo Nation, BIA, and BLM by telephone within 48 hours and provide written report within 30 days. 3. In the event of solution spill or embankment failure, notify Navajo Nation, BIA, and BLM by telephone within 48 hours and provide written report within 7 days. 4. Work with U.S.EPA and State of New Mexico to involve Navajo Nation in UIC permitting. 5. Facilitate negotiations between State of New Mexico and Navajo Nation in water rights permitting. 6. Consult with traditional practitioners of the Church Rock Chapter to ascertain whether specific ceremonies should be facilitated on project land.	Under Alternative 3, potentially significant environmental justice impacts would be avoided because HRI would implement the NRC Staff recommended measures for all resource areas. Additionally, the NRC Staff has included the Navajo Nation regulatory authorities in oversight and decision making regarding HRI's mining project in order to provide the Navajo Nation a more active role in regulating the project.
ALTERNATIVE 4 (NO ACTION)	No environmental justice impacts.	

22. Based on the Staff's comparative anaylsis in the FEIS and summarized in Tables 4-15, above, Alternative 3 (Staff Recommended Action) was superior to Alternative 2 (Modified Action) with respect to mitigating environmental impacts from the project. Similarly, Alternative 3 (Staff Recommended Action) was considered favorable to Alternative 4 (No Action) because the environmental impacts are acceptable (*i.e.*, insignificant and/or mitigable) and has socioeconomic benefits that flow from conducting mining operations at Section 8. These socioeconomic outweigh the benefits of the No Action alternative.

23. The foregoing is true and correct to the best of my knowledge and belief.

Robert D. Carlson

Sworn and subscribed to before me
this 14 day of May, 1999

Elva Bowden Berry
Notary Public
My commission expires:_____
ELVA BOWDEN BERRY
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires December 1, 1999