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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF THE SECRETARY
ADJUDICATION STAFF

Before Administrative Judge Peter B. Bloch

In the Matter of)
)
HYDRO RESOURCES, INC.)
(2929 Coors Road, Suite 101)
Albuquerque, NM 87120)
_____)

Docket No. 40-8968-ML
ASLBP No. 95-706-01-ML

ENDAUM'S AND SRIC'S WRITTEN PRESENTATION IN
OPPOSITION TO HYDRO RESOURCES, INC.'S
APPLICATION FOR A MATERIALS LICENSE
WITH RESPECT TO:

NEPA ISSUES CONCERNING PROJECT PURPOSE AND NEED,
COST/BENEFIT ANALYSIS, ACTION ALTERNATIVES,
NO ACTION ALTERNATIVE, FAILURE TO SUPPLEMENT EIS,
AND LACK OF MITIGATION

February 19, 1999

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INTRODUCTION

As part of their presentations pursuant to 10 C.F.R. § 2.1233, Intervenor Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Center ("SRIC") hereby submit the following legal brief in support of their opposition to Hydro Resources, Inc.'s ("HRI's") April 13, 1988 materials license application, as amended, and its license, because the environmental impact statements prepared by the Nuclear Regulatory Commission ("NRC") Staff, and the environmental reports prepared by HRI, fail to satisfy the National Environmental Policy Act ("NEPA") and its implementing regulations. NUREG-1508, Draft Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project Crownpoint, New Mexico (October, 1994) ("DEIS") (Hearing Record ACN 9411160064); NUREG-1508, Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico (February 29, 1997) ("FEIS") (Hearing Record ACN 9703200270); Church Rock Environmental Report Hearing Record ACN 8805200334/346 (April, 1988) ("Church Rock ER 1");

Supplemental Environmental Report Hearing Record ACN 9509070065 (April, 1989); Churchrock Revised Environmental Report, Hearing Record ACN 9304130421/9304130415 (March, 1993) ("Church Rock ER 2"); Environmental Assessment of Unit 1 Hearing Record ACN 9509080065 (January, 1992) ("Unit 1 ER"); Crownpoint Project Technical Report Hearing Record ACN 9211399381 (June, 1992) ("Crownpoint ER").

These documents are based on the mistaken assumption that the NRC needs to issue HRI a license. This approach has completely undermined the NEPA process. The statements of purpose and need in the DEIS and the FEIS admit the NRC believes its purpose is to give HRI a source material license. Since the cost-benefit analysis and the alternatives analysis are necessarily based on the statement of purpose and need, the analysis in the DEIS and FEIS are skewed in favor of project approval, rather than a reasoned evaluation of environmental impacts. The Staff's approach to mitigation and its refusal to supplement the NEPA documents also violate NEPA.

This brief is accompanied and supported by the expert testimony of Dr. Arjun Makhijani, David Osterberg, and Dr. Michael F. Sheehan. Dr. Makhijani is a qualified expert in nuclear engineering.¹ Dr. Makhijani's testimony ("Makhijani Testimony") is

¹ Dr. Makhijani was previously qualified to testify as an expert in nuclear engineering on the topics of decommissioning funding and the conversion component of the cost of tails disposal. Louisiana Energy Services, L.P. (Claiborne Enrichment Center), LBP 97-3, 45 NRC, 99 (1997), vacated as moot, CLI 98-5, 47 NRC 113 (1998).

attached hereto as Exhibit A. Mr. Osterberg is a qualified expert in energy economics.² His testimony ("Osterberg Testimony") is attached hereto as Exhibit B.³ Dr. Sheehan is a qualified expert in energy economics. Dr. Sheehan's testimony ("Sheehan Testimony") is attached hereto as Exhibit C.

REGULATORY FRAMEWORK

NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act was signed into law on January 1, 1970. National Environmental Policy Act, Pub.L. 91-190, § 2, Jan. 1, 1970, 83 Stat. 852, 42 U.S.C. § 4321 (1994) ("NEPA"). NEPA is "our basic national charter for protection of the environment." Council on Environmental Quality Regulations, 40 C.F.R. §1500.1 (1998). The purpose of NEPA is to "declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental

² Mr. Osterberg was found qualified to testify as an expert in energy economics by the licensing board in Louisiana Energy Services (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331, 344-345 (1996).

³ On January 11, 1999, Mr. Osterberg submitted testimony in support of ENDAUM and SRIC's presentation in opposition to Hydro Resources, Inc.'s Application for a Materials License with Respect to HRI's Lack of Technical and Financial Qualifications. Exhibits A-FF were attached to his testimony. Rather than reproduce each of those exhibits and resubmit them with this brief, they are not attached but referenced by letter. Exhibits submitted with Mr. Osterberg's testimony in support of this brief are identified by number.

Quality." 42 U.S.C. § 4321.

The policies and goals of NEPA are to:

(1)"create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans,"

(2) meet "the social, economic and other requirements of present and future generations," use all practicable means to improve and coordinate federal plans, functions, programs and resources to act as "trustee of the environment for succeeding generations", "assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings," "attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences," "achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities," and "enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources"; and

(3) "recognize that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment." NEPA § 101, 42 U.S.C. § 4331. The Supreme Court has recognized that NEPA Section 101 establishes a national commitment to protect and promote environmental quality. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 348

(1989) (holding that Forest Service is not required to perform worst case analysis and not required to include complete mitigation plan in impact statement).

To insure the federal government incorporates this commitment to environmental quality in decision making, NEPA requires federal agencies to follow certain "action-forcing" procedures.⁴ Among these procedures is the requirement, for every major federal action significantly affecting the quality of the human environment, that agencies prepare a detailed environmental impact statement ("EIS"), addressing any adverse environmental effects which cannot be avoided, alternatives to the proposed action, the relationship between local short-term uses and the maintenance and enhancement of long-term productivity of the environment, and "any irreversible and irretrievable commitments of resources that would be involved in the proposed action." NEPA § 102(2), 42 U.S.C. § 4332(2).⁵ See also Methow Valley, 490 U.S. at 348; Louisiana Energy Services (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 87 (1998) ("LES 2"). Agencies must also create methods and procedures to ensure that "presently

⁴ Senator Henry M. Jackson is credited with the phrase "action-forcing." 115 Cong. Rec. 40,416, 40,419 (1969); Louisiana Energy Services, (Claiborne Enrichment Center), LBP 96-25, 44 NRC 331, 340 (1996) ("LES 1") (citations omitted); Sierra Club v. Siegler, 695 F.2d 957, 964 (5th Cir. 1983). reh.den. 704 F.2d 1251 (1983).

⁵ NEPA Section 105 notes that NEPA's policies and goals are supplementary to those in existing authorizations for federal agencies. NEPA, § 105, 42 U.S.C. § 4335. Section 104 states that nothing in the purpose, policies or goals sections affects an agency's statutory obligations to comply with environmental quality standards or criteria or to coordinate or consult with other agencies, or to base action on recommendations or certifications of other agencies. NEPA, § 104, 42 U.S.C. § 4334.

unquantified environmental amenities and values may be given appropriate consideration in decision making along with economical and technical considerations," and evaluate "alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(2).⁶

The environmental impact statement (EIS) serves two purposes. First, the EIS insures that environmental values are included in the agency decision making process, allowing the agency to take a "hard look" at the environmental consequences of a proposed action. LES 2, 47 NRC at 87; Methow Valley, 490 U.S. at 349-50. The EIS should therefore provide "sufficient discussion of the relevant issues and opposing viewpoints to enable the decision maker to take a 'hard look' at environmental factors and to make a reasoned decision." LES 2, 47 NRC at 88, *citing Tongass Conservation Society v. Cheney*, 924 F.2d 1137, 1140 (D.C. Cir. 1991), *quoting Natural Resources Defense Council, Inc. v. Hodel*, 865 F.2d 288, 294 (D.C. Cir. 1988).

Second, the EIS allows the public a chance to review and comment on the

⁶ Other action-forcing requirements in Section 102(2) direct federal agencies to: (1) integrate the use of natural and social sciences and the environmental design arts in planning and decision making that may impact the environment, (2) recognize the worldwide nature of environmental problems and seek to prevent a decline in the quality of the world environment where consistent with the foreign policy of the U.S., (3) make information useful in improving the quality of the environment available to state county and municipal governments, individuals and institutions, (4) "initiate and utilize ecological information in the planning and development of resource-oriented projects", and (5) assist the Council on Environmental Quality. 42 U.S.C. § 4332(2).

proposal, and thus, participate in the decision making process. LES 2, 47 NRC at 88; Methow Valley, 490 U.S. at 349-350. The EIS is therefore designed to foster "informed decision making and informed public participation." LES 2, 47 NRC at 88 (citations omitted). Because other parts of the administrative record do not receive the same wide circulation and commenting as the EIS, it is essential that all relevant information be presented in the EIS. National Wildlife Federation v. Marsh, 568 F.Supp.985, 996-997 (D.C.Cir. 1983) (holding that "the cost-benefit analysis and the analysis of alternatives must be contained within the environmental impact statement standing alone, and not as complemented by the administrative record."), citing Grazing Fields Farms v. Goldschmidt, 626 F.2d 1068, 1072-74 (1st Cir. 1980); I-291 Why? Association v. Burns, 517 F.2d 1077, 1081 (2d Cir. 1975).

COUNCIL ON ENVIRONMENTAL QUALITY REGULATIONS

NEPA created the Council on Environmental Quality ("CEQ"). NEPA § 202, 42 U.S.C. § 4342. The CEQ has issued regulations for the implementation of the action-forcing provisions in NEPA Section 102(2). Council on Environmental Quality Regulations, 40 C.F.R. § 1500.1 (1998). See 40 C.F.R. Parts 1500-1517 (1998). In particular, the CEQ regulations implement NEPA's requirement for agencies to prepare an EIS. 40 C.F.R. Part 1502. An EIS should include a cover sheet, summary, table of contents, purpose and need for action, alternatives including proposed action, affected environment, environmental consequences, list of preparers, list of those to whom copies

are sent, index and any appendices. 40 C.F.R. § 1502.10. The alternatives section of the EIS is defined as the "heart of the environmental impact statement." 40 C.F.R. § 1502.11. Supplements to either a draft or final EIS are required if a) the agency makes substantial changes in the proposed action that are relevant to environmental concerns, or b) significant new circumstances or information relevant to environmental concerns exists, and an agency may supplement the EIS when it determines that the purposes of the Act will be furthered by doing so. 40 C.F.R. § 1502.9.

Each federal agency must comply with the CEQ regulations. 40 C.F.R. § 1507.2; Andrus v. Sierra Club, 442 U.S. 347, 356-58 (1979); Baltimore Gas & Electric v. NRDC, 462 U.S. 87, 100 n.12 (1983); Sierra Club v. Siegler, 695 F.2d at 964, 972; Executive Order 11991 directs federal agencies to "comply with the regulations issued by the Council except where such compliance would be inconsistent with statutory requirements." E.O. 11991, 3 C.F.R. 123-124 (1977). The CEQ regulations direct agencies to establish their own procedures to supplement, as necessary, the CEQ set of regulations. 40 C.F.R. § 1507.3(a).

NUCLEAR REGULATORY COMMISSION'S NEPA REGULATIONS

The NRC has adopted regulations to implement NEPA Section 102(2), consistent with the NRC's other governing statutes, "and which reflect the Commission's announced policy to take account of the [1978 CEQ regulations]." 10 C.F.R. § 51.10(a).

Environmental Report Requirements

To aid the NRC Staff with its environmental analysis, an applicant for a source materials license must submit an environmental report (ER) with its application. 10 C.F.R. §§ 51.45(a), 51.60(a) 51.60(b)(1)(iii). The NRC generally relies on the ER in preparing its own EIS. As the Courts have held, and CEQ regulations require, while an applicant may initially prepare an EIS, the agency must independently evaluate the EIS before adopting it, and is responsible for its accuracy. 40 C.F.R. 1506.5(a) See also Sierra Club v. Lynn, 502 F.2d. 43 (5th Cir. 1974), cert. den. 421 U.S. 994, 1975); Essex County Preservation Association v. Campbell, 536 F.2d 956, 960 (1st Cir. 1976). Accordingly, the ER "should contain sufficient data to aid the Commission in its development of an independent analysis." 10 C.F.R. § 51.45(c).

The ER must contain: a description of the proposed action, a statement of its purposes, a description of the environment affected, and it must discuss the following:

1. the impact on the environment of the proposed action, in proportion to significance,
2. alternatives to the proposed action, including the environmental impacts of alternatives,
3. the relationship between local short-term uses with the maintenance and enhancement of long-term productivity, and
4. irreversible and irretrievable commitment of resources involved if the proposed action is implemented.

10 C.F.R. §§ 51.45(b); 51.60(a).

The ER must also include an analysis that "considers and balances" the environmental impacts of the proposed action, its alternatives, alternatives available for reducing or

avoiding adverse environmental effects, along with the economic, technical and other benefits and costs of the proposed action and alternatives. 10 C.F.R. § 51.45(c). The analyses must quantify the factors considered "to the fullest extent practicable," and discuss important factors that cannot be quantified in qualitative terms. Id.

Environmental Impact Statement Requirements

When an EIS will be prepared, the NRC must publish a notice of intent to prepare an EIS and conduct a scoping process to define the proposed action, the issues to be discussed in depth, the issues that will receive limited coverage, identify other analyses and studies so they can be prepared and integrated in the EIS, and identify cooperating agencies and the means and timing for preparation of the EIS. 10 C.F.R. §§ 51.27, 51.29.

As soon as practicable afterwards, the NRC Staff prepares a draft EIS, which should be prepared concurrently or integrated with environmental impact analyzes and related surveys or studies required by federal law. 10 C.F.R. § 51.70(a).⁷ The NRC lays out the requirements for both the draft EIS and the final EIS under the draft EIS regulations. 10 C.F.R. § 51.91(a)(1). The draft EIS, and therefore the final EIS as well, should consist of: a cover sheet, summary, table of contents, purpose and need for action (and discussion of no action alternative), alternatives including proposed action, affected environment, environmental consequences and mitigating actions, list of preparers, list of

⁷ In the particular case of a materials license application, "except as the context may otherwise require, procedures and measures similar to those described in § § 51.70, 51.71, 51.72, and 51.73 will be followed." 10 C.F.R. § 51.80(a).

those to whom copies are sent, substantive comments received and NRC Staff responses, index and any appendices. 10 C.F.R. Part 51 Appendix A(1)(a), (4). The EIS includes consideration of major points of view concerning the environmental impacts of the proposed action and alternatives, and analyzes the significant problems and objections raised by other agencies, affected Indian tribes and individuals. 10 C.F.R. § 51.71(b). The EIS lists all federal permits, licenses, approvals and other entitlements necessary for the proposed action, and indicates if it is uncertain whether a particular approval is necessary. 10 C.F.R. § 51.71(c).

The EIS must additionally contain an analysis that weighs the environmental impacts of the proposed action, its alternatives, alternatives available for reducing or avoiding adverse environmental effects. 10 C.F.R. § 51.51(d). The EIS "should also include consideration of the economic, technical and other benefits and costs of the proposed action and alternatives and indicate what other interests and considerations of federal policy, including factors not related to environmental quality if applicable, are relevant to the consideration of environmental effects of the proposed action." 10 C.F.R. § 51.71(d). The analyzes must quantify the factors considered "to the fullest extent practicable," and discuss important factors that cannot be quantified in qualitative terms. Id.

The EIS must give "due consideration to compliance with environmental quality standards and requirements," such as zoning and land use regulations, thermal or water

pollution limitations, or requirements imposed by federal, state, and local agencies responsible for environmental protection. 10 C.F.R. § 10.71(d). The environmental impact of the proposed action covered by other environmental standards and requirements will be analyzed whether or not a certification or license has been obtained. Id.

Finally, the draft EIS normally makes a preliminary recommendation by the Staff, based on the information and analysis, after consideration of the environmental effects of the proposed action, and reasonable alternatives and weighing the costs and benefits of the proposed action. 10 C.F.R. § 51.71(e).

Notice of the publication of the draft EIS is published and the NRC Staff requests comments on the proposed action and the draft within a period of at least 45 days. 10 C.F.R. §§ 51.73, 51.74. After consideration of the comments received on the draft EIS, the NRC Staff prepares a final EIS, following the same format as the draft EIS. 10 C.F.R. § 51.91(a)(1). The final EIS will include responses to any comments to the draft EIS, discuss any relevant responsible opposing view not adequately discussed in the draft and respond to the issues raised, state how the alternatives considered and the decisions based on the final EIS will or will not achieve the requirements of sections 101 and 102(1) of NEPA and other environmental laws and policies, and include a final analysis and action recommendation. 10 C.F.R. § 51.91(a)-(d).

A supplement to either a draft EIS or a final EIS will be prepared if (1) there are

substantial changes in the proposed action relevant to environmental concerns, or (2) significant new circumstances or information relevant to environmental concerns and bearing on the proposed action. 10 C.F.R. §§ 51.72(a), 51.92(a). A notice of availability and a comment period will accompany release of a supplement. 10 C.F.R. §§ 51.72(c), 51.92(d)(1).

Record of Decision

The final EIS accompanies the decision making process and is considered by the Commission in its decision making. 10 C.F.R. § 51.94. A Commission decision on a proposed action shall be accompanied by a "concise public record of decision". 10 C.F.R. § 51.102(a). Until the record of decision is issued, the Commission cannot take action concerning the proposal that would have an adverse environmental impact or limit the choice of reasonable alternatives. 10 C.F.R. § 51.101(a)(1). The record of decision is prepared by the NRC staff director authorized to take the action. 10 C.F.R. § 51.102(b).

FACTUAL BACKGROUND

HRI's Environmental Reports

HRI submitted an environmental report to support its application in 1988. The Church Rock ER 1 evaluates mining at Section 8, and contains an introduction; site characteristics; description of proposed facility; effluent control systems; operations; restoration; environmental effects; alternatives, environmental approvals and

consultations; and references. Church Rock ER 1 at I-v. The revised Church Rock ER was submitted in 1993, and evaluates Section 8 and Section 17 at Church Rock. Church Rock ER 2 at 1. The sections headings are the same as Church Rock 1. Id. at I-iv. In both, the analysis of alternatives (open mining and underground mining) is half a page long. Id. at 393; Church Rock ER 1 at 440.

In January, 1992, HRI submitted the Unit 1 ER. This ER evaluates only Unit 1. Unit 1 ER at 1-1. It uses the same section headings as the Church Rock ERs: introduction; site characteristics; description of proposed facility; effluent control systems; operations; restoration; environmental effects; alternatives, environmental approvals and consultations; and references. Id. at I-iv. What is basically the same half-page alternatives discussion is included. Id. at 8-1.

The Crownpoint ER is limited to an evaluation of Crownpoint mining. Crownpoint ER at 1. This ER contains only an introduction; site characteristics; description of proposed operations; and restoration. Id. at I.

Draft Environmental Impact Statement

On November 14, 1994, the NRC published a "Notice of Availability of Draft Environmental Impact Statement: Notice of Opportunity for Hearing," for the Crownpoint Project, in the *Federal Register*. Hydro Resources, Inc., LBP 98-9, 47 NRC 261, 264 (1998) ("LBP 98-9"). The DEIS contains a cover sheet, abstract, summary and conclusions, foreword, acknowledgment, purpose and need for the

action, alternatives including the proposed action, the affected environment, environmental consequences, monitoring and mitigation, consultation and coordination, list of agencies and organizations receiving the DEIS, references and appendices.

With respect to need for the project, the DEIS states that "Because this project is neither sponsored nor funded by the Federal government, the purpose of this DEIS is neither to justify nor establish an economic need for the project." DEIS at 1-7.

Economic considerations would dictate whether the mine is constructed or operated after licensing. Id. It concludes that NEPA requires the DEIS state the underlying purpose to which the reviewing agencies are responding, licensing an ISL mine, and lists the health and safety criteria of some applicable NRC regulations for licensing.

Id.

The DEIS evaluates four alternatives: (1) mining at Crownpoint and Church Rock, as proposed by HRI, (2) mining at Crownpoint and Church Rock, with modifications to alleviate minor deficiencies in the application, (3) mining at Crownpoint and Church Rock using underground mining, and (4) no action. DEIS at 2-1 - 2-3. It selects Alternative 2, and concludes that HRI should be issued a combined Source and Byproduct Material License. DEIS at xv-xvi.

Final Environmental Impact Statement

On February 28, 1997, the NRC staff issued the FEIS. The FEIS contains a coversheet; summary and conclusions; purpose of and need for the proposed action;

alternatives including the proposed action; affected environment; environmental consequences; monitoring and mitigation; costs and benefits associated with the proposed project; consultation and coordination; references; list of preparers; list of agencies, organizations and individuals receiving copies of the FEIS; and appendices. FEIS at v-xi.

The FEIS section entitled "Purpose of and Need for the Proposed Action" states that the purpose of the action is to license and regulate HRI's proposal and the need is NRC's need to act on the license application. FEIS at 1-3.

The FEIS lists four alternatives, which are different than those in the DEIS: 1) the action as proposed by HRI, 2) the action as proposed by HRI, "but as alternative sites and/or using alternative liquid waste disposal methods", 3) the action as proposed by HRI, "but with additional measures required and recommended by the NRC Staff to protect public health and safety and the environment, " and 4) no action. FEIS at 2-1.

The FEIS recommends alternative 3, and recommends that HRI receive a source and byproduct material license. Id. at xxi, 2-1.

ENDAUM's and SRIC's Concerns

In their Second Amended Request for Hearing, Petition to Intervene, and Statement of Concerns (August 15, 1997), ENDAUM and SRIC state that the FEIS and the ERs contain an inadequate statement of purpose and need, the FEIS and ERs fail to adequately quantify, qualitatively describe or weigh the costs and benefits of license

issuance. Id. at 150. The FEIS and ERs also fail to evaluate the costs and benefits of alternatives in the cost-benefit analysis. Id. ENDAUM and SRIC further explained that FEIS inadequately evaluates the the no action alternative and the action alternatives. Id. at 159-163. ENDAUM and SRIC stated their concern that the FEIS does not adequately consider mitigation for the significant adverse impacts of the project. Id. at 139-140. Lastly, ENDAUM and SRIC allege that significant new information and substantial changes in the proposed action warrant supplementation of the DEIS and the FEIS. Id. at 178-183. The Presiding Officer admitted these concerns as germane. LBP 98-9, 47 NRC 261, 281-282 and notes 62, 63, 64 (1998).

BURDEN OF PROOF

The environmental review under NEPA is subject to a "rule of reason," limiting review to environmental effects that can be reasonably forecast or have some likelihood of occurring. Northern States Power Company (Prairie Island Nuclear Generating Plant Units 1 and 2), ALAB-455, 7 NRC 41, 48 (1978); Arizona Public Service Company (Palo Verde Nuclear Generating Station, Units 1, 2 and 3), LBP 82-117A, 16 NRC 1964, 1992 (1982).

The licensing board has the authority to review the adequacy of the Staff's environmental review. Kerr-McGee Chemical Corp. (West Chicago) LBP-85-3, 21 NRC 244, 255 (1985). If a final environmental impact statement "disregards broad areas of environmental impact or fails to apprise the public of the nature of the proposed action

and its expected consequences, recirculation of the [EIS] may be necessary." Id. at 256 (citations omitted).

Generally, the NRC has the burden of proof when NEPA issues are involved. LES 1, 44 NRC at 338-339, citing Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), CLI 83-19, 17 NRC 1041, 1049 (1983). However, the applicant has the burden on contentions asserting deficiencies in the ER. LES 1, 44 NRC at 338. And, "should the Applicant become a proponent of a particular challenged position set forth in the EIS, the Applicant, as such a proponent, also has the burden on that matter." Id. at 339.

ARGUMENT

I. NEPA AND ITS IMPLEMENTING REGULATIONS REQUIRE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT FOR HRI'S PROJECT.

NEPA requires preparation of an environmental impact statement for major federal actions significantly affecting the quality of the human environment. 42 U.S.C. § 4332(2)(C). The NRC's regulations implementing NEPA, in 10 C.F.R. Part 51, repeat this requirement. 10 C.F.R. § 51.20(a)(1). In addition, Part 51 states that an EIS is required when the proposed action involves a matter in which the Commission has, in its discretion, determined should be covered by an EIS. 10 C.F.R. § 51.20(a)(2). The NRC regulations then list fourteen types of action which require an EIS, including "[i]ssuance of a license to possess and use source material for uranium milling or production of

uranium hexafluoride pursuant to Part 40 of this chapter." 10 C.F.R. § 51.20(b)(8).

An EIS is required for HRI's project, because it is a major federal licensing action which will significantly affect the quality of the human environment and because the Staff has already made the determination that an EIS should be prepared. The project is a federal action because the NRC, in licensing the project, is making a determination about the project's regulatory compliance. See Citizens' Awareness Network v. NRC, 59 F.3d 284, 293 (1st Cir. 1995) (holding that NRC cannot skirt NEPA by exempting a licensee from regulatory compliance with decommissioning, and calling it mere oversight, not a federal action); New Jersey v. Long Island Power Authority, 30 F.3d 403, 418 (3rd Cir. 1994) (private project can amount to a major federal action when federal agency has legal control over project). HRI's project will significantly affect the quality of the human environment by imposing a large industrial mine complex on a rural, agricultural community, and creating a significant risk of environmental impacts. In fact, the DEIS states,

ISL technology has never before been applied on a commercial scale in the New Mexico uranium mining production area. In addition, the proposed project could have significant impacts upon the rich cultural and environmental resources in the area.
DEIS at 1-1.

The FEIS acknowledges the project will have significant impacts on the environment. FEIS at 4-113, 4-116-4-118, 4-121.

Moreover, this project falls within the specific description of action type 8, listed

in Part 51, issuance of a source materials license for uranium milling under Part 40. 10 C.F.R. § 51.20(b)(8).⁸ An EIS is required.

II. HRI'S PROJECT VIOLATES NEPA BECAUSE THE FEIS AND THE ERs FAIL TO ADDRESS THE UNDERLYING PURPOSE AND NEED FOR THIS PROJECT.

A. The Final Environmental Impact Statement Violates NEPA Because the Statement of Purpose and Need is Inadequate.

An environmental impact statement must address the "underlying purpose and need to which the agency is responding." 40 C.F.R. § 1502.3. See also 10 C.F.R. Part 51, App. A Section 4. The EIS examines the need for a facility and the benefits it will create to assist the NEPA cost-benefit analysis. LES 2, 47 NRC at 89.

The need for the proposed facility is merely a shorthand expression to describe the principal beneficial factor that is to be weighed against the various costs of the proposal in striking the cost-benefit balance required by NEPA and the Commission's implementing regulations.

LES 1, 44 NRC at 349.

The NRC, in its statement of the purpose and need for the project, entirely misses the point. Rather, the FEIS provides an inaccurate and simplistic statement of purpose and need, which unreasonably distorts the entire FEIS. The FEIS section entitled "Purpose

⁸ 10 C.F.R. Part 40 broadly defines uranium milling as "any activity that results in the production of byproduct material," including surface wastes resulting from uranium extraction processes. 10 C.F.R. § 40.4.

of and Need for the Proposed Action" states:⁹

The purpose of the proposed action is to license and regulate HRI's proposal to construct and operate facilities for ISL uranium mining and processing. The NRC's need for action is to fulfill its statutory responsibility to protect public health and safety and the environment in matters related to source nuclear material (Atomic Energy Act of 1954 as amended). The BLM and BIA's need for action is to fulfill their statutory responsibilities to regulate mining activities on Federal and Indian lands (Mining Law of 1872, Allotted Lands Mineral Leasing Act of 1920, National Historic Preservation Act of 1966, Endangered Species Act of 1973, Federal Land Policy and Management Act of 1976).

FEIS at 1-3.

Thus, the NRC describes the purpose and need for the proposed action as the NRC's duty to license and regulate the proposal. This statement is insufficient for two reasons. First, the description of NRC's obligation is inaccurate. The Staff is not required to grant a license to HRI. Second, the statement fails utterly to identify any need, or benefit, that will be filled by the proposed action.

Elsewhere in the FEIS, in the chapter on costs and benefits, the Staff cites as benefits providing a domestic source of uranium and offsetting a "deficit" in domestic production. FEIS at 5-1. If these alleged benefits constitute the need for the project, then that should be stated clearly in the statement of purpose and need so that the public

⁹ Both Section 1.3 and Chapter 1 are entitled "Purpose of and Need for the Proposed Action." However, only section 1.3 relates to purpose and need. The remaining sections in Chapter 1 consist of an introduction, a short description of the proposed action, a statement of the scope of the FEIS, and descriptions of the scoping process and roles of cooperating agencies and other federal agencies. FEIS at 1-1 to 1-5.

and decision makers need not speculate.

An EIS bases its analysis of alternatives and cost-benefits with the purpose and need for the project. This is the point from which alternatives are identified and the cost-benefit analysis begun. Here, the FEIS commences that analysis based on the false assumption that the NRC needs to issue a license to HRI. This fault originates in the DEIS. DEIS at 1-7. In fact, the DEIS rejects the no-action alternative because NRC would not be able to license the project under that alternative. DEIS at 2-3 ("The No Action alternative also conflicts with NRC's regulations requiring license issuance if [health and safety criteria related criteria are met]").

From the beginning of its environmental review therefore, the NRC's decision making has been distorted by an incorrect statement of purpose and need, a "need" to issue HRI a license. This distortion has likely skewed the entire review process. Dr. Sheehan in fact concludes that the FEIS exaggerates the benefits of the proposed action while ignoring environmental costs. Sheehan Testimony at 7 and 51. Because it is fundamentally tainted by the NRC's woefully inadequate statement of need and purpose, the DEIS and the FEIS should be rejected, and the EIS scoping process re-initiated.

B. HRI's Environmental Reports also Fail to Provide an Adequate Statement of Purpose and Need.

A statement of purpose and need is also required for the ER. As a tool designed to aid the Commission in development of an independent analysis, the ER must contain a statement of the purpose and need for the proposed action. 10 C.F.R. §§ 51.45(b) and (c).

See LES 1, 44 NRC at 346-347 and n.5. The ER is submitted with the applicant's application and provides a basis for the Staff's EIS. HRI's mix of ERs (Church Rock ER 2, Unit 1 ER and Crownpoint ER) do not contain a statement of purpose. Each begins with a description of HRI's proposed activities, and nothing more. Church Rock ER 2 at 1; Crownpoint ER at 1; Unit 1 ER at 1-1. The HRI ERs are therefore insufficient and the application is deficient, warranting revocation of HRI's license.

III. HRI'S PROJECT VIOLATES NEPA BECAUSE THE FEIS AND THE ENVIRONMENTAL REPORTS FAIL TO PERFORM AN ADEQUATE COST-BENEFIT ANALYSIS.

NEPA requires federal agencies to balance the costs and benefits of a proposed action. Section 102(2) directs agencies to create methods and procedures to ensure that "presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economical and technical considerations." 42 U.S.C. § 4332(2). Thus, NEPA calls for a weighing of the environmental costs of a project against its technical, economic, or other public benefits. LES 2, 47 NRC at 88. "Misleading information on the economic benefits of a project, therefore, could skew an agency's overall assessment of a project's costs and benefits, and potentially 'result in approval of a project that otherwise would not have been approved because of its adverse environmental effects.'" Id., at 89, *quoting Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 447-448 (4th Cir. 1996) (holding that EIS's inflated estimate of economic benefits impaired fair consideration of adverse environmental effects). The

economic assumptions of the FEIS must therefore not be distorted as to impair fair consideration of the adverse environmental effects. Id.; Hughes at 446, *citing South Louisiana Environmental Council Inc. v. Sand*, 629 F.2d 1005, 1011-12 (5th Cir. 1980).

The NRC regulations require the EIS to contain a cost-benefit analysis of the proposed action and alternatives. 10 C.F.R. §§ 51.71(d), 51.90. See also 10 C.F.R. § 40.32; LES 1, 44 NRC at 348. This cost-benefit analysis must:

'to the fullest extent practicable, quantify the various factors considered' and '[t]o the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms.'

LES 1, 44 NRC at 348, quoting 10 C.F.R. § 51.71(d).

A. The FEIS Cost-Benefit Analysis Is Deficient Because it Inflates Project Benefits and Impairs Fair Consideration of the Environmental Effects.

In Section 1.3, the NRC states the need, and thus the primary benefit, of the proposed action is to license and regulate the project. Obviously this statement is not a public benefit and is insufficient to support a rational cost-benefit analysis, because the NRC is already statutorily required to evaluate license applications and regulate licensees. Elsewhere in the FEIS, in the section entitled, "Costs and Benefits Associated with the Proposed Project", the Staff cites as benefits the production of uranium, which eventually serves as fuel for nuclear reactors, supporting public interest in uranium supply, and offsetting a "deficit" in domestic production. FEIS at 5-1. If these alleged benefits constitute the need for the project, then that should be stated clearly in the

statement of purpose and need so that the public and decision makers need not speculate. Nevertheless, all of these alleged benefits are illusory. Moreover, the alleged secondary benefits of tax revenue, royalty and employment income from the project, are either unlikely to be realized, miscalculated or are unreasonably optimistic. The overall analysis in section 5 is based "on demonstrably mistaken assumptions about prices, costs, and production levels." Sheehan Testimony at 12. Section 5 generally overestimates and emphasizes the alleged supply benefits of the project while ignoring or downplaying environmental costs. *Id.*, at 11-12.

1. The Staff Fails to Quantify or Qualitatively Describe the Alleged Benefits.

In violation of NEPA and NRC regulations, the FEIS fails to quantify the alleged benefits consisting of providing a domestic source of uranium for reactor fuel, supporting public interest in uranium supply, and offsetting a "deficit" in domestic production, all of which are readily capable of being quantified, or at least being qualitatively discussed on more than a superficial level. The FEIS, however, mentions these items briefly in the first paragraph of section 5. The Staff directs its evaluation toward other alleged benefits, explaining on the first page that its cost benefit analysis section,

describes the benefits and costs of the project for members of local communities, local governments, and the State of New Mexico. These effects would include those that are brought about by HRI's proposed operation, including the expansion of tax bases related to the mining and processing operation, and any additional demands on the infrastructure and

public services that would be imposed by the project. They also include the beneficial effects of project employment. FEIS at 5-1.

The rest of the cost-benefit section discusses only the secondary benefits, without further mention of the general "uranium-supply" type arguments it throws out in the first paragraph. Consequently, the cost-benefit section discusses only secondary benefits, and utterly fails to describe, let alone quantify the alleged public benefits of producing additional uranium supply.

2. There is no need for additional uranium production because there is adequate uranium supply while the demand for uranium is shrinking.

The Staff's passing claim that HRI's project will provide a public benefit by increasing domestic production and providing fuel for nuclear reactors is "seriously flawed economically." Sheehan Testimony at 8. There is no need for additional domestic uranium supply for the foreseeable future, and production of the HRI project cannot compete in the uranium market. Id.; Osterberg Testimony at 4. As Mr. Osterberg testifies, the level of government intervention in the uranium market has declined, leading the market forces of supply and demand to have a predictable effect on uranium prices. Id. at 36. The decreasing demand and increasing supply of uranium obviates the need for additional supply, and is driving down the price of uranium below the point where the HRI project can be viable.

a. Demand for uranium is decreasing, which has a negative effect on the price of uranium.

The demand for the uranium to be produced by HRI's project is generated by commercial nuclear power plants in the United States and around the world. Osterberg Testimony at 6. Demand for uranium is projected to decline because the number of nuclear units in the United States is declining.¹⁰ Id., at 6-17.

The last U.S. nuclear unit "in the licensing pipeline" went into service in 1996. Id., at 8. At that time, 110 units were on line. Id. In the past two years the number has dropped to 104. Six units have been taken out of service, and a seventh, Oyster Creek, is expected to close in 2000 after burning its last load of fuel. Id. Each of these units "closed early," before the end of their planned production life. Id. Many were poor performers with inefficient production and/or safety or operational problems. Id. at 11-12. Others were rated as good performers, but may have been vulnerable to competition from alternate power, in a more competitive electric industry. Id. at 7, 11.

Mr. Osterberg concludes that many of the other remaining units are likely to be

¹⁰ HRI's project may produce uranium that can fuel foreign nuclear units. Osterberg Testimony at 6. Producing fuel for foreign units which will not generate power for domestic users is not a public benefit. Nevertheless, "[d]emand for nuclear power has stalled in Western Europe . . . a moratorium or slowdown in construction of nuclear units was in effect in thirteen countries" at the end of 1993. Osterberg Testimony at 17-18. And, "[t]he few countries in which nuclear expansion is occurring have market and political conditions that promise to dampen the planned expansions," such as Russia and Ukraine, which are experiencing macro-economic problems, and Japan and South Korea, which have canceled completion schedules due to the Asian economic downturn. Osterberg Testimony at 18-19. Seven nuclear units in Canada were recently taken out of service. Osterberg Testimony at 19.

shutdown earlier than expected because they are also poor performers, or due to the increasingly competitive utility environment. Id. at 20. His conclusion is supported by the 1998 DOE Energy Information Administration ("EIA") report on Challenges of Electric Power Industry Restructuring for Fuel Suppliers, the 1997 Interstate Natural Gas Association of America Foundation report, the Public Citizen list of Nuclear Lemons, a 1998 Public Citizen report critiquing TVA and Biewald and White's 1998 study. Id. at 10-17. These studies project early shutdowns of nuclear units in varying terms of 12, 17, 19, 20, 24, 34, 42, 48 and even 90 U.S. nuclear units. Id., at 20. The EIA's yearly projections for nuclear capacity have decreased projections for worldwide nuclear capacity over the past five years. Id. at 6-7. Indeed, the EIA Case Reference report for 1998 predicts no growth in nuclear capacity world-wide between 1996 and 2000, a 0.1% increase per year until 2010, after which demand will decrease sharply. Id.

The decline in nuclear capacity has resulted in a decline in uranium consumption. Id. at 9-10. As the number of nuclear units decreases, the demand for uranium falls, and so does the price of uranium. Since several nuclear units were shutdown since 1996, uranium prices have fallen steadily. Id. at 16. Mr. Osterberg concludes that "the steady decline in the viability of nuclear units and the consequent decline in uranium prices raise profound questions about the economic viability of any new domestic uranium mine." Id. at 16-17. The demand for nuclear power plant fuel will steadily decline over the foreseeable future, which will drive down the price of uranium. Id. at 20.

b. There are many sources contributing to the supply of uranium, which has a negative effect on the price of uranium.

There are many components of uranium supply that would be competing with, and obviate the need for, the proposed project. Each of these factors will drive down the price of uranium. Osterberg Testimony at 35-36.

i. Other producers of new uranium.

Five companies, bigger and better capitalized than HRI, operate eight mines that account for two thirds of the production in the West. Id., at 21-22, 35. Canada and Australia are producing large amounts of uranium. Id. These other producers will make it difficult for HRI to compete.

ii. Military nuclear stocks have contributed to an increase in secondary market supplies.

Several sources of military stocks have, or may be, released to the market. Osterberg Testimony at 22-30, 35. First, the 1993 Agreement between the Government of the United States and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium from Nuclear Weapons ("Russian HEU Agreement") provides for the release of 500 metric tons of HEU (the equivalent of 398 million pounds of natural mined uranium U308) to the U.S. over 20 years.¹¹ Osterberg Testimony at 23-24. The Russian government holds an estimated

¹¹ HEU can be downblended with lower grade material to produce nuclear power plant fuel. Osterberg at 23.

700 more metric tons of HEU, so additional arrangements may result in the release of more Russian HEU. Id. at 24. Second, the U.S. military has decided to release 174 metric tons of its own military stocks, 156 metric tons of which can be used as power plant fuel. Osterberg Testimony at 27-28. TVA will take 38 metric tons, USEC will take 63 metric tons, which displaces 36.9 million pounds of U3O8. Id. The remaining 55 metric tons of surplus remains a potential source of fuel. Id. at 28. The U.S. may declare additional uranium to be surplus. The military has an estimated 575 metric tons remaining in its possession. Id. Third, a mixture of plutonium and uranium, recycled from spent power plant fuel, ("MOX") is being used to fuel foreign power plants. Id. at 29. MOX reduces uranium requirements by an estimated 8% per year. Id. This approach may eventually be used in the U.S. as well. Id., at 29-30, 35.

iii. Surplus releases on the market.

Utility companies, producers, brokers, enrichers and national governments are expected to release their uranium inventories to the market as electric markets become more competitive, and nuclear units are shut down. Osterberg Testimony at 30-33. This represents an enormous amount of uranium. At the end of 1997, the inventories held by utilities and uranium suppliers equaled 75.8 million pounds. Id. at 30. Mr. Osterberg concludes that "the released uranium will act as a short-term supply source, push down prices, and put extra pressure on uranium mining over the next few years." Id. at 31. Secondly, USEC has obtained inventories the equivalent of 75 million pounds

U3O8. Id. This inventory is much larger than the amount USEC requires for enrichment operations (about 13 million pounds per year) that it is anticipated USEC will put surplus supply on the market. Id. at 32. Thirdly, the DOE continues to hold 14.2 million pounds of uranium from Russian Feed (11,000 metric tons uranium) pursuant to the Russian HEU Agreement. Id. at 32-33. This stock can be sold outside the U.S., sold back to the Russians, and 3 millions pounds U3O8 worth can be sold in the U.S. after 2002. Id. at 32. Lastly, there are several hundred metric tons of enriched uranium in Kazakstan. While restrictions exist on sale in the U.S., 20 metric tons was recently imported into the U.S., and Mr. Osterberg concludes that "this new source of supply will find its way into the market in the next few years, causing more pressure on the price of newly-mined uranium." Id. at 33.

iv. Technological advances that reduce the need for natural uranium.

Technological advances have developed that allow increased efficiency and creates a greater quantity of enriched uranium from the same amount of natural uranium than in the past. Id. at 33. When USEC announced new enrichment methods that would underfeed natural uranium in 1998, the industry biweekly NuclearFuel referred to the development as the equivalent of a new 3.9 million pound/year uranium mine, which is more production than maximum output at all three HRI sites. Id., at 34. Russia's enrichment company has also made technological advances, and it was recently announced that they have reduced their need for natural uranium by reprocessing

enrichment tails. Id. at 34-35.

c. The FEIS is based on overly optimistic price Assumptions.

The FEIS, though issued in February, 1997, is based on 1995 price projection data from the EIA, which fails to include nearly all of the supply and demand factors described in sections a and b above. Osterberg Testimony at 37- 41. The projection relied on by the FEIS estimates the price for 1999 to be \$13.00 per pound. FEIS at Table 5-2. The current spot market price is \$10.50, \$2.50 less than projected. The projection was overly optimistic because it failed to take into account the Russian HEU agreement,¹² the decrease in demand caused by early closing of nuclear units, an additional 55 metric tons of HEU declared surplus by the U.S., and an additional 26 metric tons that may be released, the use of military plutonium as part of MOX fuel, the possibility additional military stocks of HEU and plutonium may be released, utility inventories of uranium that are likely to be released on the market, the market's underestimation of secondary sources of uranium, the DOE's holdings of Russian Feed, uranium supplies available in Kazakstan and the improved efficiency in enrichment technology. Osterberg at 38-39.

Consequently, uranium prices have generally remained below \$11.00 since 1990, and the short-term forecast is for prices to "worsen rather than improve". Osterberg

¹² The EIA issued another price projection in 1997 which included the 1993 Russian HEU agreement, but because it omitted the other factors listed above, it too was overly optimistic. Osterberg Testimony at 37-38.

Testimony at 40. The price predictions that optimistically predicted a rise in prices in the late 1990s have proven false. Given market conditions, it would be unreasonable to expect prices to improve to a level above HRI's production costs to make the project viable. Id., at 40, 43.

d. The proposed project is unnecessary to provide a sufficient supply of uranium.

Uranium from the proposed project will not provide any public benefit. As Mr. Osterberg concludes, "There is so much cheap uranium available from so many sources that there is no need for an additional source." Osterberg Testimony at 41. The other mines in production, secondary supply, in domestic military and civilian inventories, along with reduced demand and improved technology, "will dominate the market for years to come." Id., at 41-42. Any additional sources of uranium will only sour the market further. Id.

The problem with new uranium production is the same as with new enrichment facilities - too much supply and too little demand. LES 1 concluded, "the current and future worldwide supply of enrichment production capacity and the supply of enriched uranium continue to exceed well into the future, worldwide demand requirements." LES 1, 44 NRC at 355-56. Similarly, the current and future supply of uranium exceeds demand.

3. The Proposed Project Threatens Peace and Security.

The FEIS conflates DOE's statutory language "to encourage use of domestic

uranium" into some kind of mandate to offset a perceived deficit in domestic uranium production. FEIS at 5-1. No such mandate exists. Rather, the need to maintain global stability has eclipsed any need to produce additional uranium domestically. Indeed, recent enactments reflect Congressional intent to encourage domestic sales of Russian uranium processed from weapons, albeit in restricted though gradually increasing amounts, and of Department of Energy stockpiles. 42 U.S.C. § 2297h-10. Obviously, these provisions for imports and stockpile sales equate to Congressional acceptance of a purported "deficit" in domestic production. The Licensing Board in LES 1 concluded that the uranium market is an international market and hence there is no particular benefit from domestic production. LES 1, 44 NRC at 361. It also found the notion that domestic utilities would rather not deal with foreign producers implausible. Id. at 369.

Assuming that there is some benefit to increasing domestic supply, there is a large inventory with USEC, utility companies, and DOE holding a substantial inventory of Russian Feed. Osterberg Testimony at 42-43. Moreover, the purported deficit of 35 million pounds would be little affected by the assumed production of one million pounds annually at each of the project sites. See FEIS at 5-1.

Importantly, the proposed action could jeopardize the Russian HEU agreement, a fact which is not considered in the FEIS. Russia has a strong economic incentive to sell its uranium to the U.S., but its continued participation in the HEU agreement is threatened by declining uranium prices. Osterberg Testimony at 26-27, 42. Russia has

already threatened to slow its deliveries because of the low price it is currently receiving, and the U.S. government has actively sought to keep the deal together. Id. Mr. Osterberg concludes, "The entry of additional competitors into the marketplace may undermine the HEU Agreement and U.S. efforts to support it by further depressing uranium prices." Id. at 27.

4. There is no public benefit in either propping up the domestic uranium mining industry or in economic gain for HRI.

The Staff asserts that the U.S. Department of Energy ("DOE") statutory directive to encourage use of domestic uranium means the proposed project will create a public benefit by contributing to the viability of the industry. FEIS at 5-1. There is no explanation, let alone a qualitative or quantitative analysis of this so-called benefit. As Dr. Sheehan testifies, while the "viability of the industry may be of concern to DOE, support of a private industry does not necessarily provide a public benefit. . .In fact, propping up a domestic industry may involve costs to society, such as environmental degradation in the United States that could be absorbed by foreign producers." Sheehan Testimony at 8-9.

Moreover, licensing HRI's project cannot improve the condition of the domestic industry. Dr. Sheehan states:

[T]he market is not capable of absorbing currently developed domestic supply at current prices. This is evident from the substantial domestic uranium mining capacity which is currently shut in. The Staff never explains how adding substantially more high-cost supply at a time when margins are low or negative assists the domestic production industry. Licensing this mine will not offset a deficit in domestic production.

Sheehan Testimony at 9.

Section 5 mentions that HRI may incur private economic profits from the project. FEIS at 5-1. It is unclear whether the Staff intends to assert that private economic gain is part of the cost-benefit analysis for the NRC. To do so runs contrary to NEPA cost-benefit principles. In any event, Dr. Sheehan and Mr. Osterberg agree that the operating costs of the project will exceed revenues, in this depressed uranium market, precluding any profits for HRI for the foreseeable future. Osterberg Testimony at 5, 43; Sheehan Testimony at 17-21.¹³

B. The FEIS Improperly Relies on Alleged Secondary Benefits to Justify the Proposed Project.

The benefits mentioned in the first paragraph of section 5 are not described or explained in any detail, let alone quantified. As demonstrated in the previous section, each benefit alleged is in fact, illusory. There is no need for additional uranium supply. All that is left in the FEIS is its asserted secondary benefits of taxes, royalties and jobs. These secondary socioeconomic benefits alone cannot be used to outweigh environmental costs. LES 2, 47 NRC at 100. LES 2 overrules the line of appeals board cases that banned consideration of socioeconomic benefits, but affirmed Vermont Yankee's holding that the agency should not find secondary benefits alone outweigh environmental costs. Id. Since there is no economic or technical need for HRI's proposal, the socioeconomic benefits

¹³ Production must begin at Church Rock, pursuant to license condition 10.28, where average costs per pound are at least between \$11.32 and \$11.83. Osterberg Testimony at 43.

listed in section 5 cannot serve to justify licensing the project. Moreover, the Staff bases its conclusions about secondary benefits on many erroneous assumptions.

1. The Staff bases the cost-benefit analysis on erroneous assumptions about price, costs, and production levels.

The FEIS makes unreasonable and erroneous assumptions about price, cost and production levels as they relate to employment, taxes and royalties.

First, section 5 presumes an unreasonably high level of production, 2 million pounds per year. FEIS at 5-3 - 5-4. Second, section 5 presumes a very unreasonable uranium price of \$15.70 per pound, based on the spot market price for October 21, 1996. FEIS at 5-2. Third, section 5 adopts HRI's unreasonable production costs figures. FEIS at 5-3 - 5-4.

a. The FEIS presumes an unreasonable production level.

HRI has stated that the **maximum** production level for each of the three sites, Unit 1, Crownpoint and Church Rock, is 1 million pounds per year. HRI Response to RAI No.2, Exhibit C-2. Dr. Sheehan concludes that this level of production is unreasonable. In fact, he concludes it is unlikely HRI can commence production at all. Sheehan Testimony at 20-21. HRI faces substantial barriers to achieving profitable production that would justify maximum production: start-up costs of over \$13 million, the fact that production costs will not yield a profit until after nearly six years of production at Church Rock, and the projected decline in long-term market demand for uranium. *Id.*, at 17-21.

The license requires HRI to begin mining at Church Rock, and complete a production demonstration before moving on to the other sites. SUA 1508 License Condition 10-28. But, HRI will need to spend over \$13 million in site development, over the course of 10 months, before it can produce a pound of uranium at Church Rock. Sheehan Testimony at 17-18. Given the company's present financial crisis (which Dr. Sheehan detailed in his testimony in support of ENDAUM and SRIC's brief on financial assurance for decommissioning (January 11, 1999)), Dr. Sheehan concludes that it is unlikely the company has funds for the initial capital expenditure, and "it is difficult to imagine that this magnitude of funding is going to be forthcoming in the first nine months of operation at Church Rock." Sheehan Testimony at 18. Indeed, the company has stated that it is re-evaluating its plan to proceed with production, is attempting to sell off the company or its assets, and reducing expenses in New Mexico by 60 to 70%. *Id.*, at 18-19, *citing* Uranium Resources Inc.'s Third Quarter 1998 Securities and Exchange Commission 10-Q report at 11, attached as Exhibit BB to David Osterberg's testimony for ENDAUM's and SRIC's presentation on HRI's lack of financial and technical qualifications (January 11, 1999).

b. The FEIS is based on an unreasonable price per pound figure.

Section 5 bases its calculation of benefits on a price of \$15.70 per pound, which is based on the spot market price for October 21, 1996. FEIS, Table 5.2, at 5-2; Sheehan Testimony at 13. This is the market price for a single day. It is much higher

than the other figures presented in section 5, where the Staff discloses the DOE/EIA spot market projection. This projection forecasts a price of \$12.72 for 1996, \$12.74 for 1997, \$12.62 for 1998, and \$13.00 for 1999. Id. \$15.70 is three dollars higher than the 1996 forecast. A price close to \$15.70 per pound is not forecast until 2010. Id. Even this forecast has proven overly optimistic for 1996, 1997, 1998, and 1999 to date. See Osterberg Testimony at 37-41. The current spot market price, as of February 8, 1999, is \$10.50 per pound. Sheehan Testimony at 13. The Staff's adoption of a \$15.70 price term is unreasonable.

c. The FEIS is based on unreasonable production costs.

According to HRI's production cost figures, the current market prices are below HRI's cost per pound at Church Rock, and production would be marginal at Crownpoint and Unit 1. Sheehan Testimony at 20-21. HRI listed production cost figures in its response to RAI No.92. According to its own information, the company will not recoup its investment in project development, and earn a profit, until after the seventy-fifth month of production. Id., at 19.¹⁴ However, in all probability, HRI's production costs are even higher than disclosed in RAI No. 92. HRI uses a restoration standard of four pore volumes to calculate these cost per pound figures, while the Staff uses a nine pore

¹⁴ By dividing the cumulative costs by cumulative production, the cost per pound of production will fall below \$12 per pound after the 33rd month of production, below \$11.50 in the 64th month, and below \$11.00 by the 75th month. Sheehan Testimony at 19. The price of uranium on the spot market and unrestricted market has been below \$11.00 per pound in recent months. Id. at 20.

volume standard in License Condition 9.5. Production costs are also likely to be higher due to the fact that restoration typically take much longer than anticipated. See Staub Testimony in support of ENDAUM and SRIC's January 11, 1999, groundwater presentation at 20-22.

2. The Cost-Benefit Analysis Overstates Employment-related Benefits.

The Staff's calculation of employment-related benefits (\$2.4 million) is unreasonable because it assumes, without justification, that 100 jobs will be filled by local Navajos and the average wage will be \$24,000 per year.

The figure of \$24,000 is more than one third higher than the rates the company is paying for similar positions in Texas. Sheehan Testimony at 22-24. This figure is derived from HRI's Response to RAI No.8. Id. at 23. Section 5 does not explain the basis for this one third difference. An agency must "exercise a degree of skepticism in dealing with self-serving statements from a prime beneficiary of the project." Simmons v. U.S. Army Corps of Engineers, 120 F.3d 664, 669 (7th Cir. 1997), citing Busey, dissent, 938 F.2d at 209; Trinity Episcopal School Corporation v. Romney, 523 F.2d 88, 94 (2nd Cir. 1975). This figure is even more curious since HRI should be in a position to offer low wages to local Navajos; unemployment is over 20% and the median household income is half the national average, at less than \$14,000. Sheehan testimony at 23-24, 27. The adoption of this figure in the FEIS is unreasonable.

The claim that the project will produce 100 long-term jobs for the local economy

is equally unrealistic, and if implemented, would violate the Navajo Nation Preference in Employment Act. As described in the section above, the cost-benefit analysis makes unrealistic assumptions about price, production costs and production level. It is unlikely HRI can afford to develop its properties, or operate the properties at a profit. Dr. Sheehan concludes, "Under such conditions, full scale production would be uneconomic, and even if episodic production were currently feasible it would not produce anywhere near the benefit stream claimed by the Staff." Sheehan Testimony at 26. Full-scale employment is therefore equally unlikely.

Moreover, it is unreasonable to conclude that HRI will employ local Navajos for all 100 positions. The FEIS makes the unreasonable assumption that all of the 100 jobs that "could" be filled by local residents "based on a review of job descriptions" (FEIS at 4-97) would in fact be given to local residents. Id. Table 5.4 at 5-5. The company is faced with laying off its trained workers in Texas, and it would be reasonable for HRI to transfer Texas employees to the proposed project, since they are already experienced and trained, and are allegedly earning lower salaries. Sheehan Testimony at 24-26.

The FEIS' endorsement of a local hiring plan and the provisions in royalty leases granting employment preference to allottees, endorses a violation of the Navajo Preference in Employment Act ("NPEA") because it may favor less-qualified local Navajo residents over better qualified Navajos from other areas. FEIS at 4-96. Employers doing business within the jurisdiction of the Navajo Nation must "advertise

and announce all job vacancies in at least one newspaper and radio station serving the Navajo Nation. NPEA, 15 N.N.C. § 604(A)(6) (1995), a copy of the relevant pages of the NPEA is attached as Exhibit D. Regardless of locale, NPEA requires that among applicants "who are solely Navajo and meet the necessary qualifications, the Navajo with the best qualifications shall be selected or retained." 15 N.N.C. § 604(C)(3).

Given the high unemployment rate on the reservation, it is highly probable HRI's job announcements will attract applicants from all over the reservation. Favoritism of local residents in Crownpoint and Church Rock, or allottees, discriminates against other qualified Navajo applicants, and thus, violates the NPEA.¹⁵ 15 N.N.C. § 604(A)(7). Thus the touted local employment benefits are illusory.

3. The Cost-Benefit Analysis Inflates Alleged Royalty Benefits.

The Staff alleges \$1,099,000 will be derived from royalty payments to Navajo allottees in the Unit 1 area. FEIS Table 5.4 at 5-5. There are several problems with this assertion. First, royalty payments do not provide a public benefit and thus are outside the scope of the cost-benefit analysis. The Staff admits royalty income would be concentrated among nine allottees and "would probably not have a widespread effect." FEIS at 5-4. Second, the staff calculation is based on the unreasonable figure of \$15.70. Sheehan Testimony at 27-28. Third, royalties will only be generated from production at Unit 1. To get to Unit 1, HRI must first commence production at Church

¹⁵ The transfer or employment of the Texas workforce is not necessarily in conflict with the NPEA, since experienced ISL workers are arguably better qualified.

Rock, and meet the licensing conditions, including a successful restoration demonstration, that must be satisfied before mining at Unit 1. Under the current market conditions, it is not economical for HRI to begin production at Church Rock. Sheehan Testimony at 28. Dr. Sheehan concludes that the likely royalty benefit will total \$32,000 per year, which is the non-production rental value under the sample lease provided by HRI, a relatively nominal amount. Id., at 27-29.

4. The Cost-Benefit Analysis Overstates the Alleged Tax Revenue Benefits.

The FEIS represents that the proposed project will generate \$942,000 in business activity tax and \$15,000 in construction tax for the Navajo Nation, and \$484,000 in real property tax and \$55,000 in personal property tax for McKinley County. FEIS, Table 5.4. Each of these figures is calculated in error.

The Business Activity Tax is based on the unreasonable figures of 2 million pounds a year production and a uranium price per pound of \$15.70. Sheehan Testimony at 30. In addition, there is a degree of uncertainty as to whether the Navajo Nation has jurisdiction to levy the Business Activity Tax and the Construction Tax on all of the mine sites. Id., at 31. The Staff admits, elsewhere in the FEIS, a dispute currently exists between the tribe and HRI over jurisdiction at Church Rock. FEIS at 4-101, 103. However, in the cost-benefit section, the entire projection of Navajo Nation taxes is listed.

Although tax benefit calculations are not shown, the calculations would likely

reflect additional significant errors, such as the failure to deduct payments under well drilling contracts in calculating the projected Navajo business activities tax liability pursuant to Navajo Nation Tax Commission Regulations §§ 1.415. See FEIS at 4-103.

State taxes are also miscalculated. With respect to personal property taxes, the figure in section 5 apparently presumes HRI will make an investment of over \$16 million in mining-related personal property. Sheehan Testimony at 31-33. Dr. Sheehan concludes, that given HRI's financial crisis and market conditions, it is unreasonable to presume such a large capital investment. Id., at 33. The real property tax assessment is based on the inflated production level (2 million pounds) and uranium market price (\$15.70). Id., at 32. This tax also appears to be miscalculated, using the full yellowcake sales value, instead of 50 percent pursuant to NMSA 1978, § 7-26-4(I) (1973), and by failing to deduct the nonproductive mineral property tax value from the production-based tax value, pursuant to NMSA 1978, § 7-36-23(E). FEIS at 4-103; Sheehan Testimony at 33.

Additionally, local residents do not enjoy the full benefit of New Mexico state taxes. "Many of the roads around Crownpoint and Church Rock, including Navajo Highway 49 between Pinedale and Smithlake and Navajo Highway 9 between Crownpoint and U.S. Route 666 near Gallup, are maintained by the Navajo Nation or the BIA, not New Mexico. Law enforcement is provided by the Navajo Nation police, not the state or county police forces." Bullard Testimony in support of ENDAUM's and

SRIC's environmental justice presentation, at 42-43.

C. The FEIS Underestimates the Environmental Costs of the Project.

The cost-benefit analysis of NEPA is concerned primarily with environmental costs affecting the public, not with private economic costs. NWF v. Marsh, 568 F.Supp. at 1000 (key issue of transportation costs omitted from EIS). See Sierra Club v. Siegler, 695 F.2d 957 (analysis presented benefits but not costs).

1. The FEIS dismisses environmental costs as outside the scope of its costs-benefit analysis.

The FEIS appears to cut off its discussion of environmental costs by dismissing the cost of environmental protection and restoration as a matter internal to HRI. See Sheehan Testimony at 10. Page 5-1 of the FEIS describes HRI's costs as land, labor and capital, the cost of meeting regulatory standards, including "environmental protection and restoration." The Staff then appears to dismiss environmental costs, stating, "The benefits and costs that are internal to HRI are not subject to government regulation and, therefore, are not assessed in this FEIS. Id. Only economic costs to the local community are mentioned in the cost discussion in section 5: the cost of building infrastructure, the cost of additional emergency response preparedness, and the financial cost of replacing the Crownpoint water supply system. FEIS at 5-6 - 5-7.

The risks associated with environmental protection and restoration are of public concern. The EIS must "consider and weigh" environmental impacts and the mitigation alternatives available to reduce or avoid adverse environmental effects. 10 CFR 51.71(d).

These issues cannot be deleted from the EIS because the applicant may be responsible for some of the mitigation alternatives or has decommissioning responsibilities under 10 CFR § 40.36 and Criterion 8 of Appendix A to Part 40. The project's impacts and proposed measures to protect and restore the environment must be discussed in the EIS. As Dr. Sheehan points out, it is especially important to do so in this instance, since "this firm is on shaky ground financially going into the project, and has minimal financial capability to deal with any serious environmental problem." Sheehan Testimony at 11, and citing Gulf States Utilities Co. (River Bend Station, Unit 1), LBP-95-10, 41 NRC 460, 473 (1995) ("a licensee in financially straightened circumstances would be under more pressure to commit safety violations or take safety 'shortcuts' than one in good financial shape").

2. The FEIS cost-benefit analysis omits significant environmental costs which distort the assessment of the project's environmental effects.

The cost-benefit analysis in section 5 completely omits an evaluation of environmental costs. Even though the FEIS acknowledges elsewhere that the proposed action will have significant environmental impacts, the cost to the environment from those impacts is nowhere to be found in section 5. Thus, the costs are neither qualitatively nor quantitatively discussed.

a. Environmental Costs of Groundwater Impacts.

The FEIS acknowledges that the proposed action "would make a significant

contribution to cumulative impacts on groundwater" and could have "significant adverse effects on groundwater quality . . . if an excursion occurs, or if . . . water quality is not restored." FEIS at 4-113, 4-121. It further acknowledges that this risk is significant; "Successful restoration of a production-scale ISL wellfield has not previously occurred." Id. Yet, the risks associated with excursions and restoration are not included the cost-benefit analysis. On the contrary, contamination at Church Rock and Unit 1 is dismissed because there are "no significant costs." FEIS at 5-6.¹⁶ Also, the FEIS acknowledges that the project will consume potentially large amounts of water during restoration. FEIS at 4-59. But, the cost to the environment from groundwater consumption is another environmental cost absent from section 5's tabulation of costs. Sheehan Testimony at 39-40.

The risk of groundwater contamination should be identified and reflected in the NEPA cost-benefit analysis. As demonstrated in the Intervenor's presentation on groundwater, there is a substantial risk of groundwater contamination from horizontal and vertical excursions and a substantial risk that restoration to primary, secondary, or even

¹⁶ In the cumulative impacts section, the FEIS presents figures that contradict the assertion in section 5 that there are no significant costs. On page 4-122, the FEIS provides an estimated volume of groundwater that would be chemically affected by the project (2671 acre feet) and an estimate of water consumption of either 23,681 acre feet, 5922 acre feet or 54 acre feet, depending on the method of restoration. FEIS at 4-122. Since the Staff chose to separate out the cost-benefit section from the description of environmental effects these two sections cannot be combined together again on review. They are contradictory and serve only to confuse the public and decision makers. In any event, the contamination figure is unreasonably low, based as it is on the unfounded assumption that no "lateral or vertical excursions would occur during operations." Id.

some other relaxed, standard. See Sheehan Testimony at 35-39 for a description of risk of injury to groundwater. HRI's ability to restore groundwater "is substantially in doubt" considering the failure of the ISL industry to ever achieve restoration to baseline or drinking water standards, and HRI's poor financial condition. Sheehan Testimony at 38-39. In addition, the risk of contamination is high since excursions are likely during power outages and stoppages in production.¹⁷ The risk of injury to groundwater is high, and the value of the resource is of considerable value as well. The aquifers at risk are potable, and portions are serving public drinking water supplies. Sheehan Testimony at 36-37. Mr. Wallace calculated the travel time for lixiviant to migrate from Unit 1 to the closest municipal well under conservative conditions. Wallace Testimony in support of Intervenors' groundwater brief, at 42. He concluded that an excursion can reach the water supply well within the projected lifetime of the mines. Id. Production at Unit 1 alone does not trigger the licensing requirement to move the Crownpoint public drinking water supply system so the threat of excursion from Unit 1 poses an extreme health risk to those served by the Crownpoint water system.

Dr. Sheehan testifies that the cost to groundwater from contamination can be described qualitatively and "quantified fairly easily as well." Sheehan Testimony at 35. For example, the Department of the Interior's natural resource damage regulations

¹⁷ There is a serious risk of excursion during power outages, since the license only requires HRI to maintain generator reserve power at the Crownpoint site, and not at Unit 1 or Church Rock. A generator would maintain the wellfield bleed.

provide procedures to quantify the injury to natural resources. 43 C.F.R. § 11.62(c).

Under these regulations, groundwater injury can be determined by assessing the extent of the area exposed, and estimating costs of restoration, rehabilitation or replacement of the resources. 43 C.F.R. §§ 11.25(c), 11.38(a) and 11.62(c); Sheehan Testimony at 37. One way to quantify the cost of damage to this volume water would be to apply the value of water rights in the area. Sheehan Testimony at 37.

Dr. Sheehan concludes that there are methods and data readily available, with which to estimate the cost of groundwater impacts from the project. Sheehan Testimony at 37-38. Mr. Wallace has calculated, for demonstration purposes, that given an excursion plume, sized 100 feet wide and 200 feet thick, given the ore body configuration, and monitor wells spaced 400 feet apart, the excursion could contaminate 1,100 acre feet of groundwater before detection. Wallace Testimony in Support of cumulative impacts presentation; Sheehan Testimony at 37. He has also calculated that during a dewatering of Section 17 to effect restoration, 15,000 acre feet of groundwater would be consumed. Wallace Testimony in support of cumulative impacts presentation; Sheehan Testimony at 38. The value of the impact can be based on this data. Id.

With respect to mining at Crownpoint, section 5 acknowledges the cost of contamination and consumption, but states the cost will be nullified by the license condition to move the wells. FEIS at 5-6. This approach fails to include the cost of environmental damage (drinking/groundwater contamination), and does not discuss the

viability of this mitigation plan. Sheehan Testimony at 40.

b. Environmental Costs of Land Use Impacts.

The FEIS acknowledges the project would have adverse impacts on land use: site disturbance, disruption of livestock grazing, and relocation of residents. FEIS at 4-93, 4-94. The costs of these impacts, though significant, are not included in the cost-benefit analysis.

The proposed mitigation for the relocation of residents -- monetary compensation -- is inadequate. FEIS at 4-118. Nearly all Church Rock residents who participated in Dr. Bullard's land use survey, including the Kings living on Section 17, stated they have lived in the area all their lives, and the land has been in their families for generations.

Bullard Testimony in support of environmental justice presentation at 20-21, 37.

Generally, this population is less mobile. "Because of deep cultural beliefs and practices that tie Navajo people to the place of their birth, as well as the high level of poverty in the area, Church Rock and Crownpoint residents are unlikely to be willing or able to flee from any contamination that may be caused by the Crownpoint Project." *Id.*, at 36-38.

Moreover, the FEIS ignores the tremendous importance of livestock to local subsistence and culture and the project's potential to contaminate land and water necessary for raising livestock. The FEIS asserts that the "land affected has only a very small value for grazing" and that the project would provide a very small benefit by closing off overgrazed lands. Livestock is an important part of Navajo culture, and

Larry King and Mitchell Capitan both testify in support of ENDAUM's and SRIC's environmental justice brief that livestock stewardship is an integral part of Navajo culture and they would not feel complete or free without livestock. See Exhibits 4 and 5 to environmental justice presentation. The FEIS does not consider the true value to local residents of displaced land uses during the life of the project, or the risk that lands would be permanently closed to grazing due to the project's contamination of land or water.

c. Environmental Costs of Radioactive Air Emissions.

Bernd Franke has testified that ambient radiological emissions will exceed NRC standards. Franke Testimony, Exhibit 2, at 12. The FEIS admits that the project will have a minor contribution to cumulative impacts from ambient radioactivity. FEIS at 4-124. But, the environmental cost of this radiation is mysteriously absent from the cost-benefit analysis. Sheehan Testimony at 42-43. The FEIS ignores data from DEIS indicating high levels of radiation at Church Rock, and misrepresents that radiation levels are naturally occurring background sources. See Bullard Testimony at 28-29.

d. Environmental Costs of Liquid Waste Disposal.

Section 5 unlawfully fails to include the environmental cost associated with liquid waste disposal. The FEIS admits elsewhere that there is risk of pond failure. FEIS at 4-7, but this risk is not mentioned in the cost-benefit analysis. Other costs are missing, including the risk of damage to cultural resources during pond construction, land

disturbance, the loss of habitat, and health risks to wildlife from land application.

Sheehan Testimony at 41-42.

e. Environmental Costs of Cultural Resource Impacts.

Section 5 omits any mention of costs to cultural resources as a result of the proposed action. In fact, the project will result in loss or damage of cultural resources because the identification and consultation attempts by the Staff to date have been inadequate to fully identify cultural resources, HRI's activities risk adverse impacts on such resources. Sheehan Testimony at 44. Given the richness of the area in cultural resources, there is a risk of inadvertent damage or loss that should be included in section 5. Id.

f. Environmental Costs of Health Impacts.

There is an increased risk of health impacts to Church Rock residents, from the project's ambient radioactivity, on top of existing high levels and increased vulnerability of local Navajo population to additional exposures. See Bullard Testimony at 32-34, Franke Testimony at Exhibit 2, 10-11. In addition, the 0.44 mg/l uranium set by NRC is not protective of public health. Abitz Testimony in support of groundwater brief at 49-51; Testimony of Doug Brugge in support of ENDAUM and SRIC's environmental justice brief. The measure, 0.44 mg/l, is 175 times higher than the concentration of uranium present now in the Crownpoint drinking water wells. Bullard Testimony at 35. This extremely lax standard poses an immediate health risk

that is ignored in section 5.

Clearly, the local community at Church Rock is at risk due to the effects of previous mining, and the susceptibility of the population which is more vulnerable still due to its socioeconomic status and health problems, and former underground uranium workers in the area. Benally Testimony in support of environmental justice presentation at 44. Dr. Bullard testifies that the FEIS should have examined whether, given existing health conditions in Church Rock and Crownpoint, the residents are at a greater risk of contamination from degraded groundwater. Bullard Testimony at 35. Recognizing that present health conditions in the Church Rock area "represents an urgent public health problem that the NRC Staff all but ignored in the FEIS." Benally Testimony at 44. Dr. Benally concludes that the project "will present an undue risk to the health and safety of the local Navajo communities, especially in the northern part of Church Rock Chapter." Id., at 45.

3. The costs listed in Section 5 are unreasonably undervalued.

With respect to the three costs mentioned in section 5, the FEIS fails to either quantify them or evaluate them qualitatively. The costs of building additional infrastructure is dismissed as insignificant. FEIS, Table 5.2 at 5-6. The cost of additional fire and emergency related response training and health care facility is dismissed because HRI would pay for the costs. Id. Table 5.2 identifies the risk of contaminating and/or degrading the public water supply in Crownpoint, and finds that

HRI will pay for replacement wells and distribution, and additional annual costs of operation and maintenance." Id. This section ignores environmental costs and fails to quantify or otherwise address the significance of each of these costs, such as the cost of additional health care needs, and operating a replacement water system after HRI terminates its operations.

D. The FEIS Does Not Perform an Ultimate Cost-Benefit Analysis Among Alternatives.

NRC regulations require that an EIS must contain an "analysis which considers and balances the environmental and other effects of the proposed action and the alternatives available for reducing or avoiding adverse environmental and other effects." 10 C.F.R. § 51.71(d). CEQ regulations also require an EIS to present the discussion of alternatives "in comparative form, thus sharply defining issues and providing a clear basis for choice among options by the decisionmaker and the public." 40 C.F.R. § 1502.14. NRC regulations also require ERs to include a "sufficiently complete" discussion of alternatives to aid the Commission in the alternatives analysis required by NEPA, and to present the alternatives in comparative form to the extent practicable. 10 C.F.R. § 51.45(b)(3).

The FEIS does not comply with these requirements. In Chapter 5, the FEIS lists costs and benefits of the proposed project, but it fails to make a comparison of the costs against the benefits or to come to any conclusion about whether the benefits of the proposed project outweigh or justify its environmental risks and harms. It also utterly

fails to make any analysis of the comparative costs and benefits of the various alternatives considered elsewhere in the FEIS. Sheehan Testimony at 32, 51. Dr.

Sheehan concludes:

The Staff's cost-benefit analysis exaggerates benefits, includes almost none of the relevant costs and risks, quantifies no costs at all, and makes no analysis comparing alternative ways to mitigate the relevant costs. Section 5 makes no ultimate comparison of alternatives. Sheehan Testimony at 51.

The cost-benefit analysis is hopelessly biased in favor of HRI, and distorts the analysis to the point where it serves no purpose as a decisionmaking tool. The license should be rejected and the FEIS remanded to the Staff.

E. HRI's Environmental Reports do not Calculate the Costs and Benefits of the Project.

The ERs do not contain a cost-benefit analysis. After the DEIS was issued, the Staff asked HRI to submit cost-benefit information in RAI No. 92. HRI's response to RAI No. 92 only sets forth the various costs of production according to the different FEIS alternatives. The Response to RAI No. 92 is not included in the FEIS, and it is not a cost-benefit analysis of public benefits and environmental costs. Further, the ERs are themselves broken into three parts and do not provide a comprehensive analysis of the project. The Crownpoint ER does not even attempt to discuss environmental impacts from the project. For example, the alternatives analysis in the Environmental Assessment for Unit 1 consists of nine sentences asserting that ISL mining is a superior

alternative to open pit mining and underground mining, without any supporting quantitative analysis comparing costs and benefits. Unit 1 EA at 8-1. Thus, there is no "clear basis for choice among options." 40 C.F.R. § 1502.14. The ERs should be rejected and HRI's application deemed inadequate to justify licensing until HRI develops an adequate ER.

IV. THE FEIS AND THE ERS INADEQUATELY EVALUATE THE ACTION ALTERNATIVES AND NO ACTION ALTERNATIVE.

An agency must consider all reasonable alternatives in depth in the EIS. 40 C.F.R. 1502.14; Simmons, 120 F.3d at 666 (holding that Corps failed to examine full range of alternatives and vitiated the EIS). "No decision is more important than delimiting what these 'reasonable alternatives' are." Simmons, 120 F.3d at 666. The CEQ reminds us that the alternatives analysis is the heart of the environmental impact statement. 40 C.F.R. § 1502.14; DuBois v. United States Department of Agriculture, 102 F.3d 1273, 1286 (1st Cir. 1996), cert. den. 117 S.Ct. 2510 (1997). The DEIS and FEIS are handicapped by inadequate statement of purpose, and therefore neglect to examine other reasonable alternatives. The FEIS also fails to explain why alternatives are rejected and performs an inadequate evaluation of the no-action alternative.

A. The FEIS Contains an Inadequate Range of Alternatives.

In order to properly identify alternatives, an agency must first define the project's purpose. Id.; Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 195-196

(D.C.Cir. 1991), cert. den. 502 U.S. 994 (1991). As the Simmons case points out:

One obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing "reasonable alternatives" out of consideration (and even out of existence). The federal courts cannot condone an agency's frustration of Congressional will. If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role. Nor can the Agency satisfy the Act.

Simmons, 120 F.3d at 666. As discussed in Section II.A. above, the statement of purpose and need in the DEIS and the FEIS is useless for the purposes of NEPA, describing an artificial "need to license." Understandably, given that beginning, the alternatives considered in the FEIS also frustrate the purposes of NEPA. Alternative 1 (proposed action) and Alternative 3 (NRC Staff recommended action) are the same alternative.

Alternative 3 is the same as Alternative 1, but with conditions that render it legal - within the bounds of the Atomic Energy Act. FEIS at 2-1. That leaves Alternative 4 - no action and Alternative 2. Alternative 2 really is not any sort of specific proposal. It claims to be a modified alternative of the HRI proposal "but at alternative sites and/or using alternative liquid waste disposal methods". Id. The exact configuration of this phantom alternative is never disclosed. The description of this alternative is never consistent. The confusion encapsulated in this "alternative" is apparent in the alternative description on page 2-28 of the FEIS, stating Alternative 2 "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." Alternative 2 is clearly an attempt to

evade the action-forcing provisions of NEPA, by throwing together a jumble of variations in HRI's development which are impossible to sort into anything coherent.

An agency, however, must consider alternatives to the "general goal of the action" and not just consider the alternatives by which a particular applicant can reach its goals. Simmons, 120 F.3d at 669, citing Van Abbema v. Fornell, 807 F.2d 633, 638-639 (7th Cir. 1986).

A reasonable statement of purpose for HRI's project however, is to provide fuel for production of electricity by nuclear power plants. Osterberg Testimony at 44. From this point, it is apparent there are reasonable alternatives to HRI's project. Blending down HEU is a reasonable alternative. Dr. Makhijani testifies as to the comparative impacts of newly mined uranium and blended down HEU. Makhijani Testimony at 2. He concludes that blending down HEU for use as reactor fuel has fewer environmental effects, because it recycles depleted uranium. Id. at 8; Osterberg Testimony at 44. The most notable reductions in environmental risk by using blended down HEU are: 1) the reduction of risk from HEU storage, 2) the reduction of risk from storage of depleted UF₆, 3) the reduction of risk from mining new uranium because less new uranium is used, and 4) blending down HEU with DU as blendstock would not produce radon emissions and uranium emissions are lower than with natural uranium production. Makhijani Testimony at 8. In addition, the use of blending down HEU has the secondary effect of promoting global security. New uranium mining will

depress market prices, reducing the incentive for Russia to convert its HEU into fuel. Id. at 9; Osterberg Testimony at 44. The longer Russia keeps HEU in its possession, the greater the likelihood the material may wind up on the nuclear black market, which is exactly what the Russian HEU agreement seeks to avoid. Id.

This alternative is entirely reasonable because there is sufficient surplus HEU in the U.S. to replace the planned production from HRI's proposal. Id. at 8-9.

B. The FEIS Fails to Explain Why Alternatives to the Recommended Alternative are Rejected.

In Simmons, the Corps was asked to issue a Section 404 permit under the Clean Water Act to allow a dam and reservoir to supply water to two users from the resulting lake. The Court threw out the EIS because the Corps did not consider other alternatives to supply the two users, "At no time has the Corps studied whether this single-source idea is the best one-- or even a good one." Simmons, 120 F.3d at 666-667, 669. Likewise, the NRC does not provide a reason why HRI's mines are the best idea, or even a good idea for producing reactor fuel. At no point does the FEIS explain why alternatives besides the recommended action are not preferable. The Summary and Conclusions section does not do so. The cost-benefit section only discusses the recommended alternative. Thus, the FEIS fails to properly conduct an analysis to any reasonable degree.

C. The FEIS and the ERs Fail to Address the No Action Alternative.

The FEIS fails to explain the environmental benefits of the no-action alternative. The No Action Alternative will provide a substantial benefit by avoiding the environmental impacts of ISL mining. LES 1, 44 NRC at 372. It is evident from the testimony of Dr. Makhijani and Mr. Osterberg that the no-action alternative best serves federal goals in encouraging the blending down of weapons grade materials in the former Soviet Union. The two ERs that discuss alternatives at all, Unit 1 and Church Rock 2, neglect to mention the no-action alternative.

V. THE NRC STAFF VIOLATED NEPA BY FAILING TO SUPPLEMENT THE DEIS AND FEIS AND RECIRCULATE THEM FOR PUBLIC COMMENT.

One of the fundamental purposes of an EIS is to foster “informed decisionmaking and informed public participation.” LES 2, 47 NRC at 88. An EIS must be circulated for comment by the public and other affected agencies, in order to assure that relevant environmental information will “be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation” of a proposed decision. Methow Valley, 490 U.S. at 349. The “broad dissemination of information mandated by NEPA permits the public and other government agencies to react to the effects of a proposed action at a meaningful time.” Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 371 (1989).

The requirement to publish and disseminate NEPA-mandated information survives the initial publication of a DEIS or FEIS. Even after a proposed action has been initially approved, a federal agency may not put on "blindens" to action's impacts. Marsh, 490 U.S. at 371. Thus, the CEQ requires the preparation of a supplemental EIS where there "are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." Marsh, 490 U.S. at 372, citing 40 C.F.R. § 1509(c).

Consistent with the CEQ's regulations governing supplementation, NRC regulations require that a supplement to a DEIS or and FEIS shall be prepared if:

- (1) There are substantial changes in the proposed action that are relevant to environmental concerns; or
- (2) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

10 C.F.R. §§ 51.72(a) and 51.92(a). In addition to those situations in which an supplemental DEIS or FEIS is mandatory, the regulations give the NRC staff the discretion to prepare a supplemental DEIS when, in its opinion, preparation of a supplement will further the purposes of NEPA." 10 C.F.R. §§ 51.72(b); 51.92(b). The regulations further require that the supplemental DEIS or FEIS be circulated for public comment. 10 C.F.R. §§ 51.73; 51.92(d).

The standard for interpreting the supplementation requirement is a "rule of reason." Marsh, 490 U.S. at 373. Application of the rule of reason "turns on the

value of the new information to the still pending decisionmaking process." Id., at 374.

"If there remains 'major federal actio[n]' to occur, and if the new information is sufficient to show that the remaining action will 'affect the quality of the human environment' in a significant manner or to a significant extent not already considered, a supplemental EIS must be prepared." Id., citing 42 U.S.C. § 4332(2)(C). Because NEPA's procedural and informational aspects are so important, "if the agency fails to properly circulate the required issues for review by interested parties, then the EIS is insufficient even if the agency's actual decision was informed and well-reasoned."

DuBois, 102 F.3d at 1287.

Here, the NRC erroneously failed to supplement either the DEIS or the FEIS in several significant respects.¹⁸

A. Performance-Based Licensing Requires Supplementation.

No mention is made, either in the DEIS or the FEIS, of the fact that the HRI license is to be a performance-based license. It appears that this is because the decision

¹⁸ ENDAUM and SRIC note that they first raised the supplementation issue in 1996, asking the NRC Staff to issue a Supplemental DEIS to reflect substantial new information received from HRI in response to the Staff's Requests for Additional Information ("RAIs"). ENDAUM and SRIC also asked the Staff to address the significant deficiencies in the DEIS raised by members of ENDAUM and others who commented on the DEIS. Letter from Susan G. Jordan, NMELC, to Shirley Ann Jackson and Joseph J. Holonich, NRC (December 6, 1996). **Exhibit E.** The NRC denied this request on the grounds that the information contained in HRI's responses to the RAIs "does not alter the proposed action or present significant new circumstances or information concerning that action or its impacts." Letter from Carl J. Paperiello, NRC to Susan G. Jordan, NMELC at 1 (December 24, 1996). **Exhibit F.**

to apply performance-based licensing was made sometime after the DEIS and FEIS were issued: the first mention by the NRC Staff of performance-based licensing is in the Safety Evaluation Report, which was issued on December 5, 1997, ten months after the FEIS was issued.

The application of performance-based licensing to the Crownpoint Project constitutes a substantial change in the proposed licensing action, such that the DEIS and FEIS must be revised and reissued for public comment. As discussed in ENDAUM's and SRIC's Brief in Opposition to HRI's Application for a Materials License With Respect to Performance Based Licensing Issues (December 7, 1998), the PBL licensing scheme violates both the Atomic Energy Act and the National Environmental Policy Act. The fact that this licensing scheme violates federal safety and environmental protection statutes should have been disclosed, as required by 10 C.F.R. § 51.71(d) ("Due consideration must be given to compliance with environmental quality standards and requirements that have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection.")

Even if the PBL scheme is found to be consistent with the Atomic Energy Act and NEPA, it should nevertheless be discussed in a supplemental DEIS or FEIS because it substantially diminishes the degree of safety and environmental protection offered by a typical Part 40 license. Ordinarily, the NRC Staff must review and approve all proposed changes to a license operation before the change can be allowed.

Under the PBL scheme in HRI's license, HRI is allowed to unilaterally alter safety and environmental provisions in its license, without providing prior notice to the NRC or the public or obtaining the NRC's prior authorization. Although the HRI license prohibits HRI from making such changes without first obtaining a license amendment if the changes would materially affect safety or degrade the environment, HRI alone may make that determination. The only Staff review provided by the license is a *post hoc* review of a summary provided by HRI at the end of the year. As a result, there is a substantially heightened risk that HRI will make changes to its operation that significantly and adversely affect human health or the environment, which otherwise would be caught and prevented by the usual review system of the NRC Staff and the public hearing process.

B. The Action Alternatives Change from the DEIS to the FEIS and therefore Supplementation is Required.

By requiring that an EIS contain a discussion of alternatives, NEPA seeks to "ensure that each agency decision maker has before him and takes into proper account all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact and the cost-benefit balance." Calvert Cliffs Coordinating Committee v. AEC, 449 F.2d 1109, 1114 (D.C. Cir. 1971). "[A]n additional alternative that has not been disseminated previously in a draft EIS may be adopted in a final EIS, without further public comment, only if it is 'qualitatively within the spectrum of alternatives that were discussed' in the prior draft;

otherwise a supplemental draft is needed." DuBois v. United States Department of Agriculture, 102 F.3d 1273, 1292 (1st Cir. 1996). In this case, the FEIS presents a set of alternatives that are quite different than the alternatives presented in the DEIS. The public has never had the opportunity to comment on the alternative proposed by the NRC for mitigating the significant environmental impacts of the Crownpoint Project. Accordingly, as required by NRC and CEQ regulations and case law interpreting NEPA, the alternatives presented in the FEIS must be circulated for public comment.

The 1994 DEIS proposes four alternatives for the Crownpoint Project. DEIS at 2-1. The first alternative consists of mining and surface processing facilities at Church Rock, Crownpoint, and Unit 1. No regulatory restrictions whatsoever are described. The second alternative, favored by the NRC Staff, consists of the same measures as Alternative 1, with the addition of standard regulatory controls, such as the requirement that the licensee conform to the terms of the license and comply with the National Historic Preservation Act, and that the licensee make various demonstrations of compliance with NRC regulations. The third alternative in the DEIS consists of conventional underground shaft mining. Id. at 2-24 - 2-25. The fourth alternative is no action. Id. at 2-2.

In the FEIS, only the first and fourth alternatives are substantially the same as the alternatives proposed in the DEIS. The second alternative described in the FEIS is completely new. It proposes various arrays of alternative mining sites, alternative

sites for yellowcake drying and packaging, and alternative liquid waste disposal methods. Id. at 2-31. None of these options was presented for consideration in the DEIS. The public therefore had no opportunity to comment on what combination of mining and milling sites or liquid waste disposal alternatives would be most protective of the environment. Even if a new alternative is a variation on a previous alternative, it must be circulated for comment if it is not within the range of a previously considered alternative, but reduced in scale for every relevant particular. DuBois, 102 F.3d at 1292-1293. Moreover, the new alternative must also be recirculated, "even if some of the environmental problems present in the prior alternatives have been eliminated." Id. at 1293.

Alternative 3 of the FEIS has some similarities to the DEIS's Alternative 2, but key aspects are completely different. Like the DEIS's Alternative 2, the FEIS's Alternative 3 constitutes a regulated version of Alternative 1, which is favored by the NRC Staff and contains various standard measures for controlling effluents and demonstrating compliance with NRC regulatory requirements. However, Alternative 3 is different in that it proposes certain very specific measures that are purported to reduce the adverse environmental impacts of the proposed project, which were outside the spectrum of the DEIS alternatives. For instance, it proposes to require that HRI replace the town of Crownpoint's drinking water wells before injecting lixiviant at Crownpoint. See Appendix B at 2. It also proposes that surety bonding for the initial

well fields should be based on nine pore volume estimates unless the applicant demonstrates that some other pore volume is appropriate. Id. The FEIS also proposes to require various demonstration projects to show the integrity of aquifers to inhibit lixiviant excursion, but does not require these demonstration projects to be completed prior to licensing. Appendix B also contains a significant number of specific “recommendations” (as opposed to proposed requirements) for mitigating environmental impacts, including various communication procedures with the Navajo Nation.

None of these proposed requirements or recommendations was included in the DEIS, and therefore none was circulated for public comment. The public never had the opportunity to comment, for example, regarding whether water quality equivalent to Crownpoint quality could be obtained from relocated Crownpoint drinking water wells; whether 0.44 mg/l is a safe or acceptable standard for drinking water at the new wells; whether a surety based on 9 pore volumes is sufficient to guarantee the adequate cleanup of the aquifer for the initial well fields; or whether the pre-operational demonstration projects required by the FEIS would be sufficient substitutes for more comprehensive pre-licensing characterization of the local hydrogeology. These issues are all fundamentally important to the evaluation of the impacts, costs, and benefits of the Crownpoint Project and its alternatives.

The introduction into the FEIS of alternative sites and liquid waste disposal options, as well as Appendix B’s array of elements favored by the NRC Staff for

mitigating the acknowledged adverse impacts of the Crownpoint Project, constitutes substantial changes in the proposal for licensing of the Crownpoint Project. By failing to publish these changes for public comment, the Staff violated 10 C.F.R. §§ 50.72(a) and 50.92(a), and unlawfully subverted NEPA's purpose of "augmenting an informed decisionmaking process" by facilitating "widespread discussion and consideration of the environmental risks and remedies associated with the pending project." LaFlamme v. FERC, 852 F.2d 389, 398 (9th Cir. 1988), quoting Warm Springs Dam Task Force v. Gribble, 621 F.2d 1017, 1021 (9th Cir. 1980) (per curiam).

The Staff's error is all the more egregious when one considers that of the four alternatives proposed in the DEIS, two did not amount to real or reasonable alternatives. The first alternative — allowing HRI to conduct its mining and milling operation without any regulation at all — is simply not an option. The NRC is required by the Atomic Energy Act and its regulations to control the safety of any ISL mine and mill. The third option — underground mining — is acknowledged to be unrealistic in the FEIS, because the ore bodies are too deep for economical extraction of the uranium. Id. at 2-1. This leaves two alternatives in the DEIS: Alternative 2, HRI's proposed mining project under standard regulatory controls by the NRC; and Alternative 4, the no action alternative. This is hardly the array of alternatives contemplated by NEPA. The result is that the NRC never proposed a meaningful set of alternatives to the Crownpoint Project for interested members of the public to

consider and respond to. Not until the FEIS was issued, and the public comment period was long closed, did the NRC reveal any real action alternatives to the proposed project, or give any detailed consideration to mitigation measures. To allow the project to go forward without public comment on these substantial changes to the proposal, simply because the FEIS had issued, would make a mockery of the process for commenting on a DEIS and amount to putting on the “blindfold” disapproved by the supreme Court in Marsh. Accordingly, the Licensing Board should remand the FEIS to the Staff for recirculation to the public for comment.

C. The Sequence of Mining at Church Rock has been Switched between Sections 8 and 17, Warranting Supplementation.

The FEIS should also be revised and recirculated for public comment because the NRC Staff has permitted a substantial change to the sequence of mining at Church Rock, which threatens the quality of the groundwater and HRI’s ability to restore it after mining.

The Church Rock site is located on two sections, 8 and 17. Section 8 lies directly to the north of Section 17. Section 17 is the site of a former underground mine. FEIS at 4-54. Strata in the Church Rock area display a northward dip of approximately 3 degrees. DEIS at 3-9. The potentiometric surface slopes north-northeast. Id. at 3-12.

The DEIS assumes that HRI will conduct mining operations at Church Rock beginning in Section 17, and progressing to Section 8. See Figure 2.1. The DEIS

reports uncritically regarding aquifer modelling by HRI that predicts HRI will be able to control lixiviant and degraded groundwater migration, based in part on this assumption. According to the DEIS:

The applicant provided independent aquifer modelling results (HRI, 1993c), prepared by Geraghty and Miller, Inc. *The purpose of the modelling was to predict the amounts of aquifer drawdown, illustrate changes in the potentiometric surface of the Westwater aquifer, and demonstrate that the project could be conducted while controlling lixiviant and degraded groundwater migration.* The model was run using local data on the hydraulic characteristics of the Westwater sandstone determined from earlier pump tests.

DEIS at 4-2 (emphasis added). With respect to the Church Rock site, the DEIS asserts that:

The model used HRI's projected operational data that provided an approximate 8-year production and restoration schedule *proceeding northward along the ore trend in a sequence of five mine units that would progress down-dip in the ore zone.* The results of the model indicate that a cone of depression would be formed (Figure 4.1) during a the project. A ground-water divide would develop between each mine unit and locations down-gradient during the production and restoration phases of the project. *Therefore, ground-water and lixiviant migration would be controlled by forcing water to flow into the well fields.*

Id.¹⁹

¹⁹ In an October 11, 1993 revision to the Church Rock Revised Environmental Report ("CRRER") (ACN 9312140083), HRI confirmed the south to north mining plan for Church Rock:

The proposed mining plan at Churchrock is summarized in Table 3.1-3 and shown on Figure 3.1-6. Production [at Church Rock] will proceed sequentially from one end of the wellfield to the other, with production in one end being initiated as a simultaneous restoration is being conducted in the other end of the wellfield. When an entire segment of a wellfield has been depleted of uranium, restoration will be started via ground water mixing and reverse osmosis

The plan for mining Church Rock beginning in Section 17 changed some time after publication of the DEIS in 1994. In the fall of 1996, HRI submitted Revision 0.0 of its Consolidated Operations Plan ("COP"), which reversed the direction of mining such that mining would now begin in Section 17 and proceed southward to Section 8. COP Rev. 0.0 (September 30, 1996). The reversed direction continued to appear in later revisions to the COP, namely Rev. 1 (May 12, 1997), and Rev. 2 (August 15, 1997) (ACN 9708210179). Apparently, the change was made for economic reasons: because the Navajo Nation is asserting jurisdiction over Section 17, HRI wants to begin with Section 8 because it is private land for which there are no legal challenges to block the commencement of mining. See Intervenors' Amended Brief in Opposition to Hydro Resources, Inc.'s Application for a Materials License with Respect to: Groundwater Protection at pages 14-15, note 18 (January 18, 1999).

The change from south-north to north-south progression of mining at Church Rock constitutes a substantial change in the proposed mining operation, requiring supplementation of the FEIS. As demonstrated in the DEIS, the south to north mining

treatment and brine concentration. The estimated productive/restoration life of the wellfields at Churchrock is about 5-7 years, which corresponds to the duration of the NRC license cycle. HRI proposes to post financial security for this period of mining.

Church Rock ER 2, Section 3.1.4 at 175. Table 3.1-3 shows the mining sequence to be Wellfield #1 followed in order by Wellfields #2, #3, #4 and #5. Figure 3.1-6 shows that Wellfield #1 is located entirely in Section 17. Wellfield #2 is shown to be located partially in Section 17 and crossing the section line into Section 8.

plan for Church Rock was one of the assumptions relied on by HRI's consultants to conclude that lixiviant and groundwater migration at Church Rock can be controlled. This conclusion no longer holds any water, so to speak, if the direction of mining reverses. As discussed in the Testimony of Michael G. Wallace and William P. Staub, the reversal in the plan for the direction of the mining sequence makes no hydrologic sense. Wallace Testimony in support of groundwater brief at 32; Staub Testimony in support of groundwater brief at 16-18, 34. Under HRI's new plan, the last wellfield to be restored would be wellfield # 6 in Section 17, which is hydrologically upgradient of all of the other wellfields at Church Rock. As a result, contaminated groundwater from Wellfield 6 could flow into other wellfields after they were restored, thus threatening the quality of the groundwater and raising restoration costs. Id.

Thus, for purely economic reasons, HRI has decided to change one of the fundamental elements of its proposed mining operation. This element — the south-to-north progress of mining at Church Rock — undergirds the finding of HRI's consultant, on which the NRC also relies, that ISL mining can be conducted safely at Church Rock. The FEIS contains no acknowledgement of the change, let alone any attempt to evaluate the safety and environmental risks of the change. Therefore, in order to satisfy NEPA, the Staff must revise the FEIS to address this significant change in the licensing proposal for the Crownpoint Project, and recirculate it for public comment.

VI. THE FEIS DOES NOT EVALUATE OR DISCUSS THE IMPACT AND CONSEQUENCES OF ITS PROPOSED MITIGATION MEASURES.

NEPA requires the EIS to discuss the extent to which adverse effects can be avoided. 42 U.S.C. § 4332(C)(ii). The Supreme Court interprets this provision to require "a reasonably complete discussion of possible mitigation measures . . . in sufficient detail to ensure that environmental consequences have been fairly evaluated." Methow Valley, 490 U.S. at 352-353. The FEIS fails to explore the impacts of its suggested mitigation measures on the environment and the local community, in sufficient detail.

A. Moving the Crownpoint Water Supply To Mitigate the Threat to Groundwater Is Not Evaluated in Sufficient Detail.

The FEIS recommends relocation of the Crownpoint drinking water wells before mining can begin at the Crownpoint mine site. This mitigation measure is not adequately addressed in the FEIS. First, the FEIS does not describe whether there are any suitable locations for replacement wells or the impacts of losing the current wells to contamination. Second, although Crownpoint doubled in size between 1980 and 1993, the FEIS does not discuss how abandoning the water supply system to industrial contamination will not impair the future drinking water supply needs of this growing community. FEIS at 3-56. Third, the uranium standard proposed as a drinking water standard for these new wells is not protective of public health. Testimony of Richard Abitz in support of Intervenors' groundwater brief January 11, 1999, at 48-51; Testimony of Douglas Brugge in support of ENDAUM and SRIC's written presentation on

environmental justice.

B. Other Mitigative Measures Defer Analysis of the Project Until After Licensing.

Many of the other mitigative measures discussed in the FEIS really just require HRI to submit additional tests or information that would normally be required in the license application. See Wallace Testimony in support of Intervenors' groundwater presentation at 26, 53-55, 60, 78-79. In fact, these measures appear to degrade the level of safety provided by a typical NRC license, because they allow HRI to postpone the safety demonstrations until sometime after licensing, rather than prior to licensing when they are subject to more rigorous mandatory review and licensing hearings. For example, the license does not require HRI to submit a surety estimate or plan for the proposed mines and mill until after licensing, even though a surety is already required by NRC regulations prior to licensing of a source materials mining facility. See ENDAUM and SRIC's written presentation on financial assurance for decommissioning (January 11, 1999).

C. The Mitigative Measures Proposed For Land Use Impacts in the FEIS have Negative Socioeconomic Impacts.

The FEIS admits that construction and operation of the project would have adverse impacts on land use at each of the three mine sites, but concludes that impacts are not significant because HRI proposes compensating residents required to relocate and compensating grazing rights permittees, along with performing site restoration and

reclamation. FEIS at 4-118, 4-125-126.

The Church Rock land use surveys demonstrate that most homes in this area have been passed down for several generations, and monetary compensation will not replace the social fabric torn by relocation. Additionally, as Larry J. King and Mitchell Capitan testify in support of the environmental justice presentation, grazing livestock is an important element of Navajo culture. They both state that their lives would not be complete or "free" without owning livestock. Testimony of Larry J. King, Exhibit 4 to environmental justice presentation at 4-5; Testimony of Mitchell Capitan, Exhibit 5 to environmental justice presentation at 4-5. Because monetary compensation cannot mitigate the damage done by forced relocation of families and livestock, the measure is ineffective to mitigate the land use impacts of the project.

In conclusion, the mitigative measures in the FEIS are generally inadequate to remedy the environmental impacts of HRI's project. Dr. Bullard testifies that "these mitigative measures should be re-examined, as they are likely to be ineffective in avoiding significant impacts in the environmental justice communities of Church Rock and Crownpoint." Bullard Testimony at 41.

CONCLUSION AND REQUEST FOR RELIEF

As demonstrated above, the FEIS and the ERs represent the work of an agency and an applicant simply going through the motions of an environmental review to provide

a post-hoc rationalization for licensing the project. It is readily apparent from the DEIS, FEIS and ERs that the Staff had already determined it was duty-bound to issue a license for the project. The FEIS and the ERs violate the legal requirements for purpose and need, alternatives analysis, cost-benefit analysis, and mitigation. Despite clear evidence of changes in the operations of the project and additional new information relevant to the environmental impacts, the Staff refused to supplement either the DEIS or the FEIS.

For the foregoing reasons, the Presiding Officer should:

1. Find that the licensing of the Crownpoint Uranium Project is not supported by an adequate FEIS that complies with NEPA; and
2. Find that the licensing of the Crownpoint Uranium Project is not supported by an adequate ER that complies with NEPA; and
3. Revoke HRI's license because it was unlawfully issued and supported by an inadequate EIS.

Respectfully Submitted this 19th Day of February, 1999.


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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION '99 FEB 22 P12:04

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

RULEMAKING AND ADJUDICATION STAFF

In the Matter of)
HYDRO RESOURCES, INC.) Docket No. 40-8968-ML
2929 Coors Road, Suite 101) ASLBP No. 95-706-01-ML
Albuquerque, NM 87120) February 19, 1999

CERTIFICATE OF SERVICE

I hereby certify that:

On February 19, 1999, I caused to be served copies of the following:

ENDAUM's and SRIC's Brief in Opposition to Hydro Resources, Inc.'s Application for a Materials License with Respect to: NEPA Issues Concerning Project Purpose and Need, Cost/benefit Analysis, Action Alternatives, No Action Alternative, Failure to Supplement EIS, and Lack of Mitigation

via e-mail and upon the following persons marked by an asterisk (*) by Federal Express, standard overnight delivery, and upon the following persons marked by a (+) by U.S. mail, first class, in accordance with the requirements of 10 C.F.R. § 2.712:

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Dated this 19th day of February, 1999,


Johanna Matanich

February 18, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

The Honorable Peter B. Bloch, Presiding Officer

_____)	
In the Matter of)	
)	
HYDRO RESOURCES, INC.)	Docket No. 40-8968-ML
(2929 Coors Road, Suite 101)	ASLBP No. 95-706-01-ML
Albuquerque, NM 87120))	
_____)	

WRITTEN TESTIMONY OF DR. ARJUN MAKHIJANI

On behalf of Eastern Navajo Diné Against Uranium Mining (“ENDAUM”) and Southwest Research and Information Center (“SRIC”), Dr. Arjun Makhijani submits the following testimony regarding the comparative environmental impacts of nuclear power plant fuel produced from newly mined uranium and downblended Highly Enriched Uranium (“HEU”).

Q.1: Please state your name, affiliation, and qualifications.

A.1: My name is Arjun Makhijani. I am President of the Institute for Energy and Environmental Research in Takoma Park, Maryland. I am an expert in the field of nuclear engineering. I have extensive experience in the area of nuclear waste management, evaluation of emissions from nuclear production facilities, disposition of weapons usable materials, and nuclear non-proliferation. I have authored or co-authored numerous books, articles, and reports on these topics. A copy of my curriculum vita is attached as Exhibit 1 to my testimony.

Q.2: What is the purpose of your testimony?

A.2: I have been asked by ENDAUM and SRIC to make a comparison of the environmental impacts of producing nuclear power plant fuel from newly mined uranium, versus the environmental impacts of producing nuclear fuel by downblending HEU with depleted uranium feedstock.

Q.3: What materials did you review in preparation for your testimony?

A.3: I reviewed relevant portions of the Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico NUREG-1508 ("Crownpoint Project"). I also reviewed the Department of Energy's EIS on Disposition of Surplus Highly Enriched Uranium, DOE/EIS-0240, July 1996. I reviewed other materials on the disposition of HEU prepared by the DOE and/or its contractors. These documents are cited in my testimony.

Q. 4: Does the FEIS for the Crownpoint Project address the comparative impacts of producing nuclear power plant fuel from newly mined uranium and HEU?

A. 4 No, it does not.

Q. 5: In your view, should these comparative impacts be addressed?

A. 5: Yes they should. As I will discuss below, the environmental impacts of producing nuclear fuel from newly mined uranium are significantly greater than the impacts of producing fuel from the downblending of HEU with depleted uranium tails. In my professional opinion, considerable adverse environmental impacts could be avoided by pursuing the downblending alternative. In addition, the downblending alternative has significant value for international security and nuclear non-proliferation.

Q. 6: Please describe the process for producing nuclear power plant fuel from newly mined uranium extracted with the solution mining method.

A. 6: Light water reactors use low enriched uranium (LEU) as a fuel. This fuel can be produced from freshly mined and refined uranium, or by taking HEU in the nuclear arsenal that has been declared surplus and converting it into reactor fuel.

In order to produce nuclear power plant fuel from freshly mined uranium the following processing steps are needed:

1. Mining of natural uranium
2. Extraction of natural uranium from the ore and its conversion to “yellow cake” (natural uranium, mainly in the chemical form U_3O_8)
3. The conversion of yellow cake to natural uranium hexafluoride (UF_6)
4. The enrichment of natural UF_6 , which contains about 0.7 percent uranium-235 to low enriched uranium, which contains 3 to 5 percent uranium hexafluoride. The level of enrichment would depend on fuel specifications provided by the customer. A typical enrichment would be 4 percent enriched uranium. This means that the fuel would contain 4 percent uranium-235, with almost all the rest being U-238.
5. Conversion of enriched UF_6 to uranium dioxide (UO_2) in a uranium fuel fabrication plant
6. Pressing of UO_2 powder into pellets
7. Sintering of UO_2 pellets.
8. Loading UO_2 pellets into fuel rods and combining fuel rods into fuel rod bundles.

The first two steps described above, the mining of the uranium and its extraction from the ore, can be combined into one step by the use of “solution mining,” which is the technique proposed to be used by HRI. Lixiviant is injected into the ore body in the mine and the uranium bearing solution is brought up from the mine to be processed into yellow cake in surface facilities.

Q. 7: Please describe the steps for producing nuclear power plant fuel from HEU.

A. 7: When highly enriched uranium is used as the starting point for fuel fabrication, the mining and refining steps have already been completed. The steps required to make reactor fuel from surplus military HEU are as follows:

1. Conversion of HEU from metal or other chemical form into highly enriched uranium hexafluoride (UF_6) or uranyl nitrate ($UO_2(NO_3)_2$, also called UNH).

2. Combining highly enriched uranium with depleted uranium (DU)¹, natural uranium, or slightly enriched uranium to yield low enriched uranium (LEU) at the desired enrichment for reactor fuel (less than 5 percent for commercial reactor fuel). The material used to dilute HEU into LEU is called the “blendstock.” The enrichment process separates natural uranium into two streams – the enriched stream, which is higher in U-235 compared to natural uranium, and the depleted uranium stream, so called because it has been depleted of uranium-235. Depleted uranium consists primarily of the isotope U-238.
3. Performing steps 5 through 8 described in my answer to Question 6 above, in order to convert the low enriched UF₆ into uranium fuel, or in the case of UNH blending down, conversion of UNH to UO₂ followed by steps 6,7, and 8 above.

The conversion of surplus military HEU into LEU is occurring both in the United States and in Russia as part of the cooperative efforts by these countries to reduce nuclear proliferation threats in the post-Cold War period. While the United States has decided to use natural uranium as the blendstock, this is not necessary to meet reactor fuel specifications for all but the most highly enriched uranium. Satisfactory fuel can be produced by blending HEU with depleted uranium in the case of about three-fourths of the uranium that the United States has declared surplus.² This is environmentally advantageous as will be discussed below.³

Q 8: Please describe the assumptions you use in comparing the environmental impacts of the two methods of producing nuclear power plant fuel described above.

¹ Depleted uranium is the leftover material after natural uranium has been passed through an enrichment plant.

² The United States has declared 174.3 metric tons of HEU surplus. HEU is defined as uranium with 20 percent or more of U-235 in it. Of this, about 19 percent has enrichments more than 92 percent, about 5.6 percent is between 80 and 92 percent and the rest is between 20 and 80 percent. The average enrichment is about 60 percent. For percentages in various enrichment classes, see *Initial Report on Characterization of Excess Highly Enriched Uranium*, prepared by Oak Ridge Y-12 Plant, Lockheed Martin Energy Systems, July 1996, p. 5-1.

³ If natural uranium is used as a blendstock instead of DU, there is some economic advantage in that there is less of a loss of separative work. However, this economic gain is offset in some measure by the fact that it will be expensive to dispose of the DU that is now surplus and has little or no commercial use. Further, the DOE possesses some natural uranium. In its EIS on HEU disposition, the DOE appears not to have included any mining, milling, or uranium conversion impacts in its assessment of LEU production from HEU blending. See Office of Fissile Materials Disposition, *Disposition of Surplus Highly Enriched Uranium – Final Environmental Impact Statement*, DOE/EIS-0240, Volume I, June 1996, Section 4.7.1.

A. 8: Since most US surplus HEU can be blended down using DU as blendstock, I will use this as the reference case for the environmental comparison here. The environmental impacts of newly mined uranium and the impacts of blended HEU are compared in Table 1 below.

It is important to note that my general conclusion that the environmental impacts of making fuel from newly mined uranium are far greater than those of making fuel by blending down HEU is not changed if it is assumed that natural uranium is used as the blendstock instead of DU. That is because natural uranium requirements are reduced by about a factor of eight (given the composition of US surplus HEU) to make a given amount of LEU fuel (4 percent enrichment) from HEU as compared to producing fuel from newly mined uranium.

The basis for the numerical estimates is a total fuel production of almost 4.5 million pounds of 4 percent enriched uranium fuel, based on 39 mine-years of output at 0.85 million pounds per year of uranium.⁴ The relative environmental impacts of reactor fuel production by the two methods – from newly mined uranium using solution mining versus blending down existing HEU by mixing it with depleted uranium – are shown in the Table 1 below. Some items in Table 1 are qualitative; others also have numerical estimates. Italicized items indicate a reduction of risk. Air emissions are compared in Table 2.

The comparison is only for the steps that are different. In other words, we omit consideration of steps 6,7 and 8 in Answer 6, above since they are the same for both methods. If operated as planned, the Crownpoint mine will yield about 4.5 million pounds of 4 percent enriched uranium fuel.⁵

⁴ All uranium figures in this memorandum are on an elemental uranium basis, unless otherwise specified. According to the mining plan the Church Rock, Unit 1 and Crownpoint mines will operate for 7, 17, and 15 years respectively. HRI estimates that one million pounds of U_3O_8 will be produced at each site each year. This gives a total of 39 mine-years of operation, resulting in 39 million pounds of U_3O_8 , which is equivalent to 33 million pounds of uranium on an elemental basis. Note that all uranium figures have been converted from U_3O_8 to the equivalent amount of uranium metal and that numbers may not add exactly due to rounding.

⁵ For the purpose of this testimony, we assume that there are no significant uranium losses during uranium conversion, enrichment or fuel fabrication other than those associated with the depleted uranium stream.

Table 1: Environmental impacts of LEU fuel production

Processing step	Impacts of newly mined uranium	Impacts of blended HEU (risk reduction elements in <i>italics</i>)	Comments
Solution mining and yellow cake production	Discharges into ground, on soil, and/or into water: radium-226, thorium-230, uranium, and heavy metal. Air emissions: uranium, radon and its decay products	None; mining and milling not needed in case of DU blendstock. Relatively low in case of natural uranium blendstock	
Conversion to UF ₆	Low-level radioactive waste (LLW), some air and water discharges of radioactivity and non-radioactive toxic materials	Relatively small LLW volume from HEU conversion to UF ₆ or UNH since quantity involved is small; <i>reduction of hazard from HEU storage</i>	
Uranium enrichment or blending down	Creation of more unneeded DUF ₆ which poses an environmental hazard; releases of UF ₆ and fluorides; DU creation almost 29 million pounds over the duration of the HRI operation	<i>Reduction of risk due to reduction of depleted UF₆ stocks in case of DU blendstock</i> Blending down HEU to 4 percent using DU will reduce DU stocks by uranium about 4.3 million pounds.	
Fuel fabrication	See comment column	See comment column	Risks are about the same for the two approaches, since both involve the same quantities of materials. Small variations may occur due to differences in uranium-234 concentrations in the LEU.

Note 1: It takes 7.436 pounds of natural uranium to produce one pound of 4 percent enriched fuel (tails assay for U-235 = 0.2 percent). Reference: *U.S. AEC Gaseous Diffusion Plant Operations*, Oak Ridge Operations Office Report No, ORO-684, 1972 as cited in Thomas Cochran, William Arkin, Robert Norris and Milton Hoenig, *U.S. Nuclear Warhead Production, Nuclear Weapons Databook Volume II*. Washington DC: Natural Resources Defense Council, 1987, p. 127. For simplicity, we ignore the uranium losses in uranium processing in this calculation. Taking these losses into account would increase the estimated environmental impact of fuel production from newly mined uranium.

Almost 29 million pounds depleted uranium will be created as a result of fuel production from HRI yellow cake, adding to the already enormous burden that this material presents as an environmental hazard. About 560,000 metric tons (about 1.2 billion pounds) of depleted UF₆ is now stored at uranium enrichment sites in cylinders.⁶ While some of this may not be suitable for use as blendstock due to contamination with uranium-236, some of it could be so used. The use of a portion of this depleted UF₆ for blending down highly enriched UF₆ would reduce an environmental hazard. It would also reduce management costs for this material.

The relative environmental impacts in terms of emissions of radioactive materials to the air for fuel produced from the proposed HRI solution mining project versus blending down HEU using the UNH or the UF₆ approach are shown in Table 2. The figures are adjusted to the cumulative planned production of 39 million pounds of U₃O₈ that HRI plans to produce.

Table 2: Air emissions impacts for fuel produced from proposed solution mining versus blending down, in curies

Impact	Solution mining	Blending down, UNH method	Blending down, UF6 method
Radon emissions, soln. mining	180	None	None
Radon emissions, restoration water	~2,500	None	None
Radon emission, uranium conversion	8.0	None	None
Uranium emissions, conversion	0.14	None	None
Uranium emissions, enrichment	0.34	None	None
Uranium emissions. Blending down processes	None	0.0052	0.0098
Total radon emissions	~2,700	None (Note 2)	None (Note 2)
Total uranium emissions	0.48	0.0052	0.0098

References: NUREG 1508 Chapter 4 for annual emissions of radon due to solution mining. All other figures for HEU Disposition EIS DOE/EIS-0240, page 4-143. DOE assumes natural uranium as the blendstock.

Notes: 1. All numbers have been adjusted for cumulative production for the proposed solution mining at Church Rock, Unit 1 and Crownpoint facilities and rounded to two significant figures.

2. Figures for HEU impacts, including those for zero impacts, are from DOE's HEU disposition EIS cited above.

⁶ Department of Energy (Office of Nuclear Energy) Notice in the *Federal Register*, Vol. 59, No. 217, November 10, 1994, page 56324 entitled "Management of Depleted Uranium Hexafluoride (UF₆); Request for Recommendations."

There are substantial radon emissions from the proposed HRI facilities, while there would be none using blended down HEU with DU as blendstock. The uranium emissions for fuel production from newly mined uranium would be between about 50 times and 90 times greater than with blending down HEU, depending on the technique chosen.

Q. 9: What do you conclude about the comparative environmental impacts of the two methods of producing nuclear power plant fuel?

A. 9: The risks involved in making reactor fuel from newly mined uranium are considerably greater than those arising from blending down HEU. Moreover, blending down HEU actually reduces some existing risks and releases, the most notable of which are:

- reduction of risks from HEU storage, both in terms of accidental releases as well as risk of diversion;
- when DU is used as the blendstock, reduction of risk from storage of depleted UF₆, which now presents a serious management problem;
- reduction of risk from mining new uranium when natural uranium is used as the blendstock. Only about one-eighth as much uranium need be mined if US surplus HEU is used to make 4% LEU fuel as compared to the same fuel made completely from newly mined uranium. Moreover, as we have noted, perhaps one-fourth of US surplus HEU needs to be blended down in this way to meet LEU fuel specifications.

Q. 10: Is there sufficient surplus HEU in the United States to replace the planned production from the proposed facilities?

A 10: Yes. About 85 percent of the 174.3 metric tons that has been declared surplus can be converted to reactor fuel. The DOE estimates that US surplus HEU “will provide the equivalent of about 37 million pounds U₃O₈”⁷ which is almost the same as the projected maximum production from the proposed facilities. In addition the United States also has LEU and natural uranium stocks equivalent to over 39 million pounds of U₃O₈. Moreover, the United States has entered into nuclear arms reduction agreements by treaty (START II)

⁷ See Energy Information Administration web page at http://www.eia.doe.gov/cneaf/nuclear/com_fuel/com_fuel_sum.html#tos

and in principle (START III) that would add to the surplus HEU stock considerably. Such arms reductions are generally considered highly desirable because of the grave economic crisis in Russia and the accompanying political instability there. Russia is unlikely to declare more of its nuclear materials surplus if the United States does not also do so.

Q. 11: Are there other risks associated with opening new uranium mines?

A 11: Yes. The opening of new mining capacity will tend to further depress already-low uranium prices. This may depress the pace of conversion of HEU to reactor fuel, notably in Russia. This would, in turn, tend to increase security risks, since it is more risky to leave surplus HEU in that form in Russia under current and foreseeable circumstances than it would be to blend it down and import it into the United States.

On the basis of 4 percent uranium fuel, the quantity of fuel to be imported from Russia is projected to be the equivalent of almost 400 million pounds of U_3O_8 , or about ten times the reactor fuel expected to result from the proposed mine. The DOE projects that at the peak of these imports in about 2010, the Russian fuel will amount to about half of US reactor fuel requirements.⁸ It is important that Russian HEU be blended down as rapidly as possible so as to reduce the danger of any of this material winding up in a nuclear black market.

Thus, in addition to the environmental penalties of opening a new mine both at the mine site and off the mine site (which should also be analyzed in the EIS), there are unmeasurable increases in security risks that will result from opening a new mine at a time of low world prices. Given the uncertain security situation surrounding Russian HEU every effort should be made to create the conditions for accelerating the pace of its conversion to LEU fuel.

Q. 12: Does this conclude your testimony.

A. 12: Yes it does.

⁸ See Energy Information Administration web page at http://www.eia.doe.gov/cneaf/nuclear/com_fuel/com_fuel_sum.html#tos

Curriculum Vita of Arjun Makhijani

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Education:

- Ph.D. (Engineering) University of California, Berkeley, 1972. Area of specialization: plasma physics as applied to controlled nuclear fusion. Dissertation topic: multiple mirror confinement of plasmas.
- M.S. (Electrical Engineering) Washington State University, Pullman, Washington, 1967. Thesis topic: electromagnetic wave propagation in the ionosphere.
- Bachelor of Engineering (Electrical), University of Bombay, Bombay, India, 1965.

Current Employment:

1987-present: President and Senior Engineer, Institute for Energy and Environmental Research, Takoma Park, Maryland. (part-time in 1987).

Other Long-term Employment

- 1984-88: Associate Professor, Capitol College, Laurel, Maryland (part-time in 1988).
- 1983-84: Assistant Professor, Capitol College, Laurel, Maryland.
- 1977-79: Visiting Professor, National Institute of Bank Management, Bombay, India. Principal responsibility: evaluation of the Institute's extensive pilot rural development program.
- 1975-87: independent consultant (see page 2 for details)
- 1972-74: Project Specialist, Ford Foundation Energy Policy Project. Responsibilities included research and writing on the technical and economic aspects of energy conservation and supply in the U.S.; analysis of Third World rural energy problems; preparation of requests for proposals; evaluation of proposals; and the management of grants made by the Project to other institutions.
- 1969-70: Assistant Electrical Engineer, Kaiser Engineers, Oakland California. Responsibilities included the design and checking of the electrical aspects of mineral industries such as cement plants, and plants for processing mineral ores such as lead and uranium ores. Pioneered the use of the desk-top computer at Kaiser Engineers for performing electrical design calculations.

Some accomplishments:

Principal author of: (i) the first overall study of energy efficiency potential of the US economy (1971); (ii) the first global analysis of energy and agriculture in the Third World (1975); (iii) the first independent re-assessment of radioactivity emissions from a nuclear weapons plant (1989); (iv) *Saving Our Skins* (1988) and *Mending the Ozone Hole* (1995), which became reference works for environmentalists seeking to reduce and reverse ozone layer depletion. Principal editor and co-author of the first global assessment of the health and environmental effects of nuclear weapons production (*Nuclear Wastelands*, 1995), which was nominated for a Pulitzer Prize by MIT Press. Co-author of (i) the first technical study to show that de-coupling of economic growth from energy use was possible (1974); (ii) the first complete audit of the cost of the US nuclear weapons program (1998).

Professional Societies:

Institute of Electrical and Electronics Engineers and its Power Engineering Society
American Geophysical Union and the American Institute of Physics (via AGU)
American Association for the Advancement of Science

Awards:

The John Bartlow Martin Award for Public Interest Magazine Journalism of the Medill School of Journalism, Northwestern University, 1989, with Robert Alvarez.

Consulting Experience, 1975-1987

Consultant on a wide variety of issues relating to technical and economic analyses of alternative energy sources; electric utility rates and investment planning; energy conservation; analysis of energy use in agriculture; US energy policy; energy policy for the Third World; evaluations of portions of the nuclear fuel cycle.

Partial list of institutions to which I was a consultant in the 1975-87 period:

Tennessee Valley Authority
Lower Colorado River Authority
Federation of Rocky Mountain States
Environmental Policy Institute
Lawrence Berkeley Laboratory
Food and Agriculture Organization of the United Nations
International Labour Office of the United Nations
United Nations Environment Programme
United Nations Center on Transnational Corporations
The Ford Foundation
Economic and Social Commission for Asia and the Pacific
United Nations Development Programme

Languages

English, French, Hindi, Sindhi, and Marathi.

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Principal author of three chapters in Schwartz, S., ed., *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940*, Brookings Institution, Washington, D.C., 1998.

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February 8, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before Administrative Judge Peter B. Bloch

In the Matter of)	
)	
HYDRO RESOURCES, INC.)	Docket No. 40-8968-ML
2929 Coors Road Suite 101)	
Albuquerque, NM 87120)	ASLBP No. 95-706-01-ML
)	

WRITTEN TESTIMONY OF DAVID OSTERBERG

On behalf of Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Center ("SRIC"), David Osterberg submits the following testimony regarding purpose/need and cost-benefit issues raised by Hydro Resources Inc.'s ("HRI's") amended application for a source materials license.

Q.1. Please state your name and qualifications.

A.1. My name is David Osterberg. I hold a Bachelor of Arts degree in economics from Washington State University. I also attended the University of Wisconsin-Madison where I earned a Masters Degree in economics, another in water resources management, and a third in agricultural economics. I was an instructor of economics at the University of Wisconsin-Green Bay and assistant professor of economics and business at Cornell College in Iowa. I am presently adjunct associate professor in the Geography Department at the University of Iowa as well as a consultant.

Until January 1995, I was an Iowa State Representative. During my 12 years in the Iowa General Assembly I served terms as chairman of the House Committee

on Agriculture, as well as chairman of the House Energy and Environmental Protection Committee. While in the General Assembly, I was a member of the Iowa Energy Policy Council and a member of the Agricultural Energy Management Advisory Council.

A summary of my professional qualifications and experience is provided in Exhibit 1. I have attached all exhibits referenced by number to this testimony. Exhibits referenced to by letter (B-FF) are attached to the testimony I provided in support to Hydro Resources, Inc.'s Lack of Technical and Financial Qualifications on January 11, 1999 in this docket.

Q.2. Have you ever testified before this or other regulatory commissions?

A.2. Yes. In 1995, I testified before the U.S. Nuclear Regulatory Commission in the matter of licensing a nuclear enrichment facility, *Louisiana Energy Services* (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331 (1996), *affirmed in part and reversed in part*, 47 NRC 77 (1998). In that case, I was found qualified to testify as an expert on energy economics. On the state level I testified at the request of the Florida Public Service Commission staff in that state's Hearings on the federal Public Utility Regulatory Policy Act definition of "cost of service." I also testified for the staff of the Iowa State Commerce Commission on the same subject. I have testified before regulatory commissions in Iowa, Illinois, Indiana, South Dakota, South Carolina, Kentucky and New York for various clients. I have been retained as an expert on electric rate design for the Nebraska Energy Office and the Omaha Public Power District. I was also part of an energy study for the state of Missouri.

Purpose and Materials Used

Q.3. What is the purpose of your testimony?

A.3. I was retained by Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Center ("SRIC") to evaluate the need

for the proposed Crownpoint Uranium Solution Mining Project, including Section 8 of the Church Rock site. I was also asked to evaluate the adequacy of the discussion of the no-action alternative to the project.

Q.4. What materials did you review in preparation for your testimony?

A.4. I reviewed the Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico NUREG 1508, Hearing Record ACN 9701030069, (February 1997) (“FEIS”); data from the Energy Information Administration of the U.S. Department of Energy (“DOE”); industry publications; economic papers and texts.

Q.5. Please describe your evaluation of the manner in which the FEIS discusses the need for the Crownpoint Project.

A.5. The NRC Staff disposes of the “need” question in one paragraph of the FEIS, at page 1-3. (A copy of the relevant pages of the FEIS is attached as Exhibit FF to my testimony). According to the FEIS:

The NRC’s need for action is to fulfill its statutory responsibility to protect public health and safety and the environment in matters related to source nuclear material (Atomic Energy Act of 1954 as amended).

Thus, according to the FEIS, the need for the project means NRC’s need to review license applications.

I find this discussion of “need” deficient in two respects. First, the Staff incorrectly identifies the “need” for the project as the agency’s need to conduct its review of the application. As the Licensing Board recognized in *Louisiana Energy Services*, need for the project is an expression that describes the principal benefit of the project that is to be weighed against the various costs that are brought about because of the project. 44 NRC at 348-49 and n.5. The NRC Staff erroneously

confuses the NEPA concept of need, as a benefit of the project, with its need to act on the license application.

Second, the discussion fails to acknowledge that market conditions for uranium ore demonstrate no need for any aspect of this mine in the foreseeable future. This includes Section 8 of the Church Rock site (the first area proposed to be mined), as well as all other portions of the Crownpoint Project. I will address the reasons for my opinion in more detail below.

Q.6. Does Staff address the issue of need in other sections of the FEIS?

A.6. In Section 5 of the FEIS, the NRC Staff describes the benefits of the project, without referring specifically to the need for the project. The FEIS claims the Crownpoint Project will have two principal benefits. First, the FEIS states that the Crownpoint Project would confer a “public benefit” by offsetting the current “deficit” in domestic production of uranium. FEIS at page 5-1.¹ Second, the FEIS states that the Crownpoint Project provides a public benefit because it would produce uranium that would eventually be used in nuclear reactors to generate electricity.² Id. The FEIS also states that the Crownpoint Project would benefit Hydro Resources, Inc. (“HRI”) by generating revenues. However, it is unclear whether the FEIS includes HRI’s private gain as part of the benefits for the project, “The benefits and costs that are internal to HRI are not subject to government regulation and, therefore, are not assessed in this FEIS.” Id.

Q. 7 Do you consider that the FEIS’s evaluation of the primary benefits of the Crownpoint Project is adequate?

¹ The issue of whether increased domestic production is in the interest of the United States is further addressed in the testimony of Arjun Makhijani.

² A discussion of other secondary benefits of the project, such as employment income, royalty income, and tax revenues are not addressed in my testimony. They are addressed in the testimony of Dr. Michael Sheehan.

A.7. No. I believe the FEIS's analysis is faulty in two key respects. First, there is no basis for the FEIS's claim that HRI would provide a public benefit. In fact, there is no need for an additional domestic source of uranium. The United States already has access to a large quantity of uranium and uranium products for the fabrication of nuclear power plant fuel, which is the principal use of uranium. Large quantities of low-cost uranium are available on the international market *and* in domestic supplies. Moreover, uranium prices are expected to remain low in the foreseeable future, such that it will not be economical for HRI to take the uranium out of the ground at Crownpoint.

Second, even assuming that the NRC has included private benefits for HRI as part of the project benefits, and assuming that it is legitimate to consider private benefits, any benefit to HRI is illusory. Given the fact that the uranium market is and can be expected to remain depressed for an indefinite period, the operation of the Crownpoint mines would not yield any revenues to HRI. In fact, the costs of running the mine will preclude any profits for HRI from the project. Thus, I fundamentally disagree with the NRC Staff's conclusions regarding the primary benefits of the Crownpoint Project. I do not believe any aspect of the Crownpoint Project, including Section 8 of the Church Rock site, is needed, nor would it be profitable.

Q. 8. Please explain the basis for your conclusion that there is no need for or benefit from the uranium that would be produced at the Crownpoint Project.

A.8. To properly analyze the need for and benefits of the Crownpoint Project, one must first look at the market for the output of the project, in this case uranium. The state of the market provides information on what specific quantities of uranium, at which specific sites will be developed. Demand for the commodity, sources of supply and government intervention in the particular market, all must be analyzed. To evaluate the FEIS's claim that additional *domestic* supplies of uranium are

needed, I would first examine the nature of the marketplace, i.e., whether it is domestic or international. If there is great ease in obtaining secure sources of uranium, the presence of large quantities of uranium ore in the ground in the United States would seem to be relatively unimportant. Finally, assuming there is some value to having a domestic stockpile of uranium, I would look at the size of the domestic inventory including military inventories.

Demand for Uranium

Q.9. Please explain the demand for uranium.

A.9 Demand for the uranium which will be produced by the proposed Church Rock Section 8 mine and the entire Crownpoint Uranium Solution Mining Project comes from the various commercial nuclear electric generating units located in the United States of America and around the world. In the most recent 10-K for itself and its subsidiaries (including HRI), Uranium Resources, Inc. ("URI") admits that power plant fuel is the only significant commercial use for uranium.⁴ In the same 10-K, URI projects an increasing demand for uranium. The company projects a one percent increase in nuclear generating capacity through the year 2000, with good prospects for growth beyond that year.⁵

Q.10. Do you agree with this projection?

A.10. No. The most recent projections from the Energy Information Administration ("EIA") of the U.S. Department of Energy ("DOE") contemplate fewer nuclear units than this. The EIA 1998 Reference Case projection for nuclear capacity world-wide is for no growth between 1996 and 2000, followed by about 1 percent

⁴ Uranium Resources Inc. (1997) Annual Report to the U.S. Securities and Exchange Commission, Form 10-K, for the year ended December 31, 1997, Washington, D.C. page 8. Exhibit B.

⁵ Ibid. Exhibit B.

growth over the entire ten year period to 2010 (i.e. 0.1 percent per year). After 2010, demand is projected to decrease sharply.⁶

EIA has made projections of the amount of nuclear capacity in each of the last five years and EIA has continuously decreased its projections for worldwide nuclear capacity over these years. I have prepared a table that demonstrates this. See Exhibit E.

The first page of my exhibit shows that the 1998 EIA Reference Case projects 9 fewer, large nuclear units in the year 2000 and 22 fewer large nuclear units in the year 2005 than predicted in the agency's 1997 Reference Case. (By large, I mean nuclear units of approximately 1000 MW of capacity.) The number of nuclear units projected for the years 2000 and 2005 in EIA's 1998 Reference Case is lower than nearly any other recent projection, whether the projection was meant as a high or a low case scenario. The sole exception is the Low Case projection for the year 1997.

Q.11. Why has the EIA reduced its projections for commercial nuclear units?

A.11. Nuclear units in the U.S. are retiring earlier than planned. A 1998 EIA report, entitled "Challenges of Electric Power Industry Restructuring for Fuel Suppliers", documents this phenomenon.⁷ As reported by the EIA, several states have begun the process of moving electric generation from a regulated monopoly to a competitive industry. There are several federal bills being considered to do the same nation-wide. As a result of this present and expected restructuring, electric utilities are losing their protection from market forces.

⁶ Energy Information Administration, (1998) Nuclear Power Generation and Fuel Cycle Requirements 1998, (Not printed, found at www.eia.doe.gov/cneaf/nuclear/n_pwr_fc/data98/prefix3.html), May 1998, Table 1. Exhibit C.

⁷ Energy Information Administration, (1998), Challenges of Electric Power Industry Restructuring for Fuel Suppliers, (DOE/EIA-0623), Washington, D.C., September 18, 1998. Exhibit D (hereinafter "EIA Challenges of Restructuring Report").

Restructuring has already resulted in the premature shutdown of some nuclear plants. One hundred ten U.S. nuclear units were on line when Watts Bar, the last U.S. nuclear unit in the licensing pipeline, went into service in mid-1996. In the following two years, five units were taken out of service before they reached their planned life: Haddam Neck, Big Rock Point, Maine Yankee, Zion 1 and Zion 2.

EIA's Challenges of Restructuring Report identified two additional plants, Millstone 1 and Oyster Creek, that were expected to close early. (Millstone 1 went out of service after July 1998, reducing the number of U.S. units to 104.⁸) With the expected closing of Oyster Creek in 2000, after it burns its last load of fuel, the number of U.S. commercial nuclear units will fall to no more than 103.

Q.12. How does EIA's Challenges of Restructuring Report explain the loss of six commercial units in the U.S. in little more than two years?

A.12. EIA observes that the new competitive electricity marketplace is beginning to demand efficiency from utility companies. It is assumed that the market will more forcefully require that poor performing nuclear units improve or retire than the public utility regulatory commissions have. Therefore, as the EIA report explains, "The prospect of having to compete on the basis of market value of electricity threatens the continued operation of a number of units."⁹

Q.13. Aside from the plants that have shut down, are there plants still in operation that have problems operating efficiently?

A.13. Yes. Browns Ferry 1 has not produced electricity since 1985. This is an unusually long period of time with no production for the NRC to continue to count it as an operating unit. Recently, a petition has been filed by The Union of

⁸ Energy Information Administration, (1998) Monthly Energy Review, October 1998, Table 8.2. Exhibit F.

⁹ Energy Information Administration (1998) Challenge of Electric Power Industry Restructuring for Fuel Suppliers, (DOE/EIA-0623), Washington, D.C., September 18, 1998, p 25. Exhibit D.

Concerned Scientists, requested that the NRC revoke the operating license of the unit.¹⁰ Several other plants have not produced electricity for a significant period:

<u>PLANT</u>	<u>DOWN SINCE</u>
Millstone 2	2/96
Clinton 1	9/96
Lasalle 2	9/96
Cook 1&2	9/97 ¹¹

The Union of Concerned Scientists has also petitioned to revoke, modify or suspend the operating license for the D.C. Cook nuclear units.¹² As recently as November 1998, Cook's owner promised the plant would be back on line in the first half of 1999 when it met with the NRC.¹³ However, the company now admits that there are more problems that will delay a restart.¹⁴ Missed deadlines followed by more safety reviews can also be found in the history of the nuclear units that were taken out of service early.

Q.14. Have the recent premature closings and poor performance of some nuclear units had an effect on total uranium consumption?

A.14. Yes. In its most recent statistical review of world energy, British Petroleum reports that worldwide consumption of nuclear energy declined for the first time after 25 years of steady growth and ten years of strong growth:

¹⁰ Nuclear Regulatory Commission, (1998) NRC STAFF TO HOLD INFORMAL PUBLIC HEARING ON OCTOBER 26 ON PETITION TO REVOKE OPERATING LICENSE FOR BROWNS FERRY UNIT 1, Atlanta, GA, Office of Public Affairs, October 13, 1998. Exhibit G.

¹¹ Nuclear Regulatory Commission, (1998) Plant Status Report, Washington DC, NRC Operations Center, December 17, 1998. Exhibit H.

¹² Nuclear Regulatory Commission, (1998) NRC STAFF TO HOLD INFORMAL PUBLIC HEARING ON PETITION TO REVOKE, MODIFY OR SUSPEND OPERATING LICENSE FOR D.C. COOK PLANT, Washington, D.C., Office of Public Affairs, July 23, 1998. Exhibit I.

¹³ Ux Weekly, (1998) AEP has fourth restart meeting w/NRC, October 5, 1998, p. 4. Exhibit J.

¹⁴ Reuters, "AEP delays restart of Cook nuclear plant", January 14, 1999. Exhibit 2.

After a decade of strong growth, consumption of nuclear energy fell by 0.6%. Almost all of this decline resulted from the sharp fall in consumption of 7.2% in the USA and Canada.¹⁵

Q.15. To what do you attribute the decreased consumption of nuclear energy?

A.15. Production or consumption of nuclear energy arises from a combination of the number of operable units and the capacity factor or usage rate for each unit. As discussed above, a number of plants have shut down, and some others are not operating to full capacity. Production could still increase even with fewer plants if capacity factor continued to increase enough, but the decrease in nuclear units puts severe limits on production.

Q.16. Has the reduction in the number of operating U.S. nuclear units put pressure on prices for nuclear fuel?

A.16. The present low prices for uranium stem from many factors on the demand side as well as on the supply side and one cannot point to one factor as being responsible for price changes. However, I can say that the existence of fewer nuclear units would tend to depress prices, everything else being equal.

Q.17. Will a new competitive environment for U.S. utilities result in more nuclear units vulnerable to early retirement?

A.17. The INGAA Foundation, ("INGAA") an arm of the Interstate Natural Gas Association of America, commissioned a report to answer this very question. INGAA was seeking an estimate of the potential increase in natural gas demand by electric utilities because of the loss of nuclear units.¹⁶ The report employed two different methodologies and produced two separate projections for the future

¹⁵ British Petroleum (1998), "1997 in Review", BP Statistical Review of World Energy 1998, available on the world wide web at <http://www.bp.com/bpstats/intros/review.htm>. Exhibit K.

¹⁶ The INGAA Foundation, Inc., (1997) Nuclear Power Plants and Implications of Early Shutdown for Future Natural Gas Demand, Washington DC, 1997. Exhibit L.

of U.S. nuclear units. The first methodology is based on nuclear plant performance alone. The second methodology is based on both performance and the regional price of alternative power.

The performance-based analysis divided nuclear sites into three classes based on economic performance: Top Performers, Good Performers, and Poor Performers. Operation and Maintenance (“O&M”) costs from 1990 to 1995 were used to establish performance. The Poor Performer group included 17 nuclear sites containing 22 individual units. In the words of the report:

The 17 sites in this group are clearly vulnerable to early shutdown. For this group, non-fuel O&M costs per kWh have increased 27 percent while capacity factor has decreased by 13 percent, from 1990 to 1995. Most of these sites have been plagued by extended shutdowns for safety or operational problems.¹⁷

Taken together the INGAA study and EIA’s “Challenges of Restructuring Report”, which was written one year later, confirm the reality of the potential for early closing. Of the seven plants listed as closed or closing soon in the EIA study, four including Big Rock Point, Haddam Neck, Millstone 1, and Oyster Creek were in the INGAA Poor Performer category.

The Poor Performers did not account for all the recent closings, however. The two Zion units that closed in January 1998 were rated in the Good Performer category. Even more disturbing for sellers of uranium, Maine Yankee, which closed in August of 1997, was in the Top Performer category.

INGAA put together a second list of vulnerable nuclear sites. Some better performing units might also be vulnerable to premature shutdown because the projected cost of replacement electric power in some regions of the country will be cheaper than a particular nuclear unit can produce it for. This may be true

¹⁷ Ibid, p 36. Exhibit L.

even if the particular unit has not performed poorly relatively to other nuclear units. INGAA put together a second list of nuclear sites that are vulnerable to shutdown due to performance and electricity costs. This larger list of 37 sites includes 48 units, and represents approximately 40% of all commercial nuclear generation units in the U.S.

Q.18. Do other reports identify plants that are candidates for early closure?

A.18. Yes. An appendix to the INGAA report compares the 17 sites listed as Poor Performers with the list of plants that have been designated as “Nuclear Lemons” by the consumer group, Public Citizen. The 19 lemons include 12 of the sites listed as Poor Performers by the INGAA. Of the 12 sites (17 units) on both lists, Haddam Neck and Millstone 1 have closed. In addition, one of the closed Zion units made the Lemon list but not the Poor Performer list and Oyster Creek was a Poor Performer but not a Lemon. The ten still operating sites that made both lists must be considered very vulnerable to early closing.¹⁸

LEMONS

POOR PERFORMERS

Salem 1 & 2	Salem 1 & 2
WNP 2	WNP 2
Millstone 1 & 2	Millstone 1 & 2
Dresden 2 & 3	Dresden 2 & 3
Quad Cities 1 & 2	Quad Cities 1 & 2
Sequoyah 1 & 2	Sequoyah 1 & 2
Cooper	Cooper
Fermi	Fermi
Haddam Neck	Haddam Neck
Indian Point 3	Indian Point 3
Palisades	Palisades*
Perry	Perry*
Pilgrim	Pilgrim
South Texas 1 & 2	Oyster Creek
River Bend	Browns Ferry 2

¹⁸ The INGAA Foundation, Inc., (1997) Nuclear Power Plants and Implications of Early Shutdown for Future Natural Gas Demand, Washington DC, 1997, p. 48 & 129. Exhibit L.

LaSalle 1	Hope Creek
Bruswick	Big Rock Point*
Zion 1	

*Appendix Table 1 in INGAA, which compares the Poor Performers with the Nuclear Lemons, does not include Perry and Big Rock Point, two sites that are on Table A-1-3, which describes the 17 sites which are the poor performers. This must be a mistake. On the other hand, Palisades, which is listed in Table 1, is not part of Table A-1-3. Since both Perry and Palisades are on the Lemons list, there are still 12 sites in common to both lists whichever list of Poor Performers is used.

Q.19. Do other reports contemplate early shut down of nuclear units in the U.S.?

A.19. Yes. A more recent report by Public Citizen finds that 42 nuclear reactors are not competitive.¹⁹ The report was a critique of the Tennessee Valley Authority (“TVA”). However, a section of the report compared the O&M costs for 1994-1996 for nuclear units with replacement power in each region of the country. Five of the 42 non-competitive units are among the units that have either closed or announced an early closing. According to the report:²⁰

Even if nuclear utilities can bring O and M costs under control, the combination of cheap replacement power and rapid aging of the nuclear reactors will likely doom many of these reactors long before the expiration of their operating licenses.

Q.20. Can you name other studies projecting early nuclear unit closings?

A.20. Yes. A report by Biewald and White gives another projection of early nuclear unit retirements.²¹ This report was written after the recent nuclear unit closings of 1996 to early 1998 documented above. The report’s Reference Case projects 34 additional units will retire prior to their license expiration date. The report

¹⁹ Public Citizen. (1998), Questioning the Authority, Jim Riccio, April. Exhibit M.

²⁰ Public Citizen. (1998), Questioning the Authority, Jim Riccio, April, p. 25. Exhibit M.

²¹ Biewald, Bruce and David White, (1998) “Implications of Premature Nuclear Plant Closures: Funding Shortfalls for Nuclear Plant Decommissioning and Spent Fuel Transportation and Storage”, Proceedings for

assumes a second, more optimistic case for nuclear plant cost and performance and still projects 20 nuclear units to close early. Using more pessimistic assumptions, an amazing 90 units could close early. In all three cases, units are projected to close, on average, 15 years prior to the end of their 40-year licenses.

Q.21. You speak of 40-year licenses. What will be the effect of extending the licenses of U.S. units for another 20 years?

A.21. Utilities are in the process of requesting the NRC to extend licenses at several nuclear units including Calvert Cliffs, Hatch and Oconee. However, it is not clear if such extensions will make any real difference. The present 40-year reactor life has not been a constraint on nuclear production since no U.S. nuclear unit has ever reached its planned life. All units going into service more than 40 years ago have closed early. Plans for life extensions demonstrate some utilities are bullish on nuclear power. However, unexpected problems befall nuclear units. Whether Calvert Cliffs has a 40-year license or a 60-year license, it could still close next year if conditions warrant.

The recently closed Maine Yankee plant provides an example of how an apparently good performer without energy pricing problems can nevertheless succumb to early retirement. In the INGAA study evaluating likelihood of shutdown (see Question 21 above), Maine Yankee was placed in the Top Performer category in terms of trends of O&M costs. Moreover, it was not located in an area where it was forced to compete with cheap alternative power. Nevertheless, the plant closed early, shortly after surprising disclosures of safety problems relating to lack of design documentation, age-related degradation, and fire protection. Similarly, the Yankee Rowe nuclear plant – which originally was considered to be one of the strongest candidates for license renewal based on its good performance record – closed in 1992 after the Union of Concerned Scientists

the United States Association for Energy Economics and International Association for Energy Economics 19th Annual North American Conference, October 19 to 21, Albuquerque, New Mexico. Exhibit N.

brought significant pressure vessel embrittlement problems to the NRC's attention. Thus, nuclear plants are vulnerable to shutdown at any time that latent O&M or design problems may be detected.

Q.22. What happens if there is a government policy response to global climate change and air pollution? Will emissions policy detrimental to coal increase the life of nuclear units?

A.22. Obviously no one can predict exactly what future policies on air emissions will be instituted, but the one study I have seen concluded that, although future emissions limits may increase the competitiveness of nuclear plants, there will still be early retirements of nuclear units. Geoffrey Rothwell, writing in late 1998 finds:

While states consider deregulating electricity prices, federal authorities are considering increasing restrictions on the emissions of air pollutants. Although regulation of Nitrogen Oxides (NOX) appears probable in the Eastern US between 2002-2004 with a cap and trade program, the form of regulating Carbon Dioxide (CO2) is now uncertain. If CO2 fees are implemented to reduce consumption of carbon-based fuels in relationship to 1990 levels, NPPs [nuclear power plants] would become more economically competitive and their continued operation would help reduce CO2.²²

Nonetheless, Rothwell finds that approximately a dozen nuclear units are at risk of early shutdown even if new CO2 restrictions are imposed immediately. If CO2 restrictions are delayed until 2008, Rothwell predicts that twice that many nuclear units will close before the year 2006.²³

If costs are not reduced there are approximately two dozen units at risk of early retirement before 2006, when nuclear power unit operating licenses begin to expire. However, with early implementation of air pollution fees, only half these units appear to be at risk of early retirement.²⁴

²² Geoffrey Rothwell, (1998) "Air Pollution Fees and the Risk of Early Retirement at US Nuclear Power Plants", Department of Economics, Stanford University, October. p.1. Exhibit 3.

²³ Geoffrey Rothwell, (1998) "Air Pollution Fees and the Risk of Early Retirement at US Nuclear Power Plants", Department of Economics, Stanford University, October, p.12. Exhibit 3.

²⁴ Ibid. Exhibit 3.

Thus, even the conservative assumption that the quickest response to global climate change will be implemented still has a dozen nuclear units closing early.

Q.23. What do you conclude will be the effect on the uranium industry of U.S. electric utility industry restructuring and the consequent premature nuclear plant closings?

A.23. Restructuring of the U.S. electric utility industry will bring competitive market pressure to an industry that has been heretofore protected from competition. Competition combined with less than stellar performance by some nuclear units will decrease nuclear power generation and also the demand for nuclear fuel. The following statement from the EIA "Challenges of Restructuring Report" describes what has been happening to uranium production:

A decline in demand brought about by nuclear power plant closings could weaken the price of uranium, forcing producers with marginal production costs above the market price to suspend operations. Under a scenario of declining price, relatively higher cost U.S. production would be particularly susceptible to competitive pressures exerted by imports.²⁵

In other words, as the number of nuclear units decreases, the demand for uranium falls, weakening the price of uranium. It is also notable that high cost producers are hurt the most by the falling price of uranium.

The fact that uranium prices have been steadily falling since the recent round of early nuclear unit retirements began in mid 1996 is consistent with the EIA's predictions that nuclear power plant closings bring down uranium prices. The fact that URI is suffering severe economic problems is also consistent.²⁶ The

²⁵ Energy Information Administration (1998) Challenge of Electric Power Industry Restructuring for Fuel Suppliers, DOE/EIA-0623, September 18, 1998, page 38. Exhibit D.

²⁶ See testimony of Dr. Michael F. Sheehan in support of ENDAUM'S and SRIC'S Brief in Opposition to Hydro Resource's Inc. Materials License with Respect to: Financial Assurance for Decommissioning (January 11, 1999.)

steady decline in the viability of nuclear units and the consequent decline in uranium prices raise profound questions about the economic viability of any new domestic uranium mine.

Q.24. What additional pressures might an increasingly competitive utility industry put on the suppliers of nuclear fuel?

A.24. One reaction by electric utilities to the coming restructuring is a spate of mergers. In my state of Iowa, seven electric utilities served the state in 1990 and now there are only two. In addition, utilities are forming alliances to jointly operate their nuclear units. For example, four Midwest utilities including Alliant Utilities, Northern States Power, Wisconsin Electric Power, and Wisconsin Public Service are exploring the advantages of forming a single organization to service or possibly operate seven nuclear power plants in the region.²⁷

The consolidation of nuclear utilities means that procurement of nuclear fuel is carried out by fewer and larger entities. Because they are larger and fewer, these remaining buyers have a stronger hand in the marketplace. The decreasing number of utility buyers, all else equal, will tend to push uranium prices down.

Q.25. What is the situation with commercial nuclear units in countries other than the U.S.? Begin with the status of nuclear power in Western Europe.

A.25. Demand for nuclear fuel has stalled in Western Europe, as popular opposition to nuclear power has grown. At the end of 1993, a moratorium or slowdown in construction of nuclear units was in effect in thirteen countries, eleven of them in Europe and nine of them in Western Europe.²⁸ More recently, the governments

²⁷ George C. Ford, (1998) "Utilities may operate nuclear plants jointly", The Gazette, Cedar Rapids, Iowa, November 26, 1998 p 9D. Exhibit O.

²⁸ Energy Information Administration, (1994) World Nuclear Outlook, DOE/EIA-0436(94), December 1994, p.ix. Exhibit P.

of Germany and Sweden have both announced early retirements of all nuclear power plants in their countries.

For Germany this is an about-face from the previous conservative government, which in December 1997 had modified the country's basic Atomic Law to keep open the option to build new units.²⁹ Talks between the newly elected German coalition government and the owners of Germany's 19 nuclear power plants are scheduled for early 1999. Chancellor Gerhard Schroeder of the Social Democratic Party, who will chair the talks, is reported to be in favor of a twenty-year timetable to close all nuclear plants in the country, according to *Der Spiegel*.³⁰ On the other hand, his Environment Minister, Juergen Trittin, of the Green Party, is said to be pushing for a much shorter timetable of five to 10 years.

In February of 1998, the Swedish government gave final approval to the early closure of the Barseback two-unit nuclear station. (Twelve nuclear units at four sites supply about half of Sweden's electric power.) Although shutdown of the plants has been delayed by court action, the ruling party maintained control of the government in elections held in the summer of 1998, so it is likely that the days of Barseback are limited.³¹ Thus, it is nearly inevitable that the two unit nuclear plant will retire before its planned life expires.

France, the one Western European country that is committed to building new nuclear units, brought on a reactor in 1998. However, the next nuclear unit planned in France is not scheduled to come on line until after 2013. Older French nuclear units will probably begin retiring before another is added.

Q.26. Where else in the world are commercial nuclear units being planned?

²⁹ Energy Information Administration, (1998) "Germany" May 1998. Exhibit Q.

³⁰ Associated Press, (1998) "Germany May Shut Nuke Plants", *The Associated Press*, Thursday, December 17, 1998. Exhibit R.

³¹ Swedish Energy Forum, (1998) "National Policy", Swedish Energy Forum,

A.26. At the end of 1996, 45 nuclear units were listed as under construction in the world.³² Twenty-six of these units are in only five countries: Russia, South Korea, India, France and Ukraine. Thirty additional units are in the planning stage.³³ Twenty-five of these planned units are in just four countries: China, Japan, South Korea and India. Thus two thirds of all units being planned or under construction are in only seven countries.

The few countries in which nuclear expansion is occurring have market and political conditions that promise to dampen the planned expansions. The economic downturn in Asia will severely hurt nuclear expansion there, including a lengthening of completion schedules or outright cancellations in South Korea and Japan.³⁴ In addition, public opposition to the construction of new nuclear units in Japan could reduce demand.³⁵ Russia and Ukraine will also see significant delays if not cancellation of units, because of macro economic problems in those countries.

Q.27. What is happening with nuclear units in Canada?

A.27. Seven reactor units at the Bruce-A and Pickering-A nuclear plants in Canada were taken out of service in 1997. The total net generating capacity of the seven plants is 4,600 MW, which makes this a very large decrease in Canada's nuclear capacity.³⁶ Although the EIA predicts that some of these units may return to service, for the present they are shut down, and therefore do not presently require uranium.

<http://www.foratom.org/Sweden/sweden.html>, updated 25 Oct. 1998. Exhibit S.

³² Energy Information Administration (1997) Nuclear Power Generation and Fuel Cycle Report 1997, Washington, DC, DOE/EIA-0436(97), Table E3. Exhibit T.

³³ Energy Information Administration (1997) Nuclear Power Generation and Fuel Cycle Report 1997, Washington, DC, DOE/EIA-0436(97), Table E4. Exhibit T.

³⁴ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories DOE/EIA-0619, May 1998, p 50. Exhibit U. (hereinafter "EIA Commercial Fuel from Weapons Report")

³⁵ Ibid. Exhibit U.

³⁶ Ibid. Exhibit T.

Q.28. What do you conclude about the demand for uranium?

A.28. EIA data shows a steady drop in its yearly projections for future nuclear units around the world. The micro-economic performance of existing individual units, the macro-economics of financing new nuclear investment when economies turn down, and the politics of nuclear power all conspire against an increase in the demand for nuclear power plant fuel. Therefore, it is reasonably certain that the demand for nuclear power plant fuel will decline steadily over the foreseeable future. This directly affects the demand for uranium, and thus drives down the price. Victor Mourogov, Deputy Director General for nuclear energy of the International Atomic Energy Association, recently explained why demand conditions in the world seem to be pushing down prices for uranium fuel:

[T]he drastic reduction in the anticipated nuclear power capacity—from 1,000 gigawatts electric (Gwe) once projected to 352 Gwe operating today, plus another 27 Gwe under construction—has resulted in a uranium surplus and in an excess capacity in the front-end fuel cycle services.³⁷

The various cases in the studies I referred to, project early retirements of 12, 17, 19, 20, 24, 34, 42, 48 or even 90 U.S. nuclear units. Since there are currently only 104 nuclear units in the U.S., some of the projections must be truly disconcerting for the uranium industry. Additional early exits of U.S. units, and those in other countries, will make the problem for the producers of uranium much worse.

Supply of Power Plant Fuel

Q.29. Turning to the issue of supply of uranium, what other sources of power plant fuel compete with the potential output of the Crownpoint Uranium Solution Mining Project?

A.29. Many sources of nuclear power plant fuel compete with the uranium from the proposed mining project. First, there is the output of producing uranium mines

³⁷ NuclearFuel, (1998) "IAEA OFFICIAL SAYS GLOBAL INVENTORY OF SPENT FUEL WILL TOP

and the potential output of mines yet to be opened both in the United States and elsewhere in the western world. (Mines in the eastern block, because there are limits on how much of their production can be imported into the U.S., are generally considered a special case.) Production of new uranium from mines made up approximately 58% of 1997 nuclear power plant requirements.³⁸

The rest of the supply of nuclear power plant fuel comes from what is called the secondary market. One component of this secondary market is uranium released from military stocks, most of which must be blended down to make nuclear power plant fuel. Reprocessing of spent commercial fuel and the possible use of military grade plutonium is another secondary source. Inventories of uranium and enriched fuel held by owners of commercial nuclear power plants, and material held by brokers and enrichers is another source. Notable here is the large stock held by the United States Enrichment Corporation ("USEC"). Finally, technological change has decreased the need for uranium and therefore is the equivalent of an increase in uranium supply. Russian centrifuge enrichment plants now require less natural uranium per unit of output and USEC has announced it will begin to underfeed its gaseous diffusion plants. I will address each of the supply components in turn.

Supply Component # 1: Competition from Other Mines

Q.30. What are the mining operations that compete with Crownpoint Uranium solution Mining Project?

A.30. URI describes its competitors as 15 major uranium-producing entities; some of which are significantly larger and better capitalized than they are.³⁹ Eight mines

340,000 MTHM IN 2010" McGraw-Hill, 16 Nov p 7. Exhibit V.

³⁸ Thomas C. Pool (1997) "Primary and Secondary Uranium Supplies: Different Cost Structures, Different Goals", Proceedings of the twenty-second Annual Symposium of the Uranium Institute, London, September 1997, page 217. Exhibit W.

³⁹ Uranium Resources Inc. (1997) Annual Report to the U.S. Securities and Exchange Commission, Form 10-K, for the year ended December 31, 1997, Washington, D.C. page 24. Exhibit B.

owned by five companies in Canada, Australia, Namibia, and Niger accounted for two thirds of total Western World production of uranium.⁴⁰

Canada continues to lead the world in uranium production. New, large, high-grade, low-cost mines in northern Saskatchewan will replace older mines that have been depleted.⁴² Australia will continue to expand its uranium production, since the Australian Labor Party -- which had restricted uranium mining when it was in office -- lost in national elections in 1998.⁴³

A number of countries in the Commonwealth of Independent States (CIS) including Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Ukraine and Uzbekistan continue to produce uranium for western reactors.⁴⁴ Kazakhstan and Uzbekistan are developing vast, low-grade, in-situ operations, as is Russia. However, the continuing economic crisis in the region will probably mean that Canada and Australia will continue to dominate world production. HRI must compete with all of these entities.

Supply Component # 2a: Surplus Military Uranium

Q.31. How will surplus military uranium inventories affect the supply of nuclear power plant fuel?

A.31. Nuclear weapons and nuclear fuel have always been linked. In the past U.S. policy has been to get controls on nuclear reactors, commercial or test facilities, to make sure the plutonium and uranium in the spent fuel would not get into the hands of those who would use the material for weapons. Now, ironically,

⁴⁰ Uranium Institute (1998) "Top ten uranium mines 1996-97 (Western world only), Uranium Institute web site <http://www.uilondon.org/utopmin.htm>. Exhibit X.

⁴¹ Energy Information Administration (1996) Uranium Purchases Report 1995 DOE/EIA-0570(95), Washington, D.C., June 1996. Exhibit Y.

⁴² Thomas C. Pool (1998) "Uranium: A Continuing Struggle for Producers", *Engineering & Mining Journal*, March 1998, p.70. Exhibit 4.

⁴³ Reuters Limited, "ERA Jumps on Relief at Howard Re-election", July 10, 1998. Exhibit 5.

⁴⁴ Energy Information Administration (1996) Uranium Purchases Report 1995 DOE/EIA-0570(95), Washington, D.C., June 1996. Exhibit Y.

weapons are being turned back into commercial nuclear fuel. This “swords into plowshares” agenda has come about since the end of the Cold War between the U.S. and the old Soviet Union. The Bush and Clinton administrations concluded an arrangement with the Russian government to purchase the uranium from dismantled Russian nuclear weapons and to release excess U.S. nuclear material for use in commercial nuclear power plants. Military uranium and plutonium are such important new sources of power plant fuel that the EIA chose to analyze them in a special report on commercial fuel from weapons in May 1998.⁴⁵

Q.32. Can nuclear weapons be burned as nuclear fuel?

A.32. No. Weapons grade uranium has a much higher concentration of the fissionable isotope U235. The Highly Enriched Uranium (“HEU”) used in weapons is enriched to beyond 20% U-235 and generally far beyond that percentage. In contrast, Low Enriched Uranium (“LEU”) used for nuclear power plant fuel is enriched to between 3% and 5% U-235. In order to make HEU usable as nuclear power plant fuel, it must be “downblended” to LEU by mixing it with a lower grade of uranium, known as “feed material” or “blend stock.” Downblending is carried out at former weapons facilities in Russia and the process is planned for facilities in the U.S.

Q.33. What is the Russian HEU agreement?

A.33. In the 1993 Agreement between the Government of the United States and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons (“the Russian HEU Agreement”), the Russian government agreed to supply to the U.S., 500 metric tons of HEU over 20 years.

⁴⁵ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories DOE/EIA-0619, May 1998, p 50. Exhibit U.

Q.34. How much nuclear power plant fuel can be manufactured from the Russian HEU that has been purchased by the U.S.?

A.34. The 500 metric tons of Russian HEU covered by the agreement constitutes an enormous source of power plant fuel, representing the equivalent of 398 million pounds of natural uranium concentrate (“U3O8”) from mined ore. The HEU is being blended down to LEU, which can then be made into fuel for commercial nuclear units. This source could fuel all the commercial nuclear units in existence in the world in 1997 for three years.⁴⁶ The down blending is taking place in Russia. First shipments of LEU arrived in the U.S. in 1995 and have continued since. The delivery schedule stretches over twenty years.

Q.35. How much Russian HEU exists?

A.35. Much more HEU remains in the Russian military program. In 1994, it was estimated that 1270 metric tons of HEU (including the 500 metric tons sold to the U.S.) were in the possession of the Russian government⁴⁷. Further reductions in nuclear weapons could release HEU beyond the initial 500 metric tons for use in commercial power plants.

Q.36. How does downblended HEU substitute for the uranium that is mined?

A.36. Uranium must be enriched before it can be inserted into nuclear reactors or made into weapons. The enriched material contains the natural uranium plus the work expended to make it suitable for fuel, known as Separative Work Units or “SWUs”. Thus, when Russia manufactures LEU by mixing HEU with uranium blend stock, the LEU product delivered to the U.S. is treated as if it had been

⁴⁶ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p. 2. Exhibit U.

⁴⁷ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p. 11. Exhibit U.

created from natural uranium, i.e. the LEU is considered to be a combination of U3O8, conversion, and SWUs.

Q.37. What are the current financial arrangements under the HEU agreement?

A.37. The Russian LEU is delivered to the USEC, the only entity that currently enriches uranium in the U.S. USEC, which was once a government corporation but now is private, pays the Russian government in dollars for the enrichment services component of low enriched uranium ("LEU") derived from Russian HEU, i.e., the SWU equivalent contained in the LEU delivered by Russia.

In exchange for the natural uranium component of the LEU, called Russian Feed, USEC provides Russia with an equivalent quantity of natural uranium. This natural uranium is transferred to Global Nuclear Services & Supplies Ltd., the Russian nuclear fuel trading organization. The Russians can then sell the uranium on the world market, use it in Russian reactors, or sell a limited amount in the U.S. Thus, under the agreement, the Russians receive a combination of cash from USEC and the possible profit from selling some uranium product.

This may be what the Russians had assumed when the Russian HEU Agreement was arrived at in 1993, but they never liked the arrangement. The Russians would prefer to be paid in cash for both the SWU component and the Russian feed component of the LEU shipped under the Russian HEU agreement. For the Russians, receiving uranium in payment for the LEU is akin to receiving coal at Newcastle. Because of the glut in the uranium market, the Russians would prefer the cash. This difference in understanding has threatened the Russian HEU agreement. To shore up the agreement, the U.S. government, through DOE, has agreed to purchase the Russian Feed component of the Russian LEU deliveries from 1995 through 1998. Without DOE stepping in to make these purchases, the transformation of Russian weapons to commercial nuclear fuel would be in trouble.

Q.38. Are there legal restrictions on selling this Russian Feed?

A.38. There are legal limits on selling Russian Feed in the U.S. and some limits on its sale in Western Europe as well. In 1998, 18.8 million pounds of U3O8 were scheduled to be made available to the Russian trading organization from USEC in partial payment for the delivery of Russian HEU. In the years 1999 through 2001, 24.4 million pounds of U3O8 will be given to the Russian trading organization, a portion of which will be put onto the market. Returned Russian Feed will put competitive pressure on world markets for uranium.

At present there are some limits on sales to the U. S, but in the future, Russian Feed will be sold with fewer constraints in the U.S. By 2010 Russian Feed permitted by U.S. laws to be sold in this country will equal one half of U.S. reactor requirements, even assuming a very generous survival rate for nuclear units.⁴⁸

Q.39. Could the addition of uranium supply sources jeopardize the Russian HEU agreement?

A.39. The Russian HEU agreement, dealing with enough fissile material for 20,000 warheads, is obviously important to world peace and security.⁴⁹ The U.S. government has therefore demonstrated a strong commitment to fulfilling the agreement. The DOE (not the USEC) purchased and now holds the Russian Feed delivered since the beginning of the Russian HEU agreement in 1995. However, the U.S. is demanding that the Russians make arrangements to sell this material on the market. U.S. Energy Secretary Bill Richardson traveled to Russia in January 1999 to resolve problems stemming from the low price the Russians would receive for Russian Feed if they sold it in the present depressed market.

⁴⁸ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p.52. Exhibit U.

⁴⁹ The threat posed by the Crownpoint Uranium Project to international security is discussed in detail in

There is no question that Russia has the capacity to blend down its uranium and send it to the United States. Russia also has a strong economic incentive to sell its uranium to the U.S., because it depends on the revenues to prop its ailing economy. However, Russia's participation in the HEU Agreement, as well as the health of its economy, are threatened by declining uranium prices. Russia is threatening to slow LEU deliveries it previously agreed to, because of the low price it is getting for Russian Feed.⁵⁰ The entry of additional competitors into the marketplace may undermine the HEU Agreement and U.S. efforts to support it by further depressing uranium prices.

Q.40. How much U.S. military HEU has been released from military use to be used as power plant fuel or to be disposed of as waste?

A.40. In March of 1995, President Clinton declared 174 metric tons of U.S. military HEU as surplus.⁵¹ This is the second major military source that competes with the Crownpoint Project. About 156 metric tons of this material can be used to produce nuclear power plant fuel. Another 18 metric tons, contained in spent fuel and other forms, is likely to be disposed of as waste.

About 38 metric tons of the military surplus HEU is labeled as "off-specification," because it cannot meet the specifications of the American Society for Testing and Materials for use as commercial nuclear fuel. However, TVA, a government-owned corporation, and DOE have agreed to downblend this material into LEU specifically for TVA commercial nuclear units. Since TVA is getting the material cheaply, it will make the effort to make it work in its reactors. This

the testimony of Arjun Makhijani.

⁵⁰ Reuters, "U.S. Hopes to Resolve Uranium Dispute with Russia, January 13, 1999. Exhibit 6.

⁵¹ President Clinton also declared 32.8 metric tons of weapons-grade plutonium as surplus. This is addressed in Section 2b below.

⁵² Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p. 30. Exhibit U.

38 metric tons of HEU will use some DOE blend stock as well, so it will displace 17.7 million pounds of U3O8.⁵³

USEC is to take 63 metric tons of the U.S. HEU. This will displace 19.2 million pounds of U3O8 from uranium mining. The remaining 55 metric tons is not expected to be converted into nuclear power plant fuel until at least the year 2010. However, there is no technical reason this material can't be released before this date and it remains a potential source of fuel.

Furthermore, the DOE Record of Decision for HEU disposition includes 200 metric tons through the year 2010.⁵⁶ Of this total only 174 has been declared surplus so far. Depending on the U235 content of the HEU, the additional disposition under the present agreement could contribute the equivalent of 1 to 2 million pounds U3O8 to the market each year to the end of 2010.

Q.41. How much HEU exists in the U.S. military inventory?

A.41. Out of the 749 metric tons estimated to be in the nation's military HEU inventory, the U.S. military has declared only 174 metric tons of HEU to be surplus.⁵⁷ This leaves a huge quantity, 575 metric tons, whose ultimate disposition remains undecided. The end of the Cold War and the possibility of further strategic arms treaties with Russia, may greatly expand the amount of nuclear power plant fuel from this source.

⁵³ Ibid. Exhibit U.

⁵⁴ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p.x. Exhibit U.

⁵⁵ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p.xi. Exhibit U.

⁵⁶ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p.64. Exhibit U.

⁵⁷ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p. 11. Exhibit U.

Supply Component # 2b: Military Plutonium Surplus

Q.42. What is the status of plutonium declared redundant by the two superpowers?

A.42. Commercial nuclear units can be powered by both plutonium and uranium. Use of military plutonium in commercial power plants will require that commercial nuclear units burn mixed oxide fuel (“MOX”). Recycling of spent power plant fuel in Europe yields plutonium and uranium. This mixture of nuclear materials makes up MOX that is already used to power reactors in Belgium, France, Germany, Japan, and Switzerland. The continuing use of power plant grade MOX is projected to decrease uranium requirements by 8 percent per year and is included in all estimates of secondary nuclear fuel sources.⁵⁸

Q.43. Why do you believe that MOX fuel from weapons will be used in commercial nuclear units?

A.43. Russian defense plutonium has a good chance of becoming fuel for commercial power plants as an addition to reprocessed commercial plutonium. The Russian MOX program got an important boost when the U.S. Congress appropriated \$200 million to help get it underway. The U.S. government took this action to help the Russians dispose of bomb material in a way that keeps it out of the hands of those who might be a danger to the U.S.⁵⁹ The Russian government could burn up to two tons of MOX annually in some of its VVER-1000 commercial power stations. Using more MOX than this might require the use of new Russian breeder reactors or sale of the fuel to another country.

⁵⁸ Energy Information Administration (1997) Nuclear Power Generation and Fuel Cycle Report 1997, Washington, DC, DOE/EIA-0436(97), p. 27. Exhibit T.

⁵⁹ Nuclear Fuel, (1998) “MOX EFFORT NEAR STALL, AGAIN; OPPONENTS QUESTION U.S. LIABILITY”, McGraw-Hill, 16 November, 1998, p12. Exhibit V.

MOX from U.S. plutonium is also a possible source of power plant fuel. If it is used, it could provide the equivalent at least 17 million pounds of U3O8 over the next 20 years.⁶⁰ DOE has been negotiating directly with TVA to arrange a test burn of MOX fuel in one of its commercial units. However, use of MOX in the U.S. requires a policy change. Thus, it is not certain that MOX fuel will be used in the U.S. There is a better chance some U.S. military plutonium may be burned in Canadian heavy water reactors.

Supply Component # 3: Nuclear Fuel Inventories

Q.44. What effect will inventories of uranium and other nuclear fuel sources have on the demand for newly mined uranium?

A.44. Domestic uranium inventories held by utilities and uranium suppliers in the U.S. equaled 86.9 million pounds of U3O8 at the end of 1994 and stood at 75.8 million pounds at the end of 1997.⁶² Commercial inventories held by uranium producers, brokers and enrichers are a small but important part of this supply. While utilities may hold some inventories as a hedge against price change, the overall move to competition should bring about a reduction in inventories for U.S. utility companies, according to the EIA "Challenges of Restructuring Report":

As the electric power industry moves toward competitive retail markets, nuclear generating companies are likely to minimize inventory holding costs for both economic and regulatory considerations.⁶³

At least one expert projects that most excess utility inventories will be drawn down by 2005.⁶⁴ If this squeeze down in inventories at operating nuclear units

⁶⁰ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p 38. Exhibit U.

⁶¹ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p 54. Exhibit U.

⁶² Energy Information Administration (1998), Uranium Industry Annual 1997, Table H-3, April 1998. Exhibit Z.

⁶³ Energy Information Administration, (1998), Challenge of Electric Power Industry Restructuring for Fuel Suppliers, DOE/EIA-0623, September 18, 1998, p 39. Exhibit D.

takes place, the released uranium will act as a short-term supply source, push down prices, and put extra pressure on uranium mining over the next few years.

Q.45. What effect will early retirement of nuclear units have on the supply of uranium and other power plant fuel?

A.45. The premature closing of nuclear plants will have a supply effect as well as a demand effect on the uranium market. When Haddam Neck closed in 1997, 500,000 pounds of U₃O₈ was rendered surplus and put on the market. The loss of one small nuclear unit placed surplus uranium equal to 9 percent of 1997 domestic production on to the uranium market.

Similarly, closing the two Zion units will increase present uranium supplies as well as reduce future demand. Commonwealth Edison, Zion's owner, has more plants that will use the materials made redundant at Zion. However, to the extent that Commonwealth Edison uses the Zion inventory, it will reduce its purchases of new uranium in the marketplace for its other plants.

Q.46. What inventories are held by USEC?

A.46. The USEC has a large inventory of uranium. In July 1998, the trade journal NuclearFuel, reported that USEC inventories that had been obtained from DOE when USEC became an independent and private company were roughly 75 million pounds U₃O₈ equivalent.⁶⁵ The large size of the stock led a number of uranium producers in the U.S. to file suit to obtain a declaration that some of the transfer of natural uranium from DOE to USEC was illegal.

⁶⁴ Thomas C. Pool (1997) "Primary and Secondary Uranium Supplies: Different Cost Structures, Different Goals", Proceedings of the twenty-second Annual Symposium of the Uranium Institute, London, September 1997, page 221. Exhibit W.

⁶⁵ NuclearFuel, (1998) "USEC INC. STOCK BEGINS TRADING AT \$14.25; TIMBERS BACKS HEU DEAL, HEALTHY U MARKET", NuclearFuel, 27 July, 1998, p. 17. Exhibit AA.

Q.47. Has this large USEC inventory affected the market for uranium?

A.47. Yes. It is well known that USEC's need for natural uranium for its enrichment operations is only about 13 million pounds per year. Thus, the announcement that USEC's uranium inventory is so much larger than expected or needed has pushed market prices for U3O8 to very low levels, in anticipation that USEC will put its surplus uranium on the market. This event caused consternation in the market. According to Uranium Resources, Inc.'s most recent 10-Q report:

Since the date USEC disclosures were announced the spot price of uranium has declined 16%, from \$10.90 to the current price of \$9.15 per pound.⁶⁶

Q.48. Aside from its transfer of natural uranium to USEC, does DOE hold other sources of uranium inventory?

A.48. Aside from its transfers to USEC, DOE holds an inventory of 14.2 million pounds U3O8 of Russian Feed transferred to DOE from USEC. The Russian Feed is the natural uranium component in the LEU derived from 18 metric tons of HEU delivered by the Russians in 1995 and 1996 under the HEU Agreement. DOE bought it in order to keep this important agreement on track.⁶⁷ There are limits on how DOE can dispose of this stock. It can be sold outside the U.S. or sold back to the Russians. Also the equivalent of 3 million pounds U3O8 per year can be sold in the U.S. beginning in 2002.

DOE was directed to purchase the Russian Feed for 1997 and 1998 LEU deliveries in October 1998. The feed from the blended-down HEU is equal to

⁶⁶ Uranium Resources Inc. (1998) Quarterly Report to the U.S. Securities and Exchange Commission for the period ended September 30, 1998, Form 10-Q, Washington, D.C. page 10. Exhibit BB.

⁶⁷ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p 37. Exhibit U.

11,000 metric tons uranium.⁶⁸ There may be limits on when DOE will sell this material, but there is no question that it will eventually come on to the market.

Q.49. What other inventories are significant?

A.49. Recently, 20 metric tons of enriched uranium produced in the old Soviet Union was imported into the U.S from Kazakstan. Admittedly, there are barriers to the immediate sale of this material. USEC and an ad hoc group of U.S. uranium mining firms oppose the deal, calling it a violation of import restrictions on the import of uranium from the Commonwealth of Independent States (“CIS”). Selling the imported Kazakstani material will take a modification of the very complicated US-Kazakstan suspension agreement.⁶⁹ Absent that, Kazakhstan may terminate the suspension agreement.⁷⁰ One way or the other, since the market for uranium is international, this new source of supply will find its way into the market in the next few years, causing more pressure on the price of newly-mined uranium. In addition, this is by no means the end of the Kazakstani supply. It is believed there are several hundred more metric tons of this material still in Kazakstan.⁷¹

Supply Component # 4: Technological Change

Q.50. Explain the fourth component of secondary nuclear fuel supply.

A.50. Technological change is also a significant factor affecting the supply of uranium. A uranium enrichment company can choose a combination of SWUs and uranium to make LEU. If more work is put in to the process, a greater quantity of enriched uranium can be produced from the same stock of natural uranium because the

⁶⁸ NuclearFuel (1998) “KAZAKSTAN LOOKING FOR SWU QUOTA, HEU FEED TALKS HELD IN PARIS, SPOT U PRICE DECLINES” McGraw-Hill, November 2, 1998, p. 11. Exhibit 7.

⁶⁹ NuclearFuel, (1998) “LITTLE PROGRESS MADE ON HEU FEED DEAL; MINERS, USEC CHALLENGE KAZAK AMENDMENT”, McGraw-Hill, September 21 1998, p. 17. Exhibit CC.

⁷⁰ NuclearFuel, (1998) “KAZAKSHSTAN TELLS DOC IT INTENDS TO TERMINATE SUSPENSION AGREEMENT; USEC SAYS U SALES OFF”, November 16, 1998, p.1 & 15. Exhibit 8.

⁷¹ NuclearFuel, (1998) “LITTLE PROGRESS MADE ON HEU FEED DEAL; MINERS, USEC CHALLENGE KAZAK AMENDMENT”, McGraw-Hill, September 21 1998, p. 17. Exhibit CC.

amount of residual uranium U235 in the “tails” or waste product is reduced. The newly privatized USEC announced it is changing the way it enriches uranium in its initial S-1 report to the U. S. Securities & Exchange Commission. USEC states it will underfeed its gaseous diffusion units, i.e., use less uranium and more units of work, to produce each kilogram of enriched uranium.⁷² The industry biweekly NuclearFuel calls the plan the equivalent of a new 3.9 million pounds per year uranium mine.

This change in operation is quite significant. NuclearFuel stated just how much difference USEC’s uranium sales from larger than anticipated stocks and underfeeding could make on price:

[a]fter USEC filed its S-1 registration, announcing an aggressive uranium sales campaign, the Uranium Exchange Co., in a widely discussed analysis, said that with USEC sales of its inventory and uranium it was producing through underfeeding the gaseous diffusion plants, the price of uranium in the U.S. could drop to a range of \$6-\$8/lb U3O8 by the year 2000.”⁷³

Q.51. How will technological changes in Russian enrichment of uranium affect the price of uranium?

A.51. Technological change in the Russian enrichment plants makes them fierce competitors. In another bit of information from USEC’s S-1 filing to the U.S. Securities & Exchange Commission, USEC described Techsnabexport (“Tenex”), Russia’s nuclear enrichment company, as a very low cost competitor. At a recent trade meeting in Tucson, Alexander Chernov, president of Global Nuclear Services & Supplies Ltd., the Russian nuclear fuel trading organization, spoke of significant improvements in Russian enrichment technology. In prepared remarks that will give no joy to uranium producers, Chernov said Tenex has been able to

⁷² NuclearFuel, (1998) “USEC STARTLES MINERS, HILL, EVEN DOE BY PLANS TO SELL NATURAL U THROUGH 2005” McGraw-Hill, July 13, 1998 p.1. Exhibit DD.

⁷³ NuclearFuel (1998) “BUYERS/SELLERS FACE UNCERTAIN MARKET”, McGraw-Hill, July 27, 1998, p20. Exhibit AA.

reduce its need for the natural uranium by about 30% by reprocessing enrichment tails that had hitherto been unavailable.⁷⁴

Q.52. Please summarize the supply sources that will tend to push uranium prices downward.

A.52. There are several sources of supply, which will have a negative effect on uranium prices. The supply components are those I detailed above.

1. First there are the large productive mines in Canada, Australia, Namibia and Niger, which made up so much of western uranium production and the new mines in Canada and Australia which will replace them. Additional uranium will come from present and future mines in the CIS countries whose production began to push down uranium prices in the 1980s.
2. Military HEU and other military inventories have played a large part in making the secondary market so important. The Russian HEU agreement is by far the most important but the U.S. decision to release military stocks is also significant. The second part of military nuclear material is plutonium. The U.S. as recently as the fall of 1998 helped the Russians to dispose of weapons grade plutonium by helping them set up a program to burn MOX fuel in their domestic power plants. A bit more speculative are plans to make U.S. plutonium into nuclear power plant fuel.
3. Nuclear material in the inventories of utility companies, producers, brokers, enrichers and national governments has found its way into the supply stream in recent years. I have documented the reasons that these inventories will decrease over the next few years.
4. Technological change that allows more LEU to be produced from the same

⁷⁴ NuclearFuel, (1998) "USEC BEATS RUSSIAN AMENDMENT DEADLINE, FILES TWO NEW MATCHED SWU CONTRACTS", McGraw-Hill, October 19, 1998, p 3. Exhibit EE.

amount of uranium is the last of the supply sources I documented above.

Government intervention in the market

Q.53. Please explain why the degree of government intervention in the uranium market should be considered.

A.53. If governments do not intervene in a market, the effects of supply and demand are more controlling. Some of the government intervention in the uranium market that I mentioned above is intended to prevent supplies from the former Soviet Union from entering the U.S. market. There are also restrictions on when USEC and the U.S. DOE can dispose of their inventories. There has also been U.S. government intervention to keep Russian nuclear material from getting into the hands of those who might use it for military purposes. The uranium market is competitive, but because of an unusual amount of government intervention it cannot be called totally free.

In the U.S., restructuring the electric industry toward competition and getting the government out of the enrichment business by selling USEC are examples of a general move toward less government intervention. U.S. government sales of nuclear materials that can be made into nuclear fuel, also demonstrate a move toward more competitive behavior. The direction is towards less interference and less protection for the players in various aspects of the nuclear energy industry.

The uranium market is not a totally free market, however, it is free enough that the vast amount of uranium and the decreasing need for it is having a predictable effect on market prices. It is my professional opinion that less government involvement in the future, leading to more competition, will allow the many sources of supply and lessening demand to push uranium prices lower.

Present and Future Market Prices for Uranium

Q.54. What did the FEIS state about the future price of uranium?

A.54. The FEIS contains a chart with projections for future uranium prices. FEIS at 5-2. That chart, which utilized data from a 1995 EIA study, is compared with a later EIA report in my table below.⁷⁵

YEAR	1995 Estimate	1997 Estimate
1996	\$12.72	
1997	\$12.74	\$11.20
1998	\$12.62	\$12.40
1999	\$13.00	\$13.10
2000	\$13.31	\$13.40
2005	\$14.86	\$15.40
2010	\$17.38	\$15.80

1995 data from FEIS at 5-2. (Source: Uranium Industry Annual 1995 [DOE/EIA-0478(95)]. Energy Information Administration, May 1996.) 1997 data from Energy Information Administration (1997) Nuclear Power Generation and Fuel Cycle Report 1997, DOE/EIA-0436(97), September 1997, p.29. Exhibit T.

First we must conclude that more recent information from the EIA demonstrates that uranium prices are now projected to be generally lower than when the FEIS was prepared. Second, the second EIA report still projects prices that are too high.

The column labeled 1997 in the table comes from the EIA's "Nuclear Power Generation and Fuel Cycle Report 1997", which utilizes the same assumptions as used in the EIA's "Commercial Fuel from Weapons Report". The Russian HEU agreement was included in

⁷⁵ See sources at bottom of table.

the forecasting of future prices in the 1997 column but much else that I stated above was not included in the analysis.

Q.55. What changes in supply and demand that you alluded to above were not included in the analysis that produced the table of future prices of uranium above?

A.55. There are enormous pressures on the demand side and the supply side, which are driving the price of uranium down and will continue to do so into the foreseeable future. To summarize, the factors I have covered that were not included in the EIA's price analysis, in the table above, are as follows:

First, the decrease in demand for nuclear fuel caused by the early closing of many more nuclear units than expected, was not included.

For the analysis developed in this report, only 8 of the 110 nuclear power reactors operating in the United States as of December 31, 1996, were assumed to be retired before their license expiration dates.⁷⁶

Since 7 units have already announced early retirement and the various studies referred to in the demand section above call for from 12 to 90 more units retiring early, this assumption is clearly inadequate.

Second, of the eventual sale of 174 metric tons of HEU declared surplus by the U.S. government, 55 metric tons was not considered by EIA uranium price projection. In addition, 26 additional metric tons can be released before 2010 under the terms of the DOE Record of Decision.

Third, the use of military plutonium in MOX fuel in Russia, the U.S., and elsewhere, was not considered in the EIA uranium price projection.

⁷⁶ Energy Information Administration (1998) Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Policies, and Market Effects DOE/EIA-0619, Washington, D.C. May 1998, p 77. Exhibit U.

Fourth, EIA ignores the possibility that more defense stocks of HEU and plutonium from U.S. and Russian vast supplies may be released through further weapons reduction treaties.

Fifth, excess nuclear power plant fuel which is expected to be squeezed out of utility inventories by a more competitive electric utility industry in the U.S., plays no part in EIA's uranium price projections.

Sixth, the strength of the market's reaction to the transfer of natural uranium from the DOE to USEC, demonstrates that the market has not accounted for all the uranium and other nuclear materials that could come to the market to compete with newly-mined uranium.

Seventh, the EIA fails to factor in the release of DOE holdings of Russian Feed purchased over the last two years. The EIA uranium price projection includes the Russian Feed from Russian HEU delivered in 1995 and 1996. However, the Russian Feed for the years 1997 and 1998, which was purchased in October 1998, is not included.

Eighth, the disclosure of former USSR military uranium supplies available from Kazakstan demonstrates that more material remains behind the old iron curtain. This material may begin to reach the market in the near future.

Ninth, and finally, the underfeeding of the USEC gaseous diffusion enrichment plants and the newly announced efficiencies in the Russian gaseous centrifuge enrichment plants, demonstrate that technology may work to decrease the uranium required to make a unit of nuclear fuel.

In conclusion, these many factors are likely to depress the uranium market for some time into the future.

Q.56. Is there other evidence that supports your conclusion that the uranium market will remain depressed?

A.56. Yes. Uranium prices spiked above \$11.00 per pound of U3O8 for a few weeks in mid 1990 and were generally above that price from early 1995 to mid 1997 then spiked again from late 1997 to early 1998. However, unrestricted uranium prices have generally been lower than \$11.00 per pound of U3O8 for most of the decade of the 1990s. A recent article in the Financial Times of London suggests a continuation of prices under \$11.00 per pound of U3O8:

The Australian Bureau of Agricultural and Resource Economics (ABARE) recently forecast that while supply into the spot uranium market was expected to stabilize in 1999, world consumption was not expected to grow significantly and short-term delivery prices are forecast to remain under \$ 11 a pound.⁷⁷

Other industry analysts have predicted prices as low as \$6 to \$8 per pound of U3O8 over a significant period of time in the future. See answer 50 above. Since such low prices actually existed in 1991/1992 and again as recently as 1994, and conditions driving down prices continue to worsen rather than improve, these projections should be considered quite realistic.

Notably, Uranium Resources, Inc. expects prices as low as the \$9 per pound range to continue into the future because of newly disclosed uranium inventory levels held by USEC, plus military sales from Russia as well as the U.S. URI states that these sources of supply will:

continue to depress uranium prices or to inhibit prices from rising to higher levels over the next several years.⁷⁸

⁷⁷ Financial Times (London) (1998), "Western Uranium producers struggle with falling prices", December 11, 1998, pg.30. Exhibit 9.

⁷⁸ Uranium Resources Inc. (1998) Quarterly Report to the U.S. Securities and Exchange Commission for the period ended September 30, 1998, Form 10-Q, Washington, D.C., Page 10. Exhibit BB.

I have stated before that the uranium market is characterized by a great deal of government intervention. However, it is free enough that the vast amount of uranium and the decreasing need for it is having a predictable effect on market prices.

Q.57. What do market conditions show about the need for the uranium from the Crownpoint Uranium Solution Mining Project?

A.57. There is so much cheap uranium available from so many sources that there is no need for an additional source. There is no need for the mine at Church Rock Section 8 or for any of the other mines in the Crownpoint project. This is because the secondary supply, made up of military and civilian inventories, reprocessing and new efficiencies in converting uranium to power plant fuel will dominate the market for years to come. High cost current and proposed primary uranium production from mining will have difficulty competing.

The demand for uranium will also continue to decline as a result of early nuclear power plant closures and consolidation of utilities, thus further depressing the price of uranium. It is non-fuel related O&M costs, not the cost of fuel, which is causing problems for the poor performing units which might be expected to go out of service before the end of their projected life. Lower priced uranium will not save them.

For the foreseeable future, increasing supply and decreasing demand will conspire to drive down the price of uranium and make new sources of mined uranium superfluous. As T.C. Pool of International Nuclear, Inc. states:

These types of primary production are not necessary, at this time, to bring supply and demand into balance.⁷⁹

⁷⁹ Thomas C. Pool (1997) "Primary and Secondary Uranium Supplies: Different Cost Structures, Different Goals", Proceedings of the twenty-second Annual Symposium of the Uranium Institute, London,

Benefits of Mining

Q.58. Please comment on the benefits of the Crownpoint Project as outlined in Chapter 5 of the FEIS, that there is a benefit to be derived from increasing the domestic supply of uranium. Do you agree?

A.58. No, I disagree for two reasons. First, as I have demonstrated above, uranium is easily and cheaply available from sources all over the world. Sources abound, including mines in Canada, Australia, and Africa, Russian military surplus, Eastern European mining and inventory, commercial and military inventories in the U.S. and changes in enrichment of nuclear fuel, which is the equivalent of added supply. Given the great diversity of supply from so many sources, I do not believe there is any major benefit to be gained by adding another uranium mine in New Mexico, especially one whose operational costs will almost certainly exceed the average market price.

On the other hand, as I have discussed above, the U.S. does have a very strong interest in supporting the Russian HEU agreement and in supporting the stability of the Russian government and economy. These national interests will be ill-served by adding another source of uranium that further depresses the market price and thus further drives down the return the Russians can obtain on their sales of Russian Feed.

Q.59. Assuming for purposes of argument that there is some benefit to be gained by increasing the domestic supply of uranium, does the Crownpoint Project confer any real benefits in this area?

A.59. No. As discussed above in Answer 48, the DOE already has a significant inventory of power plant fuel from its purchased of Russian Feed. This could be enhanced any time the Department of Defense decides it can release more of its

huge inventory of nuclear warheads. Other inventories are in the hands of USEC, utility companies, and firms that produce and sell uranium.

Q.60. Would HRI benefit from the Crownpoint Uranium Solution Mining Project?

A.60. No. As I previously testified in this case, HRI's costs will exceed its revenues, and therefore the mining project will not be profitable.⁸⁰ The FEIS gives average production costs per pound of U3O8 at the several sites that make up the Crownpoint Uranium Solution Mining Project. FEIS at 5-2. Even assuming these costs include adequate restoration, reclamation and decommissioning requirements, none of the estimates falls below \$9.40 per pound. The costs at the Church Rock site are between \$11.32 and \$11.83 per pound. Realizing that total costs are in excess of production costs, these sites do not look competitive in the present and future markets, which are characterized by falling demand and many new or expanded sources of supply. Thus, I fundamentally disagree with the NRC Staff's conclusions regarding the benefits of the Crownpoint Project. I do not believe any aspect of the Crownpoint Project, including Section 8 of the Church Rock site, is needed, nor would it be profitable for the Company.

Q.61. Does this conclude your testimony on the need for and benefits of the proposed mines?

A.61. Yes, it does.

Conclusion on Action Alternatives

Q.62. What is your evaluation of the FEIS's assessment of action alternatives?

⁸⁰ Written Testimony of David Osterberg at 32-33 (January 7, 1999), Exhibit 4 to ENDAUM's and SRIC's Brief With Respect to HRI's Lack of Technical and Financial Qualifications (January 11, 1999).

⁸¹ U.S. Nuclear Regulatory Commission, Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico, Hydro Resources, Inc. NUREG-1508, p. 5-2. Exhibit FF.

A.62. The evaluation of alternatives in the FEIS fails to include the benefits of the no-action alternative or alternative sources of nuclear power plant fuel. The "product" of the Crownpoint Project is power plant fuel for the production of electricity by nuclear plants. However, the same electricity can be produced using environmentally benign power sources such as wind or biomass. More importantly, the same energy services can be gained by investing in efficiency, which demands less total electricity to accomplish the same final purposes. This was not considered.

Confining the analysis to nuclear-powered electric plants, there are many alternative sources of power plant fuel. One can easily think of a few alternatives to the Crownpoint and Church Rock mines that are not addressed in the FEIS.

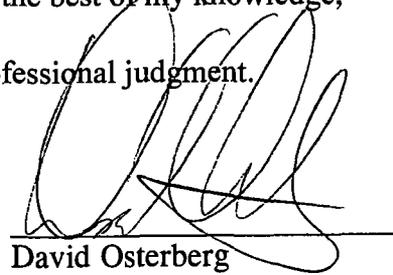
Most significantly, blending down HEU might have few environmental effects and will have salutary effects on world peace. Because the Russian HEU agreement and the related question of Russian Feed are so important to world peace, the NRC staff must look at the possibility that opening another U.S. mine might have detrimental effects on continuing the program of dismantling warheads. All these questions would be addressed in a through analysis of the alternatives, including the "no-action" alternative.

Q.63. Does this complete your testimony?

A.63. Yes.

AFFIRMATION

I declare on this 8th day of February, 1999, at Mt. Vernon, Iowa, under penalty of perjury that the foregoing is true and correct to the best of my knowledge, and the opinions expressed herein are based on my best professional judgment.


David Osterberg

Sworn and subscribed before me, the undersigned, a Notary Public in and for the State of Iowa, on this 8th day of February, 1999, at February, Iowa.
My Commission expires on 1-18-00.


Notary Public

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LEGISLATIVE & POLITICAL EXPERIENCE (1983-1998)

Democratic Candidate, for United States Senate from Iowa, 1998.

Chair, House Committee on Energy and Environmental Protection (1991-1992); and
Chair, House Committee on Agriculture (1987-1990) Iowa General Assembly.

Member Agricultural Energy Management Advisory Council (1987-1989) Council
oversaw \$1.5 million per year budget for education and demonstration projects
on tillage practices, fertilizer management and pesticide use to reduce chemical inputs
and reduce the potential for groundwater contamination.

Co-Chairman Interim Legislative Committee on Water Quality (1985 and 1986)
Set the agenda for an interim committee that took testimony, gathered information and
devised legislation which became the Iowa Groundwater Act of 1987.

Member of the Energy Policy Council (1985-1986)
Seven member Council oversaw all energy related expenditures for the state of Iowa.
Abolished with State Reorganization in July 1986.

US-Japan Environmental Mission (May 1991) sponsored by the Council of State
Governments/U.S.- Japan Foundation of New York; and Swedish-American
Bicentennial Travel Grant (Summer 1986) sponsored by the Swedish Ministry of
Agriculture and the Swedish Institute.

TEACHING (1966-1998)

University of Iowa, Iowa City, Iowa
1985-Present

Currently Adjunct Associate Professor, Department of Geography; teaching graduate
and undergraduate courses in Environmental Policy. Additional courses for Urban and
Regional Planning, Preventive Medicine and the Labor Center.

Dalarna University, Borlange, Sweden
Spring 1997
Lecturer in Environmental Tourism.

Cornell College, Mt. Vernon, Iowa
1975-1982
Assistant Professor of Economics and Business.

TEACHING (Continued)

University of Wisconsin-Green Bay, Green Bay, Wisconsin
1972-1973

Lecturer in Modernization Processes and Natural Resources Economics.

Peace Corps, Iran Project X

1966-1968

Taught English to Iranian high school students and became fluent in Persian.

CONSULTING (1978-1998)

Osterberg and Sheehan, Public Utility Economics; expert witness before regulatory Commissions in 8 states and the U.S. Nuclear Regulatory Commission.

Osterberg Consulting; writing and speaking on issues of natural resources, energy and taxation policy.

EDUCATION

M.S. Agricultural Economics, University of Wisconsin-Madison, June 1975.

M.S. Water Resources Management, University of Wisconsin-Madison, August 1972.

M.A. Economics, University of Wisconsin-Madison, August 1969.

B.A. Economics with departmental distinction, Washington State University, Pullman, Washington, February 1966. Junior year spent at Stockholm University, Sweden.

HONORS

University honors: Phi Beta Kappa, Phi Kappa Phi, Phi Eta Sigma

Ford Foundation Fellowship, Environmental Protection Agency Traineeship

Honors for legislative service from: Iowa League of Women Voters, Iowa Citizen Action Network, Iowa Division Izaak Walton League, Methodist Federation for Social Action, Iowa Farmers Union, Farm Unity Coalition, Cedar Rapids Audubon Society, Iowa Soil & Water District Commissioners, Sierra Club of Iowa.

COMMUNITY ACTIVITIES

Founding board member, Iowa Environmental Council 1994 to present; board member, Iowa Trails Council, 1992 to present; PrairieFire Rural Action, 1994 to present; and Iowa Citizen Action Education Foundation, 1997 to present.

DAVID OSTERBERG'S TESTIMONY SUBMITTED SUBJECT TO CROSS-EXAMINATION

Partner in Osterberg and Sheehan, Public Utility Economists, expert witness before Regulatory Commissions in 8 states & the Nuclear Regulatory Commission.

<u>Date of Testimony</u>	<u>Subject/Company</u>	<u>Witness for</u>
1999 Not Set	In the Matter Of: Private Fuel Storage, LLC Docket No. 72-22-ISFSI (Nuclear Regulatory Commission)	Utah Department of Environmental Quality
1999 January	Proposal to Construct and Operate the Crownpoint Uranium Solution Mining Project - Crownpoint NM Docket No. 40-8968 (Nuclear Regulatory Commission)	New Mexico Env. Law Center; Eastern Navajo Dine Against Uranium Mining; Southwest Research & Information Center
1995 March	Proposal to construct Uranium Enrichment Facility in Homer Louisiana, by Louisiana Energy Services, L.P., Docket 70-3070-ML (Nuclear Regulatory Commission)	Sierra Club Legal Defense Fund and Citizens Against Nuclear Trash
1990 August	Proposal to modify gas rates in the matter of an adjustment of gas and electric rates of the Union Light, Heat and Power Company, Case No. 90-041 (Kentucky)	Attorney General Commonwealth of Kentucky
1989 November	Proposal to modify electric rates of Public Service Company of Indiana, Inc. Cause Nos. 37414-S2 and 38809 (Indiana)	City of Terre Haute, Citizens Action Coalition of Indiana, Inc.
1987 December	Proposal to modify avoided cost rates for small power production under Section 210 of PURPA, Docket No. 80-251-E (Settlement reached prior to submission of testimony.) (South Carolina)	Aquenergy, Inc. and Riegel Power Corporation Greenville, SC
1987 October	Affidavit submitted in proposal to lower retail electric rates of the Public Service Company of Indiana, Inc. Cause 38411 (Indiana)	City of Terre Haute, & Citizens Action Coalition of Indiana, Inc.

1987 July	Proposal to modify retail electric rates of New York State Electric & Gas Corporation, Case Nos. 29541, 29542 (New York)	Public Utility Law Project Albany, NY
1985 July	Proposal of rate design for Duke Power Co., Docket No. 85-78-E (South Carolina)	South Carolina Consumer Advocate Office
1984 December	Proposal to modify Avoided Cost rates for small power production under Section 210 of PURPA, Doc. no. 80-251-E (South Carolina)	Aquenergy Inc., Greenville, SC
1984 October	Critique of Union Electric phase-in of Callaway Nuclear Power Plant, Docket No. 84-0109 (Illinois)	Illinois Office of Consumer Affairs
1984 October	Proposal to lower customer service charge for Niagara-Mohawk Power Co., Case No.'s 28798, 28799, and 28800 (New York)	NY Community Action Network; Public Utility Law Project, Albany NY
1983 August	Critique of company rate design in Ottetail Power Company, Doc. F-3418 (South Dakota)	Citizens for Equality Sioux Band, Sissiton, SD
1982 April	Proposal to modify retail electric rates of New York State Electric & Gas Corporation, Case Nos. 29541, 29542 (New York)	Public Utility Law Project Albany, NY
1982 April	Opposition to Petition for Franchise of 4.2 miles of 72,000 volt transmission line in Clayton County, Docket No. E-19540 (Iowa)	Landowner in Clayton County Iowa
1981 November	Critique of Company rate design in Iowa Electric Light & Power Co.'s Rate Case, Docket No. RPU 81-20 (Iowa)	Citizens for Community Improvement, Des Moines, IA
1981 September	Critique of Company rate design in Iowa Public Service Company Rate Case, Docket Nos. RPU 81-8 and TF 81-50 (Iowa)	Iowa Citizens-Labor Energy Coalition, Des Moines, IA

1981 March	Endorsement of Marginal Cost Pricing as appropriate in setting rates for Electric Utilities in Florida. Docket No. 790593-EU (Florida)	Staff of the Florida Public Service Commission
1981 March	Critique of Company rate design in Iowa Power & Light Company Rate Case, Docket Nos. RPU 78-27, RPU 80-36 (Iowa)	Legal Services Corporation of Iowa, Des Moines IA
1981 January	Proposal of Rules regarding Avoided Cost rates for cogeneration and small power production under Section 210 of PURPA, Docket No. RPU 80-1 (Iowa)	Continental Hydro Corporation, Chicago, IL
1980 November	Critique of the Iowa Electric Light & Power Co.'s estimation Facility (650 MW coal-fired power plant), Docket No. GCU 79-1 (Iowa)	Solar Advocates to Conserve Kilowatts, Ames, IA
1980 July	Proposal of Rules regarding Marginal Cost Pricing methodology for determining Utility Rates, Docket No. RMU 80-1 (Iowa)	Staff of the Iowa Iowa Commerce Commission
1978 September	Critique of Iowa/Illinois Gas and Electric's Benefit/Cost Analysis of the Louisa County Generating System (650 MW coal-fired power plant), Docket No. GCU 77-1 (Iowa)	Community Action Research Group, Ames, IA



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AEP delays restart of Cook nuclear plant

BRIDGMAN, Mich., Jan 14 (Reuters) - American Electric Power Co. Inc. said Thursday that it is delaying the restart of both units at its Cook nuclear plant, with no new restart date set.

The company said in a statement that the units were previously scheduled to return to service at the end of the first and second quarters of 1999.

"The need to repair the ice condenser systems at Cook is well known, and we've nearly completed that phase. However, the key question to be asked during the new assessments is whether we have been thorough enough in other plant systems," said Robert Powers, senior vice president-nuclear generation.

The plant is located near Bridgman, Mich.

Both the 1,020-megawatt Cook Unit 1 and the 1,090-megawatt Unit 2 have been shut down since September 1997 after the Nuclear Regulatory Commission raised safety questions during a design investigation.

The company said a new restart schedule will be developed based on the results of expanded reviews and should be available in May.

New budget projections are being developed, but will not be completed until the results of the expanded system readiness reviews are known.

"Current shutdown related costs are about \$12 million per month," said Powers.

AEP provides energy to 3 million customers in seven Midwestern and Middle Atlantic states.

More Quotes and News: [American Electric Power Co Inc \(NYSE:AEP - news\)](#)

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**Air Pollution Fees and the Risk of Early Retirement
at US Nuclear Power Plants**

October 1998

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ABSTRACT

During the next decade, electricity generation will be deregulated in many US jurisdictions. Nuclear power plants (NPPs) that were ordered and built in a regulated environment will continue to be regulated as nuclear facilities, but under deregulation the price they receive for their electricity will be set by nonregulated markets. This paper examines the operating expenses and productivity at NPPs with a probabilistic model to identify which plants face the greatest risk of early retirement. Using this identification as a baseline, fees for nitrogen oxides (NOX) are added to the market price in the Eastern US starting in the year 2000. Fees for carbon dioxide (CO₂) are added in the year 2000 and compared with their addition in 2008. Although a few plants remain economically competitive with the addition of NOX fees in 2000, over a dozen plants remain competitive with the early addition of CO₂ fees. However, with the later addition of CO₂ fees, the marginally competitive NPPs are likely to close before these fees are introduced. These results are compared with Clinton Administration projections of nuclear power industry output.

Keywords: Nuclear power economics, investment under uncertainty, Monte Carlo simulation

Acknowledgments: Previous versions of this paper were presented to the Center for Clean Air Policy, Center for International Security and Arms Control (Stanford University), the Energy Modeling Forum, and the International Association for Energy Economics. Funding has been provided by Center for Clean Air Policy, Department of Energy/Energy Information Administration, and the IBM Environmental Research Program. I thank Chaim Braun, Robert Eynon, Sue Gander, Robert Graber, Ned Helme, James Hewlett, Hill Huntington, Donald Korn, Jay Maidment, Dan Nikodem, David South, Jim Turnure, and G. Campbell Watkins for their comments, data, encouragement, or financial support.

approximately two dozen nuclear power units at risk of early retirement with the introduction of competition into electricity generation throughout the US. Further, I find that one cost of waiting to implement CO2 regulations is the increased risk of early retirement for more than half these units.

2. Average Variable Expenses at NPPs

The economics shutdown rule states that a firm will cease production if its average variable cost (AVC, equal to total variable cost divided by output) is greater than price. To determine whether a particular nuclear power unit is likely to cease production because its cost is greater than the market price, this section discusses variable cost; Section 3 discusses output; Section 4 discusses price; and Section 5 discusses the probability that cost is greater than price.

Variable cost includes all costs that vary with additional units of output. But NPPs are continuous production facilities where costs vary little with the production of an additional kilowatt-hour (Kwh), see Rothwell (1996). Therefore to distinguish these costs from the traditional definition of AVC, I will refer to them as annual Average Variable Expenses (*AVE*). There are three costs that vary annually: fuel expenses (*FUEL*), operating and maintenance costs (*O&M*), and capital additions (*CAPADD*):

$$TVE_t = FUEL_t + O\&M_t + CAPADD_t, \quad (1)$$

$$AVE_t = (FUEL_t + O\&M_t + CAPADD_t) / Q_t, \text{ and} \quad (2)$$

$$AVE_t = AveFUEL_t + AveO\&M_t + AveCAP_t, \quad (3)$$

where TVE_t are total variable expenses, Q_t is electricity generated in year t , and $AveFUEL_t$, $AveO\&M_t$, and $AveCAP_t$ are annual average fuel, O&M, and capital additions per Kwh; the time subscript will be dropped to simplify notation. While fuel expenses vary with Kwh, O&M and capital additions vary little with additional kilowatt-hours, so quantity must be considered explicitly. This can be done by

2000 and -14% in 2010. The magnitude of these differences arise from modeling assumptions and methodology. Assuming an average MMTCE/Twh of 0.22, a decline of 100 Twhs in the nuclear power industry implies an average increase of 22 MMTCE from increased fossil fuel use. Therefore, if deregulation has the unintended consequence of leading to more early NPP retirements than projected by DOE, much of the 25 to 40 MMTCE reduction might not be realized. Of course, this assumes no implementation of carbon fees, which are not considered in US DOE (1998).

During the next decade, electricity generation in many US states will be deregulated. Deregulation involves (1) restructuring of electricity generator ownership and (2) the creation of electricity markets where the cost of marginal producer will determine the competitive price. During the institutional transition from the current system to a deregulated one, NPP operators will face increasing uncertainty regarding the price they receive for their product. Because of the capital intensity of the nuclear power industry, the real and financial costs of continuing to operate and maintain NPPs will rise in a risky environment unless steps are taken to reduce expenses, particularly those for labor, which account for a large percentage of O&M costs. If costs are not reduced, there are approximately two dozen units at risk of early retirement before 2006, when nuclear power unit operating licenses begin to expire. However, with early implementation of air pollution fees, only half these units appear to be at risk of early retirement. Further, between 2006 and 2016, 50 nuclear power operating licenses will expire, unless life extension programs are implemented. However, even if life extension regulations are finalized before 2013 (11 licenses expire in 2013 and 12 licenses expire in 2014), many units at risk of early retirement will actually retire before these regulations are promulgated. Until electricity deregulation, environmental regulation, and nuclear power plant regulations are solidified, uncertainty facing owners of nuclear power plants will encourage earlier retirements than under a more certain regulatory environment.

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Cover: The 1912 sinking of the White Star Line's Titanic, featured in a recent blockbuster \$200M Hollywood movie, is a current metaphor for what has befallen gold. The first "iceberg" struck by gold was the prodigious sale of gold by the Australian Central Bank. A second iceberg struck is the ongoing Asian financial crisis. More recently, nickel has joined its lustrous cousin in hazardous water (see page 35).



The facilities of Codelco's newest mine make it an oasis of color in the otherwise visually bland Atacama desert (see page 28).

DEPARTMENTS

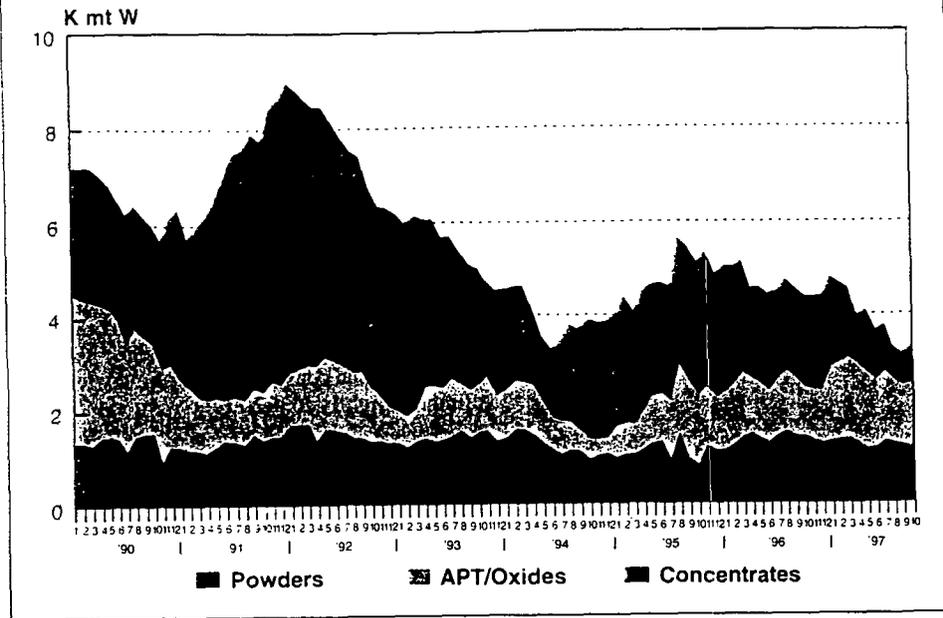
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Clarification: In January 1998's "This Month in Mining," pg. 14, a news item ran claiming 400 new mines were added in Nevada over the past year. The Associated Press, the original source, could not confirm what this meant. E&MJ assumes that the item should have read "over the past years" and that the 400 new mines refers to all official efforts, from exploration to permitting of mining companies during this time.

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U.S. TUNGSTEN STOCKS



rotungsten). Subsequently, massive releases of government stockpile materials, both in Russia and Kazakhstan, became the main source of this supply.

Depressed market pricing, coincident with the liquidation of Soviet stocks, has resulted in a long-term suppression of production to levels consistently below consumption. The gap between production and consumption has for many years now been filled by these stocks.

TABLE 4. 1997 SUPPLY/DEMAND SUMMARY (mt W)

1997 Consumption	40,250
Supplied from: 1997 Production	27,500
China	21,700
FSU/Other	2,100
MEC	3,700
Stock reduction:	
U.S.	1,000
W. Europe	1,000
China	1,250
CIS Stockpiles	1,300 (Kazakh, 1997)
	2,000 (1994-5 Release)
	2,200 (1996 Release)
	4,000 (1997 Release)
Total	40,250

The direct result has been a worldwide mining industry that is now conditioned to supplying a 30K mt W/yr market, compared to the total market of 40K mt W. Capacity has adjusted to a 30K mt W market (from a 55K mt W market in the late 1980s). This has been achieved by the abandonment of a high percentage of the prior capacity in MECs and Russia. Almost no exploration and development of new mines has occurred in at least the last 10 years. Even in China, almost all the main mines now have reduced capacity, as grades have fallen, and the only new capacity has been the collective/scavenging operations that are probably of short duration.

As long as governmental liquidation of stockpiles is available to bridge the gap between production capacity and consumption the market will be fully supplied. Once these have been depleted, mining capacity will be insufficient and a major shortfall in supply will be the likely result.

Outlook. Despite serious concerns about demand falling in Asia in

1998, the outlook for consumption in the United States and Europe looks strong. In addition, there is growing evidence of a return to significant consumption in Russia, albeit to levels a mere fraction of those in Soviet days.

The crucial question is as to how long the gap between mine capacity and demand can be met by government stockpile releases.

A preview of what might occur in the broader market was perhaps seen when ferrotungsten prices soared by 80% late in 1997 due to a sudden halt in Russian exports when stockpile releases were temporarily halted.

There has been much speculation about what is left in Russian stockpiles but no hard evidence. The only fact that seems clear is that the tungsten mining industry is now too small to meet world consumption in the absence of such stockpile supply, and a sustained halt of such releases would create a dramatic effect on the tungsten market.



URANIUM

A Continuing Struggle for Producers

Thomas C. Pool, president, International Nuclear, Inc.

Uranium prices declined almost 20% from last year's eight-year high to average \$12.09/lb U_3O_8 for non-former Soviet Union (FSU)-origin and \$10.57 for FSU-origin. World uranium production declined 2.1% to 89.1M lb U_3O_8 from 91.0M lb U_3O_8 in 1996. Saskatchewan-based Cameco Corp. remained the world's largest producer with attributable production of approximately 19.4M lb U_3O_8 . Consumption for 1997 was 163.9M lb U_3O_8 , up 3.4% from last year's 158.5M lb U_3O_8 . The gap between uranium production and estimated reactor requirements for 1997 was therefore 74.8M lb U_3O_8 , up from 67.5 in 1996, a continuing reflection of rapid depletion of overhanging inventories.

Last year's higher prices provided the impetus for a series of new entries onto the uranium scene including: Acclaim Uranium, Anaconda Uranium, International Uranium, JNR Resources, Southern Cross Resources, Strathmore Resources, and World Wide Minerals. These newcomers have had varying degrees of success in acquiring current or potential production capability. Other recent events in the industry include the commencement of sales of surplus uranium by the U.S. Department of Energy (DOE), the announcement of the premature shutdown of seven reactors by Ontario

WORLD URANIUM PRODUCTION FORECAST (M lb U_3O_8)

Region	1998	1999	2000	2001	2002
Canada	4.30	3.90	3.90	3.80	4.20
Eastern Europe	23.66	23.90	23.50	22.90	23.60
Far East	28.50	29.50	31.70	33.30	37.30
Other	3.30	3.50	3.70	3.20	3.80
United States	49.40	46.50	46.10	48.60	45.40
Western Europe	51.70	50.90	49.80	50.20	48.80
Total	160.86	158.20	158.70	162.00	163.10

U.S. URANIUM PRODUCTION - 1997

Estimated Production Center	1997 Principal Location	Production Owner	Production Method	(M lb U ₃ O ₈)
Highland	Wyoming	Cameco	in-situ leaching	1.56
Crow Butte	Nebraska	Uranerz	in-situ leaching	0.78
Irigaray/Christensen	Wyoming	Cogema	in-situ leaching	0.70
Uncle Sam	Louisiana	IMC Global	byproduct, P ₂ O ₅	0.70
Kingsville Dome	Texas	Uranium Resources	in-situ leaching	0.60
Donaldsonville	Louisiana	IMC Global	byproduct, P ₂ O ₅	0.40
White Mesa	Utah	International Uranium	byproduct, Ta & Nb	0.35
Rosita	Texas	Uranium Resources	in-situ leaching	0.30
Ambrosia Lake	New Mexico	Rio Algom	mine water	0.28
Smith Ranch	Wyoming	Rio Algom	in-situ leaching	0.15
Total				5.8

Hydro, the continuation of quotas for FSU-origin uranium in the United States and Europe, the expansion of production by existing producers in Australia, and delays in licensing the McClean Lake and Cigar Lake projects.

Secondary Supply. Uranium consumption continues to exceed production by a wide margin. This resulting "gap" is filled by a number of secondary sources such as reprocessing of spent fuel, government inventories, civilian inventories, and conversion of highly enriched uranium (HEU) from nuclear weapons. These sources account for over 45% of current uranium supply and are expected to temper prices through at least the end of the century.

Spent fuel discharged from light water reactors contains appreciable quantities of fissile ²³⁵U, in addition to ²³⁹Pu, ²³⁸U, and other radioactive materials. Currently, plants in Europe are reprocessing spent fuel from utilities in Europe and Japan. Plutonium recovered during reprocessing is being used to fabricate mixed oxide fuel (MOX). In 1997, MOX production was equivalent to about 2.7M lb U₃O₈. Increases in fabrication capacity will increase MOX supply to approximately 4.9M lb U₃O₈ by 2000, and to 8M lb U₃O₈ equivalent by 2010.

Substantial uranium inventories are controlled by the governments of the United States and the Russian Federation. Over 100M lb U₃O₈ are owned by the DOE and are beginning to enter the marketplace at the rate of a few million pounds annually. Of the many unknowns facing the uranium industry, none has had a greater impact in the past or is expected to have a greater impact in the future than Russia's commercial stockpile. This stockpile was accumulated over the past 50 years from production in central and eastern Europe, central Asia, and Siberia. Its past and present size are shrouded in secrecy, but it has been contributing 30 to 40M lb/yr U₃O₈ to world uranium supply. A series of recent events is believed to herald the drawdown of this stockpile to a strategic minimum by 2003. When that minimum is reached, new uranium production will be required and prices will increase as a result.

Large, and in some cases massive, uranium inventories were built up by many nuclear utilities during the late 1970s and early 1980s as a result of over-optimistic projections of the growth of nuclear power and scheduling requirements for enrichment services as implemented by the DOE. Since 1988, these inventories have been reduced through consumption by almost 400M lb U₃O₈, but nearly another 100M lb U₃O₈ remain as excess.

Uranium supplies from converted HEU are expected to amount to over 25M lb/yr U₃O₈ by 1999. Russia will provide the lion's share at 24M lb/yr U₃O₈. Weapons conversion in the United States is progressing much more slowly, with maximum scheduled sales of 3.4M lb/yr U₃O₈.

Quotas. Both the United States and the European Union (EU) have established antidumping import quotas for uranium from the FSU. Russian-origin uranium can enter the United States through 2004 in several different ways, including certain quantities "matched" with new U.S. production, allowable sales of converted HEU,

"grandfathered" contracts, and origin exchanges. Kazakh uranium imports into the United States through 2002 are tied mainly to market prices and Uzbek imports through 2004 are tied mainly to U.S. uranium production levels. Overall, FSU imports into the United States during the period 1998 through 2003 are expected to approach 100M lb U₃O₈ or about 30% of U.S. requirements.

Through a policy promulgated by the Euratom Supply Agency, the EU limits imports of FSU uranium to 20% of its total uranium needs. The policy has been somewhat flexible, however, and FSU imports have averaged about one-third of EU uranium supplies since 1994.

Consumption. Most analysts see little future growth in the world's nuclear generating capacity because an increasing regulatory burden brought on by environmental activism forces costs to unnecessarily high levels. Indeed, some analysts are projecting decreasing uranium requirements as a result of shutdowns of higher-cost reactors. Ontario Hydro announced in mid-1997 that it would shut down seven of its 16 reactors in response to a report criticizing the company's ability to properly manage its substantial nuclear program.

Recent projections by the U.S. Energy Information Agency point toward relatively flat requirements through 2010 and then a sharp drop off as many reactors reach the end of their 30-year lives and few replacements come on stream. The only region expected to show any significant growth is the Far East. Other projections of future requirements, notably by the Uranium Institute, are much more optimistic about the future of nuclear power and project continued growth in consumption, e.g., 178M lb/yr U₃O₈ by 2008.

Markets and Prices. Two-tiered pricing in the uranium market continued during 1997 as FSU material was discounted due to import restrictions in both the United States and the European Union. Prices in both tiers, as quoted by the Ux Consulting Co. (Ux), declined during the year. Non-FSU-origin uranium moved from an average of \$15.52 to \$12.09/lb U₃O₈ and FSU-origin moved from an average of \$14.01 to \$10.57/lb U₃O₈. Prices declined for most of the year and reached lows of \$10.30 and \$9.00/lb in late summer before a minor rally to \$12.75 and \$9.50/lb in November. Year-end prices were \$12.15/lb for non-FSU-origin uranium and \$9.50/uranium for FSU-origin.

U.S. producers continued to take advantage of the "matched sale" program wherein they receive a premium for newly produced U.S. uranium amounting to half the difference between the prices of FSU and non-FSU uranium. Use of this program was down somewhat from previous years due to a smaller price difference between the two tiers.

During 1997, Ux reported 70 spot market transactions totaling 20.5M lb U₃O₈, up just 4.1% from 1996. Concentrates made up 67% of the total, natural UF₆ made up 30%, and enriched uranium product made up the remainder. FSU-origin material accounted for 25% of the total.

In the long-term market, 26 contracts for future delivery of a total of 68.4M lb U₃O₈ between 1997 and 2007 were signed during the year, down 41% from the previous year. Of those contracts, two were for UF₆ which accounted for 4% of total volume, none were for enriched uranium product, and the remainder were for uranium concentrates. Contract terms were distributed as follows: base price, 27%; market related, 15%; and complex/unknown/other, 58%.

Uranium Production. World uranium production totaled 89.1M lb U₃O₈ in 1997, down 2% from 91M lb in 1996. Only Canada and Namibia recorded production increases, as the Cameco/Uranerz Rabbit Lake project returned to full output of 12M lb/yr U₃O₈ and as Rossing began its drive to return to full capacity. Most other producers showed either no change or a slight decline.

African production is expected to remain stable for the foreseeable future as declines in Gabon and South Africa are balanced by

MAJOR WORLD URANIUM PRODUCERS — 1997

Center	Principal Location	Production Owner	Production Method	Estimated 1997 Production (M lb U ₃ O ₈)
Key Lake	Canada	Cameco	conventional	13.70
Rabbit Lake	Canada	Cameco	conventional	12.50
Ranger	Australia	E.R.A.	conventional	9.20
Rossing	Namibia	Rio Tinto	conventional	7.50
Krasnokamensk	Russia	Priargunsky	conventional	5.20
Akouta	Niger	Cogema	conventional	5.00
Cluff Lake	Canada	Cogema	conventional	5.00
Olympic Dam	Australia	Western Mining	byproduct Cu	3.70
Arlit	Niger	Cogema	conventional	2.60
Zafarabad	Uzbekistan	Navoi	in-situ leaching	1.80

an increase at Rossing. Rossing, majority-owned by Rio Tinto, upped its output in 1997 to 7.5M lb/yr U₃O₈, about 75% of capacity. Gabon will cease production in 1999 due to depletion of economic reserves. Uranium production in South Africa, solely as a byproduct to gold and copper, continues to decline as higher-grade ores are exhausted.

Australian production currently is confined to two major producers: Ranger, operated by Energy Resources of Australia, recently expanded to 11M lb/yr U₃O₈ and Olympic Dam, operated by Western Mining, recently expanded to 4M lb/yr U₃O₈ and is now embarked upon a further expansion to 10.2M lb/yr U₃O₈. By 2008, Olympic Dam plans to produce 17M lb/yr U₃O₈. Other potential production, as a result of the abandonment in 1996 of the "three-mines" policy promulgated by the Australian Labor Party (ALP), may be forthcoming. Honeymoon, owned by Southern Cross Resources, plans to commence operation in 1998 as an in-situ leaching pilot plant and to expand thereafter. General Atomics' Beverley in-situ leaching project also plans pilot plant operations in 1998. Rio Tinto's Kintyre, a proposed conventional project, was placed on care and maintenance in 1997 due to deteriorating market conditions. Jabiluka received its environmental go ahead but still faces difficult negotiations with aboriginal groups concerning royalties. The ALP has recently threatened to resume restrictions against new uranium mines if returned to power.

Canada is the world's largest producer of uranium and is expected to remain in that position indefinitely as new, large, high-grade, low-cost production centers come on stream in northern Saskatchewan over the next few years. Certain delays in approval and licensing, however, may slow Canada's expansion. Commencement of operations at the nearly completed McClean Lake mill at a rate of 6M lb/yr U₃O₈ is being delayed for at least six months due to licensing questions concerning tailings disposal. As a consequence, its scheduled expansion to include processing high-grade ore (20% U₃O₈) from the Cigar Lake deposit and to increase its total output to 24M lb/yr U₃O₈ has been delayed to at least 2001. Key Lake will increase its production level from 14 to 18M lb/yr U₃O₈ when it begins to treat ore from the McArthur River deposit (19% U₃O₈) in 1999. Production at Rabbit Lake is expected to continue at full capacity (12M lb/yr U₃O₈) through 2002. Cluff Lake, operated by the French integrated nuclear fuel producer, Cogema, increased its output to 5M lb/yr U₃O₈ in 1996.

FSU uranium production has an uncertain future. Kazakhstan and Uzbekistan are now focusing on production from vast, low-grade, in-situ leaching projects. Nevertheless, an inability to raise capital for replacement equipment and new wellfields has caused a continuing decline in production. Russia recently announced the development of a new in-situ project in the Urals. Production from this source would supplement that from its only current producer, Krasnokamensk, a conventional underground mine with an output of 5.2M lb/yr U₃O₈ from moderate-grade ores. The Ukraine is committed to providing domestic uranium from a low-grade underground mine for its own nuclear program in an effort to conserve foreign exchange.

Other uranium-producing countries include Argentina, Belgium, Brazil, China, the Czech Republic, France, Hungary, India, Mongolia, Pakistan, Portugal, Romania, and Spain. Most of this production is minor and for domestic use. Hungary ceased production in 1997. France is scheduled to cease production in 2001. Argentina's Cerro Solo deposit is being studied for future development. Lagoa Real in Brazil is due to come on stream in 1998 at a rate of about 0.7M lb/yr U₃O₈. World Wide Minerals reports that production at a rate of 0.8M lb/yr U₃O₈ from the Dornod district in Mongolia is scheduled to begin in 1998.

U.S. production declined from 6.3M lb U₃O₈ in 1996 to 5.8M lb in 1997 as International Uranium Corp. (IUC) finished milling stockpiled ore at its White Mesa mill in Blanding, Utah, and as production declined at the Rosita and Kingsville Dome in-situ leaching (ISL) projects of Uranium Resources Inc. (URI). IUC acquired the assets of Energy Fuels through a bankruptcy proceeding and also reopened several uranium/vanadium mines on the Colorado Plateau as a result of much higher vanadium prices. URI received most of the necessary approvals for its proposed ISL operations in New Mexico but has classed start-up as "uncertain" due to present market conditions. Rio Algom's Smith Ranch ISL project commenced production in December 1997 and is scheduled to increase its output to 2M lb/yr U₃O₈ by 1999. ISL production continued at Crow Butte, Neb., and Irigaray/Christensen, Wyo., at rates of about 0.8M and 0.7M lb/yr U₃O₈, respectively. Power Resources, the largest U.S. producer with about 1.6M lb U₃O₈ in 1997 from ISL operations at its Highland, Wyo., project, was acquired by Cameco. Cotter Corp. resumed underground mining at its Schwartzwald mine in Colorado and stockpiled the ore at its Canon City mill. Uranium production as a byproduct of phosphoric acid continued at IMC Global's Uncle Sam and Donaldsonville plants in Louisiana.

U.S. uranium output is and will likely continue to be dominated by ISL and byproduct producers as most conventional ores offer only modest grades and conventional milling capacity has declined significantly. Generally, the United States has a large production capability from a number of small to medium-sized deposits at somewhat higher prices, about \$15 to \$20/lb U₃O₈. Price increases to that level would promote much greater domestic production.

SCHEDULED URANIUM PRODUCTION FORECAST (M lb U₃O₈)

	1998	1999	2000	2001	2002
Africa	20.18	21.77	20.25	20.15	20.03
Australia	15.25	17.35	21.80	22.20	22.20
Canada	33.00	39.60	37.00	44.00	51.00
FSU	13.03	13.03	13.03	13.03	13.03
Other	6.00	5.90	4.90	4.05	4.05
United States	8.50	8.65	7.85	7.65	7.55
Total	95.95	106.30	104.83	111.08	117.85

Outlook. Non-production supply from a variety of public and private sources will continue to limit the need for new production, just as the drawdown of utility inventories has limited this need in the recent past. Non-production supply is expected to account for almost 40% of world requirements during the next few years. Russia is the major contributor to secondary supply but is giving increasing indications that this supply is rapidly declining to a strategic minimum. When that minimum is reached, substantial new production will be required to balance supply and demand. In the meantime, however, increasing production from Canada and Australia and increased conversion of nuclear weapons will provide an excess of uranium to both the restricted and unrestricted markets. As a consequence, prices are unlikely to rise above the \$20/lb U₃O₈ level under any reasonable scenario and could well remain in the low to mid-teens through at least the end of the century. Volatility may, however, be an increasing factor in the market as perceptions of a diminishing Russian stockpile gain additional credence.

ERA JUMPS ON RELIEF AT HOWARD RE-ELECTION

SYDNEY - Shares in uranium producer Energy Resources of Australia Ltd jumped 33 cents or 15.9 percent to A\$2.40 in early Monday trade on relief that the Labor opposition, which wanted to stop the Jabiluka mine, had not won office.

Counting from Saturday's election is incomplete, but the conservative government of Prime Minister John Howard appears to have been returned with its majority slashed to about six seats compared with its previous 44-seat majority in the 148-seat lower house of parliament.

"People are happy there won't be any impediment to Jabiluka proceeding," said one Melbourne analyst.

"Labor had said they might scuttle the mine and now they've lost you can be pretty confident there won't be any problems," the analyst said.

Analysts noted however that ERA was a relatively thinly traded stock and any change in sentiment was likely to have an exaggerated effect.

Labor leader Kim Beazley said in September Labor would halt the development of ERA's Jabiluka uranium mine on the fringes of the Kakadu National Park in the Northern Territory.

Jabiluka has been the subject of prominent protests by the environmental movement, which argues the mine would pollute the nearby wetlands of the world-famous Kakadu park.

While ERA had already begun work on Jabiluka, Beazley said then he did not believe it was so far advanced that it could not be stopped.

Labor's policy would prevent the development of new mines and only allows uranium to be exported from Australia's two existing mines, one of which is ERA's existing Ranger mine near Jabiluka.

ERA said in response to Labor's policy that the mine already had 15 sales contracts that would qualify for the issue of an export permit and it therefore could not be stopped.

North Ltd, ERA's majority shareholder, has also said it had all the legal approvals to go ahead with Jabiluka and that it would sue if a Labor government tried to stop it.

The mine is expected to generate A\$12 billion in revenue during its 28-year life, making Australia one of the world's leading uranium producers.

ERA, which owns the nearby Ranger uranium mine, is still negotiating final approval for the safe disposal of its Jabiluka mine tailings.

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U.S. Hopes to Resolve Uranium Dispute with Russia

WASHINGTON, Jan. 13, 1999 -- (Reuters) U.S. Energy Secretary Bill Richardson said on Tuesday he hoped to resolve problems soon with a deal in which the United States agreed to buy 500 tons of highly enriched uranium from Russia to fuel American commercial nuclear power reactors.

"We hope soon to bring to closure the recent issues that have dogged our progress on implementing this important agreement," he told a conference sponsored by the Carnegie Endowment for International Peace.

"There are still some issues we need to narrow down," he said. He gave no details.

Under the \$12 billion 1993 deal, Russia was to convert 500 tons of highly enriched material into low-grade uranium over 20 years.

The fissile material, enough for 20,000 nuclear weapons, was to be extracted from decommissioned nuclear warheads and sent to the United States after dilution.

The U.S. side had agreed to pay for both the natural and enriched components that make up low-enriched uranium.

But at the end of 1996 the United States stopped paying for the uranium's natural component. Instead it said it was willing only to pay for the enriched part, and for the natural component it has been returning an equal amount of natural uranium.

Russian energy officials accused Washington of violating its obligations and said they would begin selling the natural uranium

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on world markets.

U.S. experts said the problem was complicated when the United States Enrichment Corporation (USEC), Russia's partner in the 1993 deal, was privatized by the U.S. government last year and when Russia put a value on the uranium out of line with world prices.

Richardson said that already under the deal, 36 tons of Russian HEU -- enough for over 2,500 nuclear weapons -- had been blended down and delivered to the United States for use as reactor fuel.

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NuclearFuel

A biweekly report from the editors of Nucleonics Week

Vol. 23 No. 22—November 2, 1998

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KAZAKSTAN LOOKING FOR SWU QUOTA, HEU FEED TALKS HELD IN PARIS, SPOT U PRICE DECLINES

Kazakstan, unable to sell uranium under Appendix A of its uranium suspension agreement because the market price is below \$12/lb, is apparently seeking a quota for the import to the U.S. of 360,000 SWU a year from 1999 to 2004, or roughly 3% of U.S. consumption. Under one proposal made about a week ago, Kazakstan would give USEC a right of first refusal to buy the Kazak SWU for sale in a matched SWU program. If USEC didn't take the SWU, then Kazakstan would have a direct quota but would pay USEC a 5% commission on any sale.

But the proposal has not been well received by the Oil, Chemical & Atomic Workers (OCAW) union. "Read my lips: 'No more SWU,'" says OCAW policy analyst Richard Miller. He added that if the U.S. wants to help Kazakstan in this area, "it should buy and stockpile the enriched uranium." Miller suggested that the union might go along with some importation of some Kazak enriched uranium (about 100,000 SWU) but only for processing and re-export without any swaps allowed.

(continued on page 10)

COGEMA TRIES AGAIN ON CENTRIFUGE DEVELOPMENT, THIS TIME WITH JAPAN

Cogema, seeking to build a centrifuge enrichment facility next to the Eurodif gaseous diffusion plant, is studying the project with "a Japanese partner," said Yves Coupin, a Cogema vice president and the company's top enrichment official, last week.

Coupin told the quadrennial European Nuclear Conference (ENC '98) in Nice that Cogema sees the centrifuge facility not as a replacement for, but as "a good complement" to, the 10.8-million-SWU/yr Eurodif diffusion plant in which it owns a majority share. If the study is positive, the market permits, and authorities give the green light, "the first centrifuge unit could be in operation in the first years of the next decade," he said.

Last spring Japanese enrichment officials told NuclearFuel that Cogema had approached the organization then known as the Power Reactor & Nuclear Fuel Development Corp. (PNC), as well as other organizations involved in Japan's gas centrifuge enrichment program, seeking a cooperation agreement to

— Post accident recovery and compliance with 10 CFR 72.122(l). Standard review plans (SRPs) will be modified to distinguish the difference between retrievability and post accident recovery. "Further, the SRPs should eliminate all references to non-credible accidents such as non-mechanistic failures of the confinement boundary," the ISG stated. "The accident analysis chapters should be rewritten to require that the staff evaluate all credible accidents and focus the review on those accidents with potential consequences resulting in the failure of the confinement boundary. Upon identification, the event shall be evaluated against the requirements of 10 CFR 72.106 and 72.122(b). Recovery methods or the need for overpacks or dry transfer systems to maintain safe storage conditions would then not be considered and evaluated as part of the licensing process."

The ISG said that Nureg-1667, Chapter 10, Section 10.4.5, "Emergency Planning," and Nureg-1536, Chapter 11, Section V.2, "Detection of Events," should be changed "to ensure that the licensee will have the ability to identify an accident or non-compliance situation."

— Cask closure weld inspections. Dye penetrant (PT) or ultrasonic (UT) examinations may be used to inspect the closure weld for the outer cover plate for austenitic steel cask designs. Though UT overall is the preferred technique to PT, which only identifies surface flaws, the staff noted that UT has not yet been proven acceptable for austenitic stainless steels. "PT is considered to be adequate for safety, specifically for austenitic stainless steels in that it can provide reasonable assurance that flaws of interest will be identified," the ISG stated. "This position does not apply to carbon steel."

— Dose calculations. The NRC staff said that storage cask applications should address potential leaks of gases, volatiles, fuel fines, and crud. "The analysis should be based on a source term that includes all radionuclides that are greater than 0.1% of the total activity present in the fuel plus iodine (this would result in approximately 95% of the dose if the total inventory were included)," the ISG said. It added that the use of a computer code such as SAS2H to generate this source term or shielding source term was acceptable. The staff said this would require that Nureg-1536 Chapter 7, Sections 3 and 4; Chapter 10, Section V, 3; and Chapter 11, Section V, 3 be updated to reflect this new position. Staff added that Nureg-1567 also should be updated accordingly.

— Establishing minimum initial enrichment for the bounding design basis fuel assembly. Nureg-1536 now recommends that an applicant calculate the source term on the basis of the fuel that will actually provide the bounding source term. But, the ISG pointed out, that a specified source term would be difficult for most cask users to determine and even more difficult for inspectors to verify. It added that specific limits on the minimum initial enrichment was a much more straightforward basis for defining the allowed contents of a cask. Staff said those limits will be included in the cask's certificate of compliance.

"Lower enriched fuel irradiated to the same burnup as higher enriched fuel produces a higher neutron source," the

ISG stated. "Sometimes fuel assemblies are driven to burnups beyond the value normally expected for the given enrichment. According to DOE's Characteristic Data Base, the enrichment for fuel burned to 45,000 MWD/MTU (megawatt-days per metric ton uranium) is about 3.3%. The neutron source for an initial enrichment of 3.3% is expected to be 70% higher than the neutron source for 4.05% enriched fuel." The ISG requires that a portion of Nureg-1536, Chapter 5, Section V, 2 be changed.

— Potential generic issues concerning cask heat transfer in a transportation accident. The staff raised two major concerns regarding the adverse effects of fission gases on the gas-mixture thermal conductivity inside a spent fuel cask following a transportation accident. The fission gases would be expelled by failed fuel pins, causing an increase in the cask's internal pressure and reducing the thermal conductivity of the gas already inside the canister. Revisions will be made in the SRP for transportation packages for spent nuclear fuel, Nureg-1617, and in Nureg-1536 requiring applicants to consider the potential impact of fission gas to the cask component temperature limits and the cask internal pressure when cask component temperatures are within 5% of their limiting values during an accident or the maximum normal operating pressure is within 10% of its design basis pressure.

The ISGs are available on the NRC Website (www.nrc.gov/OPA) under selected reports.

U MARKET *(continued from page 1)*

Shearman & Sterling's Tom Wilner, who is representing Kazakstan, had a pithy response, but unfortunately that response is generally considered unprintable in a McGraw-Hill newsletter. Wilner also said that USEC is very much opposed to any kind of Kazak SWU quota.

But Kazak representatives say that Kazakstan might decide in November, and certainly by the end of the year, to terminate its suspension agreement if there is not some reasonable counter-offer made by USEC and the miners. If that happens then the Kazak enriched uranium will be sold outside the U.S., these sources said.

Sen. Mitch McConnell (R.-Ky.) urged Commerce Secretary William Daley in an Oct. 26 letter "to withdraw immediately" any proposal to amend the existing suspension agreement to that would permit Kazakstan to sell enriched uranium in the U.S. He wrote:

"The recently privatized USEC Inc. is responsible for fulfilling the 'swords to plowshares' agreement with Russia to purchase and sell its bomb-grade uranium. If additional material is introduced into the U.S. market, as you have proposed, it will be even more difficult for USEC to remain competitive and to justify current production levels. The result would be additional layoffs at one or both of the U.S. enrichment facilities in Paducah, Ky. or Portsmouth, Ohio."

McConnell added: "I assume that Commerce will only agree to an amendment that enjoys broad support within the U.S. industry and is neither price-suppressive nor injurious to U.S. industry."

Energy Secretary Bill Richardson, who is to visit Kazakstan this month, promised the OCAW he would raise the issue of Kazak enriched uranium with DOC's Daley, the Paducah (Ky.) Sun newspaper reported. Richardson met with union officials during a visit to the Paducah gaseous diffusion plant Oct. 23.

Separately, USEC and the ad hoc committee of uranium mining companies has asked DOC to hold a hearing to review the recently signed amendment to the Kazak agreement permitting the import by Nukem for processing at General Electric's Wilmington, N.C. fuel plant of 20 metric tons of enriched uranium product from Kazakstan (NF, 5 Oct., 1). No date has been set for the hearing, which would be the first such hearing held to review a uranium suspension agreement issue.

HEU Feed Deal Still Appears Elusive

With the U.S. government now providing a new incentive for a commercial deal, representatives from three Western companies and the Russian Ministry of Atomic Energy met last week in Paris to discuss a long-term contract (10 years or more) for the sale of the feed component from blended-down Russian high-enriched warhead uranium (HEU). The meeting took place a little over a week after Congress passed, and the president signed, legislation permitting the U.S. to spend up to \$325 million to purchase almost 11,000 metric tons uranium, the amount of uranium feed that is contained in the blended-down HEU delivered—or to be delivered—by Russia in 1997 and 1998. The uranium would go into DOE's inventory, and at least the presumption is that the material will be held off the market by the U.S. for a long period of time.

There was general agreement that the U.S. government's action "takes a big problem off the table," as one source said. But it is not at all clear, according to a number of sources, that the money will be a sufficient lubricant for a commercial deal to get done. Price, among other things, still seems to be a major sticking point.

One source explained that the Western companies—Cameco, Cogema, and Nukem—have to assume the worst about future prices in the market. And right now "there is more uncertainty about future prices" than there was earlier this year when the Western companies offered a price of \$29/kgU as UF₆ for a substantial part of the material. Uncertainty over the sale of USEC Inc. uranium inventories and the impact of Department of Commerce (DOC) monitoring procedures for the U.S. HEU feed quota, combined with a more negative environment for nuclear power in Germany, has forced the Western companies to conclude that they can only pay so much for this uranium now (perhaps \$15/kgU), given that the 24-million lb that will be available from 1999 blended-down HEU can't be sold in the near term at anything close to today's market prices (\$26-\$28/kgU as UF₆). In the future, when the material is sold, the Russians could then get some additional payments if the market is stronger.

But the Russians have indicated that they have little flexibility to accept this "market risk," because Russian law requires full payment for the uranium component within 180

days of the export.

To some observers, this impasse can only be broken if the U.S. government again steps in to provide some insurance against this market risk—either by making an additional payment now to Russia or later to the Western companies.

If that is not possible, then some high U.S. official—possibly Energy Secretary Bill Richardson or Vice President Al Gore—is going to have to work to persuade Russian officials to carve an exception in the Russian export law for the HEU feed, a source said.

Of course the other option is for the Russians to go ahead and market the uranium themselves. But this would not remove the market risks and would mean that the U.S. would not make a near-term payment of \$325-million.

DOC Monitoring Procedures Also Uncertain

The DOC procedures for monitoring the quota for Russian HEU feed sales, a quota specified in the USEC Privatization Act of 1996, is another potential stumbling block for the negotiators, say a number of sources. If those procedures are too restrictive, require too much paperwork, or are too intrusive in commercial dealings, then the HEU feed will have to be discounted in order to be sold to some possible end-users, particularly those outside the U.S., some argue.

The Nuclear Energy Institute (NEI), which has formed an industry task force to come up with ideas for monitoring the HEU feed quota, is going to petition DOC to conduct a rulemaking to come up with a process for determining the proper procedures, several sources indicated. The market needs "business certainty," one source argued, and that can only be achieved if the procedures flow from a process developed through formal Administrative Procedure Act rulemaking.

In The Market . . .

Niagara Mohawk, having seen attractive offers for 22,000 kgU as UF₆, is back in the market, now looking for 120,000 lb U₃O₈ for delivery in December 1999. The utility said it will buy the 22,000 kgU from UG U.S.A., with analysts suggesting that the price was below \$28/kgU as UF₆.

The Tennessee Valley Authority is out looking for 400,000 lb U₃O₈ for delivery in August 1999. Bids are due Nov. 9.

Omaha Public Power District is looking for about 75,000 kgU/yr as UF₆ and 44,000 SWU/yr over the period 2000-2005 with options for 2006-2008. The utility has indicated that it will consider buying enriched uranium product. Bids are due Nov. 16.

"Sellers are getting more anxious," observed one market analyst, as the spot market price in the U.S. continued to tumble over the past two weeks. Both TradeTech and the Uranium Exchange Co. were reporting a price in the U.S. of \$9.25 a pound U₃O₈ at the beginning of last week.

The declining price is reflective of the uncertainty in the market and few analysts were willing to say that the bottom to this current cycle has arrived. There appears to be still a

NuclearFuel

A biweekly report from the editors of Nucleonics Week

Vol. 23 No. 23—November 16, 1998

HIGHLIGHTS

Enrichment:

- NRC papers offer more details on BWXT's downblending of USEC HEU —page 14

Fuel Cycle:

- Greenpeace turns spotlight on krypton-85 releases at La Hague —page 9
- Cogema, critics spar over legality of storing foreign reprocessing waste —page 10
- Cogema official details expansion, including a BWR line, for Melox plant —page 11

Nonproliferation:

- MOX effort near stall, again; opponents question U.S. liability —page 12

Waste Management:

- EPA-NRC groundwater protection debate likely to intensify with EPA draft rule. —page 4
- Claims court opens door for damages, declares DOE liable for storage delay —page 5
- IAEA official says global inventory of spent fuel will top 340,000 in 2010 —page 7
- U.S. official suggests countries may want to work together on disposal —page 7
- BNFL delays switching nuclear train site after widespread public fears —page 8
- Russians test processor for purification of sub waste —page 15

KAZAKHSTAN TELLS DOC IT INTENDS TO TERMINATE SUSPENSION AGREEMENT; USEC SAYS U SALES OFF

Kazakhstan Nov. 10 formally gave notice of its intent to terminate its uranium suspension agreement with the U.S. Department of Commerce (DOC).

Without a suspension agreement, Kazakhstan would no longer be subject to DOC reporting requirements and its uranium could be enriched in Europe and imported into the U.S. under the normal rules applying to substantial transformation of uranium products. The termination will become effective in 60 days, but Kazakhstan has indicated it might rescind the termination if DOC offers an acceptable modification to the current agreement. An acceptable modification would most likely have to include some form of a SWU quota (NF, 2 Nov., 1).

If not, then DOC will have to decide how to move ahead with a final determination on whether Kazakh uranium has been sold in the U.S. at less than fair market value. The original investigation was based on data submitted in 1992 and DOC might want to update that information, a DOC source indicated. (continued on page 15)

U.S. MULLING MORE DIRECT ROLE IN STALLED HEU FEED NEGOTIATIONS

Shipments of blended-down high-enriched uranium (HEU) from Russia to the U.S. this year have clearly been delayed. Whether they have now been suspended because of the lack of progress in commercial talks between the Russians and three Western companies was an unanswered question as NuclearFuel went to press.

Sources said a frustrated U.S. government is now likely to take a more direct role in those commercial negotiations over the sale of the uranium feed component of the blended-down HEU.

USEC Inc., which pays the Russians for the SWU component of the blended-down HEU, formally confirmed that it anticipates taking delivery of only about 57% of the low-enriched uranium (LEU) that it was expecting to receive this calendar year. Russia was to blend down in 1998 24 metric tons of warhead HEU, producing LEU containing about 4.4 million SWU, and about 18.8 million pounds U3O8. In a filing with the U.S. Securities & Exchange commission Nov. 12, USEC said

But for projects like the TVA bid, some of the blend stock, which is depleted 1% enriched material, "exceeds our license limit because of the low quantity of U-235," according to BWXT. When the license limits originally intended for HEU are applied to low-enriched or depleted uranium, the small amount of U-235 drives the allowable concentration of contaminants down, BWXT says.

In order to be able to possess depleted and LEU material with contaminants, BWXT has proposed to revise the possession limits from a per gram U-235 basis to a per gram total uranium basis. There is no significant increase in risk to personnel because of this change, the company said in the NRC filing.—*Wayne Barber, Washington*

RUSSIANS TEST PROCESSOR FOR PURIFICATION OF SUB WASTE

The Zvezda Russian navy shipyard started testing a floating liquid nuclear waste processing station in the Russian Far East late last month, according to Valery Maslakov, the factory's director.

Construction of the facility, called "Lily," is a joint Russian-American project. It will deal with radioactive waste of Russian atomic submarines stationed in the Primorie region on Russia's Pacific coast.

Construction of Lily may solve one of the region's most difficult problems: removing nuclear waste from Soviet submarines. Some 15,000 metric tons of liquid nuclear waste is now stored at ports of the Russian Pacific fleet.

The U.S. provided most of the equipment and technology for Lily, which was installed into a Russian vessel in the city of Komsomolsk na Amure this year. The U.S. government also granted some \$25 million for the construction work.

The floating station can process up to 7,000 cubic meters of waste a year.

The test consists of two stages. In the first one, the filtering system is being used to desalinate sea water. If the trial run is successful, a group of Zvezda representatives, Russian Navy officers and American specialists will implement the second stage, in which Lily will process real liquid radwaste.

The second stage is expected to begin in mid-November. "So far we are satisfied with results," said Maslakov, adding that if all goes well, the tests should be completed by the end of this year and regular operation can commence.

The facility is capable of processing all the liquid radioactive waste in the Russian Far East by the beginning of the next century.

Lily is not the only ship that will process submarine waste. A second, similar device is being completed in Murmansk in the Russian North. The project is also sponsored by American government and may start its work in a few months.—*Sergey Rybak, Moscow*

U MARKET (continued from page 1)

A positive finding would move the case to the International Trade Commission (ITC), which must then determine whether U.S. industry has been injured by Kazakh imports. If the ITC issues a positive finding, then DOC would issue an antidumping duty order. A negative finding by the ITC would mean that Kazakh uranium could freely enter the U.S.

In 1993, Ukraine and Tajikistan terminated their suspension agreements with DOC. The ITC ruled against Ukraine, but said that Tajik uranium could be freely imported into the U.S. Subsequently, Ukraine has supplemented its uranium sales with sales to U.S. utilities that have European enrichment contracts. The price it receives for its uranium is typically above the price for uranium from the Commonwealth of Independent States (CIS), although a recent rumored sale to a North American producer was said to be at a "distressed" price.

Bolat Nurgaliyev, the Kazakhstan ambassador to the U.S., sent the following letter to Robert LaRussa, the DOC assistant secretary for import administration. It accompanied Kazakhstan's formal notice of intent to terminate its suspension agreement.

"We are attaching a letter formally notifying the secretary of commerce of the intent of the Republic of Kazakhstan to terminate the uranium suspension agreement pursuant to the terms of the agreement.

"We provide this notice with deep regret. The uranium suspension agreement was the first agreement between our two governments, and we had big expectations about its benefits for the two sides. Unfortunately, Kazakhstan is currently unable under the agreement to export material to the U.S. for consumption and has even faced great difficulty in exporting material temporarily for processing and re-export to third countries. At the same time, the agreement imposes many restrictions on the ability of Kazakhstan to sell uranium in third-country markets. We have no choice, therefore, but to provide notice of our intent to withdraw from the agreement.

"We want you to know that we very much appreciate the personal efforts that you, Mr. Spetrini, and your staff have made over recent months to solve the problems that Kazakhstan has faced under the agreement. We recognize, however, that the strenuous and uncompromising opposition of U.S. parties to any proposal has made your efforts to resolve those problems extremely difficult.

"We would certainly study any proposals that might be made during the next 60 days before the termination of the agreement becomes effective. However, because of commercial considerations we cannot delay any longer providing this notice of termination."

In The Market . . .

Although most signs in the spot uranium markets remain bearish, there are some sellers trying to comfort themselves by stating their belief that the price in the U.S. will not go below \$8 a pound U3O8. But a number of analysts were suggesting that it is likely that the Tennessee

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December 11, 1998, Friday LONDON EDITION 2

SECTION: COMMODITIES & AGRICULTURE; Pg. 30

LENGTH: 811 words

HEADLINE: Western Uranium producers struggle with falling prices: Demand outlook tied to contracts signed by utilities who already have medium-term agreements, writes Scott Morrison:

BODY:

Western uranium producers are shutting down facilities, reducing staff and cutting production as they struggle to contend with a supply glut, low spot market prices and an uncertain market outlook.

IMC Global, the US potash and phosphate producer, was the latest company to respond to low uranium prices when it indicated this month it would permanently shut down its two uranium facilities by early next year. The company, which was expected to produce roughly 950,000 pounds this year, about 16 per cent of US uranium production, said it would meet existing sales obligations through inventory.

IMC's decision follows a rash of announcements from producers struggling to cope with a sharp drop in the uranium spot price.

Uranium Resources, the US producer, has said it would "shut in" two facilities and put them on standby status. The company also announced a series of operational and administrative cuts. Paul Willmott, the company's chief executive, said prices had fallen below production costs and the outlook was not favourable in the near term.

Cogema Resources, the Canadian subsidiary of the French Cogema group, has also announced plans to shut down a high cost mine in 2000. Rossing Uranium of Namibia recently proposed to cut salaries and other operating expenses in an attempt to reduce costs by 20 per cent by the turn of the century.

Perhaps the most significant announcement came from Cameco, the world's largest publicly traded uranium producer, which said recently it would slash output by 38 per cent to 16m pounds in 1999. In addition, Cameco said uranium conversion services at its Ontario operations would be reduced to 10 per cent below 1998 levels, a measure the company expected would improve its cash flow by C\$ 200m (US\$ 130m) over the next three years.

Like IMC, Cameco said it would continue to meet sales commitments by drawing on uranium inventories, which it has built up in preparation for a transition to a new high grade mine in Saskatchewan.

The Cameco announcement appears to have stabilised the spot price for uranium at about \$ 8.75 a pound after slipping more than 10 per cent since late August. While most uranium is sold through long-term contracts at a premium to the spot price, the value of about half of that uranium is tied to the market price at the time of delivery. One nuclear industry analyst said that simply stabilising the spot price was an important development, given the current environment.

The Australian Bureau of Agricultural and Resource Economics (ABARE) recently forecast that while supply into the spot uranium market was expected to stabilise in 1999, world consumption was not expected to grow significantly and short-term delivery prices are forecast to remain under \$ 11 a pound.

Some industry sources said uranium prices had probably hit bottom, but other forecasters, such as Uranium Exchange, the US consultancy, have been more bearish. It suggested earlier this year that the US market price for uranium could range between \$ 6-\$ 8 by 2000.

That compares with average spot prices of \$ 12.05 a pound in 1997 and \$ 15.62 in 1996.

The outlook for uranium prices is tied to western utilities, which have covered their medium-term uranium needs in contracts signed over the past few years. Industry observers said there had been few new contracts signed this year and not many were expected in the next two or three years.

More importantly, there is a high degree of uncertainty regarding future uranium prices because of the unresolved status of 500 tonnes of highly enriched - weapons grade - uranium stockpiled by Russia. That is equivalent to about 400m pounds of benchmark U308, which would be sufficient to meet global demand by commercial reactors for almost three years.

Under a 1993 intergovernmental agreement, Russia is committed to deliver that uranium to the US over 20 years. But it is not yet clear who would control the sale of those stockpiles. A trio of western producers - Cameco, Cogema and Nukem, the US producer - has been attempting to secure control to sell a portion of the Russian uranium to introduce it into the market in an orderly fashion. Recent negotiations, however, have failed to yield an agreement.

While there are restrictions on the sale of Moscow's uranium in the US and Europe, Russia's atomic energy ministry is free to sell its product on the open market to countries in Asia, eastern Europe and Latin America. Some western producers are concerned that Russian uranium sales could destabilise the market and further depress prices.

Cameco, Cogema and Nukem remain hopeful they can strike a deal to market a portion of the Russian uranium. But with the recent spate of closures and cutbacks, it is clear that many other producers see little reason to be optimistic about the prospects for the uranium industry.

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**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Law Judge Bloch

In the Matter of:

HYDRO RESOURCES, INC.
2929 Coors Road, Suite 10
Albuquerque, NM 87120

)
) Docket No. 40-8968-ML
) ASLBP No. 95-706-01-ML
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**TESTIMONY OF MICHAEL F. SHEEHAN
ON BEHALF OF SRIC AND ENDAUM
ON THE COST BENEFIT ANALYSIS ISSUE**

February 11, 1999

OSTERBERG & SHEEHAN

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**TESTIMONY OF MICHAEL F. SHEEHAN
ON BEHALF OF SRIC AND ENDAUM ON
THE COST BENEFIT ANALYSIS ISSUE**

I. INTRODUCTION

A. Qualifications

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Q. PLEASE STATE YOUR NAME AND ADDRESS FOR THE RECORD.

A. My name is Michael F. Sheehan. My address is 33126 Callahan Road,
Scappoose, Oregon 97056.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am a partner in the firm of Osterberg & Sheehan, Public Utility Economists, of
Scappoose, Oregon and Mount Vernon, Iowa.

Q. PLEASE DESCRIBE YOUR PROFESSIONAL BACKGROUND.

A. I hold B.S., M.A. and Ph.D. degrees in economics from the University of
California at Riverside. I have a juris doctorate degree, and I am licensed to
practice law in the states of Iowa and Oregon. I have taught project analysis,
quantitative economics, and operations research, as well as basic, intermediate,
and graduate courses in economic theory and policy at the Graduate School of
Administration at the University of California at Riverside; at California State
College, San Bernardino; and in the Graduate Program at Chapman College. In
1979 I was hired into the Graduate Program in Urban and Regional Planning at

1 the University of Iowa, where I taught courses in environmental policy and
2 planning, public utility policy and planning, planning economics, local energy
3 planning, and state and local development finance. I have published a substantial
4 number of articles in scholarly journals and a number of chapters in books.
5 Further details of my qualifications are set forth in my vita, attached to this
6 testimony as Exhibit 1.

7
8 **Q. PLEASE DESCRIBE YOUR BACKGROUND ON ISSUES RELATED TO**
9 **MINING, ENVIRONMENTAL PLANNING, AND ENVIRONMENTAL**
10 **AND LAND USE REGULATION.**

11
12 **A.** Much of my practice over the last twenty years has been involved with
13 environmental planning and regulation, including geothermal development in
14 California, surface mining in Oregon, high and low level radioactive waste
15 issues in the west and midwest. I have worked extensively, as a consultant, on
16 water quality issues, including reclamation of waste water in the Los Angeles
17 basin, preparing reports on NPDES permits in the meatpacking and related
18 contexts, and analyzing radium 226 problems in the midwest. I have published
19 on the economics of water supply, and been involved in several studies and cases
20 involving water supply economics. I have published a number of articles on
21 public policy related to toxics. My dissertation was largely focused on the issues
22 of infrastructure and mining development in the United States and Mexico.

1 Q. **HAVE YOU PREVIOUSLY TESTIFIED ON ISSUES RELATED TO**
2 **FINANCE OR PROJECT PLANNING?**

3 A. Yes. I have testified before the Indiana Utility Regulatory Commission in a
4 number of cases dealing with such issues as: incentives, utility planning,
5 valuation, and rate of return. I have testified before the Oregon Public Utility
6 Commission on utility planning, rate design and cost allocation; before the
7 Kentucky Public Service Commission on cost of service, rate design, credit and
8 service, and conservation related issues. Before the Iowa Utility Regulatory
9 Board, I have presented testimony on rate of return, rate design, excess capacity,
10 issues involving municipalization, utility franchises, and utility planning in a
11 series of electric, natural gas, and telephone cases. Before the Massachusetts
12 Department of Public Utilities I have testified on utility planning and rate design
13 issues in the area of demand-side management and least cost planning. I testified
14 before the South Dakota Public Utilities Commission on rate design and utility
15 planning. I testified before the New York Public Service Commission on
16 avoided costs in the allocation of preference power. I have testified before the
17 Wisconsin Public Utilities Commission on rate of return. I have testified before
18 the Alaska Public Utilities Commission on investment planning in
19 telecommunications, cross-subsidization, rate design, and the problems of the
20 communications handicapped. I have testified before the Texas Public Utility
21 Commission on economic development rates. I have testified before the Hawaii

1 Public Utility Commission on rate design and low-income conservation
2 programs. In addition, I have testified before the Illinois Commission on utility
3 planning issues in the nuclear context, and I have appeared before committees of
4 the Nebraska, Missouri, Iowa, and Washington legislatures on various aspects of
5 utility regulation and energy management, and valuation of service territories.

6
7 **Q. HAVE YOU EXAMINED ENVIRONMENTAL OR PLANNING ISSUES IN**
8 **ANY OTHER FORUM?**

9
10 A. Yes, I worked on contract to Economic Research Associates to provide several
11 chapters of a detailed study of energy planning in Missouri, including the impact
12 of the Clean Air Act Amendments. Together with Skip Laitner I prepared a
13 report on low income weatherization as a stimulus to economic development in
14 Washington.

15
16 From about 1982, I have been involved in several studies involving problems of
17 utility franchises. I was a member of the Iowa City Franchise Review
18 Committee in 1983-4, and I am co-author of an article in the *Urban Lawyer* on
19 utility franchise fees.

20 I have also provided services on contract to the Vermont Commission staff on
21 utility planning issues, the Nebraska Energy Office, and the Iowa Energy Policy
22 Council in the areas of local energy planning and the relationship of energy

1 pricing to local economic development.

2
3 I have served on the Rate Advisory Committee and the Resource Acquisition
4 Council of the Columbia River PUD, the Research Advisory Committee of the
5 National Regulatory Research Institute (NRRI) and the National Consumer
6 Advisory Panel to AT&T.

7
8 I have been economic consultant on issues related to municipal solid waste
9 disposal to METRO, the region government for the three counties surrounding
10 Portland, Oregon, and I am a member of the Solid Waste Advisory Committee
11 for Columbia County, Oregon. I have worked on costing and valuation issues
12 for various cities and organizations. And I have consulted on issues related to
13 radioactive materials in the low level waste context, and in other proceedings. I
14 assisted David Osterberg in his preparation to testify in the matter of Louisiana
15 Energy Services L.P.(Claiborne Enrichment Center), NRC Docket No. 70-3-70-
16 ML (1997).

17 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?**

18 **A.** Yes. I submitted testimony in this proceeding on the issue of financial assurance
19 for decommissioning.

20
21 **B. Purpose of Testimony and Materials Reviewed**

22 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

1 A. I have been retained by ENDAUM and SRIC as an expert in the field of energy,
2 economics, and environmental risk. The purpose of my testimony is to evaluate
3 the adequacy of the benefit-cost analysis presented by the Staff in section 5 of the
4 FEIS.

5
6 **Q. WHAT MATERIALS HAVE YOU REVIEWED IN THE COURSE OF**
7 **YOUR EVALUATION?**

8 A. I have reviewed the following documents and classes of documents among others
in support of this testimony:

10 Draft Environmental Impact Statement to Construct and Operate the Crownpoint
11 Uranium Solution Mining Project Crownpoint, New Mexico (October, 1994)
12 ("DEIS") (Hearing Record ACN 9411160064)

13
14 NUREG-1508, Final Environmental Impact Statement to Construct and Operate
15 the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico
16 (February 29, 1997) ("FEIS") (Hearing Record ACN 9703200270)

17
18 HRI's Response to Requests for Additional Information No.s 1-10, 16-21
(February 20, 1996) (Hearing Record ACN 9602220389)

21 Portions of HRI's Response to Request for Additional Information No. 92 (April
22 5, 1996) (Hearing Record ACN 9604260063)

23
24 Consolidated Operations Plan Rev. 2.0 (August 15, 1997) (Hearing Record ACN
25 9708210179)

26
27 NUREG-1508 Source Material License SUA-1508 (January 5, 1998) (Hearing
28 Record ACN 9801160066)

29
30 10 C.F.R. Part 51 and materials on New Mexico state and local taxation

31 Certain pleadings and other testimony filed in this proceeding

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C. Summary of Conclusions

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Q. PLEASE SUMMARIZE YOUR CONCLUSIONS.

A. The Staff's cost-benefit analysis exaggerates benefits, includes almost none of the relevant costs of the project, quantifies no costs at all, and makes no analysis comparing alternative ways to mitigate the environmental relevant costs. Generally, the FEIS cost-benefit makes no ultimate comparison of alternatives. Based on my review of the available data, I conclude that the benefits to be had from the project in the foreseeable future are either zero or close to zero, and the costs of the project on groundwater, surface areas, cultural resources and air quality are liable to be substantial.

II. FEIS SECTION 5'S ANALYSIS OF BENEFITS

A. Overview

Q. HOW IS SECTION 5 OF THE FEIS ORGANIZED?

A. The FEIS Section 5 is organized in three parts. The first part, the first three paragraphs of page 5-1, divides benefits into three categories: Benefits to the public from production of uranium to be used eventually in nuclear reactors, benefits from offsetting a "deficit" in domestic uranium production, and benefits to Hydro Resources Inc. ("HRI"). Section 5.1 deals with "Other Benefits." Section 5.2 deals in just a little over a page with "costs of the proposed project."

Q. HOW DO YOU EVALUATE THE STAFF'S STATEMENT OF PUBLIC

1 **PURPOSE AND NEED IN THE FIRST PARAGRAPH OF PAGE 5-1?**

2 A. The Staff sets forth two benefits in this section.

3 **Power Plant Fuel** Since the uranium from HRI's New Mexico operation may
4 be used as power plant fuel, therefore--the Staff argues--the project has a public
5 benefit. This argument is seriously flawed economically. Economically, there is no
6 public benefit to the production of uranium unless both the production itself is
7 competitive and the technology it is a part of is competitive with other competing
8 technologies. As David Osterberg demonstrates in detail in his testimony, there are
9 many other cheaper sources of uranium with considerably greater benefit to national
10 defense and public health and safety. And there is a good deal of evidence that nuclear
11 power in this country is itself not competitive with the production of electricity via
12 other technologies. The decline of the nuclear power industry is also discussed in detail
13 in David Osterberg's testimony.

14 **Uranium Supply**

15 The Staff also argues that:

16 "Existing statutes oblige the U.S. Secretary of Energy to
17 have a 'continuing responsibility' for the uranium mining
18 industry 'to encourage use of domestic uranium' (42 USC
19 §§ 2201b and 2296b-3). The NRC recognizes that the
20 viability of the industry is a federal concern and that there is
21 a public interest in the uranium supply."
22

23 First of all, viability of the industry may be of concern to DOE, but federal

1 support of a private industry does not necessarily provide a public benefit. The
2 FEIS does not explain what the benefit would be in supporting the viability of
3 the industry.¹ In fact, propping up a domestic industry may involve costs to
4 society, such as environmental degradation in the United States that could be
5 absorbed by foreign producers.

6
7 Second, if supporting "public interest in uranium supply" were a cognizable
8 public benefit in this proceeding, this has no direct connection to encouraging
9 new supply when the market is not capable of absorbing currently developed
10 domestic supply at current prices. This is evident from the substantial domestic
11 uranium mining capacity which is currently shut in. The Staff never explains
12 how adding substantially more high-cost supply at a time when margins are low
13 or negative assists the domestic production industry. Licensing this mine will
14 not offset a deficit in domestic production.

15
16 **Q. WHAT ABOUT THE SECOND PARAGRAPH OF P.5-1 DEALING WITH**

¹ The problem with this is that when the old AEC was abolished by the Energy Reorganization Act of 1974, part of the purpose of the Act was to separate the regulatory and promotional functions of the AEC into separate entities. The NRC being limited to regulation, while DOE took on what was left of the role of promoter. The purpose of doing this was to resolve the inherent conflict of interest in a regulator also being a promoter. DOE has not intervened in this case, and the fact that one of the many things DOE is supposed to do is "encourage use of domestic uranium" is certainly not the goal of the NRC as regulator in this proceeding.

1 **BENEFITS FROM "HRI'S PERSPECTIVE"?**

2 A. The Staff describes HRI's benefits as being any revenues that would be
3 generated from the sale of uranium from the mining operation. Costs would be
4 capital and operating costs, regulatory costs and the cost of "environmental
5 protection and restoration." FEIS 5-1. The Staff then goes on to say:

6 "The benefits and costs that are internal to HRI are not
7 subject to government regulation and, therefore, are not
8 assessed in this FEIS." FEIS 5-1

9 The implication of this is that as long as the applicant meets the financial
10 assurance requirements of 10 CFR 40.36², environmental risks are outside the
11 scope of the 10 CFR Part 51 (NEPA) analysis. This is clearly incorrect. 10
12 CFR 51.71(d) requires that the environmental impact statement,

13 "consider and weigh the environmental effects of the
14 proposed action; environmental impacts of alternatives to the
15 proposed action; and alternatives available for reducing or
16 avoiding adverse environmental effects."

17 Clearly the environmental impact statement has to include an evaluation of all
18 the significant environmental impacts regardless of the hypothetical ability of the
19 applicant to "internalize" environmental losses and costs to the community. This
20 is especially important in this case, since, as I have shown in my testimony on

² There being no other standard in the NRC rules requiring a showing that the applicant will be able to internalize environmental costs, guaranteeing that all damages will be fully corrected and all losers will be made whole.

1 financial assurance for decommissioning, this firm is on shaky ground financially
2 going into the project, and has minimal financial capability to deal with any
3 serious environmental problem. The Staff's analysis in sections 5.1 and 5.2
4 inexplicably almost completely ignores environmental costs, losses, and risks,
5 which should be of particular interest under these circumstances. The Licensing
6 Board has observed, "a licensee in financially straightened circumstances would
7 be under more pressure to commit safety violations or take safety 'shortcuts'
8 than one in good financial shape." *Gulf States Utilities Co.* (River Bend Station,
9 Unit 1), LBP-95-10, 41 NRC 460, 473 (1995).

10
11 **Q. SO, IN SUM, WHAT ARE THE COSTS AND BENEFITS THE STAFF**
12 **ANALYZES IN SECTION 5?**

13
14 **A.** In the third of the first three paragraphs on page 5-1 the Staff limits its cost-
15 benefit analysis section to:

16
17 "[t]he benefits and costs of the project for members of local
18 communities, local governments, and the State of New
19 Mexico. These effects would include those that are brought
20 about by HRI's proposed operation, including the expansion
21 of tax bases related to the mining and processing operation,
22 and any additional demands on the infrastructure and public
23 services that would be imposed by the project. They also
24 include the beneficial effects of project employment." FEIS
page 5-1.

25
26 Note that the Staff's plan in the language just quoted makes no mention of
27 environmental costs or risks, while putting great emphasis on economic benefits.

1 This inappropriate approach is carried through in the balance of the Staff's
2 benefit-cost analysis.

3
4 **B. The Staff's Factual Assumptions**

5 **Q. PLEASE REVIEW THE FACTUAL ASSUMPTIONS UNDERLYING THE**
6 **STAFF'S COST-BENEFIT ANALYSIS IN SECTION 5?**

7 A. The Staff focuses its cost-benefit analysis on the economic benefits to local
8 residents and local and state governments in the form of payroll, royalties and
9 taxes. The entire analysis rests, however, on demonstrably mistaken
10 assumptions about prices, costs, and production levels, with environmental costs
11 and risks largely ignored or minimized.

12 **Q. WHAT DOES THE STAFF ASSUME ABOUT PRODUCTION LEVELS?**

13 A. Virtually all the benefits the Staff includes in its analysis depend upon a high
14 level of production. To reach this high level, the Staff assumes that production
15 will be at the maximum level of one million pounds per year for both Unit 1 and
16 Crownpoint. Peculiarly, given the Staff endorsement of the applicant's plan to
17 begin production at Church Rock, Church Rock production figures are not
18 included at all. FEIS, bottom of Page 5-3, top of page 5-4, notes a and b to
19 Table 5.4. See License Condition 10.28. And See HRI Response to RAI No. 2
20 (maximum output is 1 million pounds per year at each of the three sites) Exhibit
21
22 2.

1
2 **Q. WHAT DOES THE STAFF ASSUME ABOUT PRICE AND HOW DOES**
3 **IT AFFECT EXPECTED PRODUCTION LEVELS?**

4 A. The Staff assumes a uranium price of \$15.70 per pound based on the spot market
5 price on a single day, October 21, 1996. The Staff uses this figure even though
6 it is substantially above any figure presented in its "Latest DOE/EIA spot market
7 projection" this side of 2010. Table 5.2. The results of Staff's cost-benefit
8 analysis would have been substantially less favorable to the applicant had it used
9 any of the DOE/EIA figures. Moreover, the Staff analysis collapses altogether
10 if we use current price data along with the applicant's own forecast of price
11 levels for the next several years.

12
13 **Q. WHAT ARE CURRENT MARKET EXPECTATIONS WITH RESPECT**
14 **TO PRICE?**

15 A. Current market prices are well below the HRI cost of production at any of its
16 licensed New Mexico production areas. Spot market prices are currently
17 (February 8) at \$10.50 per pound in the restricted market and \$8.75 in the
18 unrestricted market. Costs of production at the three New Mexico sites are
19 presented in Table 5.1 of the FEIS. Current spot market prices are below
20 production costs at Church Rock and Unit 1 and for all production alternatives.
21 The highest production costs, it should be pointed out, are found at the Church
22 Rock site where HRI and the Staff intend production to begin first. These costs

1 range from \$11.30 to \$11.83 per pound, depending on the scenario, substantially
2 above current spot market prices.³

3
4 Moreover, the Staff reports, "With additions for taxes and royalties, HRI's costs
5 could be 5 to 15 percent higher than projected in Table 5.1." FEIS p.5-3.

6 Given the staff's cost concession, a recalculation of the Table 5.1 "haul loaded

³ Uranium Resources Inc. estimated that production cost per pound would be under \$10 at its Alta Mesa property in Texas. URI 10-K Filing with SEC, at page 36, attached as Exhibit B to David Osterberg's testimony in support of ENDAUM and SRIC's presentation on HRI's lack of technical and financial qualifications. Despite this low production cost compared to the New Mexico sites, Uranium Resources Inc. relinquished its rights to the Alta Mesa property, citing:

"careful consideration of the project's remaining permitting uncertainties, the high capital cost required to place the property into production and the property's high cash cost when compared to the Company's existing licensed production alternatives. The Company concluded that the uranium market would not have sufficiently rebounded in 1999 to allow for the timely commencement of production [before 2000]."

Uranium Resources, Inc. Announces Abandonment of Uranium Property, Business Wire, January 20, 1999, attached as Exhibit 3.

If the Company gave up a property with lower production costs than at Church Rock (costs there are between \$11.32 and \$11.80), it appears extremely unlikely the Company can undertake production at Church Rock.

1 resin to other site" option cost figures is as follows:
2

3
4
5
6

TABLE 5.1 COST FIGURES RECALCULATED TO REFLECT THE STAFF'S 5 TO 15 PERCENT TAX AND ROYALTY ADJUSTMENT			
Site	Table 5.1 Cost	Plus 5%	Plus 15%
Church Rock	\$11.36	\$11.92	\$13.06
Unit 1	11.32	11.88	13.01
Crownpoint	9.46	9.93	10.87

7
8
9
10

11
12 In light of this analysis the Staff "suggests" "that the Church Rock operation
13 could become marginal if the price for U₃O₈ falls back to the projected prices
14 shown in Table 5.2." FEIS p.5-3. The Table 5.2 figure for 1999 is \$13.00. Yet
15 we know that spot prices for the end of 1998 and the beginning of 1999 are in
16 the \$8 to \$10 range and substantially below the \$13 range that the Staff suggests
17 would make Church Rock "marginal." Clearly, at \$10.50 Church Rock is
18 nowhere near economic viability; nor is Unit 1, and Crownpoint itself is only
19 "marginal." Since the license specifies that Church Rock has to be developed
20 first, the overall project is not viable under these conditions.

21
22 **Q. ARE CONDITIONS IN THE URANIUM MARKETS LIKELY TO**
23 **IMPROVE IN THE NEAR TERM?**

24
25 A. Uranium spot prices have been below \$11.00 for most of the period from 1989
26 to the present. Exceptional periods have been mid-1990, 1995-6, and late 1997

1 to early 1998 where prices rose quickly only to fall rapidly again to below
2 \$11.00. From 1997 to the present prices have been trending downward, with
3 the current price, as noted, in the \$8 to \$10 range.

4
5 **Q. DID THE COMPANY AND THE STAFF OVERESTIMATE MARKET**
6 **PRICES FOR URANIUM AT THE TIME THE FEIS WAS PREPARED?**

7 A. The Staff estimate of spot market prices into the future as presented in Table 5-2
8 of the FEIS was, and has proven to be, overly optimistic, suggesting that prices
9 for 1998-1999 would be in the \$12.62 to \$13.00 range, \$2 to \$3 over the current
10 spot price. Furthermore, the Company concedes that low prices will probably
11 continue for a significant period into the future.

12 "The market price of uranium has fallen to levels that are
13 currently below the Company's cost of uranium production.
14 The outlook for uranium prices through the end of 1999
15 indicates that a price rebound during this period is not
16 likely." URI, 10-Q SEC filing, Third Quarter 1998, p.9
17 attached as Exhibit BB to David Osterberg's January 7,
18 1999, testimony in support of ENDAUM and SRIC's
19 presentation on HRI's lack of financial and technical
20 qualifications.

21
22 There are structural factors beyond the natural variation in uranium markets at
23 work here. For example, the announcement of the 75 million pound treasure
24 trove of uranium held by the USEC has had a substantial and continuing
25 depressive effect on the market. Combine this with substantial supplies from
26 Russia of various forms of uranium, and other demand side factors, which are

1 discussed in detail by David Osterberg in his testimony, and we see that the
2 Staff's estimates are liable to be overstated for the foreseeable future.⁴ All these
3 factors are to the disadvantage of HRI, and work to impair its ability to
4 commence operations, produce at a profit, to pay royalties, wages or taxes or to
5 respond to environmental emergencies.

6
7 **Q. THE NRC STAFF USES AN ASSUMED VALUE OF 2 MILLION POUNDS**
8 **OF URANIUM PRODUCTION PER YEAR. IS THIS A REASONABLE**
9 **ASSUMPTION?**

10 A. Whether 2 million pounds per year is a reasonable production value depends on
11 production economics. We know that the license, though it licenses production
12 at all three sites, requires that production cannot go forward at Unit 1 or
13 Crownpoint until the applicant demonstrates that groundwater restoration is
14 feasible through a full scale production demonstration at Church Rock. License
15 Condition 10.28. HRI's plan (as manifested in its response to Staff RAI Q.92) is
16 to produce uranium from its Church Rock property about 10 months after
17 beginning field development, with production continuing through month 83, for
18 a total of 73 months or just over six years.

19
20 There are two major problems with this scenario. HRI's estimate of the cost to

⁴ The Company has a substantial discussion of these issues in its Third Quarter 1998 10-Q, p.10, Exhibit BB to David Osterberg's testimony in support of ENDAUM and SRIC's brief on HRI's lack of financial and technical qualifications.

1 bring the Church Rock property into production is well over \$13 million before
2 a single pound of uranium is produced. RAI Q.92 Response: Church Rock 1-2.
3 The Company is currently facing a financial crisis; it is difficult to imagine that
4 this magnitude of funding is going to be forthcoming in the first nine months of
5 operation at Church Rock. In fact, URI has announced its intention to reevaluate
6 its plan to proceed with production at its New Mexico properties:

7 "The Company continues to evaluate its core uranium assets in * * *
8 New Mexico * * * . Possible alternatives for these uranium assets may
9 include the sale or joint venturing of certain of these properties or the
10 termination of the Company's rights for those properties whose holding
11 costs are determined to be in excess of their expected value." Third
12 Quarter 1998 10-Q, p.11.

13 The owners of the Company are now attempting to sell off the Company or its
14 assets:

15 "The Company has entered into discussions with a number of domestic
16 and international uranium production companies regarding the divestiture
17 of all or a portion of the Company or its assets." Third Quarter 1998 10-
18 Q, p.11.

19 The Company's efforts in this direction have resulted in,

20 "certain of these uranium production companies expressing an interest in
21 certain of the Company's projects and assets." Third Quarter 1998 10-Q,
22 p.11.

23 In a recent press release reported by Reuters, the Company gave notice that it
24 intends to sharply *reduce* its expenditures on its New Mexico properties in order
25 to "maintain a positive liquidity position."

1 "The South Texas uranium producer added that it would cut costs in 1999
2 by reducing corporate overhead by 33 percent, **reducing expenses in**
3 **New Mexico by 60 to 70 percent** and reducing capital expenses in South
4 Texas by about 90 percent." URI Press Release, November 16, 1998.
5 (Emphasis added).

6 HRI's ongoing, non-production New Mexico expenses are not insubstantial. As
7 reported by the applicant in the URI 1997 10-K,

8 "Capital expenditures at the Company's Church Rock,
9 Crownpoint and Vasquez [Texas] projects for permitting and
10 land holding costs totaled approximately \$1,300,000 and
11 \$2,900,000 in 1996 and 1997, respectively and are expected
to be \$1,200,000 in 1998." p.36.

13 Thus it seems unlikely that the Company would be able to fund the capital
14 expenditures necessary to get production at Church Rock underway, and it may
15 have difficulty continuing to cover its apparently substantial landholding and
16 regulatory costs on an ongoing basis.

17 This all relates to expenditures necessary to bring the field to the point of
19 production. It is then necessary to review the time necessary to bring the field
20 into profitable production. The Company's own figures on production cost show
21 that cumulative costs divided by cumulative production only gets below \$12 per
22 pound in the 33rd month, below \$11.50 in the 64th month, and only breaks
23 \$11.00 in the 75th month, with only 8 months of productive life left. HRI
24 Response to RAI Q.92.

1 Compare this with spot market prices as of January 7th at \$8.75 per pound in the
2 restricted market and \$8.10 in the unrestricted market, and at January 25th at
3 \$10.50 and \$8.75, respectively. HRI's forecast of the average cost of
4 production per pound at Church Rock is \$11.92 to \$13.06⁵, well above spot
5 prices. The Company appears to agree:

6 "The prospect of potentially depressed uranium prices for
7 continued periods could adversely impact the Company's
8 ability to secure additional long-term sales contracts at
9 prices that exceed the Company's overall costs." Third
10 Quarter 1998 10-Q, p.10.

11 The Company concedes that it is faced with a financial crisis, has determined to
12 shut down its producing fields in Texas. It also plans to satisfy its "remaining
13 1998 and 1999 sales contracts" through deliveries from existing inventory and
14 "taking advantage of low uranium prices" by "arbitraging its contractual position
15 in the market." Third Quarter 1998 10-Q, p.10.

17 I conclude from this that there is a substantial risk that there will be no
18 production from Church Rock, for the foreseeable future, and that even if there
19 is, there is a high probability that operation will be episodic, given the high cost
20 of production. Production at Unit 1 and Crownpoint, though marginally more
21 economical in terms of cost per pound, is still unfavorable with prices in the

⁵ FEIS Section 5 estimate of taxes and royalties included.

1 \$8.75 to \$10.50 range.⁶
2
3

4 In sum, given the current economics of uranium prices, I conclude that the most
5 likely scenario is no production or at best episodic production at these sites over
6 the reasonably foreseeable future. Though the spot market is notoriously volatile
7 on a short term basis, long term domestic demand for uranium as power plant
8 fuel should decline significantly as substantial numbers of older nuclear plants
are retired in the next few years.

10 Under these circumstances, for the Staff to base virtually their entire cost-
11 benefit analysis on the spot market price for a single day, especially given that
12 that single day is three dollars higher than the DOE/EIA estimate they also
13 publish (Table 5.2), is clearly unsound.

14 **Q. WHAT DO YOU CONCLUDE FROM THIS WITH RESPECT TO
STAFF'S ESTIMATE OF BENEFITS BASED ON PRODUCTION?**

17 A. The license specifies that the Company may only begin production at Church
18 Rock. License SUA-1508 Condition 10.28. Church Rock is the property with
19 the highest cost of production. FEIS Table 5.1. Under current market

⁶ It is important to note here that HRI uses 4 pore volumes as its groundwater restoration standard to arrive at its cost per pound figures in its response to RAI Q.92, when even the Staff uses 9, and the Mobil Pilot well took 16.7 pore volumes and still didn't reach complete restoration. This almost certainly means that the costs provided by the Company in its Response to RAI Q.92 are significantly understated.

1 conditions there is a substantial likelihood that the Company will be financially
2 unable to make the investment necessary to bring the Church Rock property into
3 production. Perhaps more seriously, even if HRI were able to bring the Church
4 Rock field into production, the risk is high that it would be unable to generate
5 sufficient net revenues to restore the groundwater to its pre-production levels as
6 well as maintain the financial capability to operate safely, and contend
7 successfully with excursions and other environmentally significant accidents.

9 **C. Local Employment Benefits**

10
11 **Q. PLEASE REVIEW THE STAFF'S ESTIMATE OF EMPLOYMENT-**
12 **RELATED BENEFITS.**

13 **A.** The Staff believes that,

14 "up to 100 jobs could be filled by members of the local
15 community depending on how well HRI executes its stated
16 intention to hire local Navajo." FEIS 5-3.

17
18 The Staff's benefits calculation also **assumes** that the average pay for local
19 Navajo jobs will be \$24,000 per year. This can be seen in Table 4.27 (FEIS
20 p.4-97) where the "annual community employment earnings" column divided by
21 the "Annual community employment" column renders average wage rates of
22 exactly \$24,000 per annum. The Staff also adopts this \$24,000 figure explicitly
23 on FEIS p.5-3, and in Table 5.4.

1 Q. **IS THIS AVERAGE OF \$24,000 PER YEAR PER LOCAL JOB A**
2 **REALISTIC NUMBER?**

3 A. This number appears to be based on HRI's answer to HRI's Response to RAI
4 Q.8, a copy of which is attached hereto as Exhibit 4. In this answer HRI
5 provided a long list of job titles for jobs common to its Texas and proposed New
6 Mexico fields. The last page of the exhibit is interesting. Whereas for the
7 higher paying job titles, some are better paid in Texas and some better paid in
8 New Mexico, for every single job title that pays less than \$25,000 in Texas, the
9 rates presented for New Mexico have been increased substantially. Jobs which
10 currently pay \$16,500 in Texas, HRI asserts will be paid \$23,900 in New
11 Mexico. Jobs which pay \$20,000 in Texas will pay \$25,000 in New Mexico,
12 etc. I calculated the average asserted increase for these lower paying jobs to be
13 over one-third (34%). Exhibit 5, Table, FEIS Section 5 Cost Benefit Analysis:
14 Comparison of HRI's Asserted Pay Scales in Texas and New Mexico.

15
16 Q. **HOW DO YOU EXPLAIN THIS ONE-THIRD DIFFERENCE?**

17 A. A one-third difference in the wages in Texas in New Mexico is unreasonable for
18 two reasons. First, consider the following: The unemployment rate among
19 Navajos in Navajo Indian Country in New Mexico is 23.5% percent. See Dr.
20 Christine Benally's testimony, Exhibit C attached thereto, page 2. Recent
21 figures show median household earning level for Navajo area households was

1 under \$14,000, while the national all-races median household income was over
2 \$30,000. *Regional Differences in Indian Health*, USPHS Indian Health Service
3 page 29, Chart 2.9 (1997), Exhibit 6. It is logical to assume that HRI would
4 take advantage of its superior bargaining position in the Navajo labor market and
5 pay lower wages.

6 The FEIS also recognizes unemployment is high and income is low
7 among Navajos in McKinley County. FEIS at pages 357-359. It concludes that
8 demand is high and the HRI jobs "would be very attractive to members of the
9 local community . . . depending on how well HRI executes its stated intention to
10 hire local Navajo." FEIS, page 5-3. However, the FEIS never questions
11 whether HRI will indeed pay high wages to local Navajos, one third higher than
12 it is paying in Texas.

13 Second, HRI can reasonably be expected to transfer the company's trained
14 Texas workforce. HRI claims job applicants for these lower level jobs will be
15 trained on the job. HRI Response to RAI Q.8, Exhibit 4, third page. However,
16 Uranium Resources Inc. is laying off experienced workers in its Texas
17 operations and is sorry to have to do it.

18 "Certain of the Company's employees have significant experience in the
19 ISL mining industry. The number of individuals with ISL experience is
20 small. The continued success of the Company is dependent upon the
21 efforts of these key individuals, and the loss of any one or more of such
22 persons' services could have a material adverse effect on the Company's
23 business operations and prospects. The Company has not entered into

1 employment contracts with * * * any of these individuals." Third Quarter
2 1997 10-K, p.28.

3 And then,

4 "In connection with the shut-in of production, the Company will be
5 making cost reductions at all levels. These cost savings will include * * *
6 **personnel reductions in both its operating and its general and**
7 **administrative workforce** and reductions in compensation for the
8 Company's executive management." Third Quarter 1998 10-Q, p.11.
9 (emphasis added).

10 Such measures would not be taken unless the Company were driven to it,
11 especially in light of the requirement in 10 CFR 40.32(b) that in order to receive
12 a license to operate the applicant be,

13 "qualified by reason of training and experience to use the source material
14 for the purpose requested in such a manner as to protect health and
15 minimize danger to life or property." 10 CFR 40.32(b).

16 In light of this problem, it seems likely that given the choice HRI would have a
17 strong incentive to:

- 18 1) Employ fully-trained workers laid off from its Texas operations;
- 19 2) Given its cash short position would prefer to hire Texas workers
20 who are paid on the average of 34 percent less, especially since one
21 year of this wage differential at Church Rock alone would amount
22 to almost \$300,000. Table, Exhibit 5 (\$1,151,000 - 859,000 =
23 \$291,600); and,
- 24 3) Conserve its fully trained Texas workforce.

25
26
27 Based on these factors and the lack of any explanation for the substantially
28 higher wage rates upon which the Staff bases its employment benefits

1 calculation, I conclude that the Staff's employment benefits claim of \$2.4 million
2 is substantially overstated and lacks a reasonable foundation.

3
4 **Q. PLEASE SUM UP YOUR CONCLUSIONS ON THE EMPLOYMENT**
5 **BENEFITS CLAIMED BY THE STAFF IN PART 5 OF THE FEIS.**

6 A. The Staff claims that approximately 100 long terms jobs for Navajo residents of
7 McKinley County will be created by this project with income from these jobs of
8 \$2.4 million. Table 5.3 FEIS p.5-4. This figure is unreasonable for the
following reasons:

10 1. Uranium market conditions and high costs make it unlikely that HRI will
11 be able to develop its New Mexico properties profitably. The Staff's
12 analysis relies on a wildly unrealistic one day spot market price to support
13 its analysis.

14
15 HRI itself is so poorly capitalized that it cannot afford to conduct
16 production activities without an immediate positive revenue stream. It is
17 significant that the license requires that the highest cost--and therefore the
18 most uneconomic--location be developed first. Further, HRI's cost
estimate--based on 4 pore volume groundwater reclamation plan--
understates costs.

21
22 Under such conditions full scale production would be uneconomic, and
23 even if episodic production were currently feasible it would not produce
24 anywhere near the benefit stream claimed by the Staff.

25
26 2. The Staff claims that the project will produce 100 long-term jobs for the
27 local Navajo community. This figure does not take into consideration the
28 fact that HRI is laying off trained workers in its Texas fields, and does
29 not explain why HRI would prefer to hire and train new local workers in
30 preference to its laid off employees from Texas; and,

31
32 3. The level of employment benefits is based both on the 100 long term job
33 figure and the \$24,000 average per year wage. HRI's response to RAI-8

1 shows that the \$24,000 per year figure is more than one third (34 percent)
2 higher than the rates being paid for trained labor in the company's Texas
3 fields. There is no apparent reason--and no explanation--as to why the
4 company would feel constrained to pay sharply higher wages to local
5 Navajo workers when the local Navajo unemployment rate is in excess of
6 20 percent and median household income for Navajos is under \$14,000.
7
8

9 **D. Royalty Income**
10

11
12 **Q. THE STAFF CLAIMS THAT LOCAL NAVAJO COMMUNITIES WOULD**
13 **RECEIVE \$1,099,000 PER ANNUM IN ROYALTY INCOME. IS THIS**
14 **CORRECT?**
15

16 A. The Staff claim appears in Table 5.4 (FEIS p.5-5) with a note saying that it is
17 based on 1 million pounds of production at Unit 1 at a price of \$15.70 per
18 pound.⁷ However, a review of Table 4.28 (FEIS p.4-98) shows that the same
19 \$1,099,000 figure, based on 1 million pounds of Unit 1 production, depends
upon a market price of uranium of \$20 per pound.

21
22
23 HRI has supplied only one lease document for the project. HRI Response to
24 RAI Q.21, attached as Exhibit 6. This lease shows a \$5 per annum per acre
25 rental fee, a \$20 per year per acre minimum royalty payment, and a sliding scale
26 production royalty system beginning at 6.25 percent of gross sale price when

⁷ It is important to note that Unit 1 is the only mine site where Navajo allottees have signed leases for royalty payments.

1 uranium prices are under \$15 per pound, rising to 7 percent for prices between
2 \$15 and \$17 and going up from there. Production royalties are offset against the
3 \$20 per acre royalty. There are 1,280 acres in Unit 1. (FEIS p.2-26).

4
5 There are two problems with the Staff's \$1,099,000 royalty figure. The first is
6 that, as we have seen, the \$15.70 per pound figure is unreasonably high under
7 current and foreseeable conditions. For uranium prices under \$15 the
8 production royalty is 6.25 percent. This would provide a royalty figure of
9 \$656,250 per annum at today's (February 8, 1999) spot market price of \$10.50
10 per pound, assuming it were economical to produce 1 million pounds from Unit
11 1 at that price. This is only about 60 percent of the Staff's \$1,099,000 figure.

12
13 The second problem has once again to do with uranium markets and the
14 feasibility of production. In order to get to Unit 1, HRI must first produce at
15 Church Rock. At current prices and cost levels--as discussed above--production
16 at either site would entail substantial operating losses. Because of this,
17 production at Unit 1 is unlikely in the foreseeable future. If no production
18 occurs, the royalty payment is \$20 per acre plus a rental of \$5 per acre. This
19 would reduce the annual royalty payments to Unit 1 allotment holders to an
20 aggregate of \$32,000 per year ($[\$20 + \$5] \times 1,280 \text{ acres} = \$32,000$).

21 Even at \$1,099,000, the Staff comments that:

1 "However, this income would be concentrated (about nine
2 lease holders [sic]), and would probably not have a
3 widespread effect." FEIS p.5-4.

4 Thus, the monetary gain of a few from the project is not a public benefit.

5 **Moreover**, the more likely figure is only \$32,000 per annum, or just under 3
6 percent of the Staff's \$1.1 million figure, the benefit is negligible.

7
8 **Q. WHAT ABOUT THE STAFF'S METHODOLOGY ON THE ROYALTY**
9 **ISSUE?**

10
11 A. As I have said in several places above, I believe it is unacceptably poor
12 economic methodology not to reflect the risks in the data involved in determining
13 benefits and costs. There was no good rationale for choosing a single day's
14 figure like the \$15.70 spot price and then betting the entire analysis on that
15 continuing to be a valid figure over the relevant period. Any kind of sensitivity
16 analysis would have shown that the results of the Staff's analysis were highly
17 vulnerable to reasonably likely variations in the market price of uranium. Good
18 practice should have informed that Staff that scenarios at different market prices
19 should have been presented, and could have been presented, with not much more
20 effort and space.

21 **E. Tax Revenues**

22
23 **Q. PLEASE REVIEW THE STAFF'S POSITION ON THE COMMUNITY**
24 **BENEFITS TO BE DERIVED FROM TAX REVENUES.**

1 A. Table 5.4 of the FEIS lists several categories of local taxes and the Staff's
2 estimate of the local revenue to be derived from each:

3

4

5

LOCAL PROJECT-DERIVED TAX REVENUES		
Taxing Entity	Tax	Amount
Navajo Nation	Business Activities Tax	\$942,000
	Construction Tax	15,000
Local Navajo Communities	None	None
McKinley County	Real Property Tax	\$484,000
	Personal Property Tax	55,000

6

7

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14

15 **Q. LET'S BEGIN WITH THE \$942,000 FROM THE NAVAJO BUSINESS**
16 **ACTIVITIES TAX. IS THE STAFF'S NUMBER CORRECT?**

17 A. The \$942,000 suffers from the same two basic problems we've seen elsewhere
18 plus a third defect. It assumes in the first place that 2 million pounds per annum
19 are being produced, and in the second place that the sale price is the \$15.70 per
20 pound. As noted above, the current spot price is about \$10.50 per pound with
21 the long term trend downward, as developed in detail in the testimony of David
22 Osterberg. At \$10.50 per pound not only is the Staff's number considerably
23 over-stated in the price term, but the production term would also be substantially
24 reduced, since production will be distinctly unprofitable at \$10.50.

25 In this case there is also a third problem with the Staff's number. This is that

1 the legal authority of the Navajo Nation to levy its Business Activity Tax
2 depends on whether the producing lands are "Indian Country" or not. Though
3 the Staff discusses this problem in a paragraph at FEIS pp.4-101 and 4-103, in
4 section 5, it lists the \$942,000 at its full value, notwithstanding the tax's
5 uncertain legal standing. For these three reasons I believe that the Staff's figure
6 of \$942,000 per annum is substantially overstated, and may in any event be zero
7 (if the Navajo Nation eventually loses on the jurisdictional issue of whether the
8 mine sites are within Navajo Indian Country, and thus, subject to its taxing
9 powers).

10
11 **Q. WHAT ABOUT THE MCKINLEY COUNTY TAXES ON REAL AND**
12 **PERSONAL PROPERTY?**

13 A. The property tax on mining property is \$30.45 per thousand of assessed value of
14 personal property plus 3 percent of one half the market value of the mined
15 commodity. With all three New Mexico locations in production the annual
16 personal property tax payment to the county would be \$92,140.⁹ FEIS p.4-103.
17 This works out to be 1.7 percent of the taxable value of the personal property
18 (with taxable value one third of market value).¹⁰ Table 4.29 FEIS p.4-102. This

⁹ However, for reasons unknown, the Staff lists in Table 5.4 only their estimate of the personal property tax (\$55,000) pertaining to the Unit 1 and Crownpoint properties.

¹⁰ Though it is not apparent how this is consistent with the assertion by the Staff that the personal property tax rate is \$30.45 per thousand of assessed value. p.4-101

1 \$92,140 assumes an investment in mining related personal property of over \$16
2 million among the three sites.

3
4 In addition to the personal property tax, there is also a real property tax
5 measured against the value of uranium produced from the property. The Staff
6 lists this revenue as \$484,000 annually. This number assumes a production of 2
7 million pounds at a value of \$15.70 per pound. Table 5.4 note d. The source of
8 this figure appears to be Table 4.29 where the Staff cautions the reader:

9 "Table 4.29 acknowledges the uncertainty of annual tax
10 collection estimates by showing various production and price
11 combinations for yellowcake." FEIS p.4-101.

12 Indeed, Table 4.29 presents alternative scenarios with prices at \$13.00, \$15.70
13 and \$20 and production levels of 0.5 million, 1 million, 2 million and 3 million
14 pounds. Peculiarly, in section 5--the NEPA cost-benefit analysis where
15 reasonable alternatives are supposed to be evaluated -- the Staff simply chooses
16 only to consider the outcome associated with 2 million pounds of production and
17 \$15.70, the spot price for the single day October 21, 1996, and never discounts
18 this price for the probability of occurrence of other likely outcomes.

19
20 **Q. WHAT DO YOU CONCLUDE WITH RESPECT TO THE STAFF'S**
21 **ESTIMATES OF \$484,000 AND \$55,000 RESPECTIVELY FOR REAL**
22 **AND PERSONAL PROPERTY TAX?**

FEIS.

1 A. The assumption underlying the personal property tax figure is unreasonable in
2 that it is based on an investment of more than \$16 million in personal property at
3 all three locations. It is unreasonable to assume under current market conditions
4 and given the financial condition of the applicant that this \$16 million in personal
5 property is going to be forthcoming. As noted above, and as developed in detail
6 in my testimony on financial assurance, other outcomes are much more likely,
7 and would result in much more limited personal property tax revenues.

9 As to Staff's \$484,000 figure for real property tax revenue, this too suffers from
10 the familiar unreasonable assumptions of 2 million pounds of production and the
11 \$15.70 per pound sale price. In addition to these problems, however, this figure
12 also suffers from another problem. New Mexico statutes provide for property
13 taxation of "nonproductive mineral property." N.M.S.A. 1978 §7-36-23(E)
14 (1973). Since initiation of production substitutes production-based tax revenues
15 for the tax revenue from non-productive mining land, these two figures should
16 be netted out. Since the Staff makes no mention of the loss of the non-
17 production tax, this was apparently not done.

18
19 **Q. HOW WOULD YOU SUM UP YOUR CONCLUSIONS ON THE STAFF'S**
20 **PRESENTATION OF SECTION 5.1 "OTHER BENEFITS OF THE**
21 **PROPOSED PROJECT"?**

22 A. The Staff's presentation is riddled with unreasonable assumptions and other

1 flaws leading to excessive values for all the benefits listed, and it fails to list
2 benefits for any alternatives but the Staff's recommendation. This is not a
3 reasonable way to do a cost-benefit analysis and section 5.1 should be rejected
4 and redone.

5
6 **III. SECTION 5: ANALYSIS OF**
7 **ENVIRONMENTAL COSTS**
8
9

10 **Q. HOW DOES THE STAFF PRESENT THE COST SIDE OF THE COST**
11 **BENEFIT ANALYSIS IN SECTION 5?**

12 A. The Staff presents the cost side in four paragraphs and one table. It concludes
13 that the only environmental problem posed by the mining at any of the three sites
14 is the threat to the Crownpoint public water supply system from mining in that
15 aquifer. There is no mention or quantification of the costs associated with liquid
16 waste disposal or radioactive air emissions. Groundwater contamination at
17 Church Rock and Unit 1 is dismissed in three words ("no significant costs"), and
18 the risk to cultural resources is ignored. The cost of groundwater contamination
19 at Crownpoint is not quantified, since the Staff assumes that all costs will be
20 internalized by requiring HRI to replace the local wells. The Staff's approach
21 appears to be that of an advocate for the project. At every point benefits are
22 unreasonably magnified while costs are almost completely ignored.

1
2
3
4 **A. Groundwater**
5

6 **Q. YOUR CRITICISM OF THE STAFF SUGGESTS THAT THERE ARE**
7 **SUBSTANTIAL COSTS INVOLVED WITH GROUNDWATER**
8 **RESOURCES THAT THE STAFF HAS IGNORED, WHAT ARE THESE?**

9 A. HRI's project is proposed for an arid region and the limiting natural resource is
10 water. Water is key to the prosperity of the Navajo communities both now and
11 for the future. When mining operations pose a significant risk to groundwater,
12 including current and future drinking water supplies, those risks need to be
13 identified and reflected in the NEPA cost-benefit analysis. The cost can be
14 qualified by evaluating the degree of damage involved and the degree of risk,
15 and it can be quantified fairly easily as well. In fact, the Department of the
16 Interior's regulations establish procedures to quantify groundwater injury under
natural resource damages assessments. 43 CFR § 11.62(c).

18 The particular risks to groundwater from this project include the following:

19 **Risk of Excursion** -- In support of ENDAUM's and SRIC's groundwater
20 presentation, Mr. Wallace, Dr. Staub and Dr. Abitz each testify to the project's
21 substantial risk of horizontal and vertical excursions into surrounding
22 groundwater. See Exhibits 1, 2 and 3 to Intervenors' January 18, 1999,
23 groundwater brief. Horizontal excursions are likely because HRI cannot keep
24

1 the wellfield in balance, the bleed rate is not sufficient to control lixiviant,
2 excursion indicators and upper control limits are not set to promptly identify
3 excursions, and the sand channels in the Westwater can conduct excursions
4 quickly past a 400-foot monitor well ring. Wallace Testimony for Groundwater
5 brief at 10-14, 25-26, 30-42; Abitz Testimony for Groundwater Brief at 27-32,
6 38-48; Staub Testimony for Groundwater Brief at 35-41. Vertical excursions are
7 likely because there is a very thin layer between the Westwater aquifer and the
8 underlying Cow Springs aquifer at Church Rock, and the Recapture Shale,
9 which was represented as a confining layer between the Westwater and the Cow
10 Springs at all three sites, is composed of permeable material, and yet there is a
11 very limited monitoring well plan to detect excursions. Wallace Testimony at
12 14-22, 27-32, 62-65; Abitz Testimony at 34-35; Staub Testimony at 27-29, 34.
13 Faulting, scouring and the Section 17 underground mine workings are likely to
14 provide pathways for excursions into the overlying aquifers, the Dakota and the
15 Brushy Basin "B" sand. Wallace Testimony at 44-60; Staub Testimony at 16-
16 17, 34.

17 The risk of excursion endangers high quality potable aquifers, the
18 Westwater, the Dakota, and the Cow Springs. Abitz Testimony at 11-23. The
19 Westwater and the Dakota currently serve as sources of drinking water, and the
20 Navajo Tribal Utility Authority ("NTUA") has identified the Cow Springs

1 aquifer as a long term source of drinking water. Exhibit 5, Intervenors'
2 groundwater brief; Abitz Testimony Exhibit M. In addition, Dr. Staub testifies
3 that horizontal and vertical excursions are a common phenomenon in the ISL
4 industry. Staub Testimony at 12-15. Yet, the Staff's discussion in section 5
5 ignores the issue of excursions entirely.

6 The environmental costs of groundwater contamination from excursions
7 can be quantified fairly easily. For example, Mr. Wallace testifies in support of
8 ENDAUM and SRIC's cumulative impacts brief that given an excursion plume
9 100 feet wide and 200 feet thick, the excursion plume would travel two miles
10 before detection by two monitor wells spaced 400 feet apart. Mr. Wallace
11 calculates 1,100 acre feet of groundwater would be affected by the contamination
12 in that plume. Determining the area of groundwater exposed is part of the
13 assessment in a natural resource damage calculation, and damages can be
14 estimated from the anticipated costs of restoration, rehabilitation, replacement
15 and/or acquisition of equivalent resources for the injured natural resources. 43
16 C.F.R. §§ 11.25(c), 11.38(a), 11.62(c). The value of the environmental injury
17 to groundwater can be measured in a number of ways. One way would be to use
18 the value of similar water rights in the area.¹¹ Thus, there are data available

¹¹ Telephone conversation with Steve Cary, New Mexico Energy Mineral and Natural Resources, State Parks Division (formerly of Natural Resource Trustee's Office) and Johanna Matanich, February 9, 1999. The price range for water rights for

1 from which to estimate the cost of environmental damage to groundwater from
2 excursions, which can be then discounted for any relative degree of risk. The
3 Staff unreasonably omitted this information from its cost-benefit analysis.

4 **Groundwater Restoration** -- The Staff does not discuss the risks associated
5 with the groundwater restoration program. No ISL mine to date has restored
6 groundwater to baseline water quality equivalent to that in the Westwater or to
7 federal safe drinking water standards. Staub Testimony at 9-18, 19-24, 40-41;
8 Abitz Testimony at 25-26, 48. Mr. Wallace and Dr. Staub testify that the
9 Section 17 underground mine workings will render restoration at Church Rock
10 extremely difficult and the mine workings will need to be dewatered for
11 restoration. Wallace Testimony at 66-68; Staub Testimony at 32-34. Mr.
12 Wallace calculates that if Section 17 is dewatered, five billion gallons, or 15,000
13 acre feet, of groundwater, will be consumed. See Wallace groundwater brief
14 testimony at 73-74 and Wallace Testimony in support of ENDAUM and SRIC's
15 cumulative impacts brief. Thus, the cost of dewatering Section 17 to achieve
16 restoration and also, the cost of restoration failure, can be quantified. The Staff
17 has failed to provide even a qualitative discussion of restoration costs, even
18 though restoration of Section 17 will involve a massive loss of groundwater.

groundwater, which is potable but not serving as drinking water source, near
Albuquerque, New Mexico, is \$3,000 -\$4,000 per acre foot.

1 In conclusion, the ability of the applicant to restore the groundwater at
2 Church Rock and at the other two sites is substantially in doubt, especially given
3 the company's poor financial condition. The costs to the community of a failure
4 in this area are not discussed by the Staff in section 5, when this is just the kind
5 of environmental risk that the CBA is intended to incorporate. Moreover, the
6 Staff has not articulated the costs of groundwater restoration to a standard poorer
7 than baseline water quality. As it stands, License Condition 10.21 sets the
8 primary restoration goal as baseline, but if baseline is not met, the secondary
9 goal is federal drinking water standards. If secondary standards cannot be
10 restored, it is possible that restoration goals will be modified. There is an
11 environmental cost involved in increasing contaminant levels in groundwater, a
12 risk of the project, which the Staff fails to evaluate.

13 **Consumption** -- The Project will consume water during restoration. The Staff
14 estimates, for a nine pore volume restoration, that 7,733 acre feet will be
15 consumed for groundwater sweep at Crownpoint, and 14,549 acre feet of will be
16 consumed at Unit 1 and Church Rock together. FEIS at page 4-59. If reverse
17 osmosis is used for restoration, 1,934 acre feet will be consumed at Crownpoint,
18 and 3,638 will be consumed at Unit 1 and Church Rock. FEIS at 4-59. And, if
19 a brine concentrator is used for restoration, 17 acre feet will be consumed at
20 Crownpoint and 32 acre-feet at Unit 1 and Church Rock. FEIS at 4-59. The

1 cost-benefit analysis does not mention the loss of this water.

2
3 **Crownpoint** -- The Staff deals with the Crownpoint groundwater contamination
4 and drawdown issues by simply saying that it will require the applicant to
5 replace the Crownpoint public well system with wells elsewhere and then
6 compensate the community for the extra cost of operating these wells and
7 conveying these supplies over greater distances. FEIS at 5-6. There is no
8 discussion at all of 1) Whether an alternative source of equal or better water
9 quality is indeed available; 2) The opportunity cost of this alternate supply (if it
10 is available); 3) The ability of the company to compensate the community for
11 the additional costs of pumping, maintenance, and other O&M in perpetuity,
12 (especially given the financial condition of the applicant); and 4) The resource
13 value of the current aquifer that the Staff proposes be abandoned by the
14 community to degradation from its current high quality level.

15
16 The items described above are just examples of the significant issues relating to
17 groundwater either not covered at all or trivialized by the Staff in its benefit cost
18 analysis. A full analysis of groundwater related issues is contained in the
19 testimony of Abitz, Wallace and Staub in support of the Intervenors'
20 groundwater presentation.

B. Liquid Waste Disposal

Q. ISL MINING GENERATES A SUBSTANTIAL AMOUNT OF RADIOACTIVE LIQUID WASTE. HOW ARE THE ENVIRONMENTAL COSTS OF DISPOSING OF THIS WASTE REFLECTED IN THE SECTION 5 COST BENEFIT ANALYSIS?

A. Section 5 does not address the costs associated with disposal of this waste.

Q. DOES THE DISPOSAL OF THIS WASTE ENTAIL ENVIRONMENTAL COSTS THAT SHOULD HAVE BEEN REFLECTED IN THE STAFF'S COST-BENEFIT ANALYSIS?

A. Yes. The radioactive waste water at issue here is the water that is left over after the bulk of the uranium is removed from the pregnant lixiviant. The company proposes to build and use waste retention ponds:

"[T]o store wastewater until treatment, promote evaporative loss of water which cannot be discharged to the environment, maintain control of source and 11e(2) by product material." FEIS p.2-12.

However, the company also contemplates using other methods for disposing of these wastes:

"During groundwater restoration, the capacity of the evaporation ponds may be exceeded by the quantity of wastewater produced. In this situation, HRI could dispose of excess wastewater by deep well injection, land application, or surface discharge subject to prior NRC approval." FEIS p.2-18.

The environmental costs of these ponds, including the risk of surface or groundwater contamination, the risk of damage to cultural resources and loss of

1 habitat, are not even mentioned in the Staff's CBA analysis, even though the
2 possibility of leakage is noted by the Staff in other parts of the FEIS, e.g. p.4-7.

3
4 Other options also have substantial risks of environmental loss. Land application
5 increases salt build up which diminishes the value of grazing land and poses a
6 threat to livestock. FEIS p.4-10. Surface discharge has these same problems
7 and process waste water would exceed the allowable level of uranium transferred
8 to the environment. FEIS p.4-86 and 87. Any of these alternatives would create
9 risks and costs for the community in the pollution of valuable resources and
10 increased risk to health. The Staff not only makes no effort to characterize and
11 quantify these costs, but doesn't even mention them in its review of costs in
12 section 5.

13 C. Radioactive Air Emissions

14
15
16
17 **Q. WOULD THE PROJECT RELEASE SIGNIFICANT AMOUNTS OF RADIOACTIVITY TO THE AIR?**

18 **A.** Radioactive air emissions would be a problem in the Church Rock mining area.

19 Bernd Franke, in his report, found the following:

20 "[T]he FEIS failed to address the considerable uncertainty of
21 the annual average source term of radon-222 and
22 underestimated the potential impact of the HRI operations.
23 When the uncertainty of the source term is taken into
24 account, **it becomes clear that there is a significant**
25 **likelihood that at all three areas of the Crownpoint**
26 **project, radon-222 emissions generated by HRI's**

1 operation will, by themselves, exceed NRC regulatory
2 limits. Given this high likelihood, the NRC Staff was not
3 justified in concluding, in the FEIS, that HRI's emissions
4 would be within regulatory limits."

5 Franke Testimony in support of ENDAUM and SRIC's January 11, 1999,
6 brief on radioactive air emissions, Exhibit 2, pp.10-1.(Emphasis added).
7

8 Franke goes on to conclude:
9

10 "[W]hen taken together with the additional contribution of existing non-
11 background sources at the Church Rock site, HRI is virtually certain to
12 exceed regulatory limits. The combined radiation doses from existing and
13 prospective sources of radon-222 and the existing external gamma
14 radiation above background may be quite high. * * * **Such high doses
15 would pose a significant health threat to the neighboring population.**"
16 Franke Testimony, Exhibit 2, pp.10-1. (Emphasis added).

17 Nevertheless, the Staff devotes not a single word to the costs and risks associated
18 with radioactive air emissions from the mining operations.

19 20 D. Cultural Resources

21 22 Q. HOW DOES THE STAFF TREAT CULTURAL RESOURCES?

23 A. The topic is not mentioned at all in section 5, though it was dealt with in section
24 4.11 and briefly at 4.13. In section 4 the Staff concludes that there will be no
25 significant adverse impact on cultural resources from the mining operation:

26 "Because cultural resource sites at the project sites would be protected
27 zones where no activity would be allowed, significant effects to cultural
28 resources are not likely to result from the project under the staff-
29 recommended action. HRI's leases would preclude other activities at the
30 project sites, so no cumulative effects would occur to cultural resources.
31 Also, HRI's proposed activities would not contribute to effects on
32 archaeological resources outside the project sites or traditional cultural
33 properties located beyond the immediate vicinity of the project." FEIS

1 p.4-126 and 127.

2
3 **Q. IS THERE EVIDENCE TO THE CONTRARY?**

4 A. Yes. William Dodge testifies that the process of identifying cultural resources
5 by HRI and the NRC Staff was "inadequate." Testimony of William A. Dodge
6 in support of ENDAUM and SRICs December 7, 1998, brief with respect to
7 cultural resources, p.20. Dr. Klara Kelley testifies that,

8 "HRI's documentation of Navajo and other tribal 'traditional
9 cultural properties' is particularly fragmented,
10 unstandardized, and incomplete, and does not comply with
11 professional standards." Kelley Testimony in support of
12 ENDAUM and SRICs December 7, 1998, brief with respect
13 to cultural resources, p.5.

14 Dr. Kelley also concludes,

15 "In my professional opinion, because important questions
16 remain about the actual significance of these places to people
17 today and the project's possible adverse effects on them, it is
18 not possible to take accurate account of how the project, or
19 issuing a license for it, will adversely affect significant
20 cultural resources." Kelley Testimony, p.13-4.

21 HRI's and the Staff's approach has not resolved these questions and has not
22 produced a systematic survey of the areas to be impacted. Kelly Testimony
23 pp.4-5. Even assuming that identification of cultural resources is adequate, the
24 area surrounding the project is rich in cultural resources. Cultural Resources
25 Brief at 6-8. Given the concentration of cultural resources, there is a risk
26 resources or sites may inadvertently be disturbed, which bears consideration.

1
2 **Q. WHAT DO YOU CONCLUDE FROM THIS?**

3 A. I conclude that the absolute silence of the Staff's cost-benefit analysis on the
4 issue of the impact of the proposed mining on cultural resources is inappropriate.
5 It is also consistent with the approach of the Staff with respect to many of the
6 other issues discussed above: Benefits are exaggerated while costs are either
7 ignored altogether or minimized.

8
9
10 **IV. CONCLUSIONS**

11 **Q. WHAT ARE YOUR CONCLUSIONS WITH RESPECT TO THE STAFF'S**
12 **CHOICE OF ASSUMPTIONS IN ITS SECTION 5 BENEFIT COST**
13 **ANALYSIS?**

14
15 A. The cost benefit analysis presented in section 5 is made up of just 6 and a half
16 pages, all of which is a discussion of benefits except for one table and four
17 paragraphs of text on cost. The Staff counts the whole project as a "benefit"
18 because its uranium may eventually be used as power plant fuel in the U.S. It
19 also says the project is a benefit because its output may allow us to use up our
20 domestic resources of uranium instead of using up Russia's uranium resources.
21 FEIS p.5-1.

22
23 The Staff then decides that any costs that are of a type that HRI should pay for
24 "are not assessed in this FEIS." FEIS p.5-1. Since the Staff's analysis of costs is
25 almost nil, this decision with respect to HRI's costs may well have been the

1 "justification" for leaving out of the analysis virtually all relevant environmental
2 costs and risks.

3
4 The Staff then focused on a presentation (it is not "analysis") of benefits to the
5 communities in three areas: employment from the project, royalties from the
6 project, and tax revenues from the project. The Staff went to extremes in order
7 to maximize the values of these benefits. Instead of using the DOE/EIA forecast
8 spot price for 1996 (\$12.76) (FEIS p.5-2), the Staff took the much higher
9 (\$15.70) spot price for a single day (October 21, 1996) as the value to use in all
10 its subsequent calculations of benefits. FEIS p.5-2. This choice was strategic.

11 Costs at the three locations were given on the top line of Table 5.1, plus the cost
12 of tax and royalty payments must be considered, which would raise costs
13 between 5 and 15 percent. (See the table below).¹² It's clear that in order to
14 show any benefits at all, the project would have to first be profitable. Thus a
15 much higher figure than the DOE/EIA estimate for 1996 had to be found; one
16 that was significantly above cost per pound. Otherwise it would be obvious that
17 the project was not financially feasible and the entire presentation would
18 collapse. It is also important to keep in mind that production has to begin at
19 Church Rock, by far the highest cost location of the three sites.

¹² It should be noted that these figures do not include corporate overhead and are based on a 4 pore volume restoration plan, and so substantially understate the costs.

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TABLE 5.1 COST FIGURES RECALCULATED TO REFLECT THE STAFF'S 5 TO 15 PERCENT TAX AND ROYALTY ADJUSTMENT			
Site	Table 5.1 Cost	Plus 5%	Plus 15%
Church Rock	\$11.36	\$11.92	\$13.06
Unit 1	11.32	11.88	13.01
Crownpoint	9.46	9.93	10.87

13 This choice of a comparatively very high sales price also enabled the Staff to
14 plug into the analysis very high levels of production, since at this high price the
15 company would want to produce all it could. These high levels of production
16 along with the high price allowed the Staff to show gratifyingly large figures for
17 production-related employment, price and production-based royalties, and price
18 and production-based tax revenues. All of this, however, was an illusion created
19 by the decision to adopt a high single day's spot market price as the price to be
20 used throughout the analysis. If the DOE/EIA spot estimate for 1996 had been
21 used instead, the benefits would come up all zeros or close to zeros.¹³

21
22
23

¹³ And as we know, not only was the \$15.70 far too high, but the current spot prices in the \$8 to \$11 range have left the company in serious financial trouble and production unlikely.

1 Q. PLEASE PRESENT YOUR CONCLUSIONS WITH RESPECT TO THE
2 BENEFITS LISTED BY STAFF IN SECTION 5.1.

3 A. **Employment** The Staff assumed that 100 long term jobs would go to Navajos at
4 an average wage of \$24,000 per year. My review shows that at current prices or
5 the DOE/EIA forecast prices in Table 5.2 no production or only episodic
6 production would occur. Therefore, the 100 job figure is at least exaggerated.
7 Secondly, the \$24,000 per year figure is unreasonable. We know from company
8 publications that HRI is laying off some or all of its trained Texas workforce.
9 The average wage of these trained workers is \$17,539 per annum.¹⁴ The
10 company has a clear incentive to maintain its trained workers, and given its
11 financial condition, to minimize the wages it pays. It is not apparent what it is
12 that would motivate the company to pay \$24,000 per annum to new, untrained
13 workers in New Mexico, when it has been paying \$17,000 to trained workers in
14 neighboring Texas. Moreover, the Navajo unemployment rate is very high and
15 the median household income level is under \$14,000, indicating that Navajos are
16 probably in a buyers' market. In light of all this, 100 local jobs is not
17 reasonable, \$24,000 per annum is not reasonable, and production itself at any
18 significant level is very iffy. Under these conditions the \$2.4 million per year
19 employment benefit listed by the Staff is based on tailored and unreasonable

¹⁴ I derived this figure using the mix of workers the Company provided in RAI-8 for Church Rock for the weighted average.

1 assumptions and has to be rejected.

2
3 **Navajo Nation Business Activities Tax** The Staff uses a figure of \$942,000 for
4 revenue from the Navajo BAT. This tax is also based on the same output and
5 price per pound assumptions rejected above. Moreover, it is not clear legally
6 whether all the mining sites are under the Navajo Nation's taxing jurisdiction.

7
8 **Royalties** Royalties are also based on the same assumptions of full scale
9 production vendable at \$15.70 per pound. Since royalties only arise on
10 allotment land in Unit 1, however, there can be no production-based royalties
11 until production has begun at Church Rock and moved to Unit 1. For the
12 reasons set forth above, this is unlikely. This leaves the royalty level not at the
13 \$1,099,000 per year presented by the Staff, but at the non-production per acre
14 level of \$25 per acre per year times 1,280 acres, or \$32,000 per year, or less
15 than 3 percent of the Staff's figure.

16
17 **Tax Revenues** Tax revenues also are based on both investment in personal
18 property on site and the level of production. The Staff's personal property tax
19 revenue stream of \$55,000 per annum assumes over \$16 million in HRI
20 investment in personal property on site. For the reasons set forth above, this
21 seems unlikely. The property tax on mineral property is based on gross revenue
22 from production in the event of production, and a per acre value in the event of

1 non-production. Again, the Staff's benefit figures are based on their same
2 unreasonable assumptions about production levels and sale prices.

3
4 To summarize, the Staff's benefit analysis is a house of cards built on a defective
5 and unreasonable assumption about price which served to mask the fact that the
6 likelihood of any benefits is zero or close to zero at any time in the foreseeable
7 future. The benefits presented by the Staff are an illusion.

8
9 **Q. PLEASE PRESENT YOUR CONCLUSIONS ABOUT ENVIRONMENTAL**
10 **COSTS AND RISKS.**

11 A. The Staff's entire presentation of costs is done in one table and four paragraphs,
12 which evaluate only the costs associated with the Staff's recommended
13 alternative. There is no discussion at all of the environmental costs and risks of
14 1) liquid waste disposal, 2) radioactive air emissions, 3) losses/damages to
15 cultural resources, and 4) groundwater protection and restoration.¹⁵

16
17 For each of the four areas of major environmental concern there is substantial
18 testimony by ENDAUM/SRIC witnesses that the proposed mining would create
19 substantial costs for the public or pose a substantial risk of loss to the public.

¹⁵ The only item mentioned specifically was the replacement of the public water supply system at Crownpoint, though there is no discussion of the availability of an equal or better water supply elsewhere, or who would guarantee long term compensation for higher costs of operation past the license period.

1 The Staff has made no effort to deal with any of this. In this case it is not that
2 the Staff's treatment is substantively incorrect, but that there is no Staff analysis
3 at all. The entire treatment of costs is done in one table and four paragraphs.
4

5 **Q. PLEASE SUMMARIZE BRIEFLY.**

6 A. The Staff's cost-benefit analysis exaggerates benefits, includes almost none of
7 the relevant costs and risks, quantifies no costs at all, and makes no analysis
8 comparing alternative ways to mitigate the relevant costs. Section 5 makes no
9 ultimate comparison of alternatives. Based on my review of the available data, I
10 conclude that the benefits to be had from the project in the foreseeable future are
11 either zero or close to zero, and the costs are liable to be substantial if the
12 company is allowed to pump lixiviant into the groundwater on a large scale for
13 even a limited period.

14 **Q. DOES THAT COMPLETE YOUR TESTIMONY?**

15 A. Yes it does.
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EXHIBITS

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Exhibit	Title
Exhibit MFS-1	Vita
Exhibit MFS-2	HRI Response to RAI Q.2
Exhibit MFS-3	Uranium Resources Inc. Announces Abandonment of Uranium Property, Business Wire, January 20, 1999
Exhibit MFS-4	HRI Response to RAI Q.8
Exhibit MFS-5	Table of Comparison of HRI's Asserted Pay Scales in Texas and New Mexico
Exhibit MFS-6	<i>Regional Differences in Indian Health</i> , USPHS Indian Health Service (1997).
Exhibit MFS-7	HRI Response to RAI Q.21
	HRI Response to RAI Q.21

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Law Judge Bloch

In the Matter of:)
)
HYDRO RESOURCES, INC.) Docket No. 40-8968-ML
) ASLBP No. 95-706-01-ML
2929 Coors Road, Suite 10)
Albuquerque, NM 87120)
_____)

STATE OF OREGON)
) ss:
County of Columbia)

AFFIDAVIT OF MICHAEL F. SHEEHAN

I, Michael F. Sheehan, being sworn, depose and say as follows:

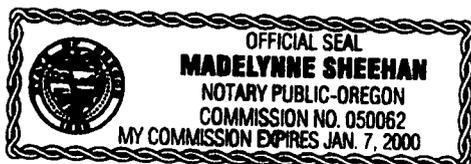
The attached prefiled written testimony was prepared by me or under my direct supervision for submission in the above captioned proceeding. The statements contained in this testimony are true and correct to the best of my knowledge, information and belief.

FURTHER AFFIANT SAYETH NOT.



Michael F. Sheehan

Subscribed and sworn to before me February 11, 1999.





Notary Public for Oregon

August 1998

MICHAEL F. SHEEHAN

Address: 33126 Callahan Road
Scappoose, Oregon 97056

Born: January 1, 1946
Brooklyn, New York

Marital Status: Married, two children

Education: J.D. (With Distinction) College of Law, University of Iowa,
May 1987.
Ph.D. (Economics) University of California at Riverside,
June 1979
Master of Arts (Economics)
University of California at Riverside, June 1973
Bachelor of Science (Economics, Magna Cum Laude)
University of California at Riverside, June 1972

Professional Licenses: Admitted to the Iowa Bar (June 1987).
Admitted to the Bar of the U.S. District Court for the
Northern District of Iowa (July 1987).
Admitted to the Oregon Bar (April 1988).
Admitted to the Bar of the U.S. District Court for the
District of Oregon (April 1990).
Admitted to the Bar of the Ninth Circuit Court of Appeals
(February 1992).

Academic References: Professor Peter Fisher
Graduate Program in Urban and Regional Planning, The
University of Iowa, Iowa City, Iowa 52242.
Professor Greg Hayden, Department of
Economics, University of Nebraska, Lincoln, Nebraska
68510.

Professor K.C. Kogiku
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Department of Economics
California State University
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Professor Richard Moss, Department of Economics,
California State College, San Bernardino, California 92407.

Teaching Fields:

Public Utility Economics and Planning
State & Local Economic Development
Natural Resources and Environmental
Economics
Operations Research (Quantitative
Economics)
Law and Economics

**Research Interests
and Expertise:**

Public Utilities
State & Local Economic Development
Analysis of Risk and Environmental Safety
Law and Economics

Languages:

Spanish

Articles in Academic Journals:

"Why Ramsey Pricing is Wrong: The Case of Telecommunications Regulation: A Response to Harkenrider." *Journal of Economic Issues* (December 1993).

"Mobile Home Rent Control: Designing Local Regulations." *Land Use Law* 3 (November 1992) (With Roger Colton).

"Ramsey Pricing Without Cross-Subsidization? A Response to Professor Becker." *Journal of Economic Issues* (December 1991).

"Monopoly, the Holding Company, and Asset Stripping: The Case of Yellow Pages." *Journal of Economic Issues*, (March 1992). (Equal authors with Evan White).

"A Clarification of the Concept of 'Instrumental Valuation' in Neoinstitutional Economics." *Journal of Economic Issues* (March 1992). (Second author with Rick Tilman).

"Why Ramsey Pricing is Wrong: The Case of Telecommunications Regulation." *Journal of Economic Issues* (March 1991).

"Raising Local Government Revenues Through Utility Franchise Charges: If the Fee Fits Foot It". 21 *Urban Lawyer* 55 (Winter 1989). (With Roger Colton).

"Institutionalists Before Regulatory Commissions: The Value of Doing in Thinking, Teaching, and Writing" *Journal of Economic Issues*, December 1988.

"Corporate Control and the Decapitalization of Subsidiary Corporations: The Looting of the Bangor and Aroostook Railroad." *Journal of Economic Issues*, September 1988.

"A New Basis for Conservation Programs for the Poor: Expanding the Concept of 'Avoided Costs,'" *National Clearinghouse Review*. June 1987 (with Roger Colton).

"Seven-Cum-Eleven: Rolling the Toxic Dice in the U.S. Supreme Court," *Boston College Environmental Affairs Law Review*. V. 14, #3 (1987) (with Roger Colton and Kathleen Uehling).

"Regulatory Control of Natural Gas Procurement Practices in Illinois: Permissible Regulation or Preempted Activity?" 35 *DePaul Law Review* 317 (1986)(with Roger Colton). Reprinted in *Public Utility Law Anthology* v. IX (1986).

"Plant Closings and the Community: The Instrumental Value of Public Enterprise," *American Journal of Economics and Sociology*, V. 44, #4, October 1985.

"Institutional Development of Water Supply in California: The Miller-Lux Water Monopoly Controversy," *Social Science Journal*, V. 22, No. 1, January, 1985 (with Barney Hope, equal authors).

"The Political Economy of Centralized Water Supply in California," *Social Science Journal*, V. 20, #2, April 1983 (with Barney Hope, equal authors).

"Land Speculation in Southern California: The Roles of Railroads, Trolley Lines and Automobiles," *The American Journal of Economics and Sociology*, V. 41, #2, April 1982.

"Land Speculation in Southern California: Energy Monopoly, Fiscal Crisis and the Future," *The American Journal of Economics and Sociology*, V. 42, No. 1, January, 1983.

"The Importance of the Burden of Proof in Environmental Regulation," *The Environmental Professional*, V. 4, 1982.

"Possibilities for Local Public and Cooperative Ownership of Short Line Railroads," *Transportation Research Record*, 802 (1981), (with Peter Fisher).

"Game Theory Analyses Applied to Water Resource Problems," *Socio-Economic Planning Sciences*, V. 15, #3, (1981), (Sheehan, Kogiku). Reprinted in Kiichiro Kogiku, ed., *Resource Allocation Models: Essays on the Management of Resources and the Environment*, Tokyo (Aoyama Gakuin University Press) 1990.

"Policy Problems Associated with Waterborne Asbestos," *The Water Resources Bulletin*, April 1981, V. 17, #2.

"Reply to Discussion of 'Policy Problems Associated With Waterborne Asbestos,'" *The Water Resources Bulletin*, February 1983, V.19, #1. ("Discussion" by Michael Edson and Wm. Thompson in the same issue).

"Coordinating Public Utility Expansion, Industrial Siting and Pollution Control: A Workable Dynamic Programming Algorithm," *Socio-Economic Planning Sciences*, April 1977, V. 11, (Sheehan, Kogiku). Reprinted in Kiichiro Kogiku, ed., *Resource Allocation Models: Essays on the Management of Resources and the Environment*, Tokyo (Aoyama Gakuin University Press) 1990.

Articles in Trade Publications:

Employment and Jobs: The Employment Impact of Federal Environmental Investments National Commission for Employment Policy; Washington D.C. April 1995 (Research Report 95-02). With Skip Laitner and Marshall Goldberg.

"Utility Franchise Charges and the Rental of City Property," in *New Jersey Municipalities* December 1995, p.10ff.

"Cash for Clunkers Program Can Hurt the Poor." *State Legislatures* 33 (May 1993) (with Roger Colton).

Books:

On the Brink of Disaster: A State by State Analysis of Low-Income Natural Gas Heating Bills (Flying Pencil Publications: Scappoose, OR 1994) (With Roger Colton).

Articles in Books:

"Raising Local Government Revenues Through Utility Franchise Charges: If the Fee Fits Foot It," Reprinted in Freilich and Bushek, eds., *Exactions, Impact Fees and Dedications: Shaping Land-Use Development and Funding Infrastructure in the Dolan Era*, ABA, Chicago, 1995; p.233ff (With Roger Colton).

"Whose Goals and Whole Alternatives? How Bad Can a Private Goal Be and Still Define the EIS Under NEPA?," Presented to the National Park & Public Land Symposium, to be reprinted. (On the New World Mine proposal) 1995.

"Law and Economic Policy: The Institutionalist Contribution." In Warren Samuels ed., *Handbook of Evolutionary and Institutional Economics* (M.E. Sharpe, forthcoming).

"The Allocation of Wildfire Control Investments." (With Kiichiro Kogiku, equal authors) chapter 3 in Kiichiro Kogiku, ed., *Resource Allocation Models: Essays on the Management of Resources and the Environment*, Tokyo (Aoyama Gakuin University Press) 1990.

"A System Simulation Analysis of New Strategies for Long-run Cost Minimization in Wildfire Control." (With Kiichiro Kogiku, equal authors) chapter 4 in Kiichiro Kogiku, ed., *Resource Allocation Models: Essays on the Management of Resources and the Environment*, Tokyo (Aoyama Gakuin University Press) 1990.

"An Application of Multi-criteria Decision-making to Multiple Use Planning in U.S. Forests." (With Kiichiro Kogiku, equal authors) chapter 5 in Kiichiro Kogiku, ed., *Resource Allocation Models: Essays on the Management of Resources and the Environment*, Tokyo (Aoyama Gakuin University Press) 1990.

"An Analysis of Davenport City Finances." Appendix 6B (p. 181-191) in G. Daniels & K. Gagala, *Labor Guide to Negotiating Wages and Benefits*, Reston (Prentice-Hall), 1985 (with Peter Fisher).

"The Struggle Between the Electric Utility Industry and Small Scale Power Producers: Law, Politics and Economics in State and Federal Policymaking." Chapter 6 in Max Neiman and Barbara Burt, eds. *The Social Constraints on Energy Policy Implementation*, Lexington, D.C. Heath & Co. 1983.

"Economism, Democracy, and Hazardous Wastes: Some Policy Considerations" in Kamieniecki, O'Brien and Clarke, *Controversies in Environmental Policy*, Albany, SUNY Press, 1986.

"Nonrenewable Resources and the Development of Arid Lands: A Planning Approach," in *Alternative Strategies for Desert Development and Management*, UNITAR, Pergamon Press, 1979 (Adam Rose, Michael Sheehan, Dale Hurd).

**Professional
Administration:**

Managing Partner, Osterberg and Sheehan,
Public Utility Economists, Iowa City.

Past Member, Research Advisory Committee, National
Regulatory Research Institute.

Past Member, Board of Editors, *Journal of Economic Issues*

Editor, *Reports on the Iowa Economy*.

Past-President, Association for Institutional Thought
(AFIT) (1988-9).

**Professional & Legal
References:**

Matthew Glasson Esq., Glasson, Grove and Sole, Cedar
Rapids, Iowa.

Ellen Johnson, Oregon Legal Services,
Hillsboro, Oregon.

David Girard, Columbia Legal Services,
Seattle.

Michael Mullett, General Counsel, Citizens Action
Coalition, Indianapolis, IN.

Mark Smith, Secretary-Treasurer, Iowa State Federation of
Labor, Des Moines, Iowa.

Diane Curran, Harmon, Curran, Gallagher & Spielberg
2001 "S" Street Suite 430, Washington, D.C. 20009-1125

**Utility-Related
Law Practice**

Ameritech Petition to the Indiana Utility Regulatory
Commission for Further Deregulation. Cause 40849.
1997-8. Representing Citizen Action Coalition of Indiana,
AARP and United Seniors in Action.

*Petition of CAC et al for an Investigation into the Rates
and Charges of Ameritech Indiana.* Cause 41058.
Representing Citizen Action Coalition of Indiana, AARP
and United Seniors in Action. November 1997.

*Indiana Bell Telephone dba Ameritech Indiana v. IURC et
al* (Before the Indiana Court of Appeals). February 1998.
Representing Citizen Action Coalition of Indiana, AARP
and United Seniors in Action.

*Indiana Utility Regulatory Commission Investigation into
All Matters Relating to Access Charge and Universal
Service Reform.* Cause 40785. 1997-8. Representing
Citizen Action Coalition of Indiana, AARP and United
Seniors in Action.

In the Matter of the Application of U.S. West for an Increase in Revenues Docket UT 125 (Rate design) Before the Oregon Public Utility Commission. 1997-8. Representing AARP.

In the Matter of the Petition of US West for a Ruling Clarifying the Effect of Rate Reductions on Refund Obligations Docket UT 143 Before the Oregon Public Utilities Commission. Representing AARP. 1997-8.

US West Communications, Inc. v. Oregon Public Utilities Commission, CA A101358, Before the Oregon Court of Appeals. Representing the Citizens Utility Board of Oregon and AARP. August 1998.

**Practice Before
Courts (Economics):**

Crostic v. Golden Pacific Homes, Multnomah County Circuit Court Action. Consumer Fraud. Before an arbitrator. Calculation of present value of damages. May 1998.

Green v. Sunpointe Associates, Civil Action No. C96-1542C (U.S. Dist. Ct. Western District of Washington). Fair Housing Act Class Action. Calculation of damages. 1997.

Garneau v. City of Seattle, Federal District Court. "Seattle's Low-Income Tenant: Relocation Assistance Ordinance: A Review of Professor Heyne's Economic Analysis." On behalf of Evergreen Legal Services and the City of Seattle in defense of the TRAO. January 1995.

Pacific Northwest Bell v. Eachus et. al. (OPUC), Multnomah County Circuit Court. Affidavits & testimony in support of CUB's resistance to (1) Bell's request for a stay of a commission rate reduction order, and (2) Bell's request for a protective order. On behalf of Oregon Citizens' Utility Board. (Spring 1990).

Azul Pacifico v. City of Los Angeles. Federal District Court for the Central District of California. Witness statement (33 pages) and oral testimony on the economics of mobilehome rent control. On behalf of the City of Los Angeles. (January 1990).

IN RE: John & Reta Martin: Chapter 12

Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1225(a)(5);" and "Moody's Corporate Bond Composite: An Analysis in Light of 11 USC 1129(b)." Fixed interest rate determination in support of plan confirmation. Written reports. April 1987. Bankruptcy Court (ND, Iowa).

IN RE: De Los and Donna Martins: "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination in support of cramdown. Written report. April 1987. Bankruptcy Court (ND, Iowa).

IN RE: Paul and Gretchen Pothoven: "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination in support of cramdown. Written report plus testimony. April 1987. Bankruptcy Court (SD, Iowa).

"An Economic Analysis of Rules Adopting 6 Percent and \$6000 Limits on Excludable Assets Essential for Self-Support in Determining Medicaid Eligibility." A report (affidavit) prepared for Legal Services Organization of Indiana. February 1987.

IN RE: Merlin & Helen Theisen: "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination in support of cramdown. Written report. February 1987. Bankruptcy Court (ND, Iowa).

IN RE: L.C. & Gladys Cole: Chapter 11
Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination in support of cramdown. Written report plus testimony. February 1987. Bankruptcy Court (ND, Iowa).

IN RE: Donald & Sharalee Kurtenbach: Chapter 11
Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination in support of cramdown. Written report in lieu of testimony. February 1987. Bankruptcy Court (ND, Iowa).

IN RE: Manta C. Noe and John & Carol Noe: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC 1129(b)(2)." Fixed interest rate determination in support of cramdown. Written report plus testimony. February 1987. Bankruptcy Court (ND, Iowa).

IN RE: Leland & Evelyn Eganhouse: Chapter 11 Bankruptcy. "The Use of the Farm Profitability Index to Index Annual Payments Under the Reorganization Plan." Written report. July 1986.

IN RE: Robert & Joann Pestka: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination; written report. July 1986.

IN RE: Leland & Evelyn Eganhouse: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination; written report. July 1986.

IN RE: Wilbert Wuebker: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination; written report. May 1986.

The Maine Association of Independent Neighborhoods, et. al. and Nancy Haggan v. Michael Petit Docket No. 83-0360-B, The U.S. District Court for the District of Maine. "An Economic Analysis of Rules Adopting 6 Percent and \$6000 Limits on Excludable Assets Essential for Self-Support in Determining Medicaid Eligibility." A report prepared for Pine Tree Legal Assistance, Inc. of Augusta, Maine. May 1986. (Favorable Decision: U.S. Dist. Ct. D. Maine, April 23, 1987. Docket No. 85-0174-B).

IN RE: Paul Kaufman: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination; written report. April 1986.

IN RE: John & Marie McAllister: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed and variable interest rate determinations; written report plus testimony. March 1986.

IN RE: Byron & Connie Greiman: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination; written report. March 1986.

IN RE: Cyrus & Annette Hopkins: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination; written report plus testimony. March 1986.

IN RE: Daniel & Helen Wolf: Chapter 11 Bankruptcy. "Materials in Support of an Analysis of the Appropriate Interest Rate Under 11 USC Section 1129(b)(2)." Fixed interest rate determination in support of the debtors successful cramdown effort. Written report plus testimony. February 1986.

**Practice Before
Regulatory
Commissions:**

In the Matter of Investigation and Hearing on Possible Reduction in Rates and Charges of Entergy New Orleans, Inc. for Electric and Gas Service in New Orleans Docket No. UD-97-1. Before the New Orleans City Council. May-June 1997. Expert written testimony on the franchise agreement. On behalf of the Alliance for Affordable Energy.

Petition of Northern Indiana Public Service Company for Approval of a Natural Gas Alternative Regulatory Plan. Before the Indiana Utility Regulatory Commission. Expert written testimony on the proposal. On behalf of Citizens Action Coalition of Indiana. February 1997. (Settled).

With Respect to Setting Rates Pursuant to Franchise for the Forest Grove Transfer Station. Before the METRO Council (Portland, Oregon). Preparation of studies and other materials. On behalf of the Metro Staff. 1996-7.

Hydro Resources Inc. Application to Construct and Operate the Crownpoint Uranium Solution Mining Project at Crownpoint, NM, Before the U.S. Nuclear Regulatory Commission. Docket No. 40-8968. 1997. Review of the economics of the proposal (issues related to financial capability; cost benefit analysis and need). On behalf of ENDAUM and the Southwest Research and Information Center.

In Re Indianapolis Power and Light Cause No.39938. Written rebuttal testimony on rate base, rate of return, and estimation of plant value. Before the Indiana Utility Regulatory Commission. On behalf of Citizens Action Coalition of Indiana. June 1995.

In Re Indianapolis Power and Light Cause No.39938. Written testimony on rate base, rate of return, and estimation of plant value. Before the Indiana Utility Regulatory Commission. On behalf of Citizens Action Coalition of Indiana. April 1995.

Petition of PSI Energy, Inc. for Authority to Raise Rates Cause 39584 Written testimony on utility incentive programs. Before the Indiana Utility Regulatory Commission. On behalf of Citizens Action Coalition of Indiana. July 1994.

In Re Kauai Electric Division Docket No. 94-0097. Written testimony on utility rate design, and low-income and conservation programs. Before the Hawaii Public Utility Commission. On behalf of the Legal Aid Society of Hawaii. March 1995.

Economic Development and Incentive Tariffs Rulemaking Supplemental comments on the efficacy and design of economic development tariffs. Before the Public Utility Commission of Texas Project No. 11434. On behalf of the Texas Ratepayers' Organization to Save Energy. January 1994.

In Re Request for Increased Rates for Denver Water Comment and Exhibits on Late Payment Fees, Low-income conservation programs, Rate Design and Rate Shock. Prepared on behalf of ACORN. January 1994.

Economic Development and Incentive Tariffs

Rulemaking Prepared comments on the efficacy and design of economic development tariffs. Before the Public Utility Commission of Texas Project No. 11434. On behalf of the Texas Ratepayers' Organization to Save Energy. May 1993.

In the Matter of the Application of MAUI ELECTRIC COMPANY, LTD. for Approval of Rate Increases and Revised Rate Schedules and Rules. Written testimony on the issues of conservation, low-income rate design, late payment charges and rate shock. Before the Hawaii Public Utilities Commission Docket No. 7000 on behalf of Legal Aid Society of Hawaii. November 1992.

Petition of PSI Energy, Inc. for Approval of its Phase Environmental Compliance Plan... Prepared written testimony on the utility's proposed incentive plans and allowance banking proposal. Before the Indiana Utility Regulatory Commission, Cause No. 39346. On behalf of the Citizens Action Coalition of Indiana. September 1992.

Comments: In the Matter of the Application of Randy Heller for a Major Partition and Variance in the Rural Residential-5 Zone. Written comments on zoning issues. Before the Columbia County, Oregon Board of Commissioners on behalf of the Scappoose-Spitzenberg CPAC. May 1991.

In the Matter of the Investigation into the Portland Extended Area Service Region Docket UM-261. Supplemental written testimony on the issues of rate design and cross subsidization. Before the Oregon Public Utility Commission on behalf of the Citizens' Utility Board of Oregon. February 1991.

In the Matter of: An Adjustment of Gas and Electric Rates of Louisville Gas and Electric Company. Case No. 90-158. Prepared written testimony on the issues of rate design, cost of service, and residential conservation programs. Before the Kentucky Public Service Commission on behalf of the Attorney General of Kentucky. November 1990.

In the Matter of the Investigation into the Portland Extended Area Service Region. Docket UM-261. Prepared written testimony on the issues of rate design, cost of service, and cross-subsidization. Before the Oregon Public Utility Commission on behalf of the Citizens' Utility Board of Oregon. October 1990.

In the Matter of: Rate Adjustment of the Western Kentucky Gas Company. Case No. 90-013. Prepared written testimony on the issues of rate design, cost of service, and residential conservation programs. Before the Kentucky Public Service Commission on behalf of the Attorney General of Kentucky. May 1990.

In the Matter of: Notice of Adjustment of Rates of Kentucky-American Water Company. Case No. 89-348. Prepared written testimony on the issues of rate design, cost of service, rates charges for public fire hydrants, and residential conservation. Before the Kentucky Public Service Commission on behalf of the Lexington-Fayette Urban County Government and the Office of the Attorney General of Kentucky. March 1990.

In the Matter of the Investigation into the Revenue Requirements and Rate Spread of Pacific Northwest Bell Telephone Company, d/b/a US West Communications, Inc. Docket UT-85. Direct written testimony on telecommunications rate design. Before the Oregon Public Utility Commission on behalf of the Citizen's Utility Board of Oregon. May 1989.

IN RE: City of Sheldon v. Iowa Public Service Company. Docket NO. SPU-88-7. Petition of the City of Sheldon for a certificate to establish a municipal electric utility. Expert written testimony on valuation principles and associated regulatory issues. Before the Iowa Utility Regulatory Board. On behalf of the City of Sheldon. March 1989.

In the Matter of the Investigation of Cost-of-Service Studies and the Rate design of ALASCOM, Inc. Docket U-87-25. Expert written testimony on intrastate toll rate design and issues relating to the provision of telecommunication services for the hearing impaired. Before the Alaska Public Utilities Commission. On behalf of the Alaska Consumer Advocacy Program. February 1989.

IN RE: Docket No. DPU 86-36. Investigation into the Pricing and Ratemaking Treatment to be Afforded New Electric Generating Facilities Which Are Not Qualifying Facilities. Expert written testimony on the regulatory treatment of conservation and demand side management programs. Before the Massachusetts Department of Public Utilities, on behalf of the Hampshire Community Action Commission (National Consumer Law Center). June 1988.

IN RE: Docket No. DPU 87-280. Western Massachusetts Electric Company. Expert written testimony on the cost effectiveness and economic justification of certain demand side management pilot programs. Before the Massachusetts Department of Public Utilities, on behalf of the Hampshire Community Action Commission (National Consumer Law Center) March 1988.

IN RE: Public Service Corporation of Indiana. Cause 37414 (Application to reduce rates). Expert written testimony on the issue of whether PSI's Marble Hill-related financial emergency continued, and whether PSI should be allowed to temporarily reduce rates via certain changes in accumulated tax accounting. Before the Indiana Utility Regulatory Commission, on behalf of the Citizens Action Coalition and the City of Terre Haute. April 1988.

IN RE: Public Service Corporation of Indiana. Cause 37414-S1 (Investigation to determine whether existing rates ought to be reduced). Prepared written testimony on the issue of the financial condition of PSI. Before the Indiana Utility Regulatory Commission on behalf of the Citizens Action Coalition and the City of Terre Haute. April 1988.

IN RE: New York State Electric and Gas Corporation. Cases 29541 and 29542. Expert written testimony on cost allocation and "economic development" rates. Before the Public Service Commission of the State of New York. July 1987. On behalf of the Public Utility Law Project. Albany, New York.

IN RE: Petition of CAC, City of Terre Haute, et al for a Reduction in the Retail Electric Rates of Public Service Company of Indiana. Cause No. 38411 Affidavit dealing with excess earnings. October 1987.

IN RE: Application of IBP, Inc. for a Water Withdrawal Permit for its Proposed Manchester Plant. Draft Water Use Permit No. 14,808. "Comments on the Public Health Impacts of Radium Contamination in the Jordan Aquifer." Before the Iowa State Department of Natural Resources. September 1987. On behalf of a coalition of local farmers and environmentalists.

IN RE: Western Massachusetts Electric Company. Docket No. D.P.U. 86-280. Expert written testimony on the economics of conservation investments targeted to low income and 'bad debt' customer subgroups. Before the Massachusetts Department of Public Utilities. March 1987. On behalf of the Hampshire Community Action Commission (National Consumer Law Center).

IN RE: Iowa Gas Company Request for Increased Rates. Docket No. RPU-85-22. Expert written testimony on rate design, interruptible rates for industrial users, and the allocation of franchise/user fee expenses. Before the Iowa State Commerce Commission. January 1986. On behalf of the City of Des Moines.

IN RE: Proposal to Set Maximum Rates Small Loan Companies Are Allowed to Charge Pursuant to Iowa Code Section 536.13.1(B) and 536.13(2). Docket No. ARC 5900. Before the Iowa State Banking Board. Written testimony opposing the proposal to increase the maximum rates to 36% per annum. October 1985. On behalf of the Iowa City Ratepayers Association.

IN RE: Union Electric Company Request for Increased Rates. Docket No. RPU-85-9. Expert written testimony on the question of whether the Callaway Nuclear Facility was a cost effective source of power to Iowa, and analyzing the impact of the proposed rates on economic development in Iowa. Before the Iowa State Commerce Commission. July 1985. On behalf of the Cities of Keokuk and Ft. Madison and Lee County, Iowa.

IN THE MATTER OF: Application of Duke Power Company for Approval of a General Increase in Electric Rates and Charges. Docket No. 85-78-E. Technical appendices in support of the expert written testimony of David E. Osterberg. Before the South Carolina Public Service Commission. July 1985. On behalf of the Consumer Advocate of the State of South Carolina.

IN RE: Rules Regarding Permissible Additional Charges for Involuntary Unemployment Insurance Premiums. Docket No. ARC 5249. Before the Administrator of the Iowa Consumer Credit Code. Written testimony on the impact of this type of insurance on consumers. February 1985.

IN THE MATTER OF: Union Electric Company. Docket No. 84-0109. Expert written testimony comparing the cost of power from Callaway Nuclear Station to other sources of power; utility planning; and the treatment of excessive costs. Before the Illinois State Commerce Commission. September 1984. For the Governor's Office of Consumer Services (Illinois).

Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Niagara Mohawk Power Corporation: Case Nos. 28798, 28799, 28800. Before the Public Service Commission of the State of New York. Expert written testimony on the disposition of the savings from the availability of federal hydroelectric power on the Niagara-Mohawk system. September 1984. For the Public Utility Law Project (New York).

IN RE: Northwestern Bell Telephone Company. Docket No. RPU-84-7. Expert written testimony on discriminatory allocation of costs, cost causation, and the jurisdictional treatment of jurisdictionally unnecessary costs. Before the Iowa State Commerce Commission. June 1984. For the coalition for Fair utility Rates and the ISU Government of the Student Body.

IN RE: Wisconsin Power and Light Company. Docket No. 6680-UR-14. Expert written testimony on rate of return. June 1984. Before the Wisconsin Public Utilities Commission. For the Citizens Utility Board.

IN RE: Young Radiator. NPDES Permit 04-07-1-02. Report submitted on the sufficiency of the terms of the proposed permit. Before the Iowa Department of Water, Air and Waste Management. April 1984. For: Local Citizens, Centerville, Iowa.

IN RE: Peoples Natural Gas Company, Division of InterNorth Inc. Docket No. RPU-83-20. Expert written testimony on conservation funding and the regulatory treatment of excess capacity. Before the Iowa State Commerce Commission. October 1983. For the Iowa Ratepayers Association.

IN RE: Iowa Electric Light and Power Company. Docket No. RUP-83-23 (TF-83-264). Expert written testimony on utility planning and excess capacity. Before the Iowa State Commerce Commission. September 1983. For the Iowa Ratepayers Association.

IN RE: Iowa-Illinois Gas and Electric Company. Docket No. RPU-83-22. Supplemental written testimony on the issue of the prudence of company management. Before the Iowa State Commerce Commission. October 1983. For the Iowa Ratepayers Association.

Iowa Power and Light Company; Iowa Southern Utilities Company; and Iowa Illinois Gas and Electric Company. Docket No. RPU-82-39. Expert written testimony on the natural gas purchasing practices of the above listed utilities. Before the Iowa State Commerce Commission. September 1983. For the Iowa Ratepayers Association.

In the Matter of the Application of Otter Tail Power Company for Authority to Establish Increased Rates for Electric Service in South Dakota. Docket No. F-3418. Expert written testimony before the South Dakota Public Utilities Commission on the issue of rate design (the OSL Rate). July 1983. For the Citizens Organized for the Purpose of Equality (COPE), Sisseton, South Dakota.

IN RE: Petition for a Special Exception for the Construction of a High Voltage Transmission Line within Iowa City, Iowa. Expert written testimony on utility planning. Before the Iowa State Commerce Commission. November 1982. For the Iowa City Ratepayers Association.

Prepared written testimony in Docket No. FCU-82-5 before the Iowa Commerce Commission on the subject of the regulatory treatment of winter utility shutoffs. December 1982. Citizens/Labor Energy Coalition.

IN RE: Rate Making Treatment of Excess Electric Utility Generating Capacity. Docket No. RMU-82-4. Expert written testimony on rate making treatment of excess electric utility generating capacity. Before the Iowa State Commerce Commission. November 1982, p. 27. Community Action Research Group.

IN RE: Petition for Franchise of 4.2085 Miles of 72,000 Volt Transmission Line in Clayton County, Iowa. Docket No. E-19540. Supplementary written testimony on utility planning and forecasting. Before the Iowa State Commerce Commission. April 1982.

IN RE: Iowa Public Service Company. Docket No. RPU-81-8. Supplemental direct written testimony on rate of return, excess capacity and utility planning. Before the Iowa State Commerce Commission. September 1981, p. 14. Woodbury County Community Action Agency and Citizens/Labor Energy Coalition.

IN RE: Iowa-Illinois Gas and Electric Company. Docket No. RPU-81-5. Expert written testimony on utility planning and forecasting. Before the Iowa State Commerce Commission. September 1982. On behalf of Iowa Planners Network.

IN RE: Iowa Public Service Company. Docket No. RPU-81-8. Expert written testimony on rate of return and other issues. Before the Iowa State Commerce Commission. August 1981. On behalf of Woodbury County Community Action Agency and Citizens/Labor Energy Coalition.

IN RE: Iowa Power and Light Application for a Revision of Rates. Docket Nos. RPU-78-23 and RPU-80-36. Expert written testimony on rate design. Before the Iowa State Commerce Commission. February 1981. On behalf of the Citizens/Labor Energy Coalition.

IN RE: Iowa State Commerce Commission Rules Regarding Rates for Cogeneration and Small Power Production. Statement of David Osterberg and Michael F. Sheehan on rates for Small Power Producers under Section 210 of the Public Utility Regulatory Policies Act of 1978. Before the Iowa State Commerce Commission. January 1981. On behalf of Continental Hydro Corporation.

IN RE: Iowa Electric Light and Power's Request for Authorization to Construct a 650 MW Coal-fired Generating Plant at Panora, Iowa. Written testimony providing a critique of certain aspects of the applicant's demand forecasting methodology (with David Osterberg). Before the Iowa State Commerce Commission. November 1980.

IN RE: Rules Requiring the Filing of Certain "Cost-of-Service" Information with the Iowa State Commerce Commission. Written testimony evaluating the Rules proposed by Commission Staff. RMU-80-1. Before the Iowa State Commerce Commission. Legal Services and Citizens/Labor Energy Coalition.

IN RE: Rate Increase Request by Iowa Power and Light. Written testimony evaluating: 1) the economic rationale for special rates for certain electric appliances; 2) the justification for proposed changes in customer charges; and 3) various alternative block rates. Before the Iowa State Commerce Commission. March 1981.

**Service on
Government
Commissions &
Committees:**

Columbia County Solid Waste Advisory Committee. 1998–Present. Columbia County, Oregon.

Conservation Acquisition Council, Columbia River People's Utility District (Columbia County, Oregon). 1992–Present.

AT&T Consumer Advisory Panel (1990–1995)

Research Advisory Committee, National Regulatory Research Institute, Ohio State University, Columbia, Ohio. 1990–1993.

Citizen Planning Advisory Commission, Columbia County, Oregon 1990–Present

Rate Advisory Committee, Columbia River Peoples' Utility District (Columbia County, Oregon). 1990–Present

Community Energy Management Advisory Board, Energy Policy Council (State of Iowa) 1984–87.

Iowa City, Iowa: City Franchise Commission (1983–4).

Recent Studies:

Principles for Valuing a Municipal Distribution Utility in 1998 May 1998.

Home-Based Enterprise in Oregon: Improving Local Regulation of an Important Economic Asset September 1996.

An Investigation into the Elements of Regulatory Success and Failure: Ten Studies Prepared on behalf of METRO (the three county planning agency for the Portland, Oregon region). 1997.

Fair Housing Plan: Analysis of Impediments and Strategies to Address Them (With Roger Colton) August 1996. On behalf of Washington County and the City of Beaverton, Oregon.

Lone Star's Plan to Strip Mine Columbia County Formal economic study presented to the Columbia County Planning Commission in **In Re Applications PA 4-96, 5-96, 6-96** for map amendments and zone changes from agriculture and industry to surface mining. On behalf of the Scappoose–Spitzenberg CPAC. November 1996.

In the Matter of the Application of WEBCO for Approval of the Preliminary Plat for the Brookfield Subdivision Before the City of St. Helens, Oregon. Study presented on behalf of the Friends of Good Planning. November 1996.

The Comparative Economics of Nebraska Revised Statutes §70-1010 A study dealing with the statutory standard for compensating rural electric providers when municipal electric utilities expand to keep pace with urban growth. Presented to the Natural Resources Committee of the Nebraska Legislature. October 1996.

Home-Based Enterprise in Oregon: Improving Local Regulation of an Important Economic Asset Winner of the Cascade Policy Institute's 1996 Oregon Better Government Competition. September 1996.

Fiscal Stability and Risk Management Over Time: Planning for Reasonable Fund Balances and Reserves January 1996.

County Sponsored Water Districts to Facilitate the Construction of High Density Rural Subdivisions: An Evaluation Presented to the Columbia County Board of Commissioners on behalf of the Scappoose-Spitzenberg CPAC. November 1995.

Fair Market Value for the Franchise: Law and Economics of Franchise Renewal in Louisville On behalf of the Legal Aid Society of Louisville, KY. March 1995.

Transfer Stations, Curbside Haulers, Landfills: Survey of Costs June 1996.

Comparison of Regulatory Standards for Rate Regulation of Transfer Station Franchisees December 1995

Environment and Jobs: The Employment Impacts of Federal Environmental Investments National Commission for Employment Policy: Washington, D.C., April 1995. Research Report No. 95-02. With Skip Laitner, Marshall Goldberg, and Marc Baldwin.

Growing Cities: Valuation and Compensation Issues in Dealing With Rural Electric Co-ops, Prepared on behalf of the American Public Power Association. (With Roger Colton and Richard Cvarak) August 1995.

An Assessment of Low-Income Energy Needs in Washington State Prepared on behalf of the Washington State Department of Community Development. November 1993. pp.319. (With Roger Colton, Skip Laitner, Adrienne Quinn, Scott Foster, and Gregory Holmes).

Economic Development Utility Rates: Targeting, Justifying, Enforcing November 1993 (With Roger Colton).

Environmental Site Assessment: Leasehold Site for New Library, Government Block, Scappoose, Oregon Prepared on behalf of the Scappoose Public Library District. October 1993.

Of Sunflowers and Dandelions: A Comparative Analysis of Low-Income Rate Discounts May 1993.

Affordable Housing and Section 8 Utility Allowances: An Evaluation and a Proposal for Action. Part I: Adequacy of Annual Allowances March 1993 (With Roger Colton).

Affordable Housing and Section 8 Utility Allowances: An Evaluation and a Proposal for Action. Part II: Adequacy of Monthly Allowances March 1993 (With Roger Colton).

Affordable Housing and Section 8 Utility Allowances: An Evaluation and a Proposal for Action. Part III: Individualized Relief March 1993 (With Roger Colton).

Major Telecommunications Problems for Consumers: An Agenda for Consumer Advocates Prepared for TURN. November 1992.

Valuation and Compensation Issues in Establishing a Municipal Electric Operation: A Manual for Professional Staff Prepared for the American Public Power Association (Draft: May 1992).

Financial Plan and Review of Options Prepared on behalf of the Scappoose (Oregon) Public Library District. April 1992.

Externalities and Least Cost Planning in Wisconsin: The Question of Job Impacts Prepared for Economic Research Associates, Eugene, Oregon. March 1992.

The Impact of the Clean Air Act Amendments of 1990 on Missouri Prepared for Economic Research Associates, Eugene, Oregon. September 1991.

Energy Efficiency, Economic Development and the Funding Problem Prepared for Economic Research Associates, Eugene, Oregon. November 1991.

Energy and Economic Development: Tuning Agency Powers to New Opportunities Prepared for Economic Research Associates, Eugene, Oregon, 1991.

A Preliminary Assessment of the Local Economic and Fiscal Impacts of a National Forest in Southern Iowa Prepared for the Iowa Natural Heritage Foundation, January 1990. (With David Osterberg, Skip Laitner, and Peter Fisher).

An Analysis of the Finances of the State of Iowa. Prepared for the Iowa United Professionals. February 1991.

Low-Income Weatherization as a Stimulus to Economic Development in Washington. Prepared for the Washington State Department of Community Development. January 1991 (With Skip Laitner).

The Economics of Energy Efficiency Building Codes for Cities With Municipally Owned Utilities Prepared under contract to Economic Research Associates, Eugene, Oregon. August 1990.

Elements of a Standard Minimum Program for Low Income Ratepayers in Utility Rate Cases. A discussion paper for general circulation. May 1990.

Incentive Rates for Large Manufacturing Concerns: A Review and a Proposal. Prepared for the Texas Department of Agriculture. November 1989.

Regional Citizen Advisory Groups to Multistate Utility Holding Companies: A Public Interest Review. Prepared as part of a Michigan Divestiture Review Fund study of the pros and cons of an Ameritech Citizen Advisory Group. March 1989.

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Issues in Demand-Side Management. Prepared for the Department of Public Service, State of Vermont. February 1989.

The Problem of Mass Evictions in Mobilehome Parks Subject to Conversion. Prepared for Oregon Legal Services for presentation to the City Council of the City of Forest Grove, Oregon. February, 1989.

The Monopolies' Campaign to Fleece POTS: Can Plain Old Telephone Service Be Saved?: Some Recommendations. Prepared for the Citizens Action Coalition of Indiana. October 1988.

An Analysis of Davenport City Finances (Revised). Prepared for the Davenport Association of Professional Firefighters, for presentation to an Iowa Public Employment Relations Board arbitrator. Davenport: September, 1988.

An Analysis of Davenport City Finances (Revised). Prepared for the Union of Professional Police, for presentation to an Iowa Public Employment Relations Board arbitrator. Davenport: September, 1988.

The Problem of Political and Administrative Corruption in State Economic Development Programs. Prepared for the Association for Ethical Government. July 1988.

Of Ratebases, Subscriber Line Charges, and Other Strange Beasts: The Public Interest Economist as Ms. Goodwrench in Energy/Utility Litigation. Prepared for the National Consumer Law Center for presentation to the NLADA Conference, Berkeley, California. July 1988.

An Analysis of Davenport City Finances. Prepared for the Davenport Association of Professional Firefighters, for presentation to an Iowa Public Employment Relations Board factfinder. Davenport: June, 1988.

An Analysis of Davenport City Finances. Prepared for the Union of Professional Police, for presentation to an Iowa Public Employment Relations Board factfinder. Davenport: June, 1988.

Economic Vitality for Iowa: A Choice of Programs and Philosophies. Prepared for the Alamakee County Almanac: May 1988. (With David Osterberg).

The Monopolization of the Meatpacking Industry: Tactics and Results, 1978-1983. (With David Osterberg). Fall 1987-Spring 1988.

The Iowa Department of Transportation RISE Grant to the City of Manchester/Manchester Enterprises, Inc.: A Case of Official Misconduct. A Complaint to the Iowa Attorney General. (66 pages) July 1987.

Francis Lauer Youth Services, Cerro Gordo County, Iowa. An Analysis in Support of the Transition From Cerro Gordo County Agency to Non-Profit Corporation. Presented to the Cerro Gordo County Board of Supervisors on Behalf of Francis Lauer Youth Services. (52 pages). July 1987.

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Combining Fire and Ambulance Service to Improve Service and Lower Cost. Prepared for the Davenport Association of Professional Firefighters (Local 17, International Association of Firefighters). March 1987.

Of Market Rates and Indubitable Equivalents: Law and Economics in Determining the Appropriate Interest Rate in Farm Chapter 11 Cramdowns. January 1987. 80pp. (With Roger Colton).

Researching the American Corporation: Purposes and Methods. January 1987. 50pp.

Local Regulation of Utilities in Nebraska: A Guide for Local Officials. Prepared for the Nebraska State Energy Office. Lincoln, Nebraska. December 1986. 150pp.

A Comparison of Base Wages Plus Fringe Benefits at Various Plants (in the meatpacking industry). Prepared for the United Food and Commercial Workers Local 222. November 1986.

Public/Private Enterprise as an Economic Development Strategy for States and Cities Prepared for the Economic Development Administration of the U.S. Department of Commerce. July 1986. (With Peter S. Fisher and Roger Colton).

Evaluation of the Energy Management Technician Pilot Program, Prepared for the Iowa State Energy Policy Council. June 1986.

The Future of Pork Packing in Monmouth, Prepared for the City of Monmouth, Illinois, and the Illinois Development Finance Authority. June 1986.

An Analysis of Davenport City Finances (Revised)
Prepared for the Iowa State Policemen's Association, Local #2. April 28, 1986.

An Analysis of Davenport City Finances (Revised),
Prepared for the International Association of Firefighters, Local 17. April 18, 1986.

The Des Moines-ICA Sewage Treatment Facilities Plan: The Economic Ramifications of a 1991 Completion Date
Prepared for the City of Des Moines for presentation to the U.S. Environmental Protection Agency. April 1986.

Municipal Regulation of Cable TV Holding Companies After the Cable Communications Policy Act of 1984: (Heritage Corporation and the Siege of Block 80) Prepared for the Iowa City Ratepayers Association. April 1986.

An Analysis of Davenport City Finances. Prepared for the International Association of Firefighters, Local 17. February 1986.

An Analysis of Davenport City Finances: Preliminary Report. Prepared for the Iowa State Policemen's Association, Local #2. February 1986.

An Analysis of the Finances of the City of Council Bluffs. Prepared for the Fraternal Order of Police, Council Bluffs Lodge #1. January 1986.

Telephones for People: Providing for the Old, the Young, the Rich, the Poor, the Middle, Business and Workers, Cityfolks and Farmfolks. Minority Report of Six Members of Northwest Bell Citizens Council #2. October, 1985.

Thinking About Inter-Class Telephone Subsidies: (The Tale of the Gardener's Pay). Prepared for the Iowa Ratepayers Association. April 1985.

The Great Gumdrop Monopoly: A Parable. Prepared for Northwest Bell Citizen Council #2, April 1985.

Universal Service: Materials for Discussion. Prepared for Northwest Bell Citizen Council #2, April 1985.

The Economic Impacts of a Prevailing Wage Law for Iowa State Construction Projects. Prepared for the Iowa State Building and Construction Trades Council. February 27, 1985. (with Peter S. Fisher).

A Primer on Bypass. Prepared for Northwest Bell Citizen Council #1, January 1985.

Materials on Telephone Rates: The Consumer Position. Prepared as Part I of a manual on telephone regulation for consumer groups. January 1985.

An Analysis of Davenport City Finances: A Preliminary Report. Prepared for the Iowa State Policemen's Association Local 2. January 1985.

Combining Fire and Ambulance Service. Prepared for the City of Rock Island on behalf of the Rock Island Firefighters Local 26. October 1984.

Designing Electric Rates to Conserve Community Resources, Enhance Local Productivity and Stem the Outward Flow of Energy Dollars: The OSL Rate Design Proposal for Nebraska. Prepared for the Nebraska Energy Office. (With Skip Laitner). October 1984.

An Analysis of City Finances: Burlington, Iowa. Prepared for Local 301 International Association of Firefighters. March 1984.

An Analysis of Dubuque City Finances. Prepared for the Operating Engineers. March 1984.

An Analysis of City Finances: Burlington, Iowa. Prepared for Local 828. The American Federation of State, County and Municipal Employees. March 1984. With Peter Fisher.

Source Reduction in Hazardous Materials Regulation: A Strategy for Both Economic Development and the Environment. Prepared for the Select Advisory Panel on Hazardous Waste Management of the Iowa Department of Water, Air, and Waste Management. February 1984.

The Electric Ratepayers Protection Act: An Evaluation. Prepared for and presented to the Consumer Protection Committee of the Missouri Legislature. January 1984.

Investments in Energy Engineering and Technology at the Local Level: Planning an Assist from State Agencies.
Prepared for the Nebraska Energy Office, February 1984.

The Impact of Increasing Concentration in the Meatpacking Industry on Iowa's Livestock Producers and Communities.
Prepared for *Reports on the Iowa Economy*. June 1983.

Policy Options for Dealing with the Impact of Continuing Energy Price Increases on the Iowa Economy for the Iowa State Legislature. February 1983 (LEAG).

An Analysis of Proposals for the Reform of the Iowa Tax System (with Peter S. Fisher). December 1982.

Reforming Iowa's Individual Income Tax to More Fully Account for Tax Shelters (with Peter S. Fisher). October 1982.

The Iowa City Electric Franchise: A Report to the City Manager. January 1982.

A Comparison of Major Cities in Iowa and Surrounding States by Income, Wage Levels, and Housing and Food Costs. March 1983.

IBP at Stanwood: Estimating the Regional Impact.
February 1983.

A Program of Progressive Tax Policies for the State of Iowa (with Peter S. Fisher). February 1982.

Municipal and Cooperative Operation of Branch Railroad Lines in Iowa: Two Alternatives to Abandonment For the Iowa State Legislature (Peter Fisher and Michael Sheehan).
December 1980.

Book Reviews:

Review of Walter Adams and James W. Brock, *Antitrust Economics on Trial: A Dialogue on the New Laissez Faire*, In *The Journal of Economic Issues* (December 1992).

Review of James A. Gross, *Teachers on Trial: Values, Standards & Equity in Judging Conduct and Competence.* In *The Journal of Labor Studies*. Summer 1990.

Review of Ronald M. Green and Richard J. Reibstein, *Negligent Hiring: Fraud, Defamation, and Other Emerging Areas of Employer Liability.* In *The Journal of Labor Studies*. Fall 1989.

Review of Lawrence E. Rothstein, *Plant Closings: Power, Politics, and Workers*, in *The Journal of Economic Issues*. March 1988.

Review of John Munkirs, *The Transformation of American Capitalism: From Competitive Market Structure to Centralized Private Sector Planning*, in *The Journal of Economic Issues*, March 1986.

Review of Claes Brudenius and Mats Lundahl, *Development Strategies and Basic Needs in Latin America*, in *The Annals of Regional Science*, July 1985.

Review of Samuel P. Epstein, et al., *Hazardous Wastes in America*, in *The Environmental Professional*, V.6, #1. 1984.

David Morell and Christopher Magorian, *Sitting Hazardous Waste Facilities: Local Opposition and the Myth of Preemption*, in *The Environmental Professional*, V.5, #3/4. 1983.

Staughton Lynd, *The Fight Against Shutdowns: Youngstown's Steel Mill Closings*, in *The Journal of Economic Issues*, September 1984.

Michael S. Baram, *Alternatives to Regulation: Managing Risks to Health, Safety and the Environment*, in *The Environmental Professional*, V.5, #3/4. 1983.

Richard A. Berk, et al., *Lessons in Conservation from the Great California Drought*, in *The Water Resources Bulletin*. October 1983.

Review of Lawrence B. Lee, *Reclaiming the American West: A Historiography and Guide*, in *The Water Resources Bulletin*, V. 18, #4. August 1982.

Review of Mario Barrera, *Race and Class in the Southwest*, in *The Journal of Economic History*, V. 42, #2. June 1982.

Review of Robert D. Friedman, *Sensitive Populations and Environmental Standards*, in *The Environmental Professional*, V. 3, #3. 1982.

Review of E. Englebert's *California's Water Planning and Policy*, in *The Water Resources Bulletin*. October 1981.

Review of Charles T. Unseld, et al., eds., *Sociopolitical Effects of Energy Use and Policy*. Washington, D.C.: National Academy of Sciences, 1979, in *The Journal of Economic Issues*. December 1981.

Review of W. W. Robinson, *California Land*, In *The Journal of Economic History*. June 1980.

Review of Wm. C. Peters, *Exploration and Mining Geology*, in *The Journal of Energy and Development*. Autumn 1980.

Review of Burnham, P. Beckwith, *The Theory of Free or Communist Distribution*, in *The Social Science Journal*. January 1981.

Review of Russ Talbot, *The European Community's Regional Fund*, in *The Annals of Regional Science*. July 1980.

Review of Louis P. Cain, *Sanitation Strategy for a Lakefront Metropolis: The Case of Chicago* in *The Water Resources Bulletin*. April 1980.

Review of M. R. Goodall, et al., *California Water: A New Political Economy* in *The Water Resources Bulletin*. February 1980.

Review of Shabad and Mote, *Gateway to Siberian Resources: The Baikal-AMVR Mainline*, in *Growth and Change*. July 1979.

Review of N. Birnbaum, ed., *Beyond The Crisis, History of Political Economy*, in *History of Political Economy*, Vol. 11, No. 1. Spring 1979.

Review of *Mathematics of Environmental Processes*, in *Journal of Energy and Development*, Vol. 3, No. 2. Spring 1978.

Review of A. Zaubermann's, *The Mathematical Revolution of Soviet Economics*, in *History of Political Economy*, Vol. 8, No. 2. Summer 1976 (H. Sherman second author).

**Post Graduate
Courses:**

Oregon Land Use Law, OSB. Portland, Oregon December 1996.

Advanced Insurance Issues Facing Oregon Businesses.
OSB Portland, Oregon September 1996.

National Park and Public Land Ecosystems: Meeting the Challenge of Common Boundaries and Conflicting Mandates. Sponsored by the Center for Environmental and Resource Law. Snowbird, Utah. April 1995. (Paper presented: "Whose Goals and Whose Alternatives? How Bad Can a Private Goal Be and Still Define the EIS Under NEPA?")

Federal Civil Litigation in Oregon, OSB. October 1994.

Economic Considerations in Managing Hazardous Waste, The Tenth Annual Hazardous Waste Law and Management Conference. Sponsored by the Northwestern School of Law. October 1993.

Spanish Language Refresher: 120 hours. El Centro Cultural. Hillsboro, Oregon. 1988-9. (Certificate).

Natural Gas Regulation Training Conference, National Consumer Law Center, Pittsburgh, Pennsylvania, November 1982.

Faculty Workshop Program on Breeder Reactor Technology, Argonne National Laboratory, Argonne-West, Idaho Falls, Idaho, August 2-5, 1982.

Workshop on Appraisal of Utilities and Railroad Property for Ad Valorem Taxation. National Tax Association -- Tax Institute of America. Wichita State University, July 27-30, 1981. (Certificate)

Simulation Modeling and Analysis. Institute for Professional Education. Los Angeles, September 1978. (Certificate)

Employment History: Current: Managing Partner: Osterberg & Sheehan, Public Utility Economists, Scappoose, Oregon & Mount Vernon, Iowa.

Partner: Fisher, Sheehan and Colton, Public Finance and General Economics, Scappoose, Oregon, Iowa City, Iowa, and Belmont, MA.

Private practice of law.

1989-92 Counsel, Telecommunications Law Project, Citizens' Utility Board of Oregon, Portland, Oregon.

1979-84 Assistant Professor, Graduate Program in Urban and Regional Planning; and Research Associate at the Institute of Urban and Regional Research, The University of Iowa, Iowa City, Iowa 52242.

1979 Lecturer, Graduate School of Administration, UCR, (Analysis of Projects). (Winter)

1976-9 Lecturer, Department of Economics, California State College at San Bernardino.

1978 Consultant, Richard Terry & Associates, *Impact of Federal Sewer Sizing Limitations on Economic Growth in the West San Bernardino Valley.*

1977-8 Research Associate, UCR-USDA (Forest Fire Damage Functions).

1977 Water Resource Consultant, Janczyk & Sheehan, Riverside (water quality problems in the Santa Ana and San Jacinto watersheds).

1976-7 Holder of a Regent's Fellowship, UCR.

Spr 1976 Research Assistant (Geothermal Development Project), Department of Economics, UCR.

1976 Teaching Assistant (Microeconomics), Department of Economics, UCR). (Fall, Winter)

Spr 1975 Research Assistant to Professor K. C. Kogiku in applied mathematical economics.

- 1975 Holder of a Regent's Fellowship. (Fall, Winter)
- 1975 Associate-in-Economics, Department of Economics, UCR (to teach one course in labor economics). (Winter)
- 1974-76 Instructor, Chapman College (Microeconomics, Macroeconomics, Statistics, Development, Comparative Systems, Cycles and Growth, Urban Economics, Decision Theory, Quantitative Methods, and Operations Research).
- 1974 Consultant, A. A. Webb Associates, Inc., Consulting Engineers, Riverside (urban information systems).
- 1973-4 Teaching Assistant (Economic Statistics), Department of Economics, UCR.
- 1970-2 Dean's Statistical Clerk, Dean James Earley, College of Social and Behavioral Science, UCR.
- 1969-70 Assistant to the Hospital Administrator, Patton State Hospital.
- 1967-69 Electrician, Timna Copper Mines.
- 1963-66 U.S. Marine Corps.

Honors and Awards: Winner, Cascade Policy Institute Better Government Competition 1996 for the study, *Home-Based Enterprise in Oregon: Improving Local Regulation of an Important Economic Asset* September 1996.

Fullbright Fellowship to Pakistan for 1979-81 awarded August 1979 (declined).

Affiliations: Association for Evolutionary Economics
 Association for Institutional Thought
 Lawyers Coordinating Committee, AFL/CIO
 Oregon Bar Association
 Policy Studies Association

HRI, INC.

(A Subsidiary of Uranium Resources, Inc.)

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Corpus Christi, Texas 78411
Telephone: (512) 993-7731
Fax: (512) 993-5744

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Dallas, Texas 75251
Telephone: (214) 387-7777
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P.O. Box 777
Crownpoint, New Mexico 87313
Telephone: (505) 786-5545
Fax: (505) 786-5555

February 20, 1996

40-8968

Mr. Joe Holonich, Chief
High-Level Waste and Uranium Recovery Projects Branch
United States Nuclear Regulatory Commission
Division of Waste Management
Office of Nuclear Materials Safety and Safeguards
Washington, D.C. 20555-0001

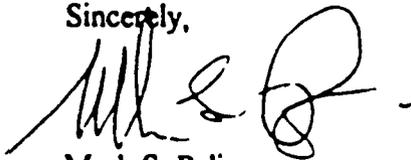
Dear Mr. Holonich:

Attached, please find three (3) copies of HRI's responses to NRC Request For Additional Information, #1-48. These requests were transmitted by letter, signed by Daniel M. Gillen, dated January 11, 1996.

The responses are complete except for Response #32, which will be followed by a free-standing engineering report, and Responses #22, #23, and #24, which will be the subject of additional work by our cultural resources contractor. Because of the various levels of inspections concerning cultural resources, our consultants and employees who are expert in these areas will make continuous contacts and reports throughout the lives of the projects. However, the company is committed to meet all the requirements of the NRC.

Please feel free to contact me with additional questions.

Sincerely,



Mark S. Pelizza
Environmental Manager

MSP/dlg
Enclosures (via Federal Express)

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HRI, INC.
RESPONSE
TO
NUCLEAR REGULATORY COMMISSION'S
QUESTIONS 1 THROUGH 48

February 19, 1996

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

ISSUE: Transportation Risk Analysis

2. **Discussion** - The applicant has stated that the maximum plant output would be 3 million pounds of yellowcake per year. A value of 1 million pounds per year was given during the October 1995 meeting in Crownpoint.

Action Needed -What is the correct maximum annual plant output?

Response

Maximum output of the Churchrock, Crownpoint, UNIT I complex will be three million pounds per year. The output from each satellite is one million pounds per year, as follows:

<u>Satellite Name</u>	<u>Annual Production</u>
Churchrock	1 million pounds
Crownpoint	1 million pounds
UNIT I	1 million pounds

9. Uranium Resources, Inc.

Announces Abandonment of Uranium Property

<http://nt.excite.com/news/bw/990120/tx-uranium-resources>

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January 20, 1999, BUSINESS WIRE DALLAS - Uranium Resources, Inc.

(NASDAQ:URIX) ("URI") announced that it has relinquished its rights to the

South Texas Alta Mesa uranium in-situ leach deposit. Attempts to

renegotiate the terms of the lease were undertaken in December 1998 with

definitive notice received mid-January 1999 informing the Company of the

landowners' intention not to amend the original lease terms. The

properties covered by the lease were estimated to contain approximately 4.0

million pounds of recoverable proven and probable uranium reserves. The

termination of this lease will result in a pre-tax charge against earnings

of approximately \$5.0 million in the fourth quarter of 1998. The reduction

in the holding value of the Company's uranium properties will be a non-cash

charge and will not impact the Company's cash position or liquidity. Paul

K. Willmott, Chairman and CEO, stated, "Given the outlook of future market

conditions, the decision to drop the Alta Mesa property was made after

careful consideration of the project's remaining permitting uncertainties,

the high capital cost required to place the property into production and

the property's high cash cost when compared to the Company's existing

licensed production alternatives. The Company concluded that the uranium

market would not have sufficiently rebounded in 1999 to allow for the

timely commencement of production within the remaining period of the lease

term (December 1999) and made the decision to forego the payment required

to retain its rights to the property into 1999." Uranium Resources, Inc.

is a Dallas-based uranium mining company, whose shares trade on the NASDAQ

National Market System under the symbol URIX. The Company specializes in

in-situ solution mining and holds substantial uranium reserves in South

Texas and New Mexico. _____

HRI, INC.

(A Subsidiary of Uranium Resources, Inc.)

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Telephone: (505) 786-5545
Fax: (505) 786-5555

February 20, 1996

40-8968

Mr. Joe Holonich, Chief
High-Level Waste and Uranium Recovery Projects Branch
United States Nuclear Regulatory Commission
Division of Waste Management
Office of Nuclear Materials Safety and Safeguards
Washington, D.C. 20555-0001

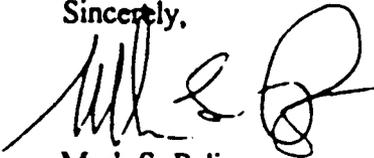
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Please feel free to contact me with additional questions.

Sincerely,



Mark S. Pelizza
Environmental Manager

MSP/dlg
Enclosures (via Federal Express)

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HRI, INC.
RESPONSE
TO
NUCLEAR REGULATORY COMMISSION'S
QUESTIONS 1 THROUGH 48

February 19, 1996

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

ISSUE: Socioeconomics

8. **Discussion** - During the site visit of October 1995, the applicant stated that the project would create approximately 200 direct jobs.

Action Needed - Would this level of employment be constant over the entire 20-year project period? If not, at what time would 200 jobs be created and for what duration? What would be the peak construction and operational work force requirements (and schedules)? What skill levels would be required for each? Which jobs (type and number) would require training and for what duration would training occur prior to on-site employment? What would be the prevailing wage rates for these jobs? What wage rates does the applicant anticipate paying for these jobs? How many people (including workers and their families) would relocate to the area from outside, and for how long? Please provide comparable information for the Kingsville and Rosita projects in Texas.

Response -

Since the three projects will be brought on in phases, and divided into construction and operational stages, the estimated employment level of 184 (excluding drill rig workers) will not be constant throughout the entire life of the project. At this time, HRI anticipates the following employment distribution (see table on following page).

Response #8 (Continued)

Estimated Operational Employment By Project Site

	Churchrock	UNIT I	Crownpoint
Plant Personnel			
Plant Superintendent	1	1	1
Plant Engineer	1	1	1
Radiation Officer	1	1	1
Chemist	1	1	1
Lab Technicians	2	2	2
Secretary	1	1	1
Plant Foreman	1	1	1
Maintenance Foreman	1	0	1
Electrician	1	1	1
Apprentice Electrician	1	1	1
Plant Operator	4	4	4
Assistant Plant Operator	4	4	4
Maintenance	5	5	5
Wellfield Personnel			
Wellfield Superintendent	1	1	1
Drilling Engineer	1	2	2
Data Entry Clerk	1	1	1
Secretary	1	1	1
Foreman	1	1	1
Logger	1	1	1
Wellfield Operators	8	4	8
Assistant Wellfield Operator	2	2	2
Balancer	2	2	2
Environmental Sampler	1	1	2
Pump Hoist Operators	6	4	6
Maintenance	3	2	3
Casing Crew	2	4	4
Geologic Personnel			
Head Geologist	1	1	1
Geologist	1	2	2
Secretary	0	0	0
Surveyor	1	1	1
Assistant Surveyor	1	1	1
Backhoe Operator	2	2	2
Logger	1	1	1
Total	61	57	66

The schedule for bringing the projects on line will be driven by prevailing market conditions. However, our current estimate on when peak work force requirements would be encountered is based upon the scenario below: It should be understood that the operational scenarios given below are for the initial licensing period. Based on HRI's ore reserve estimates, operational life at each of the three locations can extend well beyond 20 years.

Churchrock Operations	1997-2003
Unit I Operations	1999- 2016
Crownpoint Operations	2001-2016

As can be seen from the above Table, peak employment will occur between the years 2000 and 2003. As Churchrock operations wind down after seven years, employment will remain steady at Unit I and Crownpoint through the year 2016.

Approximately 25 workers are needed for the construction phase at each site. The duration of the construction period for each site is the same; approximately six months. With the exception of a small number of outside contractors, workers helping with construction will be HRI employees. At the end of construction, the workers will continue to assume operational duties.

HRI does not believe that a training period (prior to on-site employment) is necessary. Many of the positions listed can be filled by local labor forces and graduates of the Crownpoint Technical Training School. Training specific to the duties at the sites will come in the form of on-the-job training (OJT). Examples of positions requiring OJT would include lab technicians, apprentice electricians, wellfield operators, casing crews, data entry clerks, maintenance pump hoist operators and secretaries. Positions such as radiation safety officer, chemist, plant engineer, plant superintendent and geologist will require a college degree and experience.

With regard to an estimate on how many workers would be brought in from outside the immediate area, our best estimate at this time is between 10 and 15. Since these people have not yet been identified, information on family size cannot be provided.

Expected annual wage rates by position are shown in the table below. Wage rates are given for HRI's Texas and proposed New Mexico projects.

Annual Wage Rates (HRI Operations)

	Texas Operations	New Mexico Operations
Plant Personnel		
Plant Superintendent	70,000	85,000
Plant Engineer	42,200	45,000
Radiation Officer	31,700	30,000
Chemist	36,000	46,000
Lab Technicians	15,500	20,000
Secretary	16,000	20,000
Plant Foreman	34,900	28,000
Maintenance Foreman	30,500	28,000
Electrician	34,000	30,000
Apprentice Electrician	23,000	25,000
Plant Operator	18,700	24,000
Assistant Plant Operator	16,900	24,000
Maintenance	16,300	24,000
Wellfield Personnel		
Wellfield Superintendent	42,600	41,200
Drilling Engineer	38,100	40,500
Data Entry Clerk	15,000	20,000
Secretary	16,000	20,000
Foreman	30,000	28,000
Logger	20,700	25,000
Wellfield Operators	18,400	23,900
Assistant Wellfield Operator	16,900	23,900
Balancer	17,400	23,900
Environmental Sampler	16,500	23,900
Pump Hoist Operators	16,500	23,900
Maintenance	16,500	23,900
Casing Crew	16,500	23,900
Geologic Personnel		
Head Geologist	60,200	58,000
Geologist	40,300	48,800
Secretary	16,000	20,000
Surveyor	20,000	25,000
Assistant Surveyor	18,000	25,000
Backhoe Operator	18,000	21,800
Logger	26,000	21,800

FEIS SECTION 5 COST BENEFIT ANALYSIS:
COMPARISON OF HRI'S ASSERTED PAY SCALES
IN TEXAS AND NEW MEXICO

Job Title	Church Rock Jobs	Local Jobs	Texas Rate	NM Rate	Tx Weights	NM Weights
Plant Personnel						
Plant Superintendant	1	0	\$70,000	\$85,000	0	0
Plant Engineer	1	0	42,200	45,000	0	0
Radiation Officer	1	0	31,700	30,000	0	0
Chemist	1	0	36,000	46,000	0	0
Lab Technician	2	2	15,500	20,000	31,000	40,000
Secretary	1	1	16,000	20,000	16,000	20,000
Plant Foreman	1	0	34,900	28,000	0	0
Maintenance Foreman	1	0	30,500	28,000	0	0
Electrician	1	0	34,000	30,000	0	0
Apprentice Elect	1	1	23,000	25,000	23,000	25,000
Plant Operator	4	4	18,700	24,000	74,800	96,000
Asst Plant Operator	4	4	16,900	24,000	67,600	96,000
Maintenance	5	5	16,300	24,000	81,500	120,000
Wellfield Personnel						
Wellfield Superintendent	1	0	42,600	41,200	0	0
Drilling Engineer	1	0	38,100	40,500	0	0
Data Entry Clerk	1	1	15,000	20,000	15,000	20,000
Secretary	1	1	16,000	20,000	16,000	20,000
Foreman	1	0	30,000	28,000	0	0
Logger	1	1	20,700	25,000	20,700	25,000
Wellfield Operators	8	8	18,400	23,900	147,200	191,200
Asst Wellfield Operator	2	2	16,900	23,900	33,800	47,800
Balancer	2	2	17,400	23,900	34,800	47,800
Environmental Sampler	1	1	16,500	23,900	16,500	23,900
Pump Hoist Operators	6	6	16,500	23,900	99,000	143,400
Maintenance	3	3	16,500	23,900	49,500	71,700
Casing Crew	2	2	16,500	23,900	33,000	47,800
Geologic Personnel						
Head Geologist	1	0	60,200	58,000	0	0
Geologist	1	0	40,300	48,800	0	0
Secretary	0	0	16,000	20,000	0	0
Surveyor	1	1	20,000	25,000	20,000	25,000
Asst Surveyor	1	1	18,000	25,000	18,000	25,000
Backhoe Operator	2	2	18,000	21,800	36,000	43,600
Logger	1	1	26,000	21,800	26,000	21,800
TOTAL	61	49			859,400	1,151,000
Weighted Average					\$17,539	\$23,490
Percent Increase NM over Texas						34%



Regional Differences *in Indian Health*

Department of Health and Human Services
Donna E. Shalala, Secretary

Indian Health Service
Michael H. Trujillo, M.D., M.P.H., M.S., Director

Office of Public Health
Robert H. Harry, D.D.S., Acting Director

Division of Community and Environmental Health
Mary Beth Skupien, Ph.D., M.S., Director

Program Statistics Team
Anthony J. D'Angelo, Team Leader

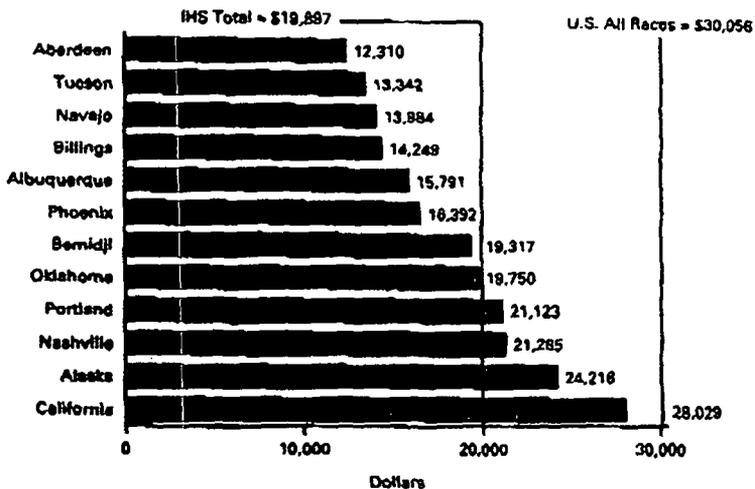
1997

According to the 1990 Census, the median household income in 1989 for Indians residing in the current Reservation States was \$19,897. This is two-thirds of the U.S. All Races figure for 1989 of \$30,056. Aberdeen, Tucson, Navajo, and Billings had median household incomes that were less than half the U.S. figure.

Chart 2.9

Median Household Income in 1989

1990 Census State-Level Indian Data



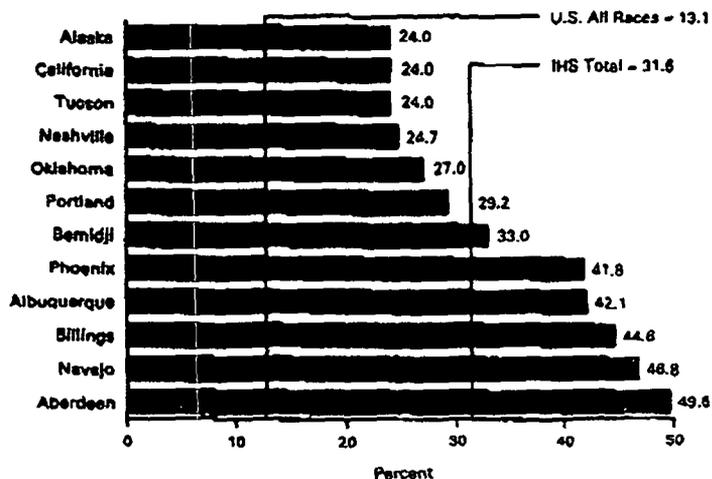
NOTE: Includes data for 35 Reservation States (South Carolina and Indiana were added as Reservation States in 1994 and 1995, respectively).

The 1990 Census indicated that 31.6 percent of Indians residing in the current Reservation States were below the poverty level. This is 2.4 times the comparable U.S. All Races figure of 13.1. Aberdeen, Navajo, Billings, Albuquerque, and Phoenix had percentages exceeding 40.0.

Chart 2.10

Percent of Population Below Poverty Level

1990 Census State-Level Indian Data



NOTE: Includes data for 35 Reservation States (South Carolina and Indiana were added as Reservation States in 1994 and 1995, respectively).

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

ISSUE: Environmental Justice

21. Discussion - None

Action Needed - Provide sample lease and royalty agreements (referred to during the October 1995 site visit) between the applicant and allottee(s) for both the New Mexico and Texas project sites.

Response -

Attached are copies of the above two captioned leases.

Generally speaking, leases in Texas are made for 5 years with an option to renew for 5 additional years by payment of a second lease bonus and doubling the rental for the last 5 years (secondary term) if the option is exercised which they usually are. Bonuses are ordinarily \$35.00 to \$50.00 per acre initially and rentals are \$5.00 per acre per annum. The second bonus at the end of 5 years is usually the same as the initial bonus, but sometimes is escalated as the Flato acreage is to \$50.00 per acre. The rentals double to \$10.00 per acre for the second 5 year term.

Royalties are usually 6 1/4% of the net proceeds received by the lessee. Occasionally we will use an escalating royalty if the particular lessor is a hard negotiator and we want the ground strongly. When the escalator royalty is used it is as follows:

- a. Six and One Quarter percent (6 1/4%), when the sale price of uranium or other Leased Substances is at \$24.99 or below.
- b. Seven and One Quarter percent (7 1/4%), when the sale price of uranium or other Leases Substances is between \$25.00 and \$29.99.
- c. Eight and One Quarter (8 1/4%), when the sales price of uranium or other Leased Substances is between \$30.00 and \$34.99.
- d. Nine and One Quarter percent (9 1/4%), when the sale price of uranium or other Lease Substances is between \$35.00 and \$39.99.
- e. Ten and One Quarter percent (10 1/4%), when the sale price of uranium or other Lease Substances is at \$40.00 and above.

The Mining Lease Indian Lands with Mary Crawford had a signing bonus of \$230 00 per acre for a ten year lease.

Upon execution of the lease, a minimum royalty of \$20.00 per acre is due and is paid for each of the 10 years the lease is in effect. Additionally, there is a \$5.00 per acre annual rent.

Lessee is further required to spend annually in development and improvements upon the leased land, not less than \$20.00 per acre.

Royalty paid on Indian Lands is as follows:

<u>Percentage Royalty</u>	<u>Sales Price Range Per Pound</u>
6.25%	Less than \$15.00
7.00%	\$15.00 to \$16.99
7.75%	\$17.00 to \$18.99
8.50%	\$19.00 to \$20.99

The royalty percentage shall continue to escalate 0.75% for each \$2.00 per pound of increased sales price through:

<u>Percentage Royalty</u>	<u>Sales Price Range Per Pound</u>
25%	\$63.00 and greater

The royalty on both leases is CPI adjusted. The Indian Leases are more advantageous to the Lessor than are the privately owned leases in Texas where we are now mining.

(October 1957)

DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

Company Lease No. CP68

Allotment No. 925

Contract No. _____

MINING LEASE INDIAN LANDS
(for Minerals other than Oil and Gas)

Uranium Mining Lease, Navajo Indian Allotted Lands

THIS INDENTURE OF LEASE, made and entered into in quadruplicate on this 15th day of

February, 1992 between Na glee na bah or Mary Crawford Gle nap pah

Gift Deeded-No Probate Number
(See copy of Attached Deed)

for heirs as the case may be. (Probate No. _____
of McKinley County, State of New Mexico, party of the first part, herein
after called the Lessor, and HRL, Inc., 5656 S. Staples, Ste. 250, LB8, Corpus Christi, TX. 78411
party of the second part, hereinafter called the Lessee, under the provisions of the Allotted Land Mining
Lease Act of March 3, 1909 (35 Stat. 783) and any amendments thereto.

WITNESSETH:

I. Lessor, in consideration of \$ 36,800.00 bonus, receipt of which is hereby
acknowledged, of the rent and royalty to be paid, and of the agreement of the Lessee herein contained,
grants and leases unto Lessee for the purpose of prospecting for and mining uranium and associated minerals
by means of in situ solution mining, except coal, oil, gas, and any mineral not associated with uranium, upon
the land described as follows:

Allotment No. 925, located in the SE Quarter of Section 16 Township, 17N, Range 15W N.M.P.M.
Navajo Indian Allotted land, McKinley County, State of New Mexico, and containing 160 acres, more
less.

The Lessee may occupy as much of the surface of the leased land as is reasonably necessary to carry on the
work of exploring for, developing, in situ recovery (solution mining), producing, processing and restoration
of said leased lands, subject to the provisions of 25 CFR 162, 212 and 216 and any other applicable law
and regulations now or hereafter in force. Subject to the limitations hereinafter provided, Lessee shall have
the right and license to explore for and recover uranium and associated minerals by in situ recovery
production, processing of uranium and associated minerals on the leased land; to construct thereon building
pipelines, plants, tanks and other structures used or useful in the production, processing and transportation
of said minerals; make excavations, openings, stockpiles, ditches, roads, transmission lines, and other
improvements used or useful in said production, processing, marketing, removing and transporting; produce
electrical power for its own use, erect and operate power lines, but this does not include rights-of-way
across lands not subject to this lease; place machinery and other equipment and fixtures upon the leased
land; to use water for all in situ recovery operations described herein developed by Lessee on the leased
land for operational use or use and transport any other water made available to Lessee for other purposes;
prepare for market, remove, process, and sell minerals; do all other things upon said leased land that may

be necessary to carry on the mining operations hereunder, including the right of ingress and egress; however, the rights contained herein do not include the right to dump or dispose of waste products of in situ recovery on the surface of the leased lands, or to perform other activities which would damage the land, except for s permitted hereby. Lessee shall not perform other activities not authorized hereunder.

(a) Survey of Leased Premises

If required by the Area Director, Lessee at its own expense shall have the leased land surveyed by a registered surveyor, the boundaries posted with substantial monuments and a tie established with the nearest United States Public Survey marker. A certified plat map of the leased land shall be furnished to the Area Director in quadruplicate and two additional copies furnished to the Area Director.

II. TERM. Subject to the other provisions herein contained, this lease is for a term of Ten (10) years from the date of its approval and as long thereafter as the minerals specified are produced in paying quantities.

III. DEFINITION. Area Director refers to the official in charge of the Navajo Area Office, Window Rock, Arizona, or his authorized representative. The Secretary refers to the Secretary of the Interior or his authorized representative. Area Manager refers to the Rio Puerco Resources Area Office, Bureau of Land Management, Albuquerque, New Mexico, or his authorized representative.

IV. ROYALTY. The Lessee agrees to pay or cause to be paid to the Minerals Management Service for the use and benefit of the Lessor a ten percent (10%) royalty of gross sales proceeds for all contract and/or spot market sales for vanadium, and other associated minerals and elements, including, but not limited to, manganese, lithium, fluorine, selenium, and precious metals.

The royalty for uranium shall be set as a sliding scale percentage based on gross sales price for all uranium (U308) sold through either arms length long-term contracts or arms length spot sales according to the following schedule:

Percentage Royalty	Sales Price Range Per Pound
6.25%	Less than \$15.00
7.00%	\$15.00 to \$16.99
7.75%	\$17.00 to \$18.99
8.50%	\$19.00 to \$20.99

The royalty percentage shall continue to escalate 0.75% for each \$2.00 per pound of increased sales price through:

Percentage Royalty	Sales Price Range Per Pound
25%	\$63.00 and greater

The sales price range shall escalate with inflation according to the following formula:

$$\text{Sales price range} \times \left[1 + \frac{(C2 - C1)}{C1} \right]$$

February 10, 1992

Where C1 equals the Consumer Price Index --Urban U.S. Cities -- As Items Index (CPI-U) as published by the U.S. Bureau of Labor Statistics for the month in which the lease is made, and C2 is the Consumer Price Index for the month in which the sale of uranium from the property is made.

Gross Sales Price and Gross Sales Proceeds are defined as the selling price of the product exclusive of any and all allowances and deductions prior to or after (e.g. sales commissions or agents fees) sale of product.

All royalties, except minimum royalties, which are due and payable under the terms of this lease, are due and payable not later than the 25th day of the month following the month that the Lessee received proceeds from the sale of production which would include the uranium being transferred, or otherwise disposed of production from the Lease in an arms length transaction. Unless otherwise directed by the Area Director, all checks due under the terms of this lease shall be made payable to the "BUREAU OF INDIAN AFFAIRS" and shall be mailed to the Minerals Management Service for the use and benefit of the Lessor. The recoupment of royalty and/or other payment against current payments will be permitted by Minerals Management Service only after verification by Minerals Management Service that previous overpayment was made by Lessee. The Lessee shall furnish to the Area Director/Area Manager statements described in Article XVI, Monthly Statements and Annual Audit.

V. **MINIMUM ROYALTY.** A minimum royalty of \$20.00 per acre or portion thereof, shall become due and payable beginning with the date of approval of this lease. The minimum royalty shall be paid on the anniversary date of the approved lease for the coming year (12 months). If there is production during the lease year, the minimum royalty shall be credited against the actual royalty paid during such year, but no other year. If the lease is surrendered or cancelled, no minimum royalty paid to the Lessor will be refunded.

VI. **CESSATION OF MINING FOR ECONOMIC CONDITIONS.** Lessee may suspend production or sales, or stockpile uranium for lack of a market, or for other economic reasons and it shall nevertheless be considered that uranium is being produced in paying quantities from the leased land, provided that Lessee provides the Area Director/Area Manager notice of the proposed suspension of production or sales ninety (90) days in advance of such proposed action, supported by a reasonably detailed explanation of the reasons for the proposed action, and that the Area Director/Area Manager approves the suspension as being in the best long term economic interests of the Lessor.

VII. **ANNUAL RENTAL.** Lessee shall pay or cause to be paid for the use and benefit of the Lessor. in advance, beginning with the date of approval of the lease, as annual rental, the sum of \$5.00 per acre or portion thereof, for the first lease year and thereafter \$5.00 per acre, or portion thereof, on each anniversary date of the approved lease. The rent shall not be credited against royalties accruing to the lessor under this lease. If the lease is surrendered or cancelled, no rent accruing to the Lessor will be refunded.

VIII. **BONDS.** To assure lease compliance, the Lessee, in accordance with 25 CFR 212.10 has to furnish bonds in the following amounts:

1. **Performance Bond** - A bond equal to one year's rent and one year's minimum royalty.
2. **Reclamation Bond** - The estimated cost to meet the reclamation requirements (25 CFR 216.8) of an approved plan of operation.

The right is reserved to the Secretary of the Interior or his authorized representative to increase the amount of the bond if deemed necessary under the provisions of 25 CFR 212.10. The lease and performance bonds are, under the regulations, subject to adjustment when deemed appropriate by the Secretary.

IX. EXCAVATION, WASTE AND CONSTRUCTION AREA. It is further agreed that in addition to all payments of bonuses, royalties and rentals heretofore set forth, the Lessee shall pay to the Area Director for the use and benefit of the Lessor, TWO HUNDRED DOLLARS (\$200.00) per acre for each acre and a proportionate amount for each part of an acre within the leased land temporarily or permanently used for mine site construction, or dumping of waste products from in situ recovery subject to the provisions of Article I and Article XI(5) and 25 CFR, Part 216.7 (5). Mine site construction shall not include wellfield or monitor well acreage for the use and production of minerals for which the Lessor will be, is being, or has been paid a production royalty. This amount shall become due and payable at the end of the lease year in which the use of the acreage commences and shall be payable one time only. Before any such use commences, Lessee shall in the plan required in Article XI(5) hereof, furnish to the Secretary a written procedure for restoring the land. The Lessee agrees to pay the Area Director for the use and benefit of the Lessor, TWO HUNDRED DOLLARS (\$200.00) per acre or portion thereof, for roads which cross the leasehold premises to gain access to other parcels of land. This payment is in addition to all other payments required under this lease and is a sum which shall be charged only once for such roadway. The Lessee shall not permit a campsite, permanent housing or community development for Lessee's employees on the lease. The Lessee may establish administrative and operation offices which shall be considered mine site construction.

X. OWNERSHIP OF BY-PRODUCT MATERIAL. Lessee may remove to other lands by-product materials extracted from the leased land or by-product materials which are residual by-products of processed ores from the leased lands; provided, if minerals or by-products are removed or produced from such materials by, or for Lessee, Lessee shall pay Lessor royalty as provided under the provisions of this lease. Lessee shall also have the right to bring any by-product materials, including by-product liquids, from other lands controlled by Lessee to the leased lands for temporary disposition. Upon cancellation, termination, or expiration of the lease, Lessee retains ownership of by-product materials for as long as the Lessee requires to dispose of such materials within the limitations of its license conditions and shall remove them within that time.

XI. PROTECTION OF ENVIRONMENT AND RESTORATION OF SURFACE. The Lessee agrees to preserve and protect the natural environmental conditions of the land encompassed by this lease, or land affected by its exploration or mining operations, and to take such preventative or corrective actions as may be necessary or required by applicable regulations through soil, stream and air pollution control practices as follows:

(1) To conduct operations so as not to permanently pollute any surface or subsurface fresh water supply. Lessee shall have the right, however, to dispose of wastes whether generated on the lease land or on any other leased unit lands within Lessee's control through disposal wells in non-potable aquifers in compliance with applicable existing or future federal and state laws and regulations.

(2) To control water supplies in conformity with all existing or future federal or state laws, and regulations that are applicable to the project, and in all cases to hold erosion and flood damage to a

inimum.

(3) To abide by applicable present and future state and federal laws, and regulations relating to water resource utilization, including those related to quantity and quality of water.

(4) To conduct operations that will minimize air pollution which may result from Lessee's development operations in compliance with all applicable existing or future federal and state air pollution laws and regulations.

(5) As soon as practicable after the issuance of the lease, and before the commencement of any surface-disturbing activities, the Lessee shall submit a plan of operations which shall indicate how the agreed-to stipulations of environmental preservations and reclamation will be carried out. The plan of operations shall be in conformance with applicable provisions of 25 CFR 216.6, 216.7 and 43 CFR 3592.1 and shall be submitted to the Area Director/Area Manager for approval, which review and approval will be provided within 120 days of receipt.

(6) Radioactive by-product material, including contaminated by-product water shall be treated and disposed of utilizing the latest available technology as set forth in the written plan submitted and approved pursuant to Article XI(5).

(7) Within 30 days after the calendar year after an area of mining has been completed, the Lessee agrees to file with the Area Manager and the Area Director, a report showing a plan for the rehabilitation of lands contained within the area mined.

(8) Upon completion of in situ recovery operations and restoration, all drill sites, holes, dumps and surface disturbances of any kind shall be filled in or plugged according to applicable regulations, restored to its approximate original condition so as to blend with the surrounding landscape. Except as otherwise provided in this agreement, all structures, pipes, sidewalks, fences, ditches and other improvements made by Lessee shall be removed and the land restored to its approximate original condition unless the Lessor requests specific improvements to remain, and the improvements can be economically decontaminated so applicable federal and state regulations will permit them to remain. All domestic water wells and utility hookups are to remain unless the Lessor requests that they be removed. Remedial actions to be conducted to meet the standards for Cleanup of Land and Buildings as set forth in 40 CFR 192, Subpart B - Section 192.12 and groundwater protection and restoration to be conducted to meet the existing water quality on the respective aquifers (background) or such other standards as may be set by the Environmental Protection Agency under 40 CFR 264, Subpart 7 - Ground-water Protection. Unless Lessor and Lessee otherwise agree, Lessor shall be responsible for all maintenance, operation and cost of operation of any property remaining on the lease at the request of Lessor upon completion of in situ recovery operations. Federal Environmental Protection Agency (EPA) regulations pertaining to closure performance standard for uranium operations will be applied to include the provisions of 40 CFR 264, Subpart G - Section 364.111.

XII. GOVERNMENT RESERVES RIGHT TO BUY MINERALS PRODUCED. In time of war or other public emergency, any of the executive departments of the United States Government shall have the option to purchase at the posted market price on the day of sale, all or any part of the substance or substances produced under this lease.

XIII. DILIGENCE, PREVENTION OF WASTE. Lessee agrees to exercise diligence in the conduct of prospecting and in situ recovery operations, to carry on development and operations in a workmanlike manner; and to the fullest possible extent, to neither commit, nor suffer to be committed, waste upon the leased land; to comply with the applicable federal and state laws and regulations where the leased land is located; to take appropriate steps to preserve the property and provide for the health and safety of workmen; to surrender and return promptly the leased land upon the termination of this lease to whomever is lawfully entitled thereto in as good condition as when received. If the payments agreed upon by this lease have been complied with, the office fixtures and records, personal property, tools, pumping and drilling equipment, boilers, engines, and mining machinery may be removed by the Lessee at any time before 120 days after the lease expires. All buildings shall remain the property of the Lessor, if allowed under applicable federal and state laws and regulations, unless the Lessor requires the removal of same; in such event the Lessee shall remove the buildings within the aforementioned 120 day period. The Area Director/Area Manager may grant reasonable extensions of time for removal of such equipment and buildings and for restoration and reclamation. Lessor shall be responsible for maintenance, operation and cost of operation of any building remaining on the lease at the request of Lessor after the expiration of the 120 day period.

XIV. FOREST PROTECTION. The Lessee agrees:

(1) To submit in advance to the Area Director for approval, a site development and layout plan, construction plan and any revisions thereto.

(2) Not to cut, destroy or damage timber without prior authorization of the Area Director, such authorization to be made only where required to pursue necessary mining operations.

(3) To pay for all such timber cut, destroyed or damaged at rates prescribed by the Area Director, such rates to be determined on the basis of sales of similar timber in the vicinity.

(4) Not to interfere with the sale or removal of timber from the land covered by this lease by contractors operating under an approved timber sales contract now in effect or which may be entered into during the period of this lease.

XV. DEVELOPMENT. The land described herein shall not be held by the Lessee for speculative purposes, but for in situ recovery of the minerals specified. The Lessee shall spend annually in development and improvements upon the leased land, or for the benefit of the leased land, not less than \$20.00 per acre, of portion thereof. The Lessee shall file with the Area Director an itemized statement, in duplicate, within 90 days after each calendar year, of the amount and character of the development expenditures during the lease year. Such expenditures may include, but are not limited to, amounts spent for exploration, drilling, development, operation, geological and geophysical studies, environmental, engineering and feasibility studies, whether such studies or activities are conducted exclusively with respect to the leased land or in connection with broader geographic areas including the leased land. The statement must be certified under oath by the Lessee or its agent. The expenditure requirements in this paragraph

shall be suspended during the time Lessee's operations are delayed due to permit approvals. If the Lessee fails to diligently develop or operate the in situ operations, or produce minerals therefrom, this lease will be subject to cancellation, except when development, operations or production have been prevented by a strike, an Act of God, administration of judicial restraint not attributable to the Lessee, or other cause beyond the reasonable control of the Lessee, including permit review and approval processes.

XVI. LOGICAL MINING UNITS. In the event two or more leases comprise a single logical mining unit the parties involved agree to unitization of such leases in accordance with maps and plans showing the proposed mining methods and the plant layout which have been submitted by the Lessee and approved by the Authorized Officer of the Bureau of Land Management, hereafter referred to an "Authorized Officer", upon such terms and conditions as may be agreed upon by the Lessor(s) and the Lessee with the concurrence of the Area Director. Lessee shall also have the right, upon approval of the Authorized Officer and the Area Director, to pool all or any part of the leased land with all parts of adjacent or contiguous land whether owned by the Lessor or a third person, and from time to time to explore, drill, operate, produce, extract, remove and transport uranium and associated minerals, provided the area so pooled shall, as nearly as practicable, covers only the delineated ore body from which pooled production is to occur. Lessee shall also have the right, upon approval of the Authorized Officer and the Area Director, to mix or commingle uranium or associated minerals from the leased land or lands pooled or unitized, with like minerals produced from other lands controlled by Lessee for transportation, treating, processing and storing prior to or for the purpose of sale.

XVII. MONTHLY STATEMENTS AND ANNUAL AUDIT. Lessee agrees to keep an accurate record of the in situ recovery operations, showing the sales, prices, dates, purchasers name and address, the quality and amount of all minerals mined and removed, the gross receipts, transportation, in situ recovery costs and to furnish the Area Manager and the Area Director sworn monthly reports thereon before the thirtieth of the succeeding month. Lessee shall perform an audit of its accounts and books annually, or at such other time as may be directed by the Area Director, copies of the audit to be provided by Lessee to the Secretary within 30 days after the completion of each audit. The audit shall be completed within 120 days from the end of each calendar year or 120 days from such other date as the Area Director may designate.

XVIII. REGULATIONS. Lessee agrees to abide by and conform to all the terms of this lease, all the terms of any agreement between the Lessee and the Secretary, and all applicable federal and state laws and regulations now or hereafter in force and relative to such lease including, but not limited to, 25 CFR 212 and 216, and 43 CFR 3590. Lessee's agreement to be bound by future regulations shall not, however, be construed to constitute a waiver of any claim by Lessee that a change in a regulation constitutes a taking of its property requiring the payment of compensation. Rate of royalty, the annual rental or the term of the lease may not be changed by a future regulation without the written consent of the parties to this lease except as provided in this lease. Accounting for all production for this lease will be in accordance with 25 CFR 200, 30 CFR 216 and 218, and all other Minerals Management Service regulations. Portions of this lease written to reflect the language or requirements of existing regulation applicable to operations or obligations of Lessee under this agreement shall be deemed amended to conform to the language or requirements of future amendments or regulations, so the language or requirements of this agreement are no more restrictive or burdensome on Lessee than the language or requirements of such future or amended regulations. Nothing in this lease shall require Lessee to take any action (or not to take an action) which is inconsistent with actions required by other responsible Federal and state regulatory agencies.

XIX. ASSIGNMENT OF LEASE. Except with the approval of the Secretary, the Lessee shall not assign his lease or any interest therein by an operating agreement including agreements providing for payment of overriding royalty. Such approval is not to be unreasonably withheld. The Lessee shall not sublet any portion of this leased land before restrictions are removed, except with the approval of the Secretary. Such approval is not to be unreasonably withheld. If this lease is divided by the assignment of the entire interest in any part of it, each part shall be considered a separate lease under all the terms and conditions of the original lease, except for normal bank collateral.

XX. LIQUOR/ILLEGAL DRUGS. The Lessee, its agents, employees or contractors, further agree that it will not use or permit to be used any part of said leased land for any unlawful action, conduct or purpose whatsoever, including the usage of any illegal drug of whatever nature, also, that it will not use or permit to be used any part of said leased land for the manufacture, sale, gift, transportation, drinking or storage of intoxicating liquors or beverages of whatever nature in violation of existing laws relating thereto. Lessee agrees to notify the Area Director of any person or persons found in violation of this paragraph. Lessee understands that any violation of this clause by the Lessee with its knowledge, shall render this lease voidable at the option of the Area Director.

XXI. INSPECTION. The leased land, appurtenances, and all books and accounts of the Lessee pertaining to the leased lands or Lessee's operations thereon may be inspected by the Lessor, his agents, or the Secretary at any reasonable time and at Lessor's and his agent's risk and expense.

XXII. DISPOSITION OF MINERALS AND SURFACE.

(a) The Lessor expressly reserves the right to lease, sell or otherwise dispose of the minerals not subject to this lease and the surface of the land in this lease under existing law or laws hereafter enacted, provided, however, that no oil rights or installations of any kind shall be situated so as to unduly interfere with Lessee's right to carry on its in situ recovery operations and related activities; and provided further, that no well may be drilled for oil or gas at any location which, in the opinion of the Area Manager of the Bureau of Land Management, would result in undue waste of mineral deposits or constitute a hazard or interfere with in situ recovery operations being conducted by Lessee on the leased land. There is further reserved to Lessor, after consultation with Lessee the right to construct, use and maintain canals, pipelines and siphons on and across said lands; provided such use and facilities will not unreasonably interfere with Lessee's in situ recovery operations and rights under this lease.

(b) Notwithstanding any other provision of this lease, the Lessor reserves the right without liability of any kind, except as provided in this lease, to grant to qualified applicants rights-of-way for pipelines for the transportation of oil, gas, helium or petroleum products, or for power lines, telephone, telegraph and water lines ("lines") or roads, across the lands embraced in this lease, upon the conditions that prior to the granting of any such right-of-way the applicant, as a condition precedent to such grant, shall file with the Area Director the following expressed undertaking in writing for the express benefit of Lessee:

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1. That applicant will either bury the lines to a sufficient depth or at a place to be designated by Lessee, construct and maintain, at applicant's expense, a ramp, so that loaded vehicles, including Lessee's heavy mining equipment, may pass unhindered over said line. Whenever said line is relocated pursuant to subsection (2) of this section (b) of this Article XXII, applicant will either bury the relocated line or promptly construct and maintain, at its own expense, a suitable ramp in a new place designated by Lessee. Lessee shall not be responsible for damage to said line caused by such vehicles and equipment crossing said lines.

2. That applicant will make adequate provision in the construction of said line, so that, in the event it is determined by Lessee that in situ recovery operations should be conducted within the area of the right-of-way or that a power or industrial plant or other building should be built in such area, the line can be expeditiously relocated so as not to interfere with Lessee's operations; and applicant shall make such relocation, including any necessary bridging, at its own expense, within six (6) months from receipt of notice in writing from Lessee requesting such relocations. If applicant fails to make such relocation within such six (6) month period, Lessee may relocate the line without liability and at the expense of applicant.

3. Applicant will, at all times, keep, maintain and repair at its own expense, the portion of the line crossing the leased land in such condition as not to injure, endanger or interfere with Lessee or any person or property on or about the leased land.

4. That applicant shall be responsible for any damage, loss of property, injury or death of any person directly or indirectly caused by the enjoyment of line rights, and shall hold Lessee harmless and indemnify it against and all claims therefore; and shall further hold Lessee harmless from and indemnify against damage to or loss of property belonging to applicant or injury to or death of any person on or about the line crossing on behalf of or at the invitation of applicant.

5. That applicant shall specify in writing to the Lessee the address to which all notices and requests may be mailed.

(d) Lessor agrees that:

1. Rights-of-way for lines, roads and other purposes granted across the leased land shall be of such widths as will accommodate themselves to Lessee's permitted use of the leased land.

2. Lessee shall be given timely written notice by the Area Director of any application for rights-of-way over the leased land before the same are granted.

3. An executed duplicate of the undertaking specified in section (c) above and a true copy of the grant of rights described therein shall be furnished Lessee upon the granting of an application of rights over the leased land.

XXIII. SURRENDER AND TERMINATION. The Lessee may surrender this lease by filing with the Area Director on or before anniversary date of the lease a written relinquishment. If the lease has been ordered, the Lessee must file a recorded release with the Area Director on or before the anniversary date of the lease. The relinquishment shall become effective on the date it is filed with the Area Director, subject to continued obligation of the Lessee and his surety to pay all accrued rentals, royalties, and other payments

due and to recondition the premises in accordance with the terms of this lease and the regulations. The Lessee shall, within 30 days after the termination of this lease, furnish the Area Director and Area Manager detailed written reports of the exploration done and all information concerning the nature and value of the minerals. All rights of Lessor and obligations of the Lessee shall survive any surrender or termination of this lease, including, but not limited to, restoration and reclamation of the properties by law and terms of the lease.

XXIV. RELINQUISHMENT OF SUPERVISION BY THE SECRETARY OF THE INTERIOR. Should the Secretary at any time during the life of this instrument, relinquish supervision as to all or part of the acreage covered hereby, the relinquishment does not bind the Lessee until the Secretary has given 30 days written notice. Until all the requirements for termination of supervision by the Secretary are fulfilled, Lessee shall continue to make all payments due under Article IV, V and VII. After notice of relinquishment has been received by Lessee, this lease is subject to the following further conditions:

1. All rentals and royalties accruing shall be paid directly to Lessor or its successor in title.
2. If at any time supervision is relinquished by the Secretary as to all lands under this lease, and the Lessee has made all payments due under the lease and has fully performed all obligations on its part to be performed up to the time of such relinquishment, then the name of the obligee on the bond given to secure the performance of the lease and on file with the Area Director shall be changed to the Lessor who holds title of record.

XXV. DOMESTIC WATER WELLS. Upon approval of the Lessor and the Area Director, the Lessee may, at its own option and expense, drill and equip domestic water wells on the leased land. The Lessee agrees that at the termination of this lease, all domestic water wells with potable water shall be left intact and properly cased upon written request of Lessor and approval of the Agency Superintendent. Lessee may remove all mechanical pumping equipment installed by Lessee at any well within 120 days after expiration of the lease, including any additional periods allowed by the Area Director for restoration or reclamation. Otherwise such equipment shall become the property of the Lessor. Lessee and Lessor agree to abide by all applicable federal and state laws, regulations, and rules regulating the use of water.

Lessee recognizes that its rights to use water from the leased premises and the Crownpoint area are not paramount to any pre-existing user rights to the Lessors and community of Crownpoint. To protect these rights, Lessee gives its assurance to the Bureau that it will take whatever corrective measures are reasonably necessary to mitigate impairment of Crownpoint's water supply which would be caused by Lessee's uranium development operations as follows:

- (a) Lessee will take reasonable corrective measures based on a hydrological model of the Crownpoint area prepared by expert consultants, utilizing consultants recommended by Lessee and approved by the Area Manager and Area Director. This model in addition to all other factors will take into account the impairment that will be caused by in situ recovery solution methods as may be used by Lessee in its development operations.

(b) As permitted by the Area Director and Navajo Tribal Utility Authority (N.T.U.A.), and other well owners, lessee will monitor existing Crownpoint community and private water supply wells located on lands leased by Lessee, and, where necessary to maintain existing supplies, Lessee will work over such wells or lower or exchange existing pumps; or truck in replacement water to Crownpoint water storage tanks; or increase Crownpoint water storage capacity; or convert existing Lessee-owned water wells to Crownpoint water supply purposes; or drill additional water wells; or otherwise replace the water supplies lowered by Lessee's Crownpoint activities. Lessee is not limited to these measures but may elect alternate measures with approval of the N.T.U.A. and Area Director.

(c) On the conclusion of a collective Crownpoint water agreement among Lessee, other companies in the Crownpoint area, the Department of Interior and the NTUA, the terms of the collective water agreement will be incorporated into this lease agreement and shall supersede Article XXV(a) and (b) of this lease agreement.

XXVI. OPERATIONAL WATER WELLS. It is further agreed, that in order for Lessee to properly explore, in situ mine and develop the uranium potential of the mineral estate covered by this lease including restoration, Lessee may, at its own option and expense, drill and equip operational water wells on the leased land for other than domestic use. From these wells Lessee shall have the use of water (except water from Lessor's domestic wells, tanks and reservoirs) for all in situ recovery operations hereunder. However, Lessee shall also the right to test water from such domestic sources. In the event water from Lessor's domestic wells, tanks or reservoirs is required for mining or restoration operations, or in the event that these operations affect Lessor's domestic or stock water wells, tanks or reservoirs, Lessee will negotiate with Lessor for any damages caused Lessor by such use, or shall, at no cost to Lessor provide potable water to Lessor in equal or greater quantities from another well or source. At the termination of this lease, including any additional periods allowed by the Area Director for restoration or reclamation, Lessee shall remove all mechanical pumping equipment installed by Lessee at all operational water wells within 120 days and all such wells shall be plugged and abandoned according to applicable state and/or federal regulations. Lessee and Lessor agree to abide by all applicable federal and state laws, regulations, and rules regulating the use of water. Future maintenance shall be the local users' responsibility.

Exploration, solution mining and restoration operations wherever situated on the leased land shall be conducted so as not to damage or destroy any water supply constructed by Lessor. In the event, however, that such activity should result in damage to or in destruction of any constructed water supply, if feasible in the opinion of Lessee, the Lessee at his option, shall repair, restore or replace any such well, tank, reservoir or other water facility damaged or destroyed, with reasonable diligence and dispatch, weather permitting, or, if not feasible, then Lessee shall pay to Lessor a reasonable compensation for any such damage so sustained. Any such water facility so repaired, restored or replaced shall be of a capacity and quality equal to that which was damaged or destroyed. Any claims for such damage or destruction MUST be made within two (2) years following the termination of this lease.

XXVII. DAMAGES. The Lessee and all of his contractors and subcontractors shall conduct all operations authorized by this lease, including construction, operations or maintenance of any of the facilities on or connected with this lease, so as to prevent unnecessary damage to natural resources, improvements and the environment. On termination of operations under this lease, including restoration, the Lessee shall make appropriated provisions for the conservation, repair and protection of the property and leave all the areas on which the Lessee has worked in a safe condition, not hazardous to life and limb, in accordance with applicable laws and regulations, all to the satisfaction of the Lessor and the Area Director.

XXVIII. LIABILITY FOR DAMAGE. The Lessee and all of his contractors and subcontractors are liable for any and all damages resulting from its operations under this lease, including injury to the Lessor, the tenants, licensees and surface owners, and for any and all damages to or destruction of all property, caused by the Lessee's operations hereunder. The Lessee agrees to save and hold the Lessor and the United States, their employees, licensees, and the surface owner or their tenants harmless from all suits for injury or claims for damages to persons and property resulting from the Lessee's operations under this lease.

XXIX. ROADS. The Lessees may use existing roads, if any, on the leased land. On application, duly approved in writing by the Lessor and the Area Director, the Lessee shall be entitled to construct and maintain, at its own expense, any additional roads on the leased land necessary for exploration and in situ recovery. No part of any such road shall inure to the benefit of the public, and the public shall obtain no rights thereon. If at any time the Lessee does not require the use of any such road for the operations authorized under this lease or upon termination of this lease for any cause whatsoever, the right to use any such road shall cease, and the road surface shall be restored to its approximate original condition unless otherwise agreed, and all the rights and obligations, including maintenance, shall revert in Lessor in accordance with law. The Lessee shall hold the Lessor and the United States harmless and indemnify them against any loss or damage that might result from the negligent construction or maintenance by Lessee of the road. Lessor and any and all agents for the United States have the right, at his own risk, to use any such road so constructed by Lessee so long as their use does not interfere with the Lessees use thereof.

A. For the purposes of this agreement, the term "existing roads" is defined as follows:

(1) Unimproved, off system roads, - dirt roads and trails which are not on the Navajo Indian Reservation and Allotted Lands Road System and do not appear on the road inventory maintained by the Navajo Area Branch of Roads.

(2) Unimproved, BLA system roads - dirt roads which are on the Navajo Indian Reservation and Allotted Lands Road System and appear on the road inventory maintained by the Navajo Area Branch of Roads. These are roads for which the Bureau of Indian Affairs has the responsibility for construction and maintenance.

(3) Improved, BLA system roads - paved, all-weather roads which are on the Navajo Indian Reservation and Allotted Lands Road System and Appear on the road inventory maintained by the Navajo Area Branch or Roads. These are roads for which the Bureau of Indian Affairs has the responsibility for construction and maintenance.

B. The Lessee shall assume the responsibilities for existing roads as stipulated below:

(1) Unimproved, off system roads within the lease area -- Improvements, rerouting, and maintenance may be accomplished as the Lessee desires, provided the facility shall be kept safe for use and crossing by local inhabitants and livestock.

Upon completion of the project, the road shall be obliterated, contoured, revegetated or restored to as near its original condition as possible so as to blend with the surrounding landscape unless requested by the Lessor in writing, to be left for Lessor's use. If so required, the road shall be left in the same condition to which it was improved for use by the Lessee. All materials, such as, but not limited to, drainage structures, fencing and gravel shall be left in place. Future maintenance shall not be the responsibility of the Lessee.

(2) Unimproved, off system roads outside the lease area -- roads used, constructed, improved and/or maintained shall be subject to acquisition of right-of-way as set forth in 25 CFR, Part 169 -- Right-of-Way Over Indian Lands. Unless otherwise provided in a right-of-way granted to Lessee, these roads shall be subject to the same use and maintenance provisions as unimproved, off-system roads within the lease area.

(3) Unimproved, BIA system roads both within the outside the lease are that portion used by the Lessee -- Maintenance of these roads, to the extent repairs are required as a result of Lessee's operations, shall be the responsibility of the Lessee for the duration of the project.

Major improvements to these roads shall be made only after consultation and written approval of the Navajo Area Road Engineer and the Area Director.

Upon completion of the project the road shall be left in a conditions equal to or better than those adjacent portions of the road for which the Lessee was not responsible. All drainage structures, fencing, surfacing materials and other materials which were necessary for full usage of the road by the Lessee shall remain in place and become property of the U.S. Government.

(4) Improved, BIA system roads both within and outside the lease area (the portion used by the Lessee) -- The lessee shall be responsible, to the extent repairs are required as a result of Lessee's operations, for maintenance of the road for the duration of the project. Responsibility for repairs shall include all work necessary (patching, overlays, seal coats, etc.), to keep the road in equal to or better condition than those adjacent portion of road. The Lessee shall also replace or repair all structures (pipe, cattle guards, fences, etc.), to which damage occurs as a result of Lessee's operations. Open access to the general public must be maintained at all times, except during periods of maintenance. Upon completion of the project, the road shall be left in a condition equal to or better than those portions of the adjacent road for which the Lessee was not responsible.

XXX. INDIAN LABOR. To the extent allowed by applicable federal laws, the Lessee shall give a priority right of employment and training to the Lessor, and members of Lessor's immediate family, and other members of the Navajo Nation for all positions for which they are qualified and available and shall pay the competitive wage rates for similar services in the area.

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Upon initial hiring and whenever thereafter a job opening occurs, the Lessee, its contractors and subcontractors shall give written notice of such opening to the Agency Superintendent, the Area Director and the President, Navajo Nation. Such notice shall state the position(s) open, the time and place where applications will be accepted and the place where additional information can be obtained. Lessee agrees to give priority to employment and training of Lessor or Lessor's immediate family and other Navajo Indians for skilled and unskilled, technical and other higher jobs in connection with Lessee's operations under this lease. Except in cases of emergency, no non-member of the Navajo Nation shall be hired for any job until 5 working days have passed, excluding weekends and holidays, following the delivery of such notice to the Agency Superintendent, the Area Director, and the President, Navajo Nation.

XXXI. INSURANCE, SOCIAL SECURITY, AND TAXES. The Lessee agrees to carry insurance covering all persons working in, on or in connection with the leased land for the Lessee as will fully comply with the provisions of the statutes of the State of New Mexico covering workmen's compensation and occupational disease, as are now in force or as may be amended. Further, the Lessee agrees to comply with all the terms and provision of all applicable laws as they now exist or they may be amended, pertaining to Social Security, unemployment compensation, wages, hours and conditions of labor; and to indemnify and hold the Lessor and the United States harmless from payment of any damages occasioned by the Lessee's failure to comply with these laws. The Lessee shall pay all taxes lawfully levied or assessed on the sale, severance, production, extraction or removal of any of the minerals covered by this lease. The Lessee shall remain solely liable and shall hold the Lessor and the United States harmless for failure to pay taxes or any cost covered in this paragraph.

XXXII. HEIRS AND SUCCESSORS IN INTEREST. It is further covenanted and agreed that each obligation under this lease shall extend to and be binding upon, and every benefit hereof shall inure to the heirs, executors, administrators, successors of or assigns of the parties to this lease.

XXXIII. GOVERNMENT EMPLOYEES CANNOT ACQUIRE LEASE. No lease, assignment thereof or interest therein, will be approved to any employee or employees of the United State Government whether connected with the Bureau of Indian Affairs or otherwise, and no employees of the Interior Department shall be permitted to acquire any interest in such leases by ownership of stock in corporations having leases or in any other manner.

XXXIV. PENALTIES. Failure of the lessee to comply with any provision of this lease, or the regulations contained in 25 CFR 211 and 212 and 216, and 43 CFR 3590, lawful orders of the Area Director, or his representative, or the Area Manager or his representative shall subject the Lessee to a penalty pursuant to the regulations contained in 25 CFR 212 as amended, or any other relevant penalty provisions contained in the Department of the Interior's regulations.

XXXV. CANCELLATION AND FORFEITURE. When, in the opinion of the Secretary, there has been a violation of any of the terms or conditions of this lease before restrictions are removed, the Secretary has the right, pursuant to the provisions for cancellation and forfeiture contained in 25 CFR Part 212, to declare this lease cancelled. Any rights or duties of the Lessor or Lessee accruing prior to the date of cancellation shall remain in full effect and shall be actionable after such cancellation.

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XXXVI. OBLIGATIONS. While the leased land is in trust or restricted status, all of the Lessee's obligations under the lease and the obligations of his sureties, are to the United States as well as the owners of the land.

XXXVII. PAYMENTS. Prior to first production all bonus, rental payments, and minimum royalty, shall be made to the Area Director. Once production has been established, all rental and royalty payments shall be made to the Minerals Management Service pursuant to its regulations found in 30 CFR Chapter II. Any payments to be made to the Area Director which are not paid in a timely manner in accord with the provisions of this lease, shall bear interest at five percent (5%) over the prime rate quoted by Chase Manhattan Bank in New York City or at 18% per annum, whichever is greater, from the date payments became due until paid and such payments shall not provide exclusion from any default provision of the lease.

XXXVIII. CONFIDENTIALITY. To the extent allowed by law, all geologic and financial information required by this agreement to be submitted by Lessee to employees of the Bureau of Indian Affairs or Bureau of Land Management or Lessor and marked "Confidential" by Lessee shall be considered proprietary and shall be kept confidential by the recipient. Such information shall not be released to any employee or consultant of the recipient not required to use it in the exercise of official function. The information shall not be copied or released to any other person or copied without the prior written consent of Lessee, who can release it if they so choose.

XXXIX. NOTICES AND PAYMENTS. All notices, payments and demands shall be sent to the addresses herein recited or to such address as the parties may hereafter designate in writing.

Area Director
Bureau of Indian Affairs
Navajo Area Office
Window Rock, AZ 86515

Area Manager
Albuquerque District Mining Office
Rio Puerco Resource Area
Bureau of Land Management
P.O. Box 6770
Albuquerque, New Mexico 87107

Agency Superintendent
Bureau of Indian Affairs
Eastern Navajo Agency
Crownpoint, New Mexico 87313

XL. COUNTERPART LEASE DOCUMENTS. This lease agreement may be signed by Lessee and individual Allottees or heirs of original allottees as the case may be, in multiple original counterparts, identical except for such signatures. Approval of any signed counterpart by the Area Director shall constitute approval of this lease agreement with respect to the interest of the person, or persons who signed such counterpart. However, the Area Director reserves the right to consolidate all signature pages to one original lease document for his administrative records.

XLI. HEADINGS. The division of this lease agreement into Articles and the insertion of headings are for convenience of reference only and shall not affect the construction or interpretation of the language of this agreement.

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XLII. **FORCE MAJEURE.** The Lessee shall not be subject to any liability or to the loss or forfeiture of any rights hereunder, for failure to carry out the provisions hereof, and all obligations of the Lessee hereunder shall be suspended, during the time and to the extent that such failure shall be due to: laws, regulations or orders promulgated by or the conflicting requirements of any governmental agency or court; the absence of any required license, permit or other consent or permission; the action, judgment or decree of any governmental agency or court; floods, storms, fires, acts of God or public enemies, strikes, insurrections, labor troubles, freezing of wells, breakdown or failure of plant or machinery, failure of manufacturers to deliver material or of carriers to transport the same; or any other cause whether similar or dissimilar to those hereinabove enumerated, over which the Lessee reasonably has no control and which forbids or prevents the performance of all or any provision hereof. This provision shall not affect or be construed to compel the Lessee to settle any labor dispute contrary to its wishes.

XLIII. **ROYALTY ADJUSTMENT.** The royalty, minimum royalty, and rental provisions shall be subject to review and adjustment three(3) years after production commences and every three (3) years thereafter.

1. The Navajo Area Office will conduct a preliminary review and if determination is made that an upward adjustment is necessary, then a recommendation will be submitted to a committee for review. This committee will be comprised of representatives from the Bureau of Indian Affairs, Navajo Area Office; Bureau of Indian Affairs, Energy and Minerals, Lakewood, Colorado; Minerals Management Service, Lakewood, Colorado; and Bureau of Land Management, Albuquerque, New Mexico.
2. The Navajo Area Director will then issue a royalty adjustment determination. Any decision is to be reasonable, economical and practical, and based on future information. The Area Director will specifically include the value of Lessee's use of water in its determination of any necessary royalty or rental adjustments.
3. The company will voluntarily make any and all operations information available to the committee for aid in rendering a decision. This information will be treated as proprietary/confidential.

XLIV. **APPEALS.** Appeals from decisions of Bureau of Indian Affairs officers may be taken pursuant to 25 CFR Part 2.

IN WITNESS WHEREOF, the said parties have hereunto subscribed their names and affixed their seals on the day and year first above mentioned.

Two Witnesses to Execution by Lessor: Mae J. Nez
Isabel B. Healy Mae J. Nez (Seal)

P.O. bln Gallup, N. Mex 87305

Carlson Tom

Mae J. Nez 87719 (Seal)
Box 341 Crownpoint, NM 87313

P.O. Box 1060 Gallup NM

Two Witnesses to Execution by Lessee:

Carlson Tom

By: Charles K. [Signature] (Seal)
Hydro Resources, Inc. a
Delaware Corporation
Land Manager

P.O. Box 2354 Window Rock Az

Isabel B. Healy

P.O. Box 462 Window Rock Az

Attest: [Signature]

State of New Mexico)

County of McKinley)

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ACKNOWLEDGEMENT OF LESSOR

Before me, a notary public, on this 11th day of August, 1994, personally appeared [Signature] to me known to be the identical person who executed the within and foregoing lease, and acknowledged to me that [Signature] executed the same as [Signature] free and voluntary act and deed for the uses and purposes therein set forth.

[Signature]
Notary Public

My commission expires: August 1995

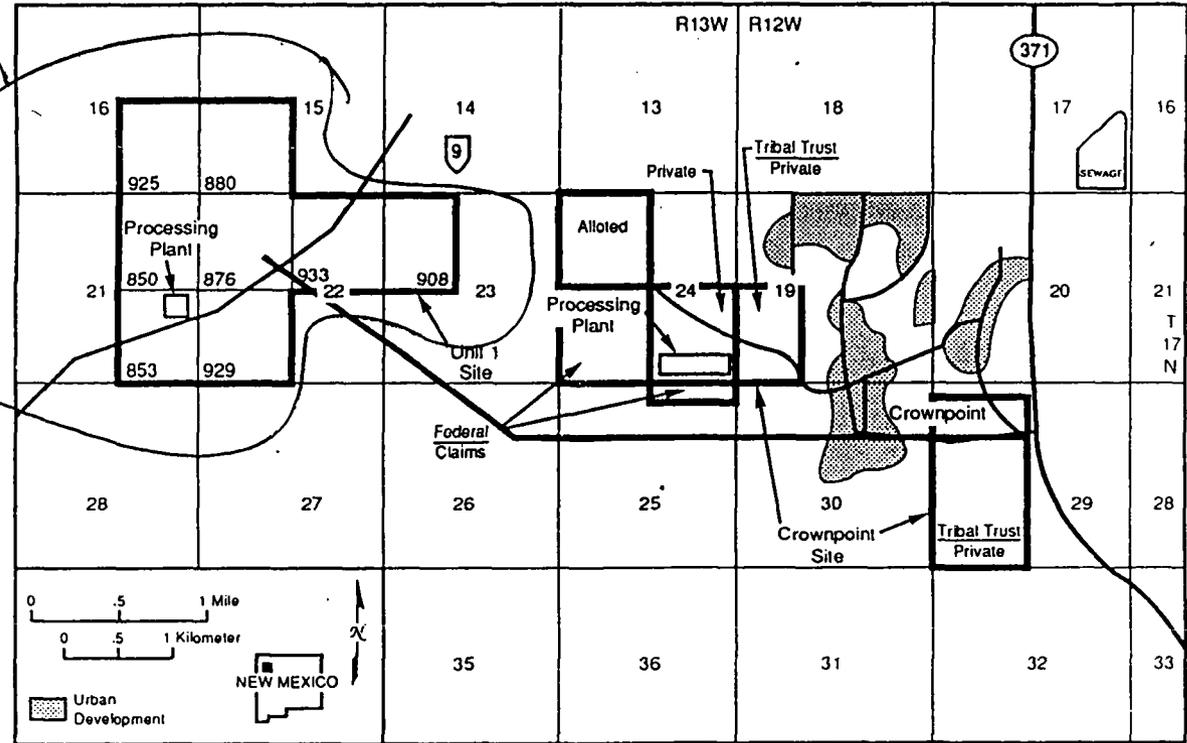


Figure 2.9. Land and minerals status: in Unit 1 showing allotment numbers; in the Crownpoint leases showing surface ownership above minerals ownership, if different.

Unit 1

2-27

NUREG-1508

Alternatives Including the Proposed Action

Projected Navajo employment during operations at the Church Rock site is 44 (Table 4.27). Based on the Church Rock Chapter's 1993 estimated population and the 1990 Navajo average labor force participation rate for McKinley County, this would represent about 6.1 percent of the Church Rock Navajo labor force. If this employment went to persons in the Church Rock community it could result in a significant reduction in unemployment. Potential earnings from the Church Rock site would be about 12 percent of estimated Navajo earnings in the Church Rock Chapter. Some of the employment for the Church Rock site could go to Navajo from the Crownpoint Chapter because of the advantage in retaining experienced employees for operations at Unit 1 and Crownpoint. Conversely, any employees hired from the Church Rock community could continue employment for operations at Unit 1 and Crownpoint. It should be noted that operations at Church Rock are projected to last for only about 6 years, compared to 17 years at Unit 1 and 15 years at Crownpoint.

Estimated long-term earnings from the proposed project would represent an insignificant percentage of McKinley County income (approximately 0.9 percent). However, as indicated in Table 4.28, it could be a significant percentage of earnings within the local community. In addition to earnings from employment, allotment owners that have royalty agreements could make significant incomes depending on the production and price of yellowcake. Although significant in terms of local community earnings, royalty income would tend to benefit a very small part of the community because it would be concentrated on about nine allottees who own the property leased to HRI.

Table 4.28. Potential employment and income effects on the Crownpoint Chapter

Average project earnings for all workers	\$28,000
Average project earnings for existing residents	\$24,000
Project employment as a percentage of estimated total Crownpoint Chapter employment	11.9%
Estimated annual long-term earnings from project for local community members	\$2,400,000
Project income as a percentage of estimated total Crownpoint Chapter income	18.3%
Estimated annual royalty income to Crownpoint Chapter Residents (allotees for Unit 1 properties; based on Unit 1 recovery of 1 million lbs. per year at \$20 per lb).	\$1,099,000
Estimated annual royalty income to Crownpoint Chapter Residents as a percentage of total Crownpoint Chapter income	8.4%
Estimated total earnings and royalty income from the project as a percentage of estimated total Crownpoint Chapter income	26.7%

Note: The estimates contained in this table are intended to provide perspective on the potential effects of the proposed project on local employment and income. The estimates are not certain projections of what will actually happen. Many factors could decrease actual project effects, including hiring from outside local communities and reduced operating levels.

Sources: Crownpoint Chapter total employment estimate based on Crownpoint Chapter estimated 1993 population and average labor participation rates for McKinley County's Native American population reported in the 1990 U.S. Census. Crownpoint Chapter total income estimate based on Crownpoint Chapter estimated 1993 population and average Native American per capita income for McKinley County. Potential employment and income assumes that 100 Navajo residents of the Crownpoint Chapter would receive long-term employment.

State of Ill)
County of Will) ss

Before me, a notary public, on this 10th day of April, 1994, personally appeared William F. Viator, lessor, to me known to be the identical person who executed the within and foregoing lease, and acknowledged to me that PI executed the same as PI free and voluntary act and deed for the uses and purposes set forth.

My commission expires: 1995

William F. Viator
(Notary Public)

State of _____)
County of _____) ss

Before me, a notary public, on this _____ day of _____, 19____, personally appeared _____, lessor, to me known to be the identical person who executed the within and foregoing lease, and acknowledged to me that _____ executed the same as _____ free and voluntary act and deed for the uses and purposes set forth.

My commission expires: _____

(Notary Public)

State of _____)
County of _____) ss

Before me, a notary public, on this _____ day of _____, 19____, personally appeared _____, lessor, to me known to be the identical person who executed the within and foregoing lease, and acknowledged to me that _____ executed the same as _____ free and voluntary act and deed for the uses and purposes set forth.

My commission expires: _____

(Notary Public)

THIS LEASE AND AGREEMENT dated this 11 day of May, 1994, between Charles H. Plato, V., 4306 Hickory Rd., Richmond, Virginia 23235, Clark C. Plato, P. O. Box 1999, Corpus Christi, Texas 78403, David L. Plato, 3718 Storm Creek Drive, Houston, Texas 77077, Francis M. Plato, 5107 Maple Springs Boulevard, Dallas, Texas 75235, William R. Plato, Jr., 11931 Drexel Hill, Houston, Texas 77077, Sandra Kinman, 2703 Cavileer Avenue, Austin, Texas 78757 (hereinafter individually or collectively referred to as "Lessor"), and URI, Inc., 5656 S. Staples, Suite 250, Corpus Christi, Texas 78411, a Delaware Corporation authorized to do business in the State of Texas, (hereinafter referred to as "Lessee").

WITNESSETH

That in consideration for Ten Dollars (\$10.00) and other good and valuable consideration paid by Lessee, the receipt and sufficiency of which is hereby acknowledged by Lessor, and in future consideration of the Royalties herein provided and the agreements of the Lessee herein contained, grants, leases and lets unto Lessee, to the extent Lessor has said rights now or in the future, the land covered hereby (hereinafter referred to as "Leased Land") with the right of ingress and egress for the purposes hereinafter specified, the following described land in Kleberg County, Texas, containing 160 acres, more or less, TO-WIT:

Being all of Farm Lots 9, 10, 15 and 16, Block 36, Kleberg Town and Improvement Company Subdivision, Kleberg County, Texas, as per map or plat of said Subdivision recorded in the Map Records of Kleberg County, Texas.

1. Said property is leased for the purposes of investigating, exploring, prospecting, drilling, solution mining, producing, extracting, milling, treating, processing, upgrading, removing, transporting, stockpiling and storing uranium, thorium and other fissionable or spatially associated substances similar to and produced in conjunction with those mentioned above (hereinafter referred to individually or collectively as "Leased Substances") by methods deemed desirable by Lessee; but excluding sand, gravel, and caliche unless produced in connection with those mentioned; SPECIFICALLY EXCLUDING oil, gas and associated hydrocarbon substances. Lessor further grants, leases and lets unto Lessee the Leased Land for the purposes of injecting gas, water or other fluids commonly associated with solution mining practices, air and any other substance into the subsurface strata, conducting all types of solution mining recovery operations for the Leased Substances; establishing and using facilities for the disposition of solution, tailings and other waste materials produced in the extraction of the Leased Substances, laying pipeline, building roads, bridges, tanks, power and telephone lines, electric and distribution lines and other utilities together with the maintenance and removal thereof, mills or processing structures or facilities deemed reasonably necessary by Lessee to conduct solution mining, recovery and restoration operations granted under this lease.

Notwithstanding, however, the general provisions of the foregoing paragraph, it is further agreed and stipulated as follows:

The facilities to be placed on the Leased Premises shall be confined to those facilities reasonably deemed necessary or convenient by Lessee for exploring, prospecting, mining, stockpiling, storing, processing, treating upgrading, removing and transporting the Leased Substances. Lessee is hereby granted the right, without any further consideration or payment, to use the Leased Premises and other improvements and facilities on, in or under the Leased Premises for or in connection with the mining,

removing, transporting, preparation and treatment of minerals, metals and materials (and disposal of waste materials into a waste water disposal well at a site at Lessee's choice) from adjacent lands, and lands in the areas of interest, and to construct and use additional facilities on the Leased Premises for said purposes and these rights shall survive termination of this lease for so long a period of time as Lessee has need for all or any of them.

2. Subject to the provisions herein contained, this lease shall remain in force for a term of FIVE (5) years from the date first written above (hereinafter referred to as the "Primary Term") and so long thereafter as uranium or any of the other Leased Substances is produced in paying quantities from said Leased Land or land with which said Leased Land is pooled, and/or as long thereafter as this lease may be maintained in force and effect under any of the other provisions herein contained. Paying quantities being defined as production in quantities sufficient to yield a profitable return to Lessee in excess of drilling, development and operation costs set solely at the discretion of the Lessee.

3. Lessee shall pay to Lessor a royalty for uranium or other Leased Substances mined by Lessee from the Leased Land or land pooled therewith and saved and removed therefrom and sold, or processed and sold, by or for Lessee, the total amount of which royalty, subject to the pooling provisions contained in paragraph 10 and any advance payments made under paragraph 5.

- a. For all such uranium-bearing solutions the royalty reserved to Lessor shall be Six and One Quarter Percent (6 1/4%) of the net proceeds received by Lessee for such solution after deducting Lessor's proportionate share of the actual transportation costs from the mill site on the Leased Land or land pooled therewith to the point of sale.
- b. In the event Lessee recovers and markets valuable constituents other than uranium from said uranium-bearing solutions as by-products during the processing of such solutions, the Lessor shall receive as royalty Five Percent (5%) of the value of such Leased Substances in raw, crude form before any processing or beneficiation, less any cost incurred by Lessee in transporting such ore to the point of sale or processing.

PRICE

For any sales pursuant to this lease, and as long thereafter as sales are made, the contract sale price per pound of uranium will be escalated or adjusted as follows:

$$\text{Contract Sale Price X } [1 + \frac{(C2 - C1)}{C1}]$$

where,

C1 = The Consumer Price Index as published monthly by the United States Bureau of Labor Statistics for the month in which the lease is made.

C2 = The closest calendar month reported in the Bureau of Labor Statistics for the month prior to each Account to Account Transfer for which the Contract price is being calculated. The value for C2 in this calculation shall not be revised to reflect any changes or adjustments by the United States Bureau of Labor Statistics made subsequent to the receipt by Buyer of the invoice sent pursuant to seller having issued an invoice to Buyer for 100% of the product.

The above listed Royalty percentages will be paid based on the actual net sales proceeds received by Lessee for yellowcake, or

slurry, sold and delivered through an arms length transaction. An arms length transaction shall be deemed to be a bona fide transaction with a third party purchaser, not an affiliate, subsidiary or parent of Lessee, or other entity in which Lessee has a financial interest by stock ownership or otherwise of Ten percent (10%) or more.

All royalties which are due and payable under the terms of this lease, shall be paid within sixty (60) days after the end of the calendar month within which Lessee receives the proceeds from the sale of the uranium or other Leased Substances, which payment shall be subject to adjustment, by addition to or deduction from royalty due, as a result of actual sale assay. Lessee's failure to pay or tender or timely pay or tender any sum as royalty, shall render Lessee liable for the amount due plus simple interest of Twelve Percent (12%), but shall not operate as a forfeiture or to terminate this lease.

4. Lessee shall use reasonable diligence to sell the uranium or Leased Substances and any of them, on which royalty is payable under the terms of this lease, but in the exercise of such diligence Lessee shall not be obligated to sell the same, or any of them, under terms, conditions or circumstances which in the Lessee's judgment, exercised in good faith, is not in its best interest.

5. If Lessee, through the drilling of a well or wells has discovered uranium or other Leased Substances on said Leased Land or on land pooled therewith, which in Lessees' opinion is capable of being produced in commercial quantities, but is not being produced and this lease is not being maintained otherwise as provided herein; or if Lessee after commencement of production, periodically suspends production or sales and stockpiles uranium or other Leased Substances for lack of a market reasonably satisfactory to Lessee, as determined by Lessee in its sole discretion, then this lease shall not terminate whether it be during the Primary or Renewal Term (unless released by Lessee), and it shall nevertheless be considered that uranium or other Leased Substance is being produced in paying quantities from said Leased Land provided a Shut-in Royalty is paid. When the lease is continued in force in this manner, Lessee shall pay or tender as a Shut-in Royalty to the parties who at the time of such payment would be entitled to receive Royalty hereunder if production were then occurring, a sum of ten dollars (\$10.00) per acre on the number of acres subject to this lease at the time such payment is made for each lease year, or portion thereof, that this lease is not otherwise maintained. When the above Shut-in payment is made, it shall serve to extend the term of said lease for one (1) year from the date said payment is made, whether in the Primary or Renewal Term. The first payment of such sum shall be made on or before the first day of the calendar month after ninety (90) days from the date the lease is not otherwise maintained and thereafter annually on or before each succeeding anniversary date of such payment. Payments made as Shut-in Royalty under this paragraph shall be made as advance minimum royalty and after royalty begins to accrue hereunder, Lessee may offset royalty owing to Lessor by deducting the abovementioned advance minimum royalty. Advance minimum royalty shall constitute prepayment of, and advances against royalty accruing at any time hereunder and Lessee may recover all advance minimum royalty by crediting it against and in reduction of royalty becoming due at any time until all advance minimum royalty has been recovered by Lessee.

6. If mining operations are not commenced on said Leased Land or on land pooled therewith on or before one (1) year from the date first above stated, this lease shall terminate unless on or before such date Lessee shall pay or tender, or make a bona fide attempt to pay or tender to Lessor or to the credit of Lessor in _____

Bank the sum of Five Dollars (\$5.00) per acre multiplied by the number of acres

retained under this lease (hereinafter referred to as "Rental"), which shall cover the privilege of deferring commencement of mining operations for a period of twelve (12) months. In like manner and upon like payment or tender annually, the commencement of mining operations may be further deferred for successive periods of twelve (12) months each during the Primary, Renewal and Continuing Term. The payment or tender of Rental under this paragraph or of any other payment coming due under the terms of this lease may be made by check or draft of Lessee mailed to the parties entitled thereto or to said Bank on or before the due date of such payment. Such Bank or its successor, is hereby designated as Lessor's agent to receive from Lessee all payments by Lessee to Lessor under the terms of this lease and shall continue as depository for all payments hereunder regardless of changes of ownership of the Leased Land and/or Leased Substances. Lessees' obligations to Lessor as to the respect to the payment of money under the terms of this lease shall end upon payment of the correct amounts to Lessor or said Bank, as set forth in this paragraph, and Lessee in no manner shall be responsible for any disposition or distribution of moneys so paid or deposited. In the event that such bank (or any successor bank) should fail, liquidate or be succeeded by another bank, or for any reason fail or refuse to accept payment, or should Lessor or any Assignee or Assignees desire to designate another depository bank, then Lessee shall not be held in default for failure to make payment or tender payment until thirty (30) days after Lessor, or Lessor's Assignees, shall deliver to Lessee a proper recordable instrument, naming another bank as agent to receive such payments or tender.

7. If at any time Lessee is in default in the performance of the terms and conditions of this lease to be performed by it, and if, within sixty (60) days after written notice of the default is given by Lessor to Lessee, Lessee has not commenced activities which will cure the default if pursued diligently, then Lessor may terminate this lease by written notice to Lessee. If the default is due to failure to timely pay, ineffective or erroneous payment or deposit as described herein, this lease shall not terminate, but shall be maintained in the same manner as if such failure to timely pay, ineffective or erroneous payment or deposit had been properly made provided that the abovementioned payment, Rental or Royalty payment be corrected within sixty (60) days after the receipt by Lessee of written notice by such party or parties of such error, accompanied by such instruments as are necessary to enable Lessee to make proper payment.

8. If at the expiration of the Primary or Renewal Term uranium or other Leased Substances is not being produced from said Leased Land or land pooled therewith, but Lessee is engaged in operations directed toward the establishment or re-establishment of production therefrom, this lease shall remain in force so long as such operations are prosecuted with no cessation of more than ninety (90) consecutive days; and if the operations result in production, so long thereafter as uranium or other Leased Substances is produced from said Leased Land or land pooled therewith. If production of uranium or other Leased Substances from said Leased Land or land pooled therewith has been obtained, and such production shall cease for any cause, whether on one or more occasion, this lease shall not terminate if Lessee commences or resumes operations directed towards the re-establishment of production from said Leased Land or land pooled therewith within ninety (90) days after cessation of production and such operations continue with no cessation of more than ninety (90) days until production is re-established, or if it be within the Primary or Renewal Term, commences or resumes the payment or tender of Rentals or commences operations directed towards the re-establishment of production on or before the Rental payment date next ensuing.

9. If, upon the expiration of the Primary Term, no mining, development or processing is being conducted, and regardless of whether the Primary Term of this lease is extended by some other

provision herein, then Lessee shall have the right to extend this lease for a secondary term by the payment to Lessor of an advance minimum royalty in the amount of fifty dollars (\$50.00) per acre multiplied by the number of acres then covered by this lease, and upon payment or tender, this lease shall automatically and without further action on the part of Lessor or Lessee and without execution of any additional instrument, be renewed for a term of FIVE (5) years from and after the Primary Term hereof (hereinafter referred to as the "Renewal Term") and so long thereafter as uranium or other Leased Substances is being produced in paying quantities from said Leased Land or land with which said Leased Land is pooled. On or before each anniversary date thereafter, Lessee shall pay to Lessor an advance minimum royalty in the amount of ten dollars (\$10.00) per acre multiplied by the number of acres retained under this lease which advance minimum royalties shall be fully recoupable by crediting it against and in reduction of royalty becoming due at any time, until all advance minimum royalty has been recovered by Lessee.

This lease is also granted for a continuing term as long after the Primary or Renewal Term as any mining, development or processing is being conducted hereunder on a continuous basis. Such operations shall be deemed conducted on a continuous basis unless and until, after the end of the Primary or Renewal Term, a period of one hundred eighty (180) consecutive days elapses in which no such operations are conducted, excluding, however, periods of force majeure as provided herein. On or before each anniversary date of the continuing term, Lessee shall pay to Lessor advance minimum royalty in the sum of Thirty Dollars (\$30.00) multiplied by the number of acres retained under this lease.

10. Lessee is hereby granted the right to pool all or any part of said Leased Land with any other land, lease or leases in the vicinity thereof when in Lessee's judgment it is necessary or advisable to do so for the purpose of exploring or developing and operating the Leased Premises for in situ leach or solution mining operations whether owned by Lessor or a third party at any time and from time to time to explore, drill, solution mine, operate for, produce, extract, remove and transport uranium or other Leased Substances, provided the area so pooled shall, as near as practicable, cover only the delineated ore body from which production attributable to the pooled area is concerned, but in no event shall the pooled area exceed twenty (20) acres in size. For the purpose of determining Royalty hereunder, any uranium or other Leased Substances produced from the land so pooled shall be allocated to said Leased Land on the basis the surface acreage contributed by said Leased Land relates to the total surface acreage of the land so pooled. It shall be conclusively presumed that the uranium or other Leased Substances produced from such pooled land is produced uniformly within the boundaries of the pooled land both as to quantity and quality, and the amount allocated to the Leased Land shall, for all purposes hereunder, be presumed to have been produced from said Leased Land.

11. Lessee shall have the right from time to time and at any time to mix or commingle uranium or other Leased Substances from the Leased Land or land pooled therewith with like substances produced from other land for transporting, treating, processing and storing prior to or for the purpose of sale. Prior to such mixing or commingling the uranium content or other Leased Substances content where such are being processed for sale, of the raw ore or the amount thereof in solution (as the case may be), shall be assayed or otherwise determined by periodic sampling, using sound engineering principles and the volume of all solutions produced shall be determined by adequate metering devices. For Royalty purposes, the uranium or other Leased Substances attributable to the said Leased Land where such mixing or commingling has occurred, shall be a percentage of the total uranium or other Leased Substances sold by Lessee (including Lessor's share from pooled land in accordance with the paragraph listed above), which

percentage shall be determined by the relationship of uranium or other Leased Substances content in the production from said Leased Land, multiplied by the volume thereof (including Lessor's share from pooled land) bears to the total uranium or other Leased Substances content, multiplied by the total volume of the mixed or commingled production from all land for the applicable production period.

12. Lessee, its successors and assigns, shall execute and deliver to Lessor, or to the depository Bank, or file for record, a release or releases of this lease within ninety (90) days of the date of termination of that portion or interval affected, in whole or in part of the Leased Land, Leased Substances, subsurface interval or any depth thereunder, and Lessee shall thereby be released from all obligations as to the released land, substances, horizon, zone or formation as of the date of release. If this lease is released as to a portion of said Leased Land, the Rental, Shut-in Royalty, or Royalty payments shall thereupon be reduced in proportion that the acreage released bears to the acreage which was covered by this lease immediately prior to such release.

13. The rights of either party hereunder may be assigned in whole or in part as to the Leased Land or any Leased Substances or subsurface interval or any depth thereunder and the provisions hereof shall extend to the heirs, executors, administrators, successors and assigns, but no change or division in ownership of the Leased Land, Rental, Shut-in Royalty or Royalty, however accomplished shall operate to enlarge the obligation or diminish the rights of the Lessee or be binding upon Lessee for any purpose until sixty (60) days after such person acquiring any interest has furnished Lessee with the instrument, instruments or certified copies thereof, constituting his chain of title from the original Lessor. In the event of an assignment of this lease as to a segregated portion of said Leased Land, the Rental, Shut-in Royalty or Royalty due hereunder shall be proportioned between the several leasehold owners ratable according to the surface areas of each in the Leased Land, and default in payment of one shall not affect the rights of the other leasehold owners hereunder. An assignment by Lessee shall, to the extent of each assignment, relieve and discharge Lessee of any obligation hereunder accruing after the date of such assignment. If Lessee or assignee or part or parts hereof shall fail or make default in payment of the proportionate part of the Rental, Shut-in Royalty or Royalty payment due from such Lessee or assignee, or fail to comply with any other provision of the lease, such default shall not affect the entire lease insofar as it covers a part of said Leased Land upon which Lessee or any assignee thereof shall make payment of said Rental, Shut-in Royalty or Royalty. In the event of the death of any person entitled to any payment under the provision of this lease, including Royalty, Lessee may pay or tender any such payment to the credit of the deceased, or the estate of the deceased, until such time as Lessee is furnished with proper evidence of the appointment and qualification of an executor or administrator of the estate, or if there be none, then until Lessee is furnished with evidence satisfactory to it as to the heirs and devisees of the deceased and that all debts, taxes, state inheritance taxes and federal estate taxes of the estate have been paid.

14. Lessee shall have free use of water (except water from Lessor's wells, tanks and reservoirs) for all operations hereunder, however, Lessee shall have the right to test water from these sources. Exploration, solution mining and restoration operations wherever situated on the Leased Land shall be conducted so not to damage or destroy any water supply constructed by Lessor. In the event, however, that such activity, in order to properly explore, solution mine and develop said Leased Land should result in damage to or in destruction of any such water supply, if feasible in the opinion of Lessee, the Lessee, at his option, shall repair, restore or replace any such well, tank, reservoir or other water facility so damaged or destroyed, with reasonable diligence and dispatch,

weather permitting, or if not feasible then Lessee shall pay to Lessor a reasonable compensation for any such damage so sustained. Any such water facility so repaired, restored or replaced shall be of a capacity and quality equal to that which was damaged or destroyed. Any claims for such damage or destruction MUST be made within two (2) years following the termination of this lease.

15. Lessor, or his duly authorized representatives, shall have the right at all reasonable times and at his own risk to enter into and upon said premises and workings thereon for the purposes of examining and inspecting the same and ascertaining whether the terms and conditions of this lease are being carried out and performed by Lessee, so long as such access or inspection does not interfere with the operations of Lessee; Lessor or his duly authorized representatives, shall at all reasonable times have access to production records, assays and evaluation of ore records, and all other records pertinent and necessary for substantiating the compliance of Lessee with the provisions of this lease. It is agreed and stipulated that neither the Lessee, its agents, employees, contractors or subcontractors, their agents or employees, shall at any time hunt or fish on the premises, nor shall they, or any of them, carry onto the premises firearms or other equipment designed or adapted for such purpose. Lessor, or his duly authorized representatives, shall have the right at all times to inspect vehicles entering upon or leaving said premises for the purpose of ascertaining whether the provisions of this paragraph are being carried out.

16. Lessee agrees to conduct its mining operations on said Leased Land in a prudent and workmanlike manner, abiding by all applicable State and Federal laws, rules and regulations.

Lessor agrees that they own the mineral estate only and will receive no compensation for surface disruption. All payments made for surface disruption on the Leased Land will be made to the surface estate as shown of record in Kleberg County, Texas.

17. Lessee shall endeavor to locate any road on the Leased Land at places mutually agreeable to both Lessor and Lessee, consistent with Lessee's operations. Lessor shall not make unreasonable objections to the location that will cause undue restrictions or added costs to Lessee. All roads shall be constructed and maintained in such a manner as to bear the traffic necessary to Lessee's operations, and so as not to be a barrier to the natural drainage of the site. Upon cessation of operations by Lessee and the termination of this lease, all roads so constructed shall become the property of Lessor except, however, that the Lessor reserves the option and privilege of requiring Lessee to remove said road material from said Leased Land and to plow the surface below ordinary plow depth by methods common to the area. Such option MUST be exercised in writing by Lessor within thirty (30) days after the termination of this lease. Lessor shall have the right, at his own risk, to use any such road so constructed by Lessee for Lessee's use so long as this use does not interfere with the Lessee's use thereof.

18. If there are FENCES located on the premises and Lessee finds it necessary to cut any fence or fences for the purpose of passage, Lessee agrees that prior to cutting such fence there will be installed and braced, heavy "corner-type" posts at each end of the opening to be made, to which the fence wire will be securely fastened in such a manner as to prevent sagging; Lessee will install a gate of a quality acceptable to Lessor in each such opening; in the event Lessee desires that such opening provide uninterrupted ingress and egress, then Lessee shall install therein cattle guards of sufficient size and substance to bear the type of traffic necessary for its operations and capable of turning all domestic livestock; If there is livestock on said Leased Land, Lessee agrees to properly fence all pits, fixed machinery and other hazards which it may dig, bore or construct on the premises so as

not to present a hazard to such livestock; Lessee agrees to bury all pipelines, if requested by Lessor, except those contained within a fenced area, enclosure or wellfield, so that the top thereof is of sufficient depth so as not to interfere with the surface operations of Lessor.

19. Lessee shall have the right at any time during or within one (1) year after the termination or expiration of this lease to remove all property and fixtures placed by Lessee on said Leased Land. In the event the Primary and Renewal Term of said lease have expired and complete restoration has not been accomplished by Lessee, Lessee shall have the right of ingress and egress over existing roads, to the acreage containing plant, well field, monitor wells and other facilities associated with Lessee's operations, to complete the required restoration of said Leased Land, without additional compensation, in accordance with Federal and State regulations.

20. In conducting its operations hereunder, Lessee shall fully comply with the terms and provisions of the Workman's Compensation Laws of the State of Texas, and shall hold the Lessor harmless against and from any and all loss, damage or claims of whatever nature or character occasioned by or arising out of its operation under the terms and provisions of this lease.

21. Lessee shall not be liable for delays or defaults in its performance of any agreement or covenant hereunder due to force majeure. The term "FORCE MAJEURE" as employed herein shall mean: any act of God, including but not limited to storms, floods, washouts, landslides and lightning; acts of the public enemy; wars, blockades, insurrections or riots; strikes or lockouts; epidemics or quarantine regulations; laws, acts, orders or requests of federal, state, municipal or other governmental officers or agents acting under color of authority; freight embargoes or failures; exhaustion, unavailability or delays of any product, labor, service or material. If Lessee is prevented from conducting or required to cease operations directed toward establishment or re-establishment of production or producing operations by any order, decree, direction, inaction or denial of permit by any federal, state or municipal law, executive order, rule, regulation or request enacted or promulgated under color of authority on said Leased Land or on land pooled therewith, or if Lessee by other types of force majeure is prevented from conducting operations directed toward establishment or re-establishment of production or producing operations, then until such time as law, order, rule, regulations, request or other force majeure is terminated or the permit issued and for a period of ninety (90) days after such termination of issuance, each and every provision of this lease that might operate to terminate it or the estate conveyed by it shall be suspended and inoperative, and this lease shall continue in full force and effect. If any period of suspension occurs during the Primary, Renewal or Continuing Term, the time thereof shall be added to such term with continuing payment of annual Rental, Shut-in Royalty or Royalty consistent with the applicable term for such period of suspension, and this lease shall remain in full force and effect in such term until Force Majeure is lifted or suspended.

22. Lessee shall have the right to terminate this lease at any time or times during the term hereof, as to the subject minerals underlying all or any one or more parts of the premises, by delivering or mailing to Lessor written notice stating such intention to terminate and describing the parts of the premises, if less than all, as to which the termination applies. The termination shall take effect upon the date specified in the notice, or, if no date is specified upon the date on which the date is given. Upon such termination, all right, title, interest and obligations of Lessee hereunder in and to the premises specified in the notice shall terminate, except obligations which then have accrued under the express provisions of this lease and which they have not been paid or performed. If the notice specifies that this

lease is hereby being terminated as to the subject minerals underlying a part, and less than all, of the premises, this lease shall continue in effect as to the subject minerals underlying all parts of the premises except the part or parts so specified. Forthwith after delivery of the notice of termination, Lessee shall execute and record, or deliver to Lessor for recording, a formal release of this lease as to the parts of the premises described in the notice.

23. Lessor hereby warrants and agrees to defend the title of said Leased Land and agrees that Lessee, at its option, may discharge any tax, mortgage or other lien upon the Leased Land, and in the event Lessee does so, it shall be subrogated to such liens with the right to enforce same and apply Rentals, Shut-in Royalty or Royalty payments accruing hereunder toward satisfying same. Without impairment of warranties contained in this lease, it is agreed that if Lessor owns an interest in said Leased Land less than the entire fee simple estate, then the Rentals, Royalty and Renewal Bonus to be paid Lessor shall be proportionately reduced accordingly.

24. Any one or more of the parties named above as Lessor, may become a party to the lease by executing the original or a counterpart thereof. Execution of such original or a counterpart shall have the same effect as if all parties had executed the same instrument. Should any one or more of the parties named above as Lessor fail to execute this lease, it shall nevertheless be binding upon and inure to the benefit of the party or parties executing the same their heirs, executors, administrators, successors and assigns.

25. Any tax based on production of the herein named Leased Substances shall be borne by Lessor and Lessee in the same proportion that each party shares in the ownership of such Leased Substances hereunder.

26. Lessee makes no implied covenant or agreement relating to the exploration, development, mining or other operation of or upon the Leased Land or the marketing or any Leased Substances therefrom, nor as to the conduct or extent of any of the same. Whether or not any such exploration, development, mining or other operations or marketing shall at any time be conducted, and the nature, manner and extent thereof, shall be matters to be determined within the sole discretion of Lessee.

WITNESS WHEREOF, the parties hereto have executed the foregoing In-Situ Uranium Mining Lease as of the day and year first written above.

TAX I.D. No. (S) OR
SOCIAL SECURITY NUMBER(S)

458-43-5358

LESSOR(S)

Charles H. Flato II
Charles H. Flato, V.



Clark C. Flato

David L. Flato

Dickson C. Flato

Francis M. Flato

William R. Flato, Jr.

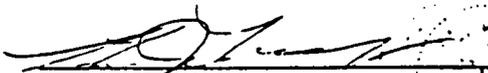
Sandra Kinman

ACKNOWLEDGMENT

STATE OF VIRGINIA)
COUNTY OF Chesterfield) ss.

BEFORE ME, a Notary Public on this day personally appeared Charles H. Plato, V. known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purpose and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this 18th day of May, 1994.


Notary Public in and for
At Large County, _____
Lana Lee Jones-Murphy
(Typed or printed name)
My Commission Expires: 11-9-97

ACKNOWLEDGMENT

STATE OF TEXAS)
COUNTY OF _____) ss.

BEFORE ME, a Notary Public on this day personally appeared Clark C. Plato known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purpose and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this ____ day of _____, 19____.

Notary Public in and for

County, _____
(Typed or printed name)
My Commission Expires: _____

ACKNOWLEDGMENT

STATE OF TEXAS)
) SS.
COUNTY OF _____)

BEFORE ME, a Notary Public on this day personally appeared David L. Flato known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purpose and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this ____ day of _____, 19__.

Notary Public in and for

County, _____

(Typed or printed name)
My Commission Expires: _____

ACKNOWLEDGMENT

STATE OF TEXAS)
) SS.
COUNTY OF _____)

BEFORE ME, a Notary Public on this day personally appeared Dickson C. Flato known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purpose and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this ____ day of _____, 19__.

Notary Public in and for

County, _____

(Typed or printed name)
My Commission Expires: _____

ACKNOWLEDGMENT

STATE OF TEXAS)
) ss.
COUNTY OF _____)

BEFORE ME, a Notary Public on this day personally appeared Francis M. Plato known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purpose and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this ____ day of _____, 19__.

Notary Public in and for

County, _____

(Typed or printed name)
My Commission Expires: _____

ACKNOWLEDGMENT

STATE OF TEXAS)
) ss.
COUNTY OF _____)

BEFORE ME, a Notary Public on this day personally appeared William R. Plato known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purpose and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this ____ day of _____, 19__.

Notary Public in and for

County, _____

(Typed or printed name)
My Commission Expires: _____

ACKNOWLEDGMENT

STATE OF TEXAS)
) ss.
COUNTY OF _____)

BEFORE ME, a Notary Public on this day personally appeared Sandra Kinman known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that she executed the same for the purpose and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this ____ day of _____, 19__.

Notary Public in and for

County, _____

(Typed or printed name)
My Commission Expires:_____

Chapter 5. [Reserved]

HISTORY

ACJY-126-60, July 20, 1960.

ACJN-74-60, June 13, 1960.

Note. Previous Chapter 5, "Wages", §§401-401, repealed by CD-79-82, December 16, 1982.

Chapter 7. Navajo Preference in Employment Act

HISTORY

Former Chapter 7. Former Chapter 7 was repealed in its entirety by CO-73-90, October 25, 1990.

CAU-63-85, August 1, 1985.

CAU-39-63, August 20, 1963.

CA-54-58, August 26, 1958.

SECTION

601. Title
602. Purpose
603. Definitions
604. Navajo employment preference
605. Reports
606. Union and employment agency activities; rights of Navajo workers
607. Navajo Prevailing wage
608. Health and safety of Navajo workers
609. Contract compliance
610. Monitoring and enforcement
611. Hearings
612. Remedies and sanctions
613. Appeal and stay of execution
614. Non-Navajo spouses
615. Polygraph test
616. Rules and regulations
617. Prior inconsistent law repealed
618. Effective date and amendment of the Act
619. Severability of the Act

§ 601. Title

This Act shall be cited as the Navajo Preference in Employment Act.

HISTORY

CO-78-90, October 25, 1990.

CAU-63-85, §1, August 1, 1985.

Note. Slightly reworded for purposes of statutory form.

§ 602. Purpose

A. The purposes of the Navajo Preference in Employment Act are:

1. To provide employment opportunities for the Navajo work force;

2. To provide training for the Navajo People;

3. To promote the economic development of the Navajo Nation;

4. To lessen the Navajo Nation's dependence upon off-Reservation sources of employment, income, goods and services;

5. To foster the economic self-sufficiency of Navajo families;

6. To protect the health, safety, and welfare of Navajo workers; and

7. To foster cooperative efforts with employers to assure expanded employment opportunities for the Navajo work force.

B. It is the intention of the Navajo Nation Council that the provisions of this Act be construed and applied to accomplish the purposes set forth above.

HISTORY

CO-73-90, October 25, 1990.

CAU-63-85, August 1, 1985.

§ 603. Definitions

A. The term "Commission" shall mean the Navajo Nation Labor Commission.

B. The term "employment" shall include, but is not limited to, the recruitment, hiring, promotion, transfer, training, upgrading, reduction-in-force, retention, and recall of employees.

C. The term "employer" shall include all persons, firms, associations, corporations, and the Navajo Nation and all of its agencies and instrumentalities, who engage the services of any person for compensation, whether as employee, agent, or servant.

D. The term "Navajo" means any enrolled member of the Navajo Nation.

E. The term "ONLR" means the Office of Navajo Labor Relations.

F. The term "probable cause" shall mean a reasonable ground for belief in the existence of facts warranting the proceedings complained of.

G. The term "territorial jurisdiction" means the territorial jurisdiction of the Navajo Nation as defined in 7 NNC §254.

H. The term "counsel" or "legal counsel" shall mean: (a) a person who is an active member in good standing of the Navajo Nation Bar Association and duly authorized to practice law in the courts of the Navajo Nation; and (b) for the sole purpose of co-counseling in association with a person described in clause (a), an attorney duly authorized, currently licensed and in good standing to practice law in any state of the United States who has, pursuant to written request demonstrating the foregoing qualifications and good cause, obtained written approval of the Commission to appear and participate as co-counsel in a particular Commission proceeding.

I. The term "necessary qualifications" shall mean those job-related qualifications which are essential to the performance of the basic responsibilities designated for each employment position including any essential qualifications concerning education, training and job-related experience, but excluding any qualifications relating to ability or aptitude to perform responsibilities in other employment positions. Demonstrated ability to perform essential and basic responsibilities shall be deemed satisfaction of necessary qualifications.

J. The term "qualifications" shall include the ability to speak and/or understand the Navajo language and familiarity with Navajo culture, customs and traditions.

K. The term "person" shall include individuals; labor organizations; tribal, federal, state and local governments, their agencies, subdivisions, instrumentalities and enterprises; and private and public, profit and non-profit, entities of all kinds having recognized legal capacity or authority to act, whether organized as corporations, partnerships, associations, committees, or in any other form.

L. The term "employee" means an individual employed by an employer.

M. The term "employment agency" means a person regularly undertaking, with or without compensation, to procure employees for an employer or to obtain for employees opportunities to work for an employer.

N. The term "labor organization" or "union" means an organization in which employees participate or by which employees are represented and which exists for the purpose, in whole or in part, of dealing with employers concerning grievances, labor disputes, wages, rates of pay, hours or other terms and conditions of employment, including a national or international labor organization and any subordinate conference, general committee, joint or system board, or joint council.

O. The term "petitioner" means a person who files a complaint seeking to initiate a Commission proceeding under the Act.

P. The term "respondent" means the person against whom a complaint is filed by a petitioner.

Q. The term "Act" means the Navajo Preference in Employment Act.

HISTORY

CO-73-90, October 25, 1990.

CAU-63-85, August 1, 1985.

§ 604. Navajo employment preference

A. All employers doing business within the territorial jurisdiction [or near the boundaries] of the Navajo Nation, or engaged in any contract with the Navajo Nation shall:

1. Give preference in employment to Navajos. Preference in employment shall include specific Navajo affirmative action plans and timetables for all phases of employment to achieve the Navajo Nation goal of employing Navajos in all job classifications including supervisory and management positions.

2. Within 90 days after the later of: (a) the effective date of this §604(A)(2); or (b) the date on which an employer commences business within the territorial jurisdiction of the Navajo Nation, the employer shall file with ONLR a written Navajo affirmative action plan which complies with this section and other provisions of the Act. In any case where a labor organization represents employees of the employer, the plan shall be jointly filed by the employer and labor organization. Any such associated labor organization shall have obligations under this section equivalent to those of the employer as to employees represented by such organization. Failure to file such a plan within the prescribed time limit, submission of a plan which does not comply with the requirements of the Act, or failing to implement or comply with the terms of a conforming plan shall constitute a violation of the Act. In the event of a required joint plan by an employer and associated labor organization, only the non-complying party shall be deemed in violation of the Act, as long as the other party has demonstrated a willingness and commitment to comply with the Act.

3. Subject to the availability of adequate resources, ONLR shall provide reasonable guidance and assistance to employers and associated labor organizations in connection with the development and implementation of a Navajo affirmative action plan. Upon request, ONLR shall either approve or disapprove any plan, in whole or in part. In the event of approval thereof by ONLR, no charge shall be filed hereunder with respect to alleged unlawful provisions or omis-

sions in the plan, except upon 30 days prior written notice to the employer and any associated labor organization to enable voluntary correction of any stated deficiencies in such plan. No charge shall be filed against an employer and any associated labor organization for submitting a non-conforming plan, except upon 30 days prior notice by ONLR identifying deficiencies in the plan which require correction.

B. Specific requirements for Navajo preference:

1. All employers shall include and specify a Navajo employment preference policy statement in all job announcements and advertisements and employer policies covered by this Act.

2. All employers shall post in a conspicuous place on its premises for its employees and applicants a Navajo preference policy notice prepared by ONLR.

3. Any seniority system of an employer shall be subject to this Act and all other labor laws of the Navajo Nation. Such a seniority system shall not operate to defeat nor prevent the application of the Act, provided, however, that nothing in this Act shall be interpreted as invalidating an otherwise lawful and *bona fide* seniority system which is used as a selection or retention criterion with respect to any employment opportunity where the pool of applicants or candidates is exclusively composed of Navajos or of non-Navajos.

4. The Navajo Nation when contracting with the federal or state governments or one of its entities shall include provisions for Navajo preference in all phases of employment as provided herein. When contracting with any federal agency, the term Indian preference may be substituted for Navajo preference for federal purposes, provided that any such voluntary substitution shall not be construed as an implicit or express waiver of any provision of the Act nor a concession by the Navajo Nation that this Act is not fully applicable to the federal contract as a matter of law.

5. All employers shall utilize Navajo Nation employment sources and job services for employee recruitment and referrals, provided, however, that employers do not have the foregoing obligations in the event a Navajo is selected for the employment opportunity who is a current employee of the employer.

6. All employers shall advertise and announce all job vacancies in at least one newspaper and radio station serving the Navajo Nation, provided, however, that employers do not have the foregoing obligations in the event a Navajo is selected for the employment opportunity who is a current employee of the employer.

7. All employers shall use non-discriminatory job qualifications and selection criteria in employment.

8. All employers shall not penalize, discipline, discharge nor take any adverse action against any Navajo employee without just cause. A written notification to the employee citing such cause for any of the above actions is required in all cases.

9. All employers shall maintain a safe and clean working environment and provide employment conditions which are free of prejudice, intimidation and harassment.

10. Training shall be an integral part of the specific affirmative action plans or activities for Navajo preference in employment.

11. An employer-sponsored cross-cultural program shall be an essential part of the affirmative action plans required under the act. Such program shall primarily focus on the education of non-Navajo employees, including management and supervisory personnel, regarding the cultural and religious traditions or beliefs of Navajos and their relationship to the development of employment policies which accommodate such traditions and beliefs. The cross-cultural program shall be developed and implemented through a process which involves the substantial and continuing participation of an employer's Navajo employees, or representative Navajo employees.

12. No fringe benefit plan addressing medical or other benefits, sick leave program or any other personnel policy of an employer, including policies jointly maintained by an employer and associated labor organization, shall discriminate against Navajos in terms or coverage as a result of Navajo cultural or religious traditions or beliefs. To the maximum extent feasible, all of the foregoing policies shall accommodate and recognize in coverage such Navajo traditions and beliefs.

C. Irrespective of the qualifications of any non-Navajo applicant or candidate, any Navajo applicant or candidate who demonstrates the necessary qualifications for an employment position:

1. Shall be selected by the employer in the case of hiring, promotion, transfer, upgrading, recall and other employment opportunities with respect to such position; and

2. Shall be retained by the employer in the case of a reduction-in-force affecting such class of positions until all non-Navajos employed in that class of positions are laid-off, provided that any Navajo who is laid-off in compliance with this provision shall have the right to displace a non-Navajo in any other employment position for which the Navajo demonstrates the necessary qualifications.

3. Among a pool of applicants or candidates who are solely Navajo and meet the necessary qualifications, the Navajo with the best qualifications shall be selected or retained, as the case may be.

D. All employers shall establish written necessary qualifications for each employment position in their work force, a copy of which shall be provided to applicants or candidates at the time they express an interest in such position.

HISTORY

CO-73-90, October 25, 1990.
CAU-63-85, August 1, 1985.

§ 605. Reports

All employers doing business or engaged in any project or enterprise within the territorial jurisdiction of the Navajo Nation or pursuant to a contract with the Navajo Nation shall submit employment information and reports as required to ONLR. Such reports, in a form acceptable to ONLR, shall include all information necessary and appropriate to determine compliance with the provisions of this Act. All reports shall be filed with ONLR not later than ten (10) business days after the end of each calendar quarter, provided that ONLR shall have the right to require filing of reports on a weekly or monthly schedule with respect to part-time or full-time temporary employment.

HISTORY

CO-73-90, October 25, 1990.
CAU-63-85, August 1, 1985.

§ 606. Union and employment agency activities; rights of Navajo workers.

A. Subject to lawful provisions of applicable collective bargaining agreements, the basic rights of Navajo workers to organize, bargain collectively, strike, and peaceably picket to secure their legal rights shall not be abridged in any way by any person. The right to strike and picket does not apply to employees of the Navajo Nation, its agencies, or enterprises.

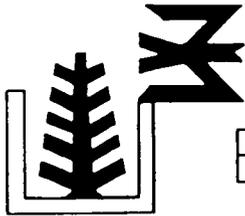
B. It shall be unlawful for any labor organization, employer or employment agency to take any action, including action by contract, which directly or indirectly causes or attempts to cause the adoption or use of any employment practice, policy or decision which violates the Act.

HISTORY

CO-73-90, October 1990.
CAU-63-85, August 1, 1985.

§ 607. Navajo prevailing wage

A. Definitions. For purposes of this section, the following terms shall have the meanings indicated:



NEW MEXICO
ENVIRONMENTAL LAW CENTER

(VIA FACSIMILE AND U.S. MAIL)

December 6, 1996

Ms. Shirley Ann Jackson, Chair
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. 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 Commission
Washington, DC 20555

Re: Request for Issuance of a Supplemental Draft Environmental Impact Statement and Establishment of a Local Public Documents Repository in the Matter of the Application of Hydro Resources Inc., Docket No. 40-8968-ML

Dear Ms. Jackson and Mr. Holonich:

On behalf of Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and the Southwest Research and Information Center ("SRIC"), the New Mexico Environmental Law Center ("NMELC") submits this letter to request the Nuclear Regulatory Commission ("NRC") to:

- (1) publish and circulate for public review and comment a Supplemental Draft Environmental Impact Statement ("SDEIS") for the Hydro Resources, Inc. ("HRI") application for source and byproduct materials licenses to construct and operate the Crownpoint Uranium Solution Mining Project ("Project") (NRC Docket No. 40-8968), and
- (2) promptly establish a local public documents repository in the community of Crownpoint, New Mexico, where the bulk of the Project will be located.

ENDAUM is a nonprofit organization of Crownpoint residents -- primarily Navajos -- organized to educate their community about the Project and protect it from the Project's health and environmental impacts. SRIC is an Albuquerque, New Mexico-based nonprofit organization that provides technical assistance to grassroots groups and public education on a wide range of environmental and energy issues. SRIC has been actively involved over the past two decades in assessing the effects of uranium mining on communities in rural New Mexico. SRIC and members of ENDAUM provided comments on the Draft Environmental Impact Statement ("DEIS")¹ for the Project. Both groups have petitioned the Atomic Safety and Licensing Board Panel ("ASLBP") for an evidentiary hearing on the Project (ASLBP No. 950706-1-ML), and NMELC represents them in that proceeding.

I. Background

A. The Project and the Affected Community

HRI seeks to construct and operate three uranium in situ leach ("ISL") mines at Church Rock and Crownpoint, New Mexico. The proposed mining process involves the injection of sodium bicarbonate and oxygen into a regional aquifer to recover approximately 70 million pounds of uranium over a 20-year period.² As acknowledged by the DEIS itself, ISL technology has "never before been applied on a commercial scale in the New Mexico uranium production area" and the Project "could have significant impacts upon the rich cultural and environmental resources of the area."³

The Project's potentially significant impacts relate, in part, to its "unprecedented" proximity to residential areas and drinking water wells.⁴ The regional aquifer in which mining would be conducted is the sole source of drinking water for many people in the Eastern Agency of the Navajo Nation, and a major source of water for their livestock.⁵ The five municipal water wells that provide that drinking water lie from only 1,900 feet to 1.5

¹ "Draft Environmental Impact Statement to Construct and Operate the Crownpoint Solution Mining Project, Crownpoint, New Mexico," U.S. Nuclear Regulatory Commission, U.S. Bureau of Land Management, and U.S. Bureau of Indian Affairs, NUREG-1508, October 1994.

² Id. at xiii.

³ Id. at 1-1.

⁴ Id. at 3-31.

⁵ Id. at 3-16. ENDAUM and others estimate that at least 5,000 people, and as many as 15,000 people, are served by those wells. Motion of Eastern Navajo Diné Against Uranium Mining to Respond to the Request of Hydro Resources Inc. to Deny All Petitions for an Evidentiary Hearing, ASLBP No. 95-706-01-ML, March 20, 1995 ("ENDAUM Response"), at 17-18.

miles of the mining zone.⁶ At least one municipal water well is located inside a proposed ISL wellfield in Crownpoint.⁷ Portions of the surface piping associated with the injection-production wells would lie "in close proximity" to schools, commercial centers, and health-care facilities.⁸

These impacts will occur in communities which are predominately Diné (i.e., Navajo) and low-income.⁹ Such socioeconomic characteristics are known to be strong determinants of adverse health conditions.¹⁰ Operations of the proposed ISL mines and processing facilities in and near the Crownpoint and Church Rock communities have the potential to exacerbate such conditions. For example, radon and other uranium-decay radionuclides would be released routinely from the proposed central processing plant and effluent lagoons, which are located on the southwestern side of Crownpoint, upwind from residential areas, churches and schools.¹¹ Although resulting doses to the public are modeled to be below regulatory limits in the DEIS,¹² there is valid concern in the community that these releases will contribute to a worsening of existing health conditions¹³ in an area already suffering from understaffed health-care facilities and lacking in emergency response capabilities.¹⁴

⁶ DEIS at 3-15 through 3-17.

⁷ Letter from Joseph J. Holonich, Chief, NRC Uranium Recovery Branch, to Hydro Resources Inc., dated February 9, 1996, enclosure 1 at 1 (excerpted in Attachment III hereto).

⁸ DEIS at 1-3, 3-4, and 3-5.

⁹ Approximately 93 percent of the population of Crownpoint and 95 percent of the population of Church Rock are American Indians, and one in every two Navajo families reservationwide had incomes below the federal poverty level. Division of Community Development, Navajo Nation, "Chapter Images: 1992 Edition," Fall 1993 at 3, 9 (citing the 1990 Census). This information was not provided in the DEIS.

¹⁰ P. Brown, "Race, Class, and Environmental Health: A Review and Systemization of the Literature," 69 Environmental Research 15 (1995).

¹¹ DEIS at 4-11.

¹² Id. at 4-15.

¹³ See e.g., "Resolution of the Eastern Navajo Health Board Opposing the Proposal of the Hydro-Resources, Inc. (HRI) to Conduct Well Field Drilling and Uranium Production in the Crownpoint, New Mexico Area," January 4, 1995.

¹⁴ Letter from Ann E. Reitz, M.D., IHS-Crownpoint Health Care Facility, to Ivan Selin, NRC, dated February 6, 1995, at 3.

B. The NEPA Process and Requests for Hearing on the Project

The National Environmental Policy Act ("NEPA"), 42 U.S.C. §§ 4321 *et seq.*, process for the Project began with scoping meetings in September 1992. The DEIS, dated October 1994, was issued by the NRC, the U.S. Bureau of Land Management, and the U.S. Bureau of Indian Affairs in November 1994.¹⁵ NRC sponsored public meetings in Crownpoint and Church Rock, New Mexico, on February 22 and 23, 1995. Written comments on the DEIS were due February 28, 1995, although NRC continued to accept written comments throughout most of 1995, and solicited the Navajo Nation's comments on new information that HRI provided at NRC's request in 1996.

In December 1994, seven different groups and individuals, including SRIC and Bernadine Martin (an ENDAUM member) requested evidentiary hearings in letters to the NRC staff.¹⁶ Pursuant to orders issued by the ASLBP Presiding Officer, Judge B. Paul Cotter Jr., ENDAUM and others¹⁷ filed amended petitions on February 15, 1995. The applicant filed a response to the petitions on February 25, 1995, and the NRC staff informed the Presiding Officer that it did not intend to be a party to an evidentiary hearing by letter of March 8, 1995. ENDAUM filed a response to the Applicant's response on March 20, 1995.

Judge Cotter has not ruled on the petitions for hearing. In a Memorandum and Order dated September 13, 1995, Judge Cotter held in abeyance action on the petitions until the NRC has issued a FEIS, has completed its review of the Applicant's license applications, and has filed a Safety Evaluation Report ("SER"). In a Memorandum and Order dated July 30, 1996, Judge Cotter instructed the NRC staff to submit a "status report" on the NEPA process. The NRC Staff responded with a Status Report dated August 30, 1996 stating, *inter alia*, that completion of the FEIS was anticipated in November 1996.¹⁸

II. NEPA and NRC Implementing Regulations Require an SDEIS for This Project

NRC Regulations specify that a supplement to a DEIS shall be prepared if:

- (1) There are substantial changes in the proposed action that are relevant to

¹⁵ 59 Fed. Reg. 56557, November 14, 1994.

¹⁶ The other requestors were Diné CARE, Grace and Marilyn Sam, Mervyn Tilden, Water Information Network, and Zuni Mountain Coalition.

¹⁷ Amended petitions were also filed by Diné CARE, Mervyn Tilden, and Zuni Mountain Coalition.

¹⁸ NRC Staff's Status Report Concerning Its Review of the In Situ Leachate Mine Application filed by Hydro Resources, Inc., August 30, 1996 ("NRC Status Report") at 2.

environmental concerns; or

- (2) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.¹⁹

Under the plain language of the regulation, either one of these two contingencies is sufficient to trigger the requirement to prepare an SDEIS. In this case, ENDAUM and SRIC cannot ascertain whether there are "substantial changes in the proposed action" because they do not have access to the HRI responses to NRC's Requests for Additional Information that may reveal substantial changes in the Project to address NRC concerns. However, there is unquestionably "significant new circumstances or information relevant to environmental concerns." The new information includes, but is not necessarily limited to, HRI's responses to NRC's Requests for Additional Information. The relevance and significance of this new information, as revealed by the NRC questions the information addresses, are described in Section III below.

An SDEIS is required by NRC regulations in this case for another reason: to disclose alternatives under consideration. NRC regulations applicable to both draft and final EISs require that "[t]he range of alternatives discussed [in the EIS] will encompass those proposed to be considered by the ultimate decisionmaker."²⁰ Here, alternatives under consideration have not been included in the DEIS, as discussed in Section III below.

For the NRC to consider this new information and alternatives without subjecting them to review and comment through DEIS supplementation would violate NEPA. As the court explained in National Wildlife Federation v. Marsh, 568 F. Supp. 985 (D.D.C. 1983):

Of great importance to a reviewing court is the distinction to be made between the environmental impact statement and the remainder of the administrative record. The cost-benefit analysis and the analysis of alternatives must be contained within the environmental impact statement standing alone, and not as complemented by the administrative record. Any substantial information pertinent to the cost-benefit analysis or the analysis of alternatives found in the administrative record, but not in the environmental impact statement, would render the impact statement inadequate under NEPA.²¹

¹⁹ 10 C.F.R. § 51.72(a). See also 40 C.F.R. § 1502.9(c)(1) (Council on Environmental Quality ("CEQ") regulation specifying the same standard for supplementation); Marsh v. Oregon Natural Resources Council, 109 S.Ct. 1851, 1858 (1989).

²⁰ 10 C.F.R. Part 51, Subpart A, Appendix A, ¶ 5.

²¹ 568 F. Supp. at 996-997, citing Grazing Fields Farm v. Goldschmidt, 626 F.2d 1068, 1070 (1st Cir. 1980) and I-291 Why? Association v. Burns, 517 F.2d 1077, 1081 (2d Cir. 1975) (emphasis added).

The requirement that the EIS contain significant information contained elsewhere in the record derives from the EIS's function as "a springboard for public comment." As emphasized by the Supreme Court, an EIS not only "ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts," but also:

serves a larger informational role. It gives the public the assurance that the agency has "indeed considered environmental concerns in its decisionmaking process," . . . and, perhaps more significantly, provides a springboard for public comment.²²

In order to provide such an opportunity for public comment, significant information cannot appear for the first time in an FEIS -- after the public comment period has closed -- but rather must be disclosed in a DEIS or SDEIS.

The opportunity for public comment is especially important in this case because this project is highly controversial and public interest organizations -- ENDAUM and SRIC -- are actively engaged in the debate over the project.²³ ENDAUM and SRIC could certainly provide additional relevant information if given the opportunity to comment on the new information submitted by HRI.²⁴ Their ability to do so is evidenced by SRIC staff's substantive comments and testimony on the DEIS provided in February and March 1995, and by ENDAUM members' testimony at NRC-sponsored public meetings in February 1995 and in sworn affidavits filed with the ASLBP in February and March 1995.²⁵ As Diné, ENDAUM members have special knowledge of the cultural and environmental resources at

²² Robertson v. Methow Valley Citizens Council, 109 S.Ct. 1835, 1845 (1989) (citation omitted).

²³ Natural Resources Defense Council v. Lujan, 768 F. Supp. 870, 889 n. 35 (D.D.C. 1991) ("It cannot be that the only relevant information on this matter comes from industry, especially where this is a question of great public controversy and where there are identified organizations that have been actively engaged in the debate over [the project]").

²⁴ See id.

²⁵ See affidavits attached as exhibits to Motion of Eastern Navajo Diné Against Uranium Mining to Respond to the Request of Hydro Resources Inc. to Deny All Petitions for an Evidentiary Hearing, ASLBP No. 95-706-01-ML, March 20, 1995, at 17-18 ("ENDAUM Response"); "Public Comments on NUREG-1508 'Draft Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico,'" attached to letter from James R. Park, NRC to James W. Saulsbury, Oak Ridge National Laboratory, dated June 12, 1995 ("Comment Summary").

ENDAUM members who gave both oral testimony and provided sworn affidavits to the ASLBP were Mitchell Capitan, Bernadine Martin, Calvin Murphy, Valarie Murphy, and Grace Tsosie.

stake.

Apparently, the only member of the public that NRC has allowed to comment on the new information supplied by HRI is the Navajo Nation through its Environmental Protection Agency ("NNEPA") and other cabinet-level departments. The Nation is effectively a member of the public because it is not a cooperating agency preparing the DEIS. While the Navajo Nation's participation is indispensable, soliciting the comments of the Nation alone is no substitute for compliance with the NEPA public participation mandate.

An SDEIS would also be appropriate in this case to address substantial deficiencies in the DEIS. In addition to those situations in which an SDEIS is mandatory, "NRC staff may prepare a supplement to a draft environmental impact statement when, in its opinion, preparation of a supplement will further the purposes of NEPA."²⁶ Here, distributing an SDEIS that corrects the failures of the DEIS described in Section IV below would unquestionably "further the purposes of NEPA." Not to do so would be an abuse of agency discretion.

III. New Information and Alternatives

Since February 1996, thousands of pages of new and explanatory data and information have been submitted to NRC by HRI. This new and additional information was submitted in response to the NRC's comments and questions on the DEIS and on several hundred written and oral comments on the DEIS made by numerous parties, including SRIC and members of ENDAUM, in 1995. The staff's comments and questions were contained in two Requests for Additional Information ("RAIs"), the first dated January 11, 1996 (and clarified by letter of January 31, 1996), and the second dated February 9, 1996. See Attachments I, II, and III.²⁷

The new information has not been made available to the general public for review and comment, even though NRC indicated in its Status Report to Judge Cotter that it will use this information to prepare a Final Environmental Impact Statement ("FEIS").²⁸ Since the

²⁶ 10 C.F.R. § 51.72(b).

²⁷ Letter from Daniel M. Gillen, NRC Uranium Recovery Projects Section, to Hydro Resources Inc., dated January 11, 1996 and attached questions 1 through 49 (excerpted in Attachment I hereto); letter from Daniel M. Gillen to Hydro Resources Inc., dated January 31, 1996 and enclosure (clarifying question 24) (excerpted in Attachment II hereto); letter from Joseph J. Holonich, Chief, NRC Uranium Recovery Branch, to Hydro Resources Inc., dated February 9, 1996 and attached questions 50 through 92 and "Final Description of Proposed Action and Alternatives" (excerpted in Attachment III hereto).

²⁸ NRC Status Report at 1-2.

agency has no stated intention of allowing public comment on the new information, the public will have no opportunity to comment on information that the agency in all likelihood will use in deciding whether to grant the licenses requested by the Applicant.

In its second RAI of February 9, 1996, the agency requested comments from the Applicant on a document entitled, "Final Description of Proposed Action and Alternatives" (Final DOPAA).²⁹ The DOPAA reveals that the agency is considering not only the proposed action called "Alternative 1" evaluated in the DEIS, but also an "Alternative 2 (Modified Action)" that differs significantly from the Alternative 2 described in the DEIS in at least two ways.³⁰

First, the DOPAA Alternative 2 appears to propose full yellowcake processing (i.e., final drying and packaging) at either the Church Rock mine site or the Unit 1 mine site, locations where no such complete yellowcake processing was described in the DEIS. Such processing has serious environmental consequences not analyzed with respect to the Church Rock or Unit 1 sites in the DEIS. DOPAA Alternative 2 also includes options for final yellowcake processing at two remote uranium mills, one at Ambrosia Lake, New Mexico (at least 75 miles from the Crownpoint site) and another at HRI's ISL facility at Kingsville, Texas (more than 1,000 miles from Crownpoint). Impacts associated with transportation of uranium slurry to either of those locations were not analyzed in the DEIS Alternative 2.

Second, DOPAA Alternative 2 asserts that 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."³¹ The DEIS examined impacts from evaporation ponds and land application only, and merely mentioned as disposal options deep-well injection and surface discharge as disposal options without analysis of their environmental impacts.³² Deep-well injection is an especially hazardous and failure-prone disposal option, involving construction of wells greater than 5,000 feet in depth and requiring special permitting.

In any event, if the agency presents this significantly different Alternative 2 for the first time in the FEIS, the public will have no opportunity to comment.

The NRC Status Report indicated that the staff provided the Applicant with a third set

²⁹ See Attachment III at 1 and excerpt of enclosure.

³⁰ Compare Attachment III, DOPAA at 44 and 47 with Attachment IV at xiv (excerpt of DEIS).

³¹ Attachment III, DOPAA at 47.

³² DEIS at 2-20 through 2-22.

of comments and questions on July 11, 1996, and is awaiting HRI's responses.³³ Accordingly, more new information is about to be -- or may already have been -- received by NRC, and again, the public will have had no opportunity to review or comment on such new information.

There is no question that this new information is "significant," "relevant to environmental concerns" and "bear[s] on the proposed action or its impacts." 10 C.F.R. § 51.72(a). The new information bears directly on the proposed action in that it responds to requests by the NRC for more information on the Project. See Attachments I, II and III.³⁴ Most of the questions in the first RAI pertained to public health and environmental and cultural resource issues, including, for example, the effects of the location of the central processing facility on the health of residents in Crownpoint, emergency response capabilities, and the need for identification of traditional cultural properties. See Attachment I. The bulk of the second RAI pertained to water resource protection and water quality restoration. See Attachment III. Question 92, contained in the second RAI, pertained to cost-benefit analysis of the Project. See id. Information responsive to each of these issues plainly bears on the proposed action and its impacts and is relevant to environmental concerns.

The significance of the new information is also demonstrated by NRC's own RAIs and discussion therein. For example, the NRC staff highlighted several questions pertaining to water resources as "especially critical to the continued licensing review and for completing the final EIS."³⁵ Because this new information pertains to the likelihood and extent of impacts on the drinking water of thousands of people, it is irrefutably significant. Similarly, the traditional cultural property information requested by NRC "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."³⁶ Finally, new information pertaining to cost-benefit analysis is significant information requiring EIS supplementation.³⁷ Since the DEIS was lacking critical information pertaining to these issues, the responsive information must constitute significant new information not in the DEIS.

³³ NRC Status Report at 2.

³⁴ The nature of the third RAI is unknown to ENDAUM, SRIC, and NMELC. Presumably, it, too, requests additional information that NRC deemed necessary to proceed with the licensing review and NEPA process.

³⁵ Attachment III at 1.

³⁶ Attachment II, enclosure at 1.

³⁷ See National Wildlife Federation v. Marsh, 568 F. Supp. at 996-997.

IV. Deficiencies in the DEIS

The DEIS fails to comply with NRC regulations concerning the scope and content of a DEIS and is fraught with inaccuracies. These failures were brought to the attention of the agency in many of the more than 950 written and verbal comments received in 1995,³⁸ including in comments made by SRIC and members of ENDAUM. The deficiencies in the DEIS were also the basis for the rating of the DEIS by the U.S. Environmental Protection Agency (EPA) as EO-2 (Environmental Objection/Insufficient Information). See Attachment V.³⁹ This means that EPA identified "significant environmental impacts" associated with the proposed action and that the DEIS did not "contain sufficient information to fully assess environmental impacts"⁴⁰ Even the NRC staff has pointed out numerous contradictions and inconsistencies in the DEIS.⁴¹

The deficiencies raised in comments by the EPA, other federal agencies, the Navajo Nation, and other commenters include, but are not limited to:

failure to demonstrate, through both modeling and previous experience at a pilot-scale ISL project operated near Crownpoint between 1979 and 1980, that ground water quality will be returned to baseline (i.e., premining) conditions upon closure;

inadequate geologic characterization of ore-bearing formations leading to questions about lixiviant containment and control at the Church Rock and Crownpoint mining sites;

failure to address the lack of medical and emergency personnel to respond to and address transportation and operation accidents involving the release of radionuclides and/or contamination of workers and members of the public;

lack of a detailed radionuclide monitoring plan for the main processing plant, located within one-half mile of residential areas in the town of Crownpoint (with a 1990 population of nearly 2,500);

failure to analyze the applicability of the Navajo Nation Water Code to installation and operation of hundreds of proposed injection and production wells;

³⁸ NRC Staff Status Report, August 30, 1996, at 2.

³⁹ Letter from D. J. Farrel, Office of Federal Activities, EPA Region 9, to Joseph J. Holonich, NRC, February 27, 1995.

⁴⁰ Attachment IV, "Summary of Rating Definitions and Follow-Up Action."

⁴¹ See, e.g., NRC RAI, February 9, 1996, comments 51, 57, 58.

lack of discussion of the environmental justice implications of the proposed mining on the predominately low-income, minority communities of Crownpoint and the Church Rock Area in accordance with provisions of Executive Order 12898;

failure to consider the poor performance record and history of license violations of the applicant's parent company at its South Texas uranium ISL mining operations;

lack of demonstrated financial surety to reclaim surface facilities and return ground water to baseline conditions; and

failure to identify impacts on religious practices and traditional cultural resources.⁴²

In particular, the NRC's failure to date to identify traditional cultural properties ("TCPs") eligible for inclusion in the National Register of Historic Properties and take into account the Project's effect on the TCPs in consultation with the affected tribes and pueblos pursuant to § 106 of the National Historic Preservation Act ("NHPA"), 16 U.S.C. § 470f, 36 C.F.R. Part 800, and National Register Bulletin 38⁴³ contributes to the DEIS' gross inadequacy in the treatment of impacts on traditional cultural resources and practices. Federal agencies, including the NRC, must integrate compliance with the NHPA § 106 process and the NEPA process and must also elicit the views of the concerned public "to the extent feasible."⁴⁴

Therefore, in order to correct the DEIS' inadequate treatment of TCPs and to integrate the NHPA and NEPA compliance processes, the NRC should issue an SDEIS that fully addresses impacts on TCPs and their mitigation. This will require consultation with the governments and religious leaders of the Navajo Tribe (especially in the Crownpoint and Church Rock areas), the Hopi Tribe, and the Pueblos of Zuni, Acoma, and Laguna to identify TCPs, assess potential impacts of the Project on the TCPs, and propose mitigation measures.⁴⁵

As explained in Section II above, resolving all of these serious defects in the DEIS through the issuance of an SDEIS would further the purposes of NEPA.

⁴² See generally Comment Summary (noting deficiencies raised by commenters).

⁴³ U.S. Department of the Interior, National Park Service Interagency Resources Division, National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties.

⁴⁴ 36 C.F.R. §§ 800.14(a) and (d).

⁴⁵ See generally National Register Bulletin 38.

V. Need for a Local Public Document Repository

In order to meaningfully participate in the NEPA process and licensing proceeding, the impacted communities need local access to the documents in NRC's docket for this Project. The NRC's failure to date to make important information about the Project readily available in the affected communities through a local public document repository contravenes the letter and the spirit of Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." In general, E.O. 12898 mandates that:

To the greatest extent practicable and permitted by law, . . . each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States

E.O. 12898, § 1-101.

The Executive Order specifically requires:

Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities, because of their race, color, or national origin.

E.O. 12898, § 2-2 (emphasis added).

The lack of a local public document repository in Crownpoint has the effect of excluding the minority, low-income communities of Crownpoint and the Church Rock area from participation in the Project licensing process. The existence of the documents in a public docket room in Washington D.C. does not facilitate those communities' participation. On this point, the analysis of a federal court in another context -- a Freedom of Information Act request -- is instructive:

The availability of FOIA material in an agency's public reading room does not thrust the material into the public domain. The public's awareness of information that, for all practical purposes, may be warehoused in an agency's reading room in the District of Columbia is likely to be dim at best, particularly to a resident in the wilds of western Montana.

Fitzgibbon v. Agency for International Development, 724 F. Supp. 1048, 1051 (D.D.C.)

1989).

In that case, the court found that reliance on an agency's public reading room in Washington D.C. to provide public access to information "would limit dissemination to those individuals who . . . lived in proximity to the reading rooms or had the financial means and time to travel to the reading rooms."⁴⁶ The Diné residents of Crownpoint and the Church Rock area neither live in proximity to Washington D.C. nor have the financial means to travel there.

Nor can the presence of an HRI office in Crownpoint, which may contain some or all of the documents in the NRC and ASLBP dockets, substitute for a local public document repository. First, the duty to provide public access to information and to ensure the participation of low income, minority communities in federal agency activities rests on the federal agency, not the private proponent of a project. Second, a private office may selectively exclude members of the public, independently determine which documents to make available to the local public, and deny access to photocopiers or assess prohibitive copying fees. Finally, relying on the Project proponent to impartially supply the public with all of the information in the record is like sending people to a casino for impartial information about the risks -- and not just the rewards -- of gambling.

Accordingly, the NRC should promptly establish and maintain a local public document repository, containing a duplicate of all documents in Docket No. 40-8968-ML and ASLBP No. 950706-1-ML, in Crownpoint, New Mexico. ENDAUM is able and eager to advise NRC in the selection of an appropriate site for the repository.

VI. Conclusion

For the foregoing reasons, on behalf of ENDAUM and SRIC, we strongly urge the NRC to issue and circulate for public review and comment an SDEIS addressing new information, alternatives under consideration, and deficiencies in the DEIS. We further request that NRC establish a Local Public Document Repository in Crownpoint, New Mexico. We look forward to your prompt response.

Sincerely,



Susan G. Jordan
Douglas Meiklejohn

Attachments
cc by U.S. Mail: see attached service list

⁴⁶ 724 F. Supp. at 1051.



40 8725

UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

January 11, 1996

31 11 0:20
PUBLIC DOCUMENT ROOM

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

Attention: Mr. Mark Pelizza, Environmental Manager

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION; SAFETY ANALYSIS REVIEW AND ENVIRONMENTAL REVIEW FOR THE HYDRO RESOURCES, INC. URANIUM SOLUTION MINING LICENSE APPLICATION, CROWNPOINT, NEW MEXICO

Dear Mr. Pelizza:

The U.S. Nuclear Regulatory Commission staff, with the assistance of Oak Ridge National Laboratory (ORNL), has completed the initial safety analysis review and the detailed environmental review of the Hydro Resources, Inc. (HRI) supporting documentation for the above referenced source material license application. The detailed environmental review was initiated to address the majority of the public comments received on the draft Environmental Impact Statement (EIS) issued for comment in October, 1994.

Enclosure 1 to this letter contains requests for additional information needed to proceed with the licensing review and to complete the final EIS. These requests encompass both safety and environmental issues, excluding water resource protection and cost/benefit analysis issues. The water resource and cost/benefit information requests will be transmitted to HRI under separate cover within 30 days of date of this letter. In addition, some additional information may be needed from HRI at a later date to adequately address a few of the public comments as the EIS is finalized.

Enclosure 2 is a copy of the NRC Staff Technical Position WM-8201 "Hydrologic Design Criteria for Tailings Retention Systems," provided for your information to address information request 32 listed in Enclosure 1.

In order to support the review schedule, please provide your response to the issues identified in Enclosure 1 within 60 days 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.

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M. Pelizza

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If you have any questions concerning this letter, please contact the NRC Project Manager, Mr. Michael Layton, at (301) 415-6676.

Sincerely,

(Original signed by)

Daniel M. Gillen, Section Leader
Uranium Recovery Projects Section
High-Level Waste and Uranium
Recovery Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated (2)
Docket No.: 40-8968
Casework Nos.: X60529, X60576

cc: James Saulsbury, ORNL

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DATE	1/11/96	1/11/96		H					

January 31, 1996

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

40-8968
JAN 31 10 21

Attention: Mr. Mark Pelizza, Environmental Manager

SUBJECT: CLARIFICATION OF QUESTION 24, JANUARY 11, 1996 REQUEST FOR
ADDITIONAL INFORMATION; SAFETY ANALYSIS REVIEW AND ENVIRONMENTAL
REVIEW FOR THE HYDRO RESOURCES, INC. URANIUM SOLUTION MINING
LICENSE APPLICATION, CROWNPOINT, NEW MEXICO

Dear Mr. Pelizza:

As discussed in the conference call with Oak Ridge National Laboratory on
January 25, 1996, enclosed is additional clarification for Information Request
24, pertaining to Traditional Cultural Properties surveys needed for the U.S.
Nuclear Regulatory Commission to meet its obligations under the National
Environmental Policy Act, and for addressing public comments on the draft
Environmental Impact Statement.

Another conference call has been arranged for Thursday February 1, 1996,
2:00pm EDT to discuss any concerns or additional clarifications. The NRC
Project Manager, Mr. Michael Layton, will contact you with the details of the
scheduled conference call. If you have any questions concerning this letter,
please contact Mr. Layton at (301) 415-6676.

Sincerely,
(Original signed by)

Daniel M. Gillen, Section Leader
Uranium Recovery Projects Section
High-Level Waste and Uranium
Recovery Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated
Docket No.: 40-8968
Casework Nos.: X60529, X60576

cc: James Saulsbury, ORNL

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ATTACHMENT II

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.

ATTACHMENT III

M. Pelizza

2

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,



for
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

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

Draft
Environmental Impact Statement
to Construct and Operate the
Crownpoint Uranium Solution Mining Project
Crownpoint, New Mexico

Docket No. 40-8968
Hydro Resources, Inc.

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



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, and each site would be decontaminated or decommissioned. All 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

40-8968

RECEIVED

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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

The 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 recommend 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."

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

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."

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 tricarbonate 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 tricarbonate 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 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

restoration schedule for Church Rock and Crownpoint, respectively, as the time input in predicting the expected cone of depression. If the life expectancy of the project at Unit 1 and Crownpoint is 17 and 19-years, respectively, then the model would underestimate the expected drawdown at the conclusion of the project. In computing the cone of depression, did the model account for the cumulative effects of the mining recovery wells and the water production wells in the City of Crownpoint? The EIS must address the impact that mining would have on the capability of NTUA and BIA wells to continue delivery of water at a desired capacity. Would the expected drawdown deplete water as a resource and require the construction of more wells to meet the demand of the community?

Pilot test results indicate that there is a potential for groundwater to end up with elevated levels of molybdenum and selenium (DEIS, pp. 4-7,8,9). The tests indicated that flushing the mine zone may reduce contaminants to statutory levels. However, this assumes that the ore body does not contain pockets where heavy metals are in higher concentrations than anticipated. This is not substantiated by data in the DEIS. The FEIS should address this issue.

Other trace elements such as arsenic, vanadium, iron and manganese would also be mobilized by the leaching process. The transport and fate of mobilized trace elements in groundwater and in waste streams at the proposed project sites are unclear in the DEIS. The FEIS should describe the transport and fate of all substances that could be incidentally released by the leaching process. In addition, the FEIS should include an estimate of the amount of time it would take to restore the aquifer to baseline conditions.

HRI would land-apply treated water on as many as 139 acres. The water would be regulated by irrigation standards adopted by the State of New Mexico. The FEIS should provide these standards and describe the potential effects irrigation could have on the Westwater Canyon Member aquifer. Table 4-12 in the DEIS (p. 4-27) outlines the monitoring program for the proposed project. Table 4-12 in the FEIS should include sampling of treated effluent prior to land application. The FEIS should describe and discuss how wastewater would be transported to irrigation areas and what the impacts would be (e.g., surface disturbance for pipelines).

The FEIS should indicate whether any springs, seeps, or ephemeral streams would be affected by the project. Would a permit be required under Clean Water Act §404 for any aspect of the project (e.g., for disturbance of the arroyo at the Church Rock site)?

Spill Prevention and Response

The DEIS (p. 2-10) indicates that secondary containment is designed to hold only the contents of the largest vessel at each of the three processing units. Such a design would not contain all solutions if massive failure took place. We recommend that NRC seriously consider requiring that secondary containment accommodate 100 percent of all solutions at each processing plant.

The DEIS states that HRI would transport yellowcake slurry to the main processing unit at Crownpoint in semi-trailer tankers (p. 2-14). It is unclear how routes would be selected to maximize safety and reduce the chance of accidents. Response plans for a spill during transportation of yellowcake are not included in the DEIS. The FEIS should address these issues.

The project sites are located very close to residences. The Crownpoint unit is located on the western edge of town, and some wells could be located within 1000 feet of residences. Although project activities are designed to safely operate, design failures (e.g., well blow-outs, pipeline ruptures, transportation spills) could occur. According to the DEIS (p. 4-21), the worst-case event would involve a major pipeline rupture going unchecked for an hour at full operating capacity. It is unclear from the DEIS that such a rupture would be detected within one hour. The FEIS should describe specific precautions and instrumentation that would be implemented at each site to immediately check ruptures. We urge NRC to require pressure sensors and automatic shut-off systems on all major pipelines and an electronic automatic telephone dialing system to alert all appropriate response personnel (e.g., HRI, police and fire departments) as well as all local residents that could be exposed in the event of a hazardous or radioactive material release emergency.

The DEIS states that all significant pipe breaks must be reported to NRC. The FEIS should specify what would constitute a "significant" pipe break or rupture.

According to the DEIS (p. 4-10), soil contaminated by a spill would be removed and disposed of in retention ponds. The FEIS should specify the standard required for cleanup/decontamination of radioactive or hazardous material spills in the project areas.

Waste Management

The FEIS should discuss the current and anticipated availability of radioactive waste disposal sites that could accept waste (including sludges and brines) from the proposed project.

Wastewater would be stored in retention ponds until treatment (DEIS, p. 2-14). The FEIS should discuss disposition of the sludge from these ponds and clarify how access to these ponds would be restricted to protect humans and wildlife.

The DEIS (p. 2-19) indicates that aquifer bleeds during uranium recovery could amount to one percent of the flow rate, or 40 gallons per minute at each site. Discontinuous liquid wastes would also be generated from production, especially from periodic flushing of depleted eluant. Other waste streams would include uranium precipitation and filter washings. HRI proposes to collect these wastes and treat them in the brine concentrator. The specific compositions, amounts, and disposition of liquid wastes generated annually are unclear and should be discussed in the FEIS.

Air Quality

The proposed facilities would be licensed by the NRC to possess Source and Byproduct Material. As such, the facilities would be subject to the requirements of the Radionuclide National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61 Subparts A and I. Subpart A provides general requirements under the NESHAP, and Subpart I sets forth requirements specific to the NRC-licensed facilities. Under Subpart A, the owner/operator must submit an application to EPA to construct the facility. Subpart I describes the information required in an application and also provides the criteria for demonstrating exemption from the application requirement (see § 61.106(b)(1)).

Even if the proposed facilities were exempt from the requirements for "application to construct" and from annual reporting under Subpart I, the owner/operator nonetheless would be responsible for performing all the evaluations specified by Subpart I, for maintaining records of these evaluations and for providing these evaluations upon demand by EPA. Such evaluations include the determination of the potential radiological dose to the public, via the use of the COMPLY computer code or other approved methods, the determination of the need to monitor emissions as well as the need to apply for EPA approval to construct or modify, and report annually. Please note that, regardless of the requirement to obtain EPA approval to construct, the facilities

would be subject to the NESHAP emission standard and would be in violation if the standard is exceeded, whether due to normal or off-normal (accident) conditions.

As of this writing, neither EPA-Region 9 nor EPA-Region 6 has received an application to construct this facility, under Subpart I. The DEIS does not identify Subpart I as an applicable requirement. The FEIS should discuss the requirements of Subpart I which are applicable to the proposed project. (For further information on NESHAP requirements, you may contact Mr. Shelly Rosenblum at (415) 744-1047).

Failure to comply with Subpart I is punishable by a fine of \$25,000 per day per violation. Violations of Subpart I are not limited to violations of the emissions standard. Violations also include violations of the requirements to submit an application to construct or modify, notify EPA of start-up, maintain records, and have a quality assurance program; and violations of the reporting requirements and requirements concerning monitoring of emissions.

Table 4.7 in the DEIS (p. 4-11) shows estimated source terms for gaseous and particulate emissions from diesel drilling equipment. The FEIS should provide total project emissions (in pounds per day) for all operations and construction activities.

CERTIFICATE OF SERVICE

In the Matter of)
)
)
HYDRO RESOURCES, INC.) Docket No. 40-8968-ML
12750 Merit Drive)
Suite 1210 LB12) ASLBP No. 95-706-01-ML
Dallas, TX 75251)

I hereby certify that on December 6, 1996 copies of the foregoing letter were served upon the following persons by U.S. mail, first class, and in accordance with the requirements of 10 C.F.R. Sec. 2.712.

- Secretary
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555
Attn: Docketing Service Branch
[original and two copies]
- Office of Commission Appellate
Adjudication
U.S. Nuclear Regulatory
Commission
Washington, DC 20555
- Administrative Judge
Thomas D. Murphy
Special Assistant
Atomic Safety and Licensing
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Albuquerque, NM 87106

✓ Mervyn Tilden
P.O. Box 457
Church Rock, NM 87311

Dated at Santa Fe, NM this
6th day of December 1996.

Allison Dellinger

Allison Dellinger



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

December 24, 1996

Susan G. Jordan, Esq.
New Mexico Environmental Law Center
1405 Luisa Street, Suite 5
Santa Fe, NM 87505

SUBJECT: CROWNPOINT, NEW MEXICO PROJECT

Dear Ms. Jordan:

I am responding to your letter, dated December 6, 1996, addressed to Chairman Shirley Jackson of the U.S. Nuclear Regulatory Commission, and Mr. Joseph J. Holonich, Chief of the Uranium Recovery Branch, Office of Nuclear Material Safety and Safeguards. In your letter, you request that the NRC issue a Supplemental Draft Environmental Impact Statement (SDEIS) for the Hydro Resources, Inc. (HRI) Crownpoint, NM proposed uranium solution mining project. As justification for this request, you cite what you believed to be significant new information that was not available at the time the Draft Environmental Impact Statement (DEIS) was published in November 1994. Therefore, you conclude that without a SDEIS, the public would not be given the ability to participate in the environmental review process as required by the National Environmental Policy Act and NRC regulations.

We appreciate your interest in this matter and have carefully considered the views expressed in your letter. However, based upon our review of the information provided in your letter, the NRC staff has determined that there is not a sufficient basis for issuing a SDEIS at this time.

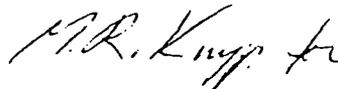
The information discussed in your letter appears to be information which was provided to the NRC by HRI in response to the NRC staff's requests for additional information (RAIs), which were developed in large part based upon the many public comments we received concerning the DEIS. We do not believe that this information constitutes such "new" and "significant" information as to require the publication of a SDEIS prior to publication of a Final Environmental Impact Statement (FEIS). It is well established that a federal agency need not prepare a SDEIS to consider each new piece of information that it obtains following the publication of a DEIS. Under appropriate circumstances, a federal agency may issue an FEIS without prior publication of a SDEIS, notwithstanding the fact that additional information is placed in the FEIS to respond to public comments on the DEIS. Because the information contained in HRI's responses to the NRC RAIs was provided in order to address public comments on the DEIS, and because that information does not alter the proposed action or present significant new circumstances or information concerning that action or its impacts, the NRC staff does not believe that a SDEIS must be published prior to publication of the FEIS. Therefore, the NRC plans to publish the FEIS in January 1997.

To the extent that you or other persons believe that the FEIS does not adequately consider the environmental impacts of the proposed action and/or requires supplementation pursuant to 10 C.F.R. § 51.92, we would encourage you to submit your views to the NRC following publication of the FEIS. Any such information will be considered by the NRC staff and, if necessary, a supplemental FEIS could then be prepared. Additionally, in the event an adjudicatory hearing is held in which your clients are afforded intervenor status, they may raise any concerns regarding the FEIS in that proceeding.

Your letter notes that all of the information submitted by the applicant is available in the NRC's Public Document Room (PDR) in Washington, DC, but because of the inability of local residents to gain access to the PDR, you request that the NRC establish a Local Public Document Room (LPDR) near the Crownpoint site. Current NRC policy is to establish LPDRs for uranium recovery sites if: (1) intervention is granted under the informal hearing procedures for materials licensing proceedings contained in 10 CFR Part 2, Subpart L; (2) the site is not near an existing LPDR; and (3) the staff determines that an LPDR is necessary. As you undoubtedly know, eight petitions for leave to intervene in the HRI licensing proceeding have been filed by various individuals and organizations that are interested in the proposed action. We expect that a decision with respect to their intervention will be made by the Presiding Officer shortly, following publication of the FEIS. In anticipation of that action, the NRC staff is preparing a hearing file that is to contain all reports and NRC-HRI correspondence relevant to this matter, so that a functional LPDR may be established in a prompt and timely manner upon the commencement of the adjudicatory proceeding. In the interim, the PDR staff in Washington, DC is prepared to assist interested individuals in any way. If you or any members of the local community would like to obtain copies of information submitted by HRI, in lieu of contacting HRI, the PDR may be contacted at (202) 634-3273/3333.

I hope this information clarifies the NRC staff's position on this matter, and responds to your concerns. If you have any questions regarding this subject, please contact Mr. Holonich of my staff at (301) 415-6643.

Sincerely,



Carl J. Paperiello, Director
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cc: See attached list

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