December 7, 1998

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

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

EASTERN NAVAJO DINÉ AGAINST URANIUM MINING'S AND SOUTHWEST RESEARCH AND INFORMATION CENTER'S BRIEF IN OPPOSITION TO HYDRO RESOURCES, INC.'S APPLICATION FOR A MATERIALS LICENSE

WITH RESPECT TO:

PERFORMANCE BASED LICENSING ISSUES

December 7, 1998

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INTRODUCTION

The performance based license issued to Hydro Resources, Inc. ("HRI") by the Nuclear Regulatory Commission ("NRC") Staff does not set forth most of the conditions that must be met by HRI in its proposed mining and milling operation in Church Rock and Crownpoint, New Mexico ("the mining operations"). Rather, the license purports to comply with applicable requirements by incorporating provisions of HRI's application. Moreover, the license permits HRI to change unilaterally the requirements that must be met without prior approval of the NRC, and authorizes HRI to determine whether it is necessary to involve the NRC or the affected public in determining whether the changes can be made without amending the license.

This approach to licensing of source materials facilities is not permitted by the Atomic Energy Act, the regulations adopted by the NRC to implement that Act, or the National Environmental Policy Act ("NEPA"). In addition, because HRI's application is incoherent and internally inconsistent, it is not clear what the Staff has purported to approve. The performance based licensing approach is therefore irrational, arbitrary, and capricious, and in violation of the Administrative Procedures Act as well. The approach also violates the Administrative Procedures Act because the Staff is acting without any regulation or policy adopted in accordance with the procedural requirements of that statute.[1]

FACTUAL BACKGROUND

I. PERFORMANCE BASED LICENSING RELIES ON THE LICENSEE'S APPLICATION AND GIVES THE LICENSEE AUTHORITY OVER CHANGES IN THE OPERATION AND OVER TESTS AND EXPERIMENTS.

The performance based licensing ("PBL") approach appears to have first been used by the Staff for *in situ* leach mining beginning around 1994. This is reflected in a September 2, 1994, letter from Joseph J. Holonich, NRC High-Level Waste and Uranium Recovery Projects Branch, to uranium recovery licensees and State officials

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[1] The Intervenors Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Center ("SRIC") raised this issue in their August 15, 1997 Second Amended Request for Hearing, Petition to Intervene, and Statement of Concerns ("Statement of Concerns"). ENDAUM and SRIC's statement of that issue is set forth on pages 30-32 of their Statement of Concerns. The Presiding Officer admitted this concern for litigation in LBP-98-9, Memorandum and Order (Ruling on Petitions and Areas of Concern; Granting Requests for Hearing Scheduling), 47 NRC 261, 281 (1998).

(hereinafter "Holonich Letter").[2] Exhibit 1. Among the attachments to the letter is a marked-up version of the PRI license which shows PBL-related changes. Id., Attachment 3, Example License for an In Situ Leach Facility (Power Resources Inc. ["PRI"]), §9.3 at 1. As is reflected there and as is noted in the summary of the NRC Staff's meeting with the industry regarding the draft example PBL licenses, the creation of a "single license condition" which ties the licensee to its commitments in the license application, creates a "more streamlined license." Holonich letter, Enclosure 1, Summary of the August 12, 1994 Meeting With Energy Fuels Nuclear, Inc., PRI, and the Nuclear Regulatory Commission on the Draft Example Licenses at 1 (undated), (hereinafter "Meeting Summary").

In response to a request by PRI to eliminate the remaining prescriptive license conditions, the NRC Staff stated that these conditions:

> would have to be discussed individually, but there are some areas where the NRC will want a licensee to come in for an amendment, such as changes impacting the radiation safety analysis. Decisions on which of a licensee's current license conditions could be eliminated by the addition of a single condition tying the licensee to its license application would have to be made on an individual basis and tailored to each specific site.

Id. This comment by the Staff indicates that unless a proposed operational measure is specifically prescribed in a license condition, it is presumptively subject to change without a license amendment.

Performance based licensing therefore involves four related features. First,

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[2] The Holonich Letter recounts that Power Resources, Inc. ("PRI"), an ISL licensee, had "volunteered" its license "to be revised to demonstrate available mechanisms to reduce the regulatory burden on uranium recovery licensees, including the implementation of the performance-based license conditions (PBLC)."

there is a comprehensive referencing and incorporation of the statements and commitments in the application as licensing requirements. See, e.g., Holonich letter Attachment 3, §9.3. Second, the license has a corresponding reduction in the prescriptive requirements of the license itself. See, e.g., Holonich letter Attachment 3, §§10.6-10.9, 11.2-11.3, and 12.1.

Third, the license contains a provision allowing the licensee -- without NRC approval -- to change the "facility or process," alter its procedures, or conduct new tests or experiments. The provision further provides that the change, test, or experiment may not conflict with any requirement specifically stated in the license, impair the licensee's ability to meet all applicable NRC regulations, degrade essential safety or environmental commitments in the license application or approved reclamation plan, or be inconsistent with the conclusions of the Environmental Assessment. See, e.g., Holonich letter Attachment 3, §§9.3, 9.4. Finally, the license establishes an internal licensee review panel to substitute for NRC review of the changes, tests, or experiments. Id.

II. The LICENSE ISSUED TO HRI BY THE STAFF IS A PERFORMANCE BASED LICENSE.

A. The Staff Issued HRI a Performance Based License.

The Staff issued a draft environmental impact statement for the Crownpoint Uranium Project in October of 1994.[3] Following a comment period, the Staff issued

[3] Draft Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico, NUREG-1508, October, 1994 (ACN 9705220214) ("DEIS").

the final environmental impact statement in February of 1997.[4] The FEIS reviewed the environmental impacts and concluded that, if certain conditions were met, the project would not adversely affect the environment. FEIS at xxi.

On December 5, 1997, the Staff issued a Safety Evaluation Report (Safety Evaluation Report for the Crownpoint Uranium Solution Mining Project, Crownpoint, NM, December, 1997) (ACN 9712110136) ("SER"; exhibit 2) for the Crownpoint Uranium Project, notifying HRI of its approval of the license application. In the introduction to the SER, the Staff stated that language appearing in bold print in the SER:

> denotes matters to be controlled by specific license conditions stated in the license. HRI cannot deviate from these conditions without first obtaining NRC approval through the license amendment process. These license conditions provide reasonable assurance that HRI's Crownpoint Project operation will be in accordance with all NRC regulatory requirements.

Id. at 2. Among the bold-faced -- and therefore binding -- license conditions listed in the SER is the following:

> **HRI shall conduct operations in accordance with all commitments, representations, and statements made in its license application submitted by cover letter dated April 25, 1988, as supplemented, and the Crownpoint Uranium Project COP [Consolidated Operations Plan], Rev. 2.0, dated August 15, 1997, except where superseded by license conditions contained in this license. Whenever the words "will" or "shall" are used in the aforementioned licensee documents, it denotes an enforceable license requirement.**

Id. at 2.

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[4] Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico, NUREG-1508, February, 1997 (ACN 9703200270) ("FEIS").

On January 5, 1998, the NRC issued a license[5] to HRI to construct and operate the Crownpoint Uranium Project. Section 9.3 of the license contains the same PBLC that was quoted in the SER. The PBL conditions in the license incorporate the terms of HRI's license application, allow HRI to change the mining operations, and permit HRI to determine unilaterally whether prior NRC approval and involvement of the affected public are required before changes in the mining operations can be made.

1. The License Incorporates HRI's Application.

The first respect in which the HRI license is a performance based license is that the license incorporates the license application. Section 9.3 of the license provides:

> The licensee shall conduct operations in accordance with all commitments, representations, and statements made in its license application submitted by cover letter dated April 25, 1988 (as supplemented by the licensee submittals listed in Attachment A), and the Crownpoint Uranium Project Consolidated Operations Plan (COP), Rev. 2.0, dated August 15, 1997, except where superseded by license conditions contained in this license. Whenever the licensee uses the words "will" or "shall" in the aforementioned license documents, it denotes an enforceable license requirement.

This language in the HRI license effectively incorporates the terms of HRI's application and various other related documents listed in Attachment A to the license, (1) by requiring HRI to comply with "all commitments, representations, and statements" made in HRI's license application, unless they are superseded by license

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[5] Materials license SUA-1508 issued to Hydro Resources, Inc. for the Crownpoint Uranium Project in McKinley County, New Mexico (January 5, 1998) (ACN 9801160066) ("license"; exhibit 3).

conditions contained in the license, and (2) by prescribing that when the licensee uses the words "will or "shall" in its license application and related documents, "it denotes an enforceable license requirement." Id., §9.3. Attachment A to the license also mandates that the licensee shall conduct its operations in accordance with the "commitments, representations, and statements" made in the submittals listed there, and indicates that each of the documents listed there is incorporated by reference. The terms of the license application, including the 49 licensing documents submitted by HRI as Attachment A to the license, therefore constitute the prescriptive requirements of the license.[6]

Finally, there are only a few prescriptive requirements included in the HRI license; examples are the requirements pertaining to the financial surety (§ 9.5), disposal of 11e(2) byproduct material (§9.6), training (§9.7), procedures (§9.8), cultural resources (§9.12), and operational controls (§10). It also contains provisions prohibiting the injection of lixiviants until certain conditions have been met (see, e.g., §§9.13, 10.18 through 10.23, and 10.26 through 10.28).

2. The License Permits HRI to Change the Mining Operations.

The second respect in which the HRI license is a performance based license is that the license permits HRI to change the mining operations. Specifically, §9.4 of

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[6] The incorporation of HRI's license application terms into the license is consistent with the example mine and mill licenses drafted by the NRC Staff in 1994. See Attachments 2 and 3 to Holonich Letter, Exhibit 1. Section 9.3 of each example license requires the licensee to conform with "the conditions, representations, and statements" made in the license application and related documents, which are "hereby incorporated by reference" into the license, except where superseded by license conditions. Id.

the license provides:

A) The licensee may, without prior NRC review or approval: (i) make changes in the Crownpoint Project's facilities or processes as described in the COP (Rev. 2); (ii) make changes in its standard operating procedures; and (iii) conduct tests or experiments, if the licensee ensures that the following conditions are met:

(1) the change, test or experiment does not conflict with any requirement specifically stated in this license, or impair the licensee's ability to meet all applicable NRC regulations;

(2) there is no degradation in the safety or environmental commitments made in the Crownpoint Uranium Project Consolidated Operations Plan (COP), Revision 2.0, or in the approved reclamation plan for the Crownpoint Project; and

(3) the change, test, or experiment is consistent with NRC's findings in NUREG-1508, the Final Environmental Impact Statement (FEIS, dated February 1997) and the Safety Evaluation Report (SER, dated December 1997) for the Crownpoint Project.

If any of these conditions are not met for the change, test, or experiment under consideration, the licensee is required to submit a license amendment application for NRC review and approval.

The license therefore gives HRI the authority to make changes in the mining operations and to conduct tests and experiments, provided that the four conditions set forth in §9.4(A) of the license are met. Moreover, the license also contains the final essential element of performance based licensing; it delegates to HRI the decision about whether those four conditions are met.

3. The license Allows HRI to Determine Whether to Involve the NRC or the Public in Changes to the Mining Operations.

Section 9.4 of the license also provides that HRI is to determine whether the

conditions set forth in §9.4(A) are met. The remainder of §9.4(A) and §9.4(B) establish an HRI "panel" to decide whether to involve the NRC or the public in changes to the mining operations:

> A) (continued)
>
> The licensee's determinations as to whether the above conditions are met will be made by a Safety and Environmental Review Panel (SERP). All such determinations shall be documented, and the records kept until license termination. All such determinations shall be reported annually to the NRC, pursuant to LC 12.8. The retained records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for determining whether or not the conditions are met.
>
> B) The SERP shall consist of a minimum of three individuals employed by the licensee, and one of these shall be designated the SERP chairman. One member or the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and, one member shall be the Environmental Manager, with the responsibility of ensuring that changes conform to radiation safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, groundwater hydrology, surface-water hydrology, specific earth sciences, and other technical disciplines. Temporary members or permanent members, other than the three above-specified individuals, may be consultants.

The license therefore delegates to the SERP the authority to determine whether the conditions set forth in §9.4(A) are met. The SERP consists of three HRI employees, and it does not include any members of the NRC or of the affected public. If the SERP determines that the §9.4(A) conditions are met, HRI may change the mining operation or conduct tests and experiments. Only if the SERP decides that those conditions will not be met is HRI required to seek authority from the NRC to change the operation or conduct tests or experiments.

ARGUMENT

I. PERFORMANCE BASED LICENSING FOR THE HRI LICENSE VIOLATES THE ATOMIC ENERGY ACT, ITS IMPLEMENTING REGULATIONS, AND THE ADMINISTRATIVE PROCEDURES ACT.

A. Neither the Atomic Energy Act nor its Implementing Regulations Authorizes the Issuance of a Performance Based License to HRI.

The Atomic Energy Act prohibits private persons and entities from possessing nuclear material without a license from the NRC. 42 U.S.C. § 2111. The Act also provides that the NRC may not issue a license for possession of such nuclear materials unless the NRC first determines that issuance of the license will not be "inimical" to the public health and safety. 42 U.S.C. § 2099.

There is nothing in either the Atomic Energy Act or its implementing regulations that authorizes the issuance of performance based source materials licenses. On the contrary, the only provisions of either the Act or its regulations that permit the issuance of anything resembling performance based licenses relate to the licensing of nuclear power plants, not to source material facilities. Section 50.59(a) of 10 C.F.R. permits nuclear power plant licensees to change the facility or procedures in ways described in the safety analysis report and conduct tests or experiments not described in that report, without prior NRC approval, unless the proposed change involves altering the technical specifications set forth in the license or an unreviewed safety question. Similarly, 10 C.F.R. §72.48 permits the holders of licenses for independent spent fuel storage installations and multiple retrievable storage installations to make changes in their facilities and procedures described in their safety analysis plans, and to conduct tests and experiments without prior NRC

approval unless the proposed change, test or experiment involves changes in license conditions, unreviewed safety questions, significant increases in occupations exposure, or significant unreviewed environmental impacts.

There is no such provision in either the Act or any NRC regulation pertaining to source materials licenses, and there is therefore no basis for the issuance of such a license to HRI. Source materials licenses are governed by 10 C.F.R. Part 40, which provides for the issuance of prescriptive requirements licenses only. Part 40 of 10 C.F.R. should not be interpreted to contain provisions permitting issuance of performance based licenses because there are no such provisions in that Part.

The only provisions in the NRC regulations allowing issuance of performance based licenses are in Parts 50 and 70, but those Parts do not govern source materials licenses. As the NRC itself has stated, NRC regulations that are written differently are to be interpreted differently. In Louisiana Energy Services (Claiborne Enrichment Center), LBP-96-25, 46 NRC 294 (1997), the NRC ruled that because the financial qualification regulations of 10 C.F.R. Parts 50 and 70 are written differently, they are not to be interpreted as meaning the same thing. The NRC held that the extensive standards set forth in Part 50 do not apply to Part 70 applicants because Part 70 neither contains those extensive standards nor adopts them by reference. 46 NRC 300.[7]

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[7] See also Russello v. United States, 464 U.S. 16 (1983), in which the Supreme Court pointed out that when the legislature includes specific language in one section of a statute but leaves it out of another section of the same statute, it is generally presumed that the legislature has acted "intentionally and purposely". 464 U.S. at 23 (quoting United States v. Wong Kim Bo, 472 F.2d 720, 722 (5th Cir. 1972) (holding

The NRC knows what it is doing when it adopts regulations. If the NRC had wanted to adopt a regulation permitting performance based licensing for source materials licenses, the NRC would have done so. The NRC did not adopt such a regulation for source materials licenses; performance based licensing therefore cannot be used for those licenses.

Moreover, the entire scheme of the 10 C.F.R. Part 40 regulations governing source materials licenses mitigates against such *post hoc* alterations to licenses. The Part 40 regulations specifically provide that an application for a source materials license will be approved only if "[t]he applicant's proposed equipment, facilities and procedures are adequate to protect health and minimize danger to life or property." 10 C.F.R. § 40.32(c). Section 40.32(d) further requires that before issuing a license, the Staff must find that the "issuance of the license will not be inimical to the common defense and security or to the health and safety of the public." The Staff's safety findings under §§ 40.32(c) and (d) , as reported in the Safety Evaluation Report, are based on the specific representations made by HRI regarding its proposed equipment, facilities and procedures, and the nature of its operation. These regulations do not contemplate that after licensing, a licensee may change the very foundation for the safety findings undergirding the license. To do so would empty the safety findings required by 10 C.F.R. §§ 40.32(c) and (d) of any meaning.

B. HRI's Performance Based License is Invalid Because the NRC Has Not

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that insurance proceeds were forfeitable as an "interest" acquired in violation of the Racketeer Influenced and Corrupt Organizations chapter of the Organized Crime Control Act).

Duly Promulgated Either Regulations or Policy Authorizing it.

The 10 C.F.R. Part 40 regulations governing source materials licenses were initially promulgated in January of 1961. 26 Fed. Reg. 284 (1961). Those regulations have never been amended to permit the use of performance based licensing; moreover, the NRC has never adopted either regulations or a formal policy allowing such licensing to be used for source materials licenses.[8] Rather, the use of performance based licensing for source materials licenses is an informal policy developed by the Staff alone without any authorization from the NRC and without any regulations or policies adopted in accordance with the Atomic Energy Act or the Administrative Procedures Act, 5 U.S.C. §§551-559, 701-706.[9]

The Staff started applying the concept of performance based licensing to *in situ* leach mining in 1994. Since 1994, the Staff has issued a number of *in situ* leach

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[8] ENDAUM and SRIC do not concede that the Commission or the Staff has the authority to implement performance based licensing through the adoption of a policy as opposed to a regulation. Even if the Commission or the Staff did have that authority, however, neither has exercised it.

[9] The new and as yet unsettled nature of performance based licensing for source materials licenses is indicated in the June 11, 1998 Memorandum on Risk-Informed, Performance-Based and Risk-Informed, Less-Prescriptive Regulation in the Office of Nuclear Material Safety and Safeguards, SECY 98-138 from L. Joseph Callan, Executive Director for Operations to the NRC Commissioners ("SECY 98-138") (Exhibit 4).

In that paper, Mr. Callan stated that it was prepared by the Staff in response to a Commission question as to whether the approach of risk-informed performance-based licensing now being considered for nuclear power plants would also be applicable to nuclear materials facilities. SECY-98-138 at 2. In addition, Mr. Callan pointed out in the paper's discussion of resources the need for rulemaking proceedings to address which nuclear materials uses are appropriate for a risk-informed performance-based regulation. SECY 98-138 at 7.

licenses containing performance based license conditions. The Staff's change in policy without adoption of regulations or other authorization from the NRC is arbitrary and capricious and therefore illegal. In Citizens Awareness Network v. United States Nuclear Regulatory Commission, 59 F.3d 284 (1st Cir. 1995), the Court held that a Commission change in policy to permit decommissioning of the Yankee Nuclear Power Station prior to a hearing requested by a citizens group violated the Atomic Energy Act and was arbitrary and capricious. The Court's ruling was based in part on the irrational nature of the change itself, but also in part on the failure of the Commission to make its change in policy in a public process and to justify its change in policy:

> The Commission adhered to [its prior] policy for almost five years, reiterating its position in at least two adjudicatory decisions. Then, rather suddenly, the Commission circulated two internal staff memos that completely reversed this settled policy, without any notice to the affected public. More troubling, however, was the Commission's failure to provide in those memos, or anywhere else, any justification or reasoning whatsoever for the change. The memos did not set forth any new facts, fresh information, or changed circumstances which would counsel the shift. Nor did they provide any legal analysis of how the new policy comported with, or at least did not conflict with, existing agency regulations. With nothing more than a breezy "notwithstanding," the Commission abruptly disposed of five years' worth of well-reasoned, duly promulgated agency precedent.

Citizens Awareness Network, 59 F.3d at 291.

The Staff acted without any change by the NRC in the applicable regulations and without any other process providing public notice or permitting input from members of the public affected by the change.[10] The Staff has purported to change

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[10] In addition, as was the case in Citizens Awareness Network, the Staff's use of performance based licensing for the HRI license is irrational because of the

NRC regulations and more than 30 years of established policy by issuing a performance based license to HRI without either any authorization from the NRC or any rulemaking or other public process. That violates the Atomic Energy Act and its regulations.

Finally, the Staff's violation of the Atomic Energy Act and the NRC regulations, and its application of performance based licensing without any regulation, policy, or formal justification for that approach, is arbitrary and capricious. It violates the Administrative Procedures Act's requirements for adoption of regulations and that Act's prohibition against arbitrary and capricious agency actions. Citizens Awareness Network, 59 F.3d at 291.

C. HRI's Performance Based License Violates the Atomic Energy Act's and the Regulations' Requirements that License Amendments be Approved by the NRC.

HRI's performance based license permits HRI to change unilaterally the conditions under which it is permitted to operate, without providing prior notice to the NRC or obtaining the NRC's prior authorization. This violates the Act and the regulations.

Section 2111 of 42 U.S.C. provides that no private person or entity may possess nuclear material without an NRC license. In order to issue such a license, the NRC is first required to determine that issuance will not be "inimical" to the public health and safety. 42 U.S.C. § 2099. Moreover, the same procedure must be

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incoherence and self-contradictory nature of HRI's application. See section IV infra.

followed when a licensee seeks an amendment to a license. Section 40.44 of 10 C.F.R. requires that applications for license amendments also be filed on NRC form 313 in accordance with 10 C.F.R. §40.31, and 10 C.F.R. §40.45 provides that application amendments must meet the same standards as original applications for licenses.

Contrary to these requirements, the license issued to HRI allows HRI to determine unilaterally whether a license amendment is required for a change to the license terms contained in its application. The Atomic Energy Act does not permit the NRC to abdicate its own statutory responsibility for making safety findings and to delegate that responsibility to its licensees. Even where the Atomic Energy Act authorizes an applicant to propose alternative requirements, it requires that the Commission, not the applicant or licensee, determine that such alternatives provide equivalent or greater protection. 42 U.S.C. §2114(c). Thus, the performance based license condition that permits HRI to determine whether a license amendment is required for a change in the mining operations would turn the Atomic Energy Act and its implementing regulations on their heads.

D. HRI's Performance Based License Violates the Atomic Energy Act's and the Regulations' Notice and Hearing Requirements.

Section 189a of the Atomic Energy Act, 42 U.S.C. §2239(a)(1)(A), requires the NRC to offer interested members of the public an opportunity to request hearing upon the issuance or amendment of any license for a nuclear facility license.[11] This

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[11] Section 189a provides, in part:
In any proceeding under this chapter, for the granting, suspending, revoking, or

provision applies to all licensing actions, regardless of the significance attributed to them by the Commission, and regardless of whether they are considered to be substantive or procedural in nature. San Luis Obispo Mothers for Peace v. NRC, 751 F.2d 1287, 1315 (D.C. Cir. 1984) (holding that the NRC must offer a public hearing on an order extending a license term). See also Sholly v. United States Nuclear Regulatory Commission, 651 F.2D 780, 791 (D.C. Cir. 1980). The Sholly Court held that §189a required a hearing on an NRC order that gave a licensee authority to vent radioactive gas, which the licensee could not have done under the existing license. The Court's holding was based on its determination that the change in the license constituted a license amendment.

In violation of this requirement, HRI's PBL condition permits HRI to effectively amend its own license, without notice to the public or an offer of an opportunity for a hearing. Although the license condition requires HRI to get NRC approval if HRI believes the change would conflict with license requirements, impair HRI"s ability to meet applicable NRC regulations, or degrade "essential safety" or "environmental commitments", the law does not countenance such qualifiers. As the Court held in San Luis Obispo:

> the reference to "amendments" in section 189(a) means *all* amendments, and not just those which effect a substantive change in a plant's status. We have already explained why we decline to create a residual category in section 189(a) for all actions which bring about a substantive change in the licensing

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amending of any license or construction permit ... the Commission shall grant a hearing upon the request of any person whose interest may be affected by the proceeding, and shall admit any such person as a party to such proceeding.
42 U.S.C. §(a)(1)(A)

> status of a plant. The logic of that analysis now leads us to conclude that substantiality should not be imported as a *limitation* on the categories specifically listed in the section. Had Congress intended substantiality to play a role in the hearing context it could have said so; Congress' silence leads us to conclude that even nonsubstantive amendments come within the section's purview.

Id. at 1315 (emphasis in original, footnote omitted). The NRC is required to offer the opportunity to request a hearing on every amendment to a license, not just to those amendments that meet the conditions specified in §9.4 of HRI's license.

III. HRI'S PERFORMANCE BASED LICENSE VIOLATES THE NATIONAL ENVIRONMENTAL POLICY ACT.

HRI's performance based license condition violates NEPA by permitting HRI to unilaterally determine whether or not changes in its operation would degrade "environmental commitments," or be "consistent" with the findings in the FEIS. HRI License, §9.4. NEPA requires that these determinations be made by the NRC, and the Staff does not have authority to delegate them to HRI.

NEPA mandates that each agency of the federal government shall include in its recommendations on proposals for major federal actions significantly affecting the quality of the human environment detailed statements examining the environmental impacts of the proposed action and the alternatives to it.[12] Moreover, the Council on Environmental Quality regulations that implement NEPA require that the federal

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[12] The specific requirement is for a detailed statement on 1) the environmental impacts of the proposed action, 2) adverse environmental consequences that cannot be avoided, 3) alternatives to the proposed action, 4) the relationship between short term uses of the environment and the maintenance of long term productivity, and 5) irreversible and irretrievable commitments of resources involved in the proposed action. 42 U.S.C. §4332(C).

agency prepare a supplement to a final environmental impact statement if: 1) there are substantial changes in the proposed action that relate to environmental concerns, or 2) there are significant new circumstances or information relevant to environmental concerns bearing on the proposed action or its impacts.[13] 40 C.F.R. §1502.9(c). The NRC regulations implementing NEPA impose the same requirements for proposed actions that have not been taken.[14] 10 C.F.R. §51.92(a)(1), (2). The NRC Staff therefore must prepare a supplemental environmental impact statement if there are substantial changes in HRI's proposed mining operations. In addition, it is the Staff and not HRI, that must determine whether such substantial changes have occurred.

The "primary and nondelegable responsibility" for considering environmental values "lies with the Commission," and may not be delegated to a private entity.

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[13] The NRC Staff argued in its October 19, 1998 Response to ENDAUM and SRIC Petition for Review of September 22 Order and Request for Stay that the Council on Environmental Quality ("CEQ") regulations do not apply to the NRC. That is not an accurate statement of the law. See, e.g., Marsh v. Oregon Natural Resources Council, 490 U.S. 360 (1989), in which the Court pointed out that:

> [t]he CEQ regulations, which we have held are entitled to substantial deference, impose a duty on all federal agencies to prepare supplements to either draft or final EIS's if there are "are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

490 U.S. 372, citations and footnote omitted. The Court held that the Army Corps of Engineers did not act arbitrarily when it determined that certain new information pertaining to a Corps project was not significant. 490 U.S. 385.

[14] For this regulation to make sense, the phrase "if the proposed action has not been taken" must be interpreted to mean proposed actions that have not been taken completely, i.e., proposed actions that have not been finished.

Greene County Planning Board v. Federal Power Commission, 455 F.2d 412, 420 (2nd Cir. 1972, cert. denied, 409 U.S. 849 (1972), citing Calvert Cliffs Coordinating Committee v. Atomic Energy Commission, 449 F.2d 1109, 1119 (D.C. Cir. 1971). In Greene County Planning Board, the Court held that the Federal Power Commission had "abdicated a significant part of its responsibility" by substituting an environmental report prepared by a licensee for its own study. The Court observed critically that:

> The Commission appears to be content to collate the comments of other federal agencies, its own staff and the intervenors and once again to act as an umpire. The danger of this procedure, and one obvious shortcoming, is the potential, if not likelihood, that the applicant's statement will be based upon self-serving assumptions.

Id., 455 F.2d at 420 (footnotes omitted). See also Cedar-Riverside Environmental Defense Fund v. Hills, 422 F. Supp. 294, 322-323 (5th Cir. 1974) (holding that agency must actively participate in environmental analysis rather than merely "rubber stamp" work done by the private entity).

As in Greene County and Cedar-Riverside, in this case the Staff has abdicated its statutory responsibility under NEPA by allowing HRI to unilaterally change the operations on which the Staff based its environmental findings in the FEIS, without first reviewing whether the change meets the standard for supplementation of the FEIS. The Staff does not even require a complete report justifying the change; instead, the license requires only a "summary" of the environmental evaluation, and only on an annual basis. HRI License, §12.8. See also §9.4.

Thus the Staff is content to "rubber stamp" HRI's decision by requiring only a cursory, after-the-fact report on the environmental impacts of the change. This

violates NEPA and the regulations adopted by the CEQ and by the NRC to implement that statute.

IV. THE PERFORMANCE BASED LICENSE CONDITION IN HRI'S LICENSE IS IRRATIONAL AND VIOLATES THE ADMINISTRATIVE PROCEDURES ACT.

A. The Administrative Procedures Act Prohibits Arbitrary and Capricious Agency Action.

The Administrative Procedures Act provides for judicial review of agency action, and states that the reviewing court shall hold unlawful and set aside agency action that is arbitrary and capricious or otherwise not in accordance with law. 5 U.S.C. §706(2). The performance based license condition in HRI"s license is arbitrary and capricious because it is irrational; the many documents that comprise HRI's application are incoherent and self-contradictory, making it impossible to determine what the performance based license requires.

B. HRI's Application Consists of Many Documents Filed During Almost a Decade.

HRI filed its original license application in the spring of 1988, and has amended it a number of times. As recounted in the FEIS, HRI submitted an application for *in situ* leach mining at Church Rock on April 25, 1988. FEIS at 1-1. On May 8, 1989, HRI amended its application to include uranium recovery and processing at Crownpoint. Id. Between 1988 and 1992, the NRC Staff deferred its review of the application at HRI's request, "due to a tentative uranium market." DEIS at 1-3.

HRI revived the application in 1992, by amending it to include mining on the

allotted lands in the Crownpoint area referred to as Unit 1. DEIS at 1-3. On July 31, 1992, HRI further amended the application to include *in situ* leach mining at Crownpoint. Id. Between 1992 and 1997, HRI also submitted a large number of reports, analyses, and responses to NRC comments, in support of its license application. See documents listed in Attachment A to HRI's License. During this period, the NRC Staff requested additional information from HRI on 99 discrete issues in at least six rounds of requests.[15] These Requests for Additional Information (hereinafter "RAIs") cover a broad range of health and safety and environmental issues, such as ground water restoration standards, historic sites and

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[15] See letter from Daniel M. Gillen, NRC, to Mark Pelizza, HRI (January 11, 1996), enclosing RAIs 1 through 48 (two-page letter and 28-page enclosures requesting information on transportation risk analysis, socioeconomics, land use, aesthetics, environmental justice, cultural resources, terrestrial ecology, solid/liquid waste disposal, and radiation safety); letter from Daniel M. Gillen, NRC, to Mark Pelizza, HRI, January 31, 1996, enclosing clarification to RAI 24 concerning cultural resources; letter from Joseph J. Holonich, NRC, to Mark Pelizza, HRI (February 9, 1996) (ACN 9602140148), enclosing RAIs 49 through 92 (two-page letter and 88-page enclosures requesting information on water resource protection and cost-benefit analysis); letter from Daniel M. Gillen, NRC, to Mark Pelizza, HRI (July 15, 1996) (ACN 9607250225), enclosing NRC Staff comments, requests for additional information concerning previous RAIs, and new RAI 94 concerning standardized license conditions (two-page letter and 70-page enclosure); letter from Daniel M. Gillen, NRC, to Mark S. Pelizza, HRI (September 13, 1996) (ACN 9703030098), enclosing NRC Staff comments, requests for additional information concerning previous RAIs, new RAI 95 concerning effect of ground water drawdown on Crownpoint water wells, and new RAI 96 concerning proposal to use multiple ground water restoration standards; letter from Daniel M. Gillen, NRC, to Richard F. Clement, Jr., HRI (November 8, 1996), enclosing NRC Staff comments, requests for additional information concerning previous RAIs, new RAI 97 concerning the potential for excursions at the Unit 1 site, and new RAI 98 concerning the potential for excursions at the Church Rock site (one-page letter and 41-page enclosures); letter from Joseph J. Holonich, NRC, to Richard F. Clement, Jr., HRI (April 1, 1997) (ACN 9704040271), enclosing NRC Staff comments and new RAI 99 regarding sensitivity analysis of the modeled Unit 1 site ground water flow .

cultural resources. In response, HRI submitted thousands of additional pages of new data and explanatory information.[16] NRC Staff's reviews of HRI's responses to RAIs also generated requests for clarification,[17] in response to which HRI repeatedly revised and supplemented its responses.[18]

By the time ENDAUM and SRIC submitted their Second Amended Request for Hearing, HRI had submitted several hundred different documents relating to and amending its application. See, e.g., Index of Docket No. 40-8968-ML (July 3, 1997), attached as Exhibit 1 to ENDAUM and SRIC's Second Amended Request. Since the Staff issued HRI's license on January 5, 1998, both the docket for this proceeding and the Hearing File have been expanded to include documents prepared

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[16] See, e.g., letter from M.S. Pelizza, HRI, to J. Holonich, NRC (February 20, 1996) (ACN 9602220389), forwarding 296-page response to RAIs 1-48; letter from M.S. Pelizza, HRI, to J. Holonich, NRC (April 1, 1996) (ACN 9604030208), forwarding 300-page response to RAIs 49 through 91; letter from M.S. Pelizza, HRI, to J. Holonich, NRC (April 5, 1996) (ACN 9604260063), forwarding 1,200-page response to RAI 92.

[17] See, e.g., letter from Daniel M. Gillen, NRC, to Mark Pelizza, HRI (July 15, 1996) (ACN 9607250225); letter from Joseph J. Holonich, NRC, to Richard F. Clement, Jr., HRI (April 1, 1997) (ACN 9704040271).

[18] See, e.g., letter from Mark S. Pelizza, HRI, to Daniel M. Gillen, NRC, (August 15, 1996), forwarding supplemental and revised responses to RAIs; correspondence from M.S. Pelizza, HRI, to J. Holonich, NRC, March 4, 1996, forwarding supplemental and replacement responses to RAIs 23 and 32; correspondence from M.S. Pelizza, HRI, to D. Gillen, NRC, June 10, 1996, forwarding supplemental responses to RAIs 10, 14, 16, 17, 20, 26, 32, and 36; correspondence from M.S. Pelizza, HRI, to D. Gillen, NRC, May 3, 1996, forwarding supplemental responses to RAIs 22, 23, and 24; correspondence from M.S. Pelizza, HRI, to M. Layton, NRC, June 28, 1996, forwarding supplemental response to RAI 53; correspondence from M.S. Pelizza, HRI, to B. Carlson, NRC, September 6, 1996, forwarding revised response to RAI 51.

prior to license issuance and documents generated after license issuance.[19]

C. The Performance Based License Provision Creates Substantial Doubt as to the Actual License Terms.

HRI's license application consists of a myriad of documents generated over a ten year period. The license is arbitrary and capricious because its performance based licensing provisions create considerable confusion as to what constitute the terms of HRI's license. Very few requirements are described in HRI's license. To determine what the regulatory limits are on HRI's operation, a regulator -- or a member of the public who wishes to evaluate HRI's compliance with its license -- must ferret through the 49 submittals listed in Attachment A to the license. These submittals consist of thousands of pages of assertions and commitments submitted by HRI over the course of almost ten years. See section IV.A, supra. HRI's performance-based license condition must be rejected pursuant to the Administrative Procedures Act because the license is irrational and therefore arbitrary and capricious. See Citizens Awareness Network, 59 F.3d at 292 (holding that a Commission change in policy to permit decommissioning of the Yankee Nuclear Power Station prior to a hearing requested by a citizens group was arbitrary and capricious).

Moreover, not only is it extremely difficult and time-consuming to sort

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[19] See letter from John T. Hull, Counsel for NRC Staff, to Administrative Law Judges Peter B. Bloch and Thomas D. Murphy (June 11, 1998), enclosing HRI Hearing File as Attachment A, and enclosing six other documents that "are considered to be part of the HRI hearing file....", and letter from John T. Hull (November 13, 1998), Counsel for NRC Staff to Johanna Matanich, Counsel for ENDAUM and SRIC, enclosing as Attachment 1 an October 16, 1998 letter from Mark S. Pelizza, HRI, to Bob Carlson, NRC Staff, and enclosing as Attachment 2 an "October 1998 Supplement" to the HRI Hearing File Index.

through the various commitments and representations in the 49 attachments to the license to determine what constitute enforceable requirements, but there are significant inconsistencies within the licensing documents. These include internal inconsistencies within documents submitted by HRI, inconsistencies between HRI documents and the FEIS, and persistent inconsistencies between HRI license documents and the license. The following examples[20] illustrate the types of inconsistencies that make HRI's license terms impossible to discern, and therefore to monitor or enforce.

1. The License Presents Different Sequences of Development of the Church Rock Well Fields.

HRI has made significantly different representations in its license application regarding the sequence of development of wellfields on Sections 8 and 17 of the Church Rock site. In October of 1993, HRI submitted revisions to its March 1993 Environmental Report for Church Rock, which stated that:

> 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 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.

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[20] Similar discrepancies exist with respect to protection of cultural resources. See ENDAUM and SRIC's brief pertaining to cultural resource issues filed on December 7, 1998, at section I.A.

CRRER Section 3.1.4 at 175 (Revised: October 11, 1993).[21] 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.

Pursuant to License Condition 9.3, the assertions made in the CRER at Section 3.1.4 constitute enforceable commitments by the licensee. The CRER is referenced in Appendix A of the License, and contains "commitments, representations, and statements" that mining will begin on Section 17 and conclude on Section 8.

In stark contradiction of these commitments, representations, and statements, the COP for the Crownpoint Project asserts that mining will begin in Section 8 first and be followed by mining in Section 17. Revision 2 of the COP states that, "Production will proceed first on Section 8," and that "Production is scheduled to begin on Section 17 following Section 8." Rev. 2 to Crownpoint Uranium Project Consolidated Operations Plan at 17 (August 15, 1997) (ACN 9708210179).

Nothing in the license or in anything else in the record states that the most recent commitments, representations, and statements are binding on HRI rather than earlier commitments, representations, and statements. The effect is a total lack of clarity and the possibility that HRI may pick and choose which of its assertions

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[21] HRI originally submitted the Church Rock Revised Environmental Report on March 16, 1993, under cover of a letter from Mark Pelizza, HRI, to Ramon Hall, NRC (ACNs 9304130415 and 9304130421). The CRRER was revised again in October of 1993, under cover of a Memorandum from Mark S. Pelizza to Distribution List (October 11, 1993) (ACN 9312140083).

govern.

This internal contradiction not only makes a mockery of the assertion in the license that HRI must comply with its commitments, but leaves it entirely unclear what sequence of mining has been reviewed and approved by the NRC. As discussed in the Third Affidavit of Michael G. Wallace at 9-10 (September 1, 1998),[22] Section 17 is hydraulically upgradient of Section 8. Section 17 also has significant underground mineworkings whose effects on the hydrology of the area must be taken into account before mining commences. Moreover, because Section 17 is upgradient of Section 8, mining and restoring Section 8 first would be extremely imprudent. Once Section 8 has been restored, it may become recontaminated by contaminated groundwater flowing downgradient from Section 17, thus raising the cost and difficulty of restoring Section 8. Id. There is no indication that HRI or the NRC Staff has given any consideration to these problems.

Moreover, the license contains no provision stating that the most recent assertions, commitments and representations supersede previous assertions, commitments, and representations. Thus, it remains entirely unclear which of these representations has been reviewed and approved by the Staff, and for which of them HRI is to be held accountable.

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[22] Mr. Wallace's affidavit (Exhibit 5) explains that the sequence of development is important because Church Rock Section 17 is upgradient of Church Rock Section 8. That means that contamination escaping from Section 17 would flow downgradient to Section 8, which may already have been mined and restored. Exhibit 5 at 9-10.

Mr. Wallace's Third Affidavit was filed in support of ENDAUM's and SRIC's scheduling Conference Brief (September 2, 1998). Because the Affidavit is relevant to this portion of the PBL issue, it is also being filed in support of this brief.

2. The License Contains Contradictions regarding Baseline Water Quality Samples.

There are also significant discrepancies between the license, the application, and the FEIS, regarding the nature of HRI's obligations with respect to the collection of baseline water quality samples. License Condition 10.21(A) requires HRI to take three independently collected samples of formation water from (1) each monitor well in the wellfield and (2) one production/injection well per acre of each wellfield. The samples must be taken a minimum of 14 days apart from each other. The FEIS also requires HRI to take "three independent baseline water quality samples from each well".[23] Id. at B-6. In contrast to these requirements, both Revision 1 and Revision 2 of the COP state that HRI will take one sample from the production zone, one sample from a monitor well, and one sample from an overlying zone. COP Rev. 1 at 85; COP Rev. 2 at 85.

At first blush, this contradiction would appear to be resolved by the language in the license which provides that the licensee is bound by the terms of the license application "except where superseded by license conditions." Id., Section 9.3.

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[23] Notably, the NRC's Draft Standard Review Plan for ISL mines recommends that baseline water quality be determined from "[a]t least four independent sets of samples." NUREG-1569, Draft Standard Review Plan for *In Situ* Leach Uranium Extraction License Applications at 5-37, 2-25 (October 1997). A "set of samples" is defined "to be a group of a least one sample for each of the designated baseline monitor wells within the unit being characterized. . . . An acceptable set of samples should include all well field perimeter monitor wells, all upper and lower aquifer monitor wells, and at least one production/injection well per acre in each well field. . . . As a general guideline, for normally and log-normally distributed populations, at least six samples are required to achieve 90 percent confidence that any random sample will lie within two standard deviations from the sample mean." Id. at 5-37.

However, a concern is raised by the fact that seven months after the NRC explicitly stated in the FEIS that three baseline water samples would be required, HRI issued Revision 2 to the COP, which carried over the same inadequate provision for collecting water samples that had appeared in its earlier revision of the COP. This indicates that HRI does not consider itself bound by the requirement, and will argue there is some distinction between the requirement of License Condition 10.21(A) and the provision in the COP. The persisting discrepancy graphically illustrates the confusion and potential for misinterpretation engendered by the approach of incorporating a vast and unwieldy license application into a license.

3. The License Contains Discrepancies in the Description of Retention Ponds.

The license application also contains contradictory information about the size of retention ponds. In the COP Rev. 2.0, HRI states that "[i]nitially, two, or more retention ponds will be constructed at each site." COP Rev. 2.0 at 28-25 and 59. According to HRI, "These ponds will occupy up to 6 acres." Id. Contradicting this assertion, the HRI Response to RAI No. 29 asserts that two ponds of four acres each will be build at the satellite plants and the six acres of ponds at Crownpoint will be used. HRI Response to RAI No. 29 at 3. HRI does not identify these ponds as either retention or evaporation ponds. Even more dissimilar, COP Rev. 2.0 also refers to evaporation ponds, and states that approximately 100 acres of such ponds will be required for disposal of waste water during restoration "at a given location." Id. at 59.

HRI makes no attempt to reconcile these disparate assertions. As a result, it is

impossible for a regulatory enforcement agency or interested member of the public to determine which commitments are enforceable and which are not. Moreover, the range of possibilities is so great as to allow the licensee great latitude in picking the least onerous of its own commitments.

In sum, the incorporation into HRI's license of thousands of pages of disparate and internally contradictory provisions in HRI's license application leads to an unintelligible license, that is therefore incapable of monitoring or enforcement. Because there is no provision giving primacy to the most recent versions of the application, the license application creates a significant lack of clarity about its actual terms, and creates the possibility that HRI may argue that it has discretion to choose among widely varying commitments made over a space of almost ten years. Moreover, there are disturbing inconsistencies between the license, the FEIS, and the license application, for which there is no indication of any resolution by the NRC Staff or HRI. As a result, the license is an irrational instrument incapable of supporting a finding that the HRI facility can and will be operated safely during its license term. Therefore, the license application must be rejected and the license reversed.

CONCLUSION

Issuance of the performance based license to HRI violates the Atomic Energy Act and its implementing regulations because there is no provision for the issuance of such a license to HRI in these circumstances. In addition, the issuance of the license violates that Act and those regulations because the license permits HRI to change the

mining operations without involving the NRC or the public and without any notice or hearing.

HRI's performance based license also violates NEPA and the regulations adopted by the CEQ and the NRC to implement that statute because the license constitutes an abdication by the Staff of its obligations under NEPA and those regulations.

Finally, the issuance of the license violates the Administrative Procedures Act for two reasons. First, the NRC has adopted neither regulations nor a policy pursuant to that Act providing for issuance of such licenses for source materials. Second, the license is incoherent, self-contradictory, and irrational.

The Staff's decision to issue the license therefore should be reversed.

Dated: December 7, 1998.

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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	)	December 7, 1998

CERTIFICATE OF SERVICE

I hereby certify that:

On December 7, 1998, I caused to be served copies of the following:

ENDAUM and SRIC's Brief in Opposition to Hydro Resouces, Inc.'s Application for a Materials License with Respect to: Performance Based Licensing

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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U.S. Nuclear Regulatory Commission
One White Flint North
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Rockville, MD 20852
Attn: Rulemakings and Adjudications Staff

Office of Commission Appellate Adjudication*
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Rockville, MD 20852

Administrative Judge
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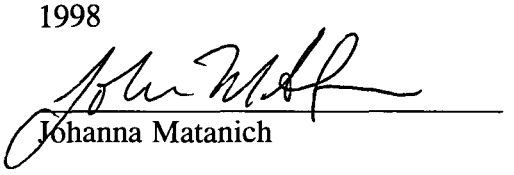
Signed at Santa Fe, NM, December 7, 1998



Johanna Matanich

EXHIBIT 1

September 2, 1994

LETTER FOR: Uranium Recovery Licensees and State Officials on the Attached List

Dear Ladies and Gentlemen:

The U.S. Nuclear Regulatory Commission, in accordance with its commitment at the Transition Oversight Team meetings, has completed the development of the example mill and in situ licenses. As you are aware, Energy Fuels Nuclear, Inc. (EFN) and Power Resources, Inc. (PRI) volunteered their licenses to be revised to demonstrate available mechanisms to reduce the regulatory burden on uranium recovery licensees, including the implementation of the performance-based license condition (PBLC). On August 12, 1994, the NRC met with representatives of EFN, PRI, and The American Mining congress (AMC) to discuss their comments on draft versions of the example licenses. The summary for this meeting is provided in Enclosure 1. The NRC staff has revised the example licenses based on comments received at this meeting and is now enclosing a copy of the example licenses for your use.

Each licensee should keep in mind the following when considering whether to implement changes similar to those shown in the example licenses:

1. All changes to the license will require the submittal of a license amendment request that documents the specific changes requested and provides justification for each of those changes.

2. The licensee will need to tailor the changes shown in the example licenses to each individual licensee's situation.

3. Changes are not limited to those shown in the example license. The NRC is always willing to consider additional changes.

If you have any questions on the enclosed information, please feel free to contact your cognizant NRC Project Manager. General questions can be directed to Sandra L. Wastler, of my staff at (301) 415-6724.

Sincerely,

/s/

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

Attachments:
1. August 12, 1994 Meeting Summary
2. Example Mill License
3. Example In Situ License

Adressees for letter dated: September 2, 1994

Quivira Mining Company
ATTN: Bill Ferdinand, Manager
Radiation Safety, Licensing &
Reg. Affairs
6305 Waterford Blvd., Suite 325
Oklahoma City, OK 73118

Atlantic Richfield Company
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P.O. Box 638
Grants, NM 87020

UNC Mining and Milling
ATTN: Juan R. Velasquez
1700 Louisiana Blvd., NE, Suite 230
Albuquerque, NM 87110

Hydro Resources, Inc.
ATTN: Mark Pelizza
Uranium Resources Inc.
12750 Merit Drive, Suite 1210, LB 12
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ATTN: Michael P. Grace
P.O. Box 731
Venice, CA 90291

Sohio Western Mining Company
10 East south Temple
P.O. Box 11248
Salt Lake City, UT 84147

Homestake Mining Company
ATTN: Fred Craft
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Grants, NM 87020

Ferret Exploration Company of
Nebraska, Inc.
ATTN: Steve Collings
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Denver, CO 80202

Tennessee Valley Authority
ATTN: Manager, Nuclear Licensing
and Regulatory Affairs
5N 157B
Lookout Place
1101 Market Street
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Rio Algom Mining Corp.
ATTN: Bill Ferdinand, Manager
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Atlas Corporation
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Umetco Minerals Corporation
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General Superintendent
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American Nuclear Corporation
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Power Resources, Inc.
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Exxon Corporation
c/o Exxon Coal and Minerals Company
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Pathfinder Mines Corporation
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Pathfinder Mines Corporation
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Pathfinder Mines Corporation
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Petrotomics Company
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ATTN: Stephanie Baker
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Lakewood, CO 80228

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ATTN: Benito Garcia, Chief
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Lincoln, NE 68509-8922

State of South Dakota
ATTN: Mike Pochop, Scientist
Department of Environment
and Natural Resources
Division of Environmental Regulation
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Pierre, SD 57501

State of Utah
ATTN: William J. Sinclair, Director
Division of Radiation Control
Department of Environmental Quality
168 North 1950 West
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State of Wyoming
ATTN: Roger Fransen, Legal and
Natural Resources Specialist
State Planning Coordinator's Office
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State of Texas
ATTN: Susan S. Ferguson, Director
Hazardous Waste Division
Texas Water Commission
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Austin, TX 78711-3087

State of Washington
ATTN: Terry R. Strong, Director
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Protection
Department of Health
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Olympia, WA 98504-7827

American Mining Congress
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Vice President
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Uranium Producers of America
ATTN: Joseph H. Card, President
c/o Jon Indall, Carpenter, Comau,
et. al.
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Santa Fe, NM 87504-0669

New Mexico Mining Association
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Executive Director
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Santa Fa, NM 87504

Wyoming Mining Association
ATTN: Marion Loomis
Executive Director
P.O. Box 866
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Colorado Mining Association
ATTN: David R. Cole, President
1340 Colorado State Bank Building
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Utah Mining Association
ATTN: Jack E. Christensen
President
625 Kearns Building
Salt Lake City, UT 84101

Wyoming Mining Association
ATTN: Dale Alberts, President
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American Mining Congress
ATTN: James E. Gilchrist
Vice President
1920 N Street N.W., Suite 300
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Envirocare of Utah, Inc.
ATTN: Charles A. Judd
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46 W. Broadway, Suite 240
Salt Lake City, Utah 84101

ATTACHMENT 1

SUMMARY OF THE AUGUST 12, 1994 MEETING
WITH ENERGY FUELS NUCLEAR, INC., POWER RESOURCES, INC.
AND THE NUCLEAR REGULATORY COMMISSION
ON THE DRAFT EXAMPLE LICENSES

ATTENDEES:

NRC
S. Wastler
M. Layton
J. Holonich
D. Sollenberger
C. Cain (summary only)

American Mining Congress (AMC)
J. Gilchrist

Power Resources, Inc.
S. Morezenti (by phone)
P. Hildenbrand (by phone)
L. McGonigal (by phone)
B. Kearney

Energy Fuels Nuclear, Inc.
R. Van Horn
S. Scheirman
M. Rehmann

PURPOSE: The purpose of the meeting was to discuss the example licenses developed for Power Resources, Inc. (PRI) and Energy Fuels Nuclear, Inc. (EFN), as examples of the implementation of the performance based license condition, as well as, updated license conditions.

PRI COMMENTS ON THE IN SITU LEACH DRAFT EXAMPLE LICENSE:

1. License Condition 9.3 - License Application

PRI supported the reliance on a single license condition to tie it to commitments made in the license application, as done in condition 9.3 of the draft example license. PRI indicated that this change created a more streamlined license. PRI also requested that other conditions in the draft example license, for example conditions 9.7, 10.3, 10.4, 9.10, and 9.11, should also be dealt with in this manner. The NRC indicated that the conditions mentioned by PRI would have to be discussed individually, but there are some areas where the NRC will want a licensee to come in for an amendment, such as changes impacting the radiation safety analysis. Decisions on which of a licensee's current license conditions could be eliminated by the addition of a single condition tying the licensee to its license application would have to be made on an individual basis and tailored to each specific site.

2. License Condition 9.4 - Performance-Based License Condition

a. PRI questioned the wording of 9.4 A (1), which states "Make changes in the facility or process as presented in the application." Specifically, PRI wanted to know if the word "changes" in the sentence referred to changes in the facility or process, or changes in the application. The NRC indicated that the "changes" referred to were to the facility or process. The NRC indicated that the 9.4 A (1) would be made clearer.

b. PRI requested a change to the wording of 9.4 B (3), which states "The change, test, or experiment falls within the alternatives analyzed and selected in the Environmental Impact Statement (EIS) dated XXXXXX, 19XX (NUREG-XXXX). PRI indicated: 1) that the wording "within the alternatives" limits a licensee from using new processes, that might not have been considered during the environmental review and 2) that reference to an EIS may be too general. In addition it pointed out that Environmental Assessments were done for the in situ's, not EIS's. Therefore, PRI suggested that the wording "within the alternatives" be replaced by the phrase "consistent with the conclusions in the Environmental Assessment (EA)." The NRC agreed that the suggested wording more clearly captured the intent of the condition and agreed with the change.

c. In regard to 9.4 D, PRI questioned whether furnishing information on changes made by an licensee using the performance-based license condition (PBLC) in an annual report was sufficient. PRI suggested that a report be required at the time of the change. The NRC indicated that reporting on an annual basis provides flexibility to a licensee consistent with reducing the regulatory burden on uranium recovery licensees. Even with this condition, however, a licensee can report a change at shorter intervals, or at the time a change is made.

3. License Condition 9.9 - Surety

PRI disagreed with the condition's requirement for a licensee to carry a surety for all mining activities proposed for the entire life of the facility, as described in the license application. PRI was concerned because the condition would require more of its operating funds to go into securing the surety. In addition, PRI indicated that the situation could occur where the surety would pay the NRC more than needed to reclaim a site. PRI indicated that it would prefer to maintain the current process of yearly updates, where a licensee carries a surety based on current mining activities. The NRC indicated that to give the licensees the flexibility to open and close a wellfield without an amendment required that the surety requirements be increased accordingly. The staff understood PRI's concerns and stated that the NRC would check with its financial experts to see if some compromise can be reached. In addition, PRI indicated that in its case the surety goes to the State of Wyoming and that the impact of this condition on the State's requirements must be considered.

EFN COMMENTS ON THE MILL DRAFT EXAMPLE LICENSE:

1. License Condition 9.5 - Surety

EFN concurred with the comments made by PRI regarding the surety and expressed their preference of maintaining the yearly updates.

2. License Condition 9.4 - Performance-Based License Condition

a. EFN concurred with PRI's comments on PBLC Section B (3) (see 2b above).

b. EFN questioned the inclusion in the PBLC of a Section B (4) that required the filing of a license amendment if an "Action Level" is changed. EFN indicated that the action levels were based on the old 10 CFR Part 20. The new Part 20, however, has already made changes that alter the "action Levels", so that including Section B (4) in EFN's PBLC would put EFN out of compliance. The NRC indicated that they would remove this requirement in the final version of the example license.

3. License Condition 9.12 - Acceptance of Material from Crown Point

EFN indicated that this action has been completed and the condition can be eliminated. NRC indicated it will be eliminated in the final version of the example license.

4. License Condition 11.10 C - Pond Leak Detection System

EFN indicated that this action has been completed and the condition can be eliminated. NRC indicated it will be eliminated in the final version of the example license.

5. General Comment

EFN suggested that it would be helpful to have those license conditions common to all licenses given the same condition number. For example, the condition on financial surety, which is 9.9 in PRI's draft example in situ license and 9.4 in EFN's draft example mill license, would both be 9.4, for example, in all licenses. This would assist licensee's with more than one site. The NRC stated that where possible, this change would be made in the example licenses.

AMC COMMENTS ON THE MILL DRAFT EXAMPLE LICENSE:

1. License Condition 10.17

AMC requested that the condition regarding the expansion of well fields be modified so that the condition only applies if the State the facility is located in does not have an adequate program. The NRC indicated that it was still considering the form that this change should

take and was not ready to modify the condition at this time. AMC indicated that it would provide suggested words for NRC consideration. NRC indicated that the final example licenses would go forward and any change could be added later.

CONCLUSION:

EFN, PRI, and AMC all expressed their appreciation of the work by the staff in preparing the example licenses. All parties indicated that the example licenses were a valuable tool that, when implemented, would result in significantly reducing the regulatory burden of the uranium recovery licensees.

ATTACHMENT 2

Example License
for a
Uranium Mill

Umetco Minerals Corporation
Post Office Box 669
Blanding, Utah 84511
[Applicable Amendments: 10A]

SUA-1358, Amendment No. 34
September 23, 1991
40-8681

Natural Uranium	Any	Unlimited

SECTION 9.0 Administrative Conditions

9.1 **Authorized place of use:** The licensee's uranium milling facilities located in San Juan County, Utah. *(9.0 - In addition to changes made to reduce regulatory impacts, the EFN license has been reorganized into the new license format. The numbers in brackets following the license conditions in the example license refer to license condition number in the current license.)*

9.2 All notices to NRC required under this license, with the exception of incident and event notifications requiring telephone notification, shall be addressed to the Chief, High-Level and Uranium Recovery Projects Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguard. Incident and event notifications that require telephone notification shall be made to the NRC Operations Center at (301) 816-5100.

9.3 For use in accordance with statements, representations, and conditions contained in ~~Sections 3.6.6, 5.1, 5.3, 5.4, 6.2, and 6.3, and Appendix E, Section 5, of~~ the license renewal application dated January 1985, as revised May 1985, and submittal dated September 2, 1992, for the standby organizational structure. The licensee shall conduct operations in accordance with the conditions, representations, and statements referenced above, which are hereby incorporated by reference, except where superseded by license conditions below.

Whenever the word "will" is used in the above referenced sections, it shall denote a requirement. *(11.0)* **[Rationale: ties licensee to entire license renewal application]**

[Applicable Amendments: 28, 31]

9.4 A. The licensee may, without prior U.S. Nuclear Regulatory Commission approval, and subject to the conditions specified in Part B. of this condition:

(1) Make changes in the facility or process as presented in the application.

(2) Make changes in the procedures presented in the application.

(3) Conduct tests or experiments not presented in the application.

B. The licensee shall file an application for an amendment to the license, unless the following conditions are satisfied.

(1) The change, test, or experiment does not conflict with any requirement specified in this license (excluding the License Condition Referencing the License Application or Reclamation Plan), or impair the licensee's ability to meet all applicable NRC regulations.

(2) There is no degradation in the essential safety or environmental commitments in the license application or the approved reclamation plan.

(3) The change, test, or experiment falls within the activities described in Environmental Impact Statement (EIS) dated May 1979 (NUREG-0556).

~~(4) No Action Level is changed.~~

C. The licensee's determinations concerning section (B) above, shall be made by a "Safety and Environmental Review Panel (SERP)." The SERP shall consist of a minimum of three individuals. One member of the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have expertise in implementation of any changes; and, one member shall be the corporate radiation safety officer (CRSO) or equivalent. Other members of the SERP may be utilized as appropriate, to address technical aspects of (A) and (B) above, in several areas, such as health physics, ground-water hydrology, surface water hydrology, specific earth sciences, and others. Temporary members, or permanent members other than the three identified above, may be consultants.

D. The licensee shall maintain records of any changes made pursuant to this condition. These records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for the determination that the change is in compliance with the requirements referred to in (B), above. The licensee shall furnish, in an annual report to NRC, a description of such changes, tests, or experiments, including a summary of the safety and environmental evaluation of each. In addition, the licensee shall annually submit changed pages to its license application to reflect changes made under this condition.

~~9.4 Before engaging in any activity not previously assessed by the NRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC in the form of a license amendment.~~ *(19.0)*
[Rationale: PBLC]

9.5 The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criteria 9 and 10, adequate to cover the estimated costs, if accomplished by a third party, for decommissioning and decontamination of the mill and mill site, for reclamation of any tailings or waste disposal areas, ground-water restoration as

warranted and for the long-term surveillance fee. Within three months of NRC approval of a revised reclamation/decommissioning plan, the licensee shall submit, for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs in the newly approved plan exceed the amount covered in the existing financial surety. The revised surety shall then be in effect within 3 months of written NRC approval.

Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criteria 9 and 10, shall be submitted to the NRC at least 3 months prior to the anniversary date which is designated as June 4 of each year. If the NRC has not approved a proposed revision to the surety coverage 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing surety arrangement for 1 year. Along with each proposed revision or annual update, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation, maintenance of a minimum 15 percent contingency fee, changes in engineering plans, activities performed and any other conditions affecting estimated costs for site closure. The basis for the cost estimate is the NRC approved reclamation/decommissioning plan or NRC approved revisions to the plan. The previously provided guidance entitled "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates" outlines the minimum considerations used by the NRC in the review of site closure estimates. Reclamation/decommissioning plans and annual updates should follow this outline.

Umetco's currently approved surety instrument, Irrevocable Letter of Credit No. S00017012, issued by The Bank of New York in favor of the NRC, shall be continuously maintained in an amount no less than $5,635,180 for the purpose of complying with 10 CFR 40, Appendix A, Criteria 9 and 10, until a replacement is authorized by the NRC. *(20.0)*

[Applicable Amendments: 12, 21, 26, 29, 32]

9.6 The licensee is hereby authorized to possess byproduct material in the form of uranium waste tailings and other uranium byproduct waste generated by the licensee's milling operations authorized by this license. *(10.)*

~~9.6 Prior to termination of this license, the licensee shall provide for transfer of title to byproduct material and land, including any interests therein (other than land owned by the United States or the State of Utah), which is used for the disposal of such byproduct material or is essential to ensure the long-term stability of such disposal site to the United States or the State of Utah, at the State's option. *(21.0)* [Rationale: Contained in Regulations]~~

~~9.8 Standard operating procedures (SOPs) shall be established for all operational process activities involving radioactive materials that are handled, processed, or stored. Standard operating procedures for operational activities shall enumerate pertinent radiation safety practices to be followed. Additionally, written procedures shall be established for nonoperational activities to include in-plant and environmental monitoring, bioassay analyses, and instrument calibrations. An up-to-date copy of each written procedure shall be kept in the mill area to which it applies.~~

~~All written procedures for both operational and nonoperational activities shall be reviewed and approved in writing by the RPO before implementation and whenever a change in procedure is proposed to ensure that proper radiation protection principles are being applied. In addition, the RPO shall perform a documented review of all existing operating procedures at least annually. [Rationale: in the license renewal application]~~

~~During extended periods of mill standby, eight-hour annual sampling for U nat, Ra-226, Th-230~~

~~and Pb-210 may be eliminated if routine airborne sampling show levels below 10 percent of the MPC. Further, during periods of standby, sampling frequencies for area airborne uranium sampling within the mill may be reduced to quarterly, provided measured levels remain below 10 percent of the maximum permissible concentration (MPC). If these levels exceed 10 percent of the MPC, the sampling frequency should follow Regulatory Guide 8.30 recommendations.~~ *(29.0)* **[Rationale: This portion was made into a separate condition]**

~~[Applicable Amendments: 28]~~

9.7 The Radiation ~~Protection~~Safety Officer (RSPO), or his designee, shall have the ~~following~~ education, training and experience as specified in Regulatory Guide 8.31.~~:~~

~~A. Education: A bachelor's degree in the physical sciences, industrial hygiene, or engineering from an accredited college or university or an equivalent combination of training and relevant experience in uranium mill radiation protection. Two (2) years of relevant experience are generally considered equivalent to one (1) year of academic study.~~

~~B. Health physics experience: At least 1 year of work experience relevant to uranium mill operation in applied health physics, radiation protection, industrial hygiene, or similar work. This experience should involve actually working with radiation detection and measurement equipment, not strictly administrative or "desk" work.~~

~~C. Specialized training: At least 4 weeks of specialized classroom training in health physics specifically applicable to uranium milling. In addition, the RSO should attend refresher training on uranium mill health physics every two (2) years.~~

~~D. Specialized knowledge: A thorough knowledge of the proper application and use of all health physics equipment used in the mill, the chemical and analytical procedures used for radiological sampling and monitoring, methodologies used to calculate personnel exposure to uranium and its daughters, and a thorough understanding of the uranium milling process and equipment used in the mill and how the hazards are generated and controlled during the milling process.~~ *(30.0)* **[Rationale: requirements specified in guidance]**

9.8 The license shall be required to use a Radiation Work Permit (RWP) for all work or nonroutine maintenance jobs where the potential for significant exposure to radioactive material exists and for which no standard written operating procedure already exists. The RWP shall be issued by the ~~RPO~~RSO or his designate, qualified by way of specialized radiation protection training, and shall contain the information specified in Regulatory Guide 8.31 ~~at least describe the following:~~

~~A. The scope of the work to be performed.~~

~~B. Any precautions necessary to reduce exposure to uranium and its daughters.~~

~~C. The supplemental radiological monitoring and sampling necessary prior to, during, and following completion of the work.~~

~~In addition, the RPO's review of all non routine activities, committed to in Section 5.3.1 of the renewal application, shall be documented.~~ *(31.0)* **[Rationale: Already stated in regulatory guide and license renewal application]**

9.9 Mill tailings other than samples for research shall not be transferred from the site without specific prior approval of the NRC in the form of a license amendment. The licensee shall maintain a permanent record of all transfers made under the provisions of this condition. *(43.0)*

~~9.12 The licensee is authorized to receive, process, and dispose of byproduct material from Mobil's Crownpoint in-situ uranium recovery facility in accordance with letters from Landmark Reclamation dated June 9, 1987, April 25 and April 28, 1988. [Applicable Amendments: 7, 13] *(49.0)*~~ **[Rationale: This action was completed by the Licensee]**

9.10 In accordance with the licensee's submittal dated May 20, 1993, the licensee is hereby authorized to dispose of byproduct material generated at licensed in situ leach facilities, subject to the following conditions:

A. Disposal of waste in excess of 10,000 cubic yards per year from single sources shall require specific approval from the NRC. Information submitted in support of such a request shall address potential impacts to the composition of the tailings and shall include an environmental report or supplement to previously submitted environmental reports if impacts from the disposal exceed those previously evaluated.

B. All contaminated equipment shall be dismantled, crushed, or sectioned to minimize void spaces. Barrels containing waste other than soil or sludges shall be emptied into the disposal area and the barrels crushed. Barrels containing soil or sludges shall be verified to be full prior to disposal. Barrels not completely full shall be filled with tailings or soil.

C. All waste shall be buried in Cell No. 3 unless prior written approval is obtained from the NRC for alternate burial locations.

D. All disposal activities shall be documented. The documentation shall include descriptions of the waste and the disposal locations, as well as all actions required by this condition. An annual summary of the amounts of waste disposed of from off-site generators shall be sent to the NRC. *(55.0)*

[Applicable Amendments: 33]

9.11 The licensee is authorized to receive and process source materials from the Allied Signal Corporation's Metropolis, Illinois, facility in accordance with the amendment request dated June 15, 1993. [Applicable Amendments: 34] *(56.0)*

9.12 ~~Archeological contractors shall be approved in writing by the Commission. The Commission will consult with the SHPO regarding the qualifications of all archeological contractors and the quality of the laboratory facilities they will use. The Commission will approve an archeological contractor who meets the minimum standards for a principal investigator set forth in 36 CFR Part 66, Appendix C, and whose qualifications are found acceptable by the SHPO.~~

Before engaging in any activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory. All disturbances associated with the proposed development will be completed in compliance with the National Historic Preservation Act (as amended) and its implementing regulations (36 CFR 800), and the Archaeological Resources Protection Act (as amended) and its implementing regulations (43 CFR 7).

In order to ensure that no unapproved disturbance of cultural resources occurs, any work resulting in the discovery of previously unknown cultural artifacts shall cease. The artifacts shall

be inventoried and evaluated in accordance with 36 CFR Part 800, and no disturbance shall occur until the licensee has received authorization from the NRC to proceed. *(16.0)*

The licensee shall avoid by project design, where feasible, the archeological sites designated "contributing" in the attachment to this license entitled, "Archeological Sites Related to the White Mesa Project," submitted by letter dated July 28, 1988. When it is not feasible to avoid a site designated "contributing" in the attachment, the licensee shall institute a data recovery program for that site based on the research design submitted by letter from C. E. Baker of Energy Fuels Nuclear to Mr. Melvin T. Smith, Utah State Historic Preservation Officer, dated April 13, 1981.

The licensee shall recover through archeological excavation all "contributing" sites listed in the attachment which are located in or within 100 feet of borrow areas, stockpile areas, construction areas, or the perimeter of the reclaimed tailings impoundment. Data recovery fieldwork at each site meeting these criteria shall be completed prior to the start of any project related disturbance within 100 feet of the site, but analysis and report preparation need not be complete.

Additionally, the licensee shall conduct such testing as is required to enable the Commission to determine if those sites designated as "Undetermined" in the attachment and located within 100 feet of present or known future construction areas are of such significance to warrant their redesignation as "contributing." In all cases, such testing shall be completed before any aspect of the undertaking affects a site. [Applicable Amendments: 15] *(15.0)*

SECTION 10.0: Operational Controls, Limits, and Restrictions

10.1 The mill production per calendar year shall not exceed 4,380 tons of U_3O_8. *(12.0)*

~~10.2 Any changes in the mill circuit as illustrated and described in Plate 3.1-3 of the renewal application shall require approval by the U.S. Nuclear Regulatory Commission in the form of a license amendment. *(13.0)* [Rationale: PBLC]~~

~~10.3 Release of equipment or packages from the restricted area shall be in accordance with the attachment to SUA-1358 entitled, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September, 1984. *(14.0)* [Rationale: in the license renewal application]~~

~~10.5 The licensee shall not make any changes to the present tailings retention system without specific prior approval of the NRC, Division of Waste Management, High Level Waste and Uranium Recovery Projects Branch (HLUR), Uranium Recovery Field Office, in the form of a license amendment. *(22.0)* [Rationale: PBLC]~~

10.2 During extended periods of mill standby, eight-hour annual sampling for U-nat, Ra-226, Th-230 and Pb-210 may be eliminated if routine airborne sampling show levels below 10 percent of the MPC. Further, during periods of standby, sampling frequencies for area airborne uranium sampling within the mill may be reduced to quarterly, provided measured levels remain below 10 percent of the maximum permissible concentration (MPC). If these levels exceed 10 percent of the MPC, the sampling frequency should follow Regulatory Guide 8.30 recommendations.

10.3 The licensee shall implement the interim stabilization program submitted to the NRC by letter dated December 18, 1985, for all tailings not covered by standing water. This program shall include written operating procedures and shall minimize dispersal of blowing tailings. The effectiveness of the control method used shall be evaluated weekly by means of a documented

tailings area inspection. [Applicable Amendments: 1, 3] *(23.0)*

10.4 The licensee shall maintain effluent control systems as specified in Table 4.1-1 of the licensee's renewal application with the following additions:

A. Operations shall be immediately suspended in the affected area of the mill if any of the emission control equipment for the yellowcake drying or packaging areas is not operating within specifications for design performance.

B. The licensee shall, during all periods of yellowcake drying operations, assure that the scrubber is operating within the manufacturer's recommended ranges for water flow and air pressure differential necessary to achieve design performance. This shall be accomplished by either (1) performing and documenting checks of water flow and air pressure differential approximately every four hours during operation or (2) installing instrumentation which will signal an audible alarm if either water flow or air pressure differential fall below the manufacturer's recommended levels. If any audible alarm is used, its operation shall be checked and documented daily.

C. Air pressure differential gauges for other emission control equipment shall be read and the readings documented once per shift during operations. *(34.0)*

~~10.9 Sample volume and analysis for all in-plant air monitoring shall be adequate to achieve an LLD of 10% of the MPC listed in Table 1, Appendix B of 10 CFR 20. (35.0)~~ **[Rationale: restatement of Pt 20 requirement]**

~~10.10 The licensee shall utilize the results of lapel sampling in calculating employee exposures when the lapel samplers are used. (36.0)~~ **[Rationale: in license renewal application]**

10.5 The licensee shall follow the proposal for the disposal of contaminated material and equipment generated at the mill site as described in their letter dated December 18, 1985~~, with the provision that any other mill equipment, not specifically addressed in the letter, which the licensee proposes to dispose of into the tailings impoundment shall require written approval by the NRC. (42.0)~~
[Applicable Amendments: 1, 3, 10A] **[Rationale: PBLC]**

~~10.12 All liquid effluents from mill process buildings, with the exception of sanitary wastes, shall be returned to the mill circuit or discharged to the tailings impoundment. (44.0)~~ **[Rationale: in license renewal application]**

~~10.13 A. The operation of the ion exchange column at the Velvet Mine shall be in accordance with statements, representations and conditions contained in the licensee's submittal dated November 28, 1988.~~

~~B. The licensee is authorized to transport eluate from the Velvet Mine to the White Mesa uranium mill in accordance with the submittal dated November 28, 1988, and Title 10, Code of Federal Regulations, Part 71. (50.0)~~ **[Rationale: in license renewal application]**

~~[Applicable Amendments: 14]~~

~~10.14 The licensee is authorized to construct Cell 4A in accordance with the plans and specifications contained in the licensee's February 8, 1989, submittal as revised by the January 10, 1990, submittal. Additionally, the following conditions will also apply.~~

~~A. Effective with issuance of Amendment No. 20 and until April 30, 1990, the maximum operating elevation in Cell No. 1 I shall not exceed 5616.1 feet. Beginning on May 1, 1990, the maximum operating elevation in Cell No. 1 I shall not exceed 5615.4 feet, which will provide 2.8 feet of freeboard.~~

~~B. Effective with issuance of Amendment No. 20 and until April 30, 1990, the maximum operating elevation in Cell No. 3 shall not exceed 5605.4 feet. Beginning on May 1, 1990, the maximum operating elevation in Cell No. 3 shall not exceed 5603.0 feet which will provide 5.0 feet of freeboard. When the volume of tailings approaches 600,000 tons, considering all tailings placed since October 23, 1989, the licensee shall revise the maximum operating elevation for Cell No. 3 in accordance with the procedures specified in their January 10, 1990, submittal. The revised elevation shall be submitted for NRC review and approval in the form of a license amendment request. The amendment request shall be submitted to NRC by the time the total tonnage of dry tailings reaches the 600,000 ton limit.~~

~~C. The maximum operating elevation for Cell 4A shall not exceed 5596.4 feet, which will provide 1.6 feet of freeboard.~~

~~D. DELETED by Amendment No. 24.~~

~~E. DELETED by Amendment No. 24.~~

~~F. DELETED by Amendment No. 25.~~ *(51.0)*~~[Rationale: in license renewal application]~~

~~[Applicable Amendments: 17, 18, 19, 20, 24, 25]~~

~~10.15 The licensee is authorized to construct a spillway between Cell 2 and Cell 3 in accordance with the plans contained in the licensee's October 9, 1990, submittal. Once the spillway has been constructed, storage of liquids and tailings will be permitted in Cell No. 2. [Applicable Amendments: 25]~~ *(52.0)* **~~[Rationale: completed]~~**

~~10.16 The licensee is authorized to place interim cover over exposed tailings in the disposal cells. If the placement of material will impact flood routing for the disposal area, a request to modify the freeboard requirements must be submitted in the form of a license amendment. [Applicable Amendments: 27]~~ *(53.0)* **~~[Rationale: complete]~~**

~~10.17 The licensee is authorized to conduct plant testing of source materials from the Teledyne Wah Chang Albany facility in accordance with the amendment request dated January 18, 1989.~~ *(54.0)* **~~[Rationale: Umetco sending waste back will not process]~~**

10.6 The licensee is hereby exempted from the requirements of Section 20.~~203(e)(2)~~1902 (e) of 10 CFR 20 for areas within the mill, provided that all entrances to the mill are conspicuously posted in accordance with Section 20.~~203(e)(2)~~1902 (e) and with the words, "Any area within this mill may contain radioactive material." *(27.0)*

SECTION 11.0. Inspection, Monitoring, and Recording Requirements

11.1 The licensee shall implement the effluent and environmental monitoring program specified in Section 5.5 of the renewal application as revised with the following modifications or additions:

A. Stack sampling shall include a determination of flow rate.

B. TLD chips used for radon monitoring shall be exchanged and read quarterly.

C. Surface water samples shall also be analyzed semiannually for total and dissolved U-nat, Ra-226, and Th-230 with the exception of the Westwater Creek, which shall be sampled annually for water or sediments and analyzed as above. A sediment sample shall not be taken in place of a water sample unless a water sample was not available.

D. Ground-water samples from Monitoring wells 1, 2, 3, 4, 5, 11, 12, 14, 15, and the culinary water well, shall be analyzed quarterly for pH, specific conductance, chlorides, sulfates, TDS, and U-nat. Quarterly water level measurements shall also be made. Ground-water samples shall be analyzed semiannually for arsenic, selenium, sodium, Ra-226, Th-230, and Pb-210.

~~E. Data for the quarterly ground water parameters shall be maintained in graphical form and copies of the graphs included with the environmental monitoring reports submitted in accordance with 10 CFR 40.65.~~ **[Rationale: in the regulations]**

~~F~~E. The licensee shall utilize lower limits of detection in accordance with Section 5 of Regulatory Guide 4.14, Revision 1, dated April 1980, for analysis of effluent and environmental samples.

~~G~~F. The inspections performed semiannually of the critical orifice assembly committed to in the submittal dated March 15, 1986, shall be documented. The critical orifice assembly shall be calibrated at least every 2 years against a positive displacement Roots meter to obtain the required calibration curve. *(24.0)*

[Applicable Amendments: 2, 15, 28, 31]

~~The licensee shall conduct a tailings retention system and liner inspection program in accordance with Section 5.5.7 and Appendix D, Section 3.0, of the renewal application. Notwithstanding any statements to the contrary, changes in inspection frequency shall require the approval of the NRC in the form of a license amendment. Further, copies of the report documenting the annual technical evaluation shall be submitted to the Uranium Recovery Field Office, NRC, within one month of the completion of the report.~~

~~During standby operations, when no effluent is being produced, appropriately trained shift foremen are authorized to conduct the daily tailings retention system and liner inspections. Training shall be properly documented. However, the Environmental Coordinator shall continue to conduct weekly, monthly and quarterly routine inspections during standby periods.~~ *(26.0)* **[Rationale: in the license renewal application]**

~~[Applicable Amendments: 28]~~

~~11.3 The RPO and mill foreman, or qualified designees, shall perform weekly inspections of all mill areas to observe general radiation control practices. However, the RPO shall conduct a minimum of one weekly inspection per month during mill standby and two weekly inspections per month during production. A member of the radiation protection staff shall perform a daily walkthrough~~

~~inspection during weekdays, with qualified supervisory personnel performing the inspection on weekends. In addition, the RPO shall prepare a monthly report which includes a review of daily and weekly inspections, and a summary of all monitoring and exposure data for the month. A copy of the monthly report shall be submitted to the Operations Manager.~~
~~[Applicable Amendments: 28]~~ *(32.0)* **[Rationale: in license renewal application]**

~~11.4 The licensee shall conduct a bioassay program in accordance with Section 5.4.2.4 of the renewal application with the following addition:~~

~~A. A urinalysis program shall be conducted for mill personnel as specified in Section 1.4.1 of the "Radiation Protection Procedures Manual" as revised June, 1985.~~

~~B. Laboratory surfaces used for bioassay analyses shall be decontaminated to less than 25 dpm alpha (removable)/100 cm2 prior to analysis of samples.~~

~~C. Anytime an action level of 15 ug/l uranium for urinalysis or 9 nCi of natural uranium for in vivo measurement is reached or exceeded, the licensee shall document the corrective actions which have been performed in accordance with Revision 1 of Regulatory Guide 8.22, dated January 1987. This documentation shall be submitted to the NRC, Uranium Recovery Field Office, as part of the semiannual report required by 10 CFR 40.65.~~

~~D. Anytime an action level of 35 ug/l for two consecutive specimens or 130 ug/l uranium for one specimen for urinalysis or 16 nCi uranium for an in vivo measurement is reached or exceeded, the licensee shall document the corrective actions which have been performed in accordance with Revision 1 of Regulatory Guide 8.22. This documentation shall be submitted to the NRC, Uranium Recovery Field Office, within thirty (30) days of exceeding the action level.~~

~~E. The licensee is released from the commitment in their license application dated January 29, 1985, for performing routine in vivo measurements of mill personnel. These measurements shall be performed in accordance with the recommendations contained in Revision 1 of Regulatory Guide 8.22.~~ *(38.0)* **[Rationale: standard requirements, in license renewal application]**

~~[Applicable Amendments: 9, 10A]~~

~~11.5 Surveys for fixed and removable alpha contamination shall be conducted in accordance with Section 2.3.2.2 of the "Radiation Protection Procedures Manual" as revised June, 1985. Action levels shall be as specified in Section 2.3.4 of the procedures manual.~~ *(39.0)* [Rationale: in license application]

11.6 Calibration of in-plant air and radiation monitoring equipment shall be as specified in Section 3.0 of the "Radiation Protection Procedures Manual" as revised June, 1985, with the exception that in-plant air sampling equipment shall be calibrated at least quarterly and the Kurz meter will be calibrated at least annually. Air sampling equipment shall be checked prior to each use, and the checks documented. [Applicable Amendments: 28] *(40.0)*

~~11.7 A decontamination and survey program for barrels containing yelloweake shall be conducted in accordance with Section 1.8 of Regulatory Guide 8.30, "Health Physics Programs in Uranium Mills," prior to shipment.~~ *(45.0)*[Rationale: in license application]

~~11.8 The licensee shall implement the program to minimize dispersal of dust from the ore stockpile~~

~~area(s) as described in their letter dated December 18, 1985. This program shall include written operating procedures. The effectiveness of the control method used shall be evaluated weekly by means of a documented inspection. [Applicable Amendments: 1, 4]~~ *(46.0)*[Rationale: in license application]

~~11.9 The licensee shall implement, by December 31, 1986, the program proposed in their letter dated October 31, 1986, for the prevention of the release of material due to an S-X line rupture. Thirty days prior to the final placement of the interim soil cover on Cell 2 the licensee shall propose a rupture detection program specific for Cell 3. [Applicable Amendments: 1, 3]~~ *(47.0)*[Rationale: in license application]

11.3 The licensee shall implement a ground-water detection monitoring program to ensure compliance to 10 CFR Part 40, Appendix A. The detection monitoring program shall be in accordance with the licensee's August 1, 1989 submittal and include the following:

A. The leak detection system for all ponds will be checked weekly. If liquid is present, it shall be analyzed for chloride, sulfate, selenium and pH.
The samples will be statistically analyzed to determine if significant linear trends exist and the results will be submitted to the NRC, ~~Division of Waste Management, High Level Waste and Uranium Recovery Projects Branch Uranium Recovery Field Office~~ for review.

B. If a significant trend is indicated, the licensee will submit a proposed corrective action for review and approval to the NRC, ~~Division of Waste Management, High Level Waste and Uranium Recovery Projects Branch Uranium Recovery Field Office~~. The corrective action shall include a discussion on delineation of the areal extent and concentration of hazardous constituents.

~~C. To determine whether increases in the Pond 2 leak detection system are from tailings seepage or from sedimentation pond seepage, the licensee shall by April 1, 1991 implement the changes proposed in their submittal of April 3, 1990. In addition, the licensee shall collect a minimum of six samples characterizing the sedimentation pond material prior to construction and analyze for U-nat and Ra-226. A copy of the analysis shall be submitted to HLUR by February 15, 1991.~~

C~~D~~. The licensee shall sample monitoring wells 5, 11, 12, 14, and 15 for potential hazardous constituents and submit this data to the NRC, ~~Division of Waste Management, High Level Waste and Uranium Recovery Projects Branch, Uranium Recovery Field Office,~~ so that background can be established and ground-water protection standards set. *(48.0)*

[Applicable Amendments: 6, 8, 10, 16, 22]

SECTION 12.0: Reporting Requirements

~~12.1 The licensee shall conduct an annual survey of land use (private residences, grazing areas, private and public potable water and agricultural wells, and non-residential structures and uses) in the area within five miles (8 km) of any portion of the restricted area boundary and submit a report of this survey to the NRC, Uranium Recovery Field Office. This report shall indicate any differences in land use from that described in the last report.~~ *(17.0)*[Rationale: in the regulations]

~~12.2 The results of all effluent and environmental monitoring required by this license shall be reported in accordance with 10 CFR 40, Section 40.65 with copies of the report sent to the NRC, Uranium Recovery Field Office. Monitoring data shall be reported in the format shown in the attachment to SUA-1358, entitled "Sample Format for Reporting Monitoring Data Regulatory Guide 4.14." *(18.0)*[Rationale: in the regulations]~~

~~12.3 The licensee shall submit to the NRC, Uranium Recovery Field Office, by March 15, 1986 for review and approval in the form of a license amendment a detailed reclamation plan for the authorized tailings disposal area which includes the following:~~

~~A. A post operations interim stabilization plan which details methods to prevent wind and water erosion and recharge of the tailings area.~~

~~B. A plan to determine the best methodology to dewater and/or consolidate the tailings cells prior to placement of the final reclamation cover.~~

~~C. Plan and cross sectional views of a final reclamation cover which details the location and elevation of tailings. The plan shall include details on cover thickness, physical characteristics of cover materials, proposed testing of cover materials (specifications and QA), the estimated volumes of cover materials and their availability and location.~~

~~D. Detailed plans for placement of rock or vegetative cover on the final reclaimed tailings pile and mill site area.~~

~~E. A proposed implementation schedule for items A through D above which defines the sequence of events and expected time ranges.~~

~~F. An analysis to show that the proposed type and thickness of soil cover is adequate to provide attenuation of radon and is adequate to assure long term stability as well as an analysis and proposal on methodology and time required to restore ground water in conformance to regulatory requirements.~~

~~G. The licensee shall include a detailed cost analysis of each phase of the reclamation plan to include contractor costs, projected costs of inflation based upon the schedule proposed in item E, a proposed contingency cost, and the costs of long term maintenance and monitoring. *(25.0)*[Rationale: complete]~~

12.4 The results of sampling, analyses, surveys and monitoring, the results of calibration of equipment, reports on audits and inspections, all meetings and training courses required by this license and any subsequent reviews, investigations, and corrective actions, shall be documented. Unless otherwise specified in the NRC regulations all such documentation shall be maintained for a period of at least five (5) years. *(28.0)*

12.5 A copy of the annual ALARA report described in Section 5.3.2.2, of the renewal application as modified by letter dated January 20, 1987, shall be submitted ~~to the NRC, Uranium Recovery Field Office~~, by April 1, 1987, and every year thereafter. [Applicable Amendments: 5] *(33.0)*

~~12.6 Occupational exposure calculations shall be performed and documented within one week of the end of each regulatory compliance period as specified in 10 CFR 20.103(a)(2) and 10 CFR 20.103(b)(2). Routine airborne ore dust and yelloweake samples shall be analyzed in a timely manner to allow exposure calculations to be performed in accordance with this condition. Non routine ore dust and yelloweake samples shall be analyzed and the results reviewed by the~~

~~RSO within two working days after sample collection.~~ *(37.0)*[Rationale: in the regulations]

123 The licensee shall submit a detailed decommissioning plan to the NRC at least twelve (12) months prior to planned final shutdown of mill operations. *(41.0)*

FOR THE NUCLEAR REGULATORY COMMISSION

DRAFT

Date _____

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

ATTACHMENT 3

EXAMPLE LICENSE
FOR AN
IN SITU LEACH FACILITY

Power Resources Inc.
P.O. Box 1210
Glenrock, Wyoming 82637

Example Performance-Based License
Print Date: September 6, 1994
SUA-1511
40-8857

Uranium	Unspecified	Unlimited

SECTION 9.0: **Administrative Conditions**

9.1 The authorized place of use shall be the licensee's Highland Uranium Project uranium recovery and processing facilities in Converse County, Wyoming.

9.2 All notices to NRC required under this license, with the exception of incident and event notifications requiring telephone notification, shall be addressed to the Chief, High-Level and Uranium Recovery Projects Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguard. Incident and event notifications that require telephone notification shall be made to the NRC Operations Center at (301) 816-5100. ~~Director, Uranium Recovery Field Office.~~ *Change reflects the consolidation of UR licensing activities to NRC Headquarters*

9.3 ~~For use in accordance with statements, representations, and conditions contained in Authorized use is for uranium recovery from pregnant lixiviant in accordance with statements, descriptions, and representations contained in Volume 6 of~~ the licensee's application submitted by cover letter dated March 20, 1991, as revised by page changes submitted on May 26, 1992; July 8, 1992; ~~and~~ July 16, 1992; and ~~Section 9 as submitted on~~ March 4, 1994. In addition, the licensee shall conduct its activities in accordance with the provisions in the following submittals:

October 20, 1988:	Research and Development Pilot
November 16, 1992:	Respiratory Protection Program
February 4, 1993:	Slurry Toll Processing
December 20, 1993, and January 26, 1994:	Modification to the F-Wellfield ground-water monitoring program

~~Regardless of the above submittals, the following license conditions shall override any conflicting statements contained in the licensee's application and supplements.~~
The licensee shall conduct operations in accordance with the conditions, representations, and statements referenced above, which are hereby incorporated by reference, except where superseded by license conditions below.

Whenever the word "will" is used in the above referenced sections, it shall denote a requirement. **[Rationale: ties licensee to entire license application]**

[Applicable Amendments: 2, 7, 17, 18, 36, 41, 44, 45, 46, 50, 51]

9.4 A. The licensee may, without prior U.S. Nuclear Regulatory Commission approval, and subject to the conditions specified in Part B. of this condition:

(1) Make changes in the facility or process, as presented in the application.

(2) Make changes in the procedures presented in the application.

(3) Conduct tests or experiments not presented in the application.

B. The licensee shall file an application for an amendment to the license, unless the following conditions are satisfied.

(1) The change, test, or experiment does not conflict with any requirement specifically stated in this license (excluding the License Condition Referencing the License Application or Reclamation Plan), or impair the licensee's ability to meet all applicable NRC regulations.

(2) There is no degradation in the essential safety or environmental commitments in the license application, or provided by the approved reclamation plan.

(3) The change, test, or experiment is consistent with the conclusions of actions analyzed and selected in the Environmental Assessment (EA) dated Xxxxxx 19XX (NUREG-XXXX).

C. The licensee's determinations concerning section (B) above, shall be made by a "Safety and Environmental Review Panel (SERP)." The SERP shall consist of a minimum of three individuals. One member of the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have expertise in implementation of any changes; and, one member shall be the corporate radiation safety officer (CRSO) or equivalent. Other members of the SERP may be utilized as appropriate, to address technical aspects of (A) and (B) above, in several areas, such as health physics, ground-water hydrology, surface water hydrology, specific earth sciences, and others. Temporary members, or permanent members other than the three identified above, may be consultants.

D. The licensee shall maintain records of any changes made pursuant to this condition. These records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for the determination that the change is in compliance with the requirements referred to in (B), above. The licensee shall furnish, in an annual report to NRC, a description of such changes, tests, or experiments, including a summary of the safety and environmental evaluation of each. In addition, the licensee shall annually submit changed pages to its license application to reflect changes made under this condition.

~~Any significant changes to the licensed mining area or the restricted area shown in Plate 1 of the Operations Plan of the approved license application shall require approval by the NRC in the form of a license amendment.~~ [Applicable Amendments: 45] *Change includes the Performance-Based License Condition*

9.~~5~~10 The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criterion 9, adequate to cover the estimated reclamation and closure costs, if accomplished by a third party, for all existing operations and any planned expansions or operational changes for the upcoming year. Reclamation includes all cited activities and ground-water restoration, as well as, off site disposal of byproduct material which may include evaporation pond wastes. ~~completion of the NRC-approved site closure plan including; above ground decommissioning and decontamination, the cost of offsite disposal of radioactive solid process or evaporation pond residues, and ground water restoration, as warranted. Within 3 months of NRC approval of a revised site closure plan, the licensee shall submit for NRC review and approval, a proposed revision to the financial surety arrangement if the estimated costs in the newly approved site closure plan exceed the amount covered in the existing financial surety. A revised surety shall then be in effect within 3 months of written NRC approval.~~ *Change made to reflect Performance-Based condition.*

Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criterion 9, shall be provided to the NRC at least 3 months prior to August 31 of each year. If the NRC has not approved a proposed revision 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing arrangement, prior to expiration, for 1 year. Along with each proposed revision or annual update of the surety, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation, maintenance of a minimum 15 percent contingency, changes in engineering plans, activities performed, and any other conditions affecting estimated costs for site closure.

The licensee shall provide an updated surety, and receive NRC approval before commencing, for any planned expansion or operational change which has not been included in the annual surety update. This surety update shall be provided to the NRC at least 60 days prior to the commencement of the planned expansion or operational change.

The licensee shall also provide the NRC with copies of surety-related correspondence submitted to the State, a copy of the State's surety review, and the final approved surety arrangement. The licensee must also ensure that the surety, where authorized to be held by the State, identifies the NRC-related portion of the surety and covers the above-ground decommissioning and decontamination, the cost of offsite disposal, soil and water sample analyses, and ground-water restoration associated with the site. The basis for the cost estimate is the NRC-approved site closure plan or the NRC-approved revisions to the plan. Reclamation/decommissioning plan, cost estimates, and annual updates should follow the outline in the attachment to SUA-1511 entitled, "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates."

Power Resources Incorporated's currently approved surety instruments, Irrevocable Letter of Credit No. SFO 870IM issued by National Westminster Bank PLC and confirmed by National Westminster Bank USA Reference No. S050925, and Irrevocable Letter of Credit No. S-865154 issued by Morgan Guaranty Trust Company, both in favor of the State of Wyoming, shall be continuously maintained in the sum total amount of no less than $6,191,400 for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9, until a replacement is authorized by both the State of Wyoming and the NRC. [Applicable Amendments: 18, 25, 27, 36, 39, 45, 47]

9.~~65~~ ~~The licensee is authorized to dispose of byproduct material from the Highland Uranium Project at a site licensed by the NRC to receive byproduct material.~~ The licensee shall ~~identify the disposal facility to the NRC in writing~~ maintain the waste disposal agreement onsite. ~~The licensee's approved waste disposal agreement must be maintained onsite.~~ In the event the agreement expires or is terminated, the licensee shall ~~notify the NRC, Uranium Recovery Field Office, within 7 working days after the expiration date. A~~ attain a new agreement ~~shall be submitted for NRC approval~~ within 90 days after expiration, or the licensee will be prohibited from further lixiviant injection. [Applicable Amendments: 17, 27, 45] *Change made to reflect Performance-Based condition*

9.~~711~~ ~~The licensee shall assign an RSO to the site on a permanent full-time basis.~~ The Radiation Safety Officer (RSO), or his designee, shall have the education, training and experience as specified in Regulatory Guide 8.31. ~~[Applicable Amendments: 45]~~

~~9.13~~ ~~The RSO shall be qualified as specified in Sections 1.2 and 2.4.1 of Regulatory Guide 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills will be As Low As Reasonably Achievable," dated May 1983, or equivalent.~~ The RSO shall also receive 40 hours of related health and safety refresher training every 2 years.

Individuals designated as the Radiation Safety Technician (RST) shall report directly to the RSO on matters dealing with radiological safety. In addition, the RSO shall be accessible to the RST at all times. The RST shall have the qualifications specified in ~~Section 2.4.2 of~~ Regulatory Guide 8.31, or equivalent. Any person newly hired as an RST shall have all work reviewed and approved by the Site RSO as part of a comprehensive training program until appropriate course training is completed, and at least for 6 months from the date of appointment.

[Applicable Amendments: 28, 35, 36, 45] *Change made to combine Conditions 9.11 and 9.13, and reference appropriate guidance as the performance standard.*

9.~~89~~ Standard operating procedures (SOPs) shall be established for all operational activities involving radioactive materials that are handled, processed, stored, or transported by employees. SOPs shall include appropriate radiation safety practices to be followed in accordance with 10 CFR Part 20. ~~The Radiation Safety Program also shall conform to 10 CFR Part 20.~~ Written procedures shall be established for non-operational activities to include in-plant and environmental monitoring, bioassay analysis, and instrument calibration. The licensee shall establish SOPs for the deployment of chemical reducing

agents in the processing plant or in well fields for aquifer restoration in accordance with ground-water restoration methods described in the license application. An up-to-date copy of each SOP shall be kept in each area where it is used.

All SOPs shall be reviewed and approved in writing by the Operations Manager and the Safety Director before being implemented and whenever a change in a procedure is proposed. SOPs for activities involving radioactive materials shall also be reviewed and approved by the Corporate Radiation Safety Officer (CRSO) prior to implementation. All existing facility SOPs related to activities involving the handling, processing, storing, or transporting of radioactive materials shall be reviewed by the CRSO on an annual basis. [Applicable Amendments: 45]

9.~~8~~9 Release of equipment, materials, or packages from the restricted area shall be in accordance with the attachment to this license entitled, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September 1984, or suitable alternative procedures approved by the NRC prior to any such release. [Applicable Amendments: 45]

9.~~10~~12 Any corporate organization changes affecting the assignments or reporting responsibilities of the radiation safety staff as described in ~~Section 9 of~~ the Operations Plan of the approved license application and as shown in the submittal dated November 5, 1992, shall conform to Regulatory Guide 8.31 ~~require approval by the NRC in the form of a license amendment~~. [Applicable Amendments: 18, 27, 29, 36, 37, 40, 45] *Change made to reference appropriate guidance as the performance standard.*

9.~~11~~14 The licensee shall have a training program for all site employees as described in ~~Section 2.5 of~~ Regulatory Guide 8.31 and as detailed in ~~Section 9 of~~ the Operations Plan of the approved license application.
[Applicable Amendments: 45]

~~9.12~~15 The licensee is exempted from the requirements of §20.1902(e) of 10 CFR 20 which addresses requirements for areas within the facility in which use or storage of uranium or thorium exceeds a designated level, provided that all entrances to the facility are conspicuously posted in accordance with Section 20.1902(e) and with the words "Any area within this facility may contain radioactive material."

Additionally, the licensee shall maintain the well-field area postings to notify people of the onsite radiological hazards. For work on non-routine maintenance jobs where the potential for exposure to radioactive materials exists and for which no standard written operating procedure already exists, the licensee shall implement radiation safety procedures in conformance with Regulatory Guide 8.31. ~~Well fields where decommissioning activities or other activities which could potentially result in personnel exposure to radioactive materials and for which no SOP exists shall require restricted area control and RWPs~~.
[Applicable Amendments: 36, 45, 50] *Change made to reference appropriate guidance as the performance standard.*

9.~~13~~16 Before engaging in any activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory. All disturbances associated with the proposed development will be completed in compliance with the National Historic Preservation Act (as amended) and its implementing regulations (36 CFR 800), and the Archaeological

Resources Protection Act (as amended) and its implementing regulations (43 CFR 7). [Applicable Amendments: 36, 45]

~~9.7~~ In order to ensure that no unapproved disturbance of cultural resources occurs, any work resulting in the discovery of previously unknown cultural artifacts shall cease. The artifacts shall be inventoried and evaluated in accordance with 36 CFR Part 800, and no disturbance shall occur until the licensee has received authorization from the NRC to proceed. [Applicable Amendments: 36, 45] *Condition 9.6 and 9.7 combined*

~~9.16 The licensee shall implement the Emergency Action Plan for Accidents as detailed in Section 9.13 of the Operations Plan of the approved license application. [Applicable Amendments: 45]~~ *Deleted-licensee already tied to the license application under license condition 9.3*

~~9.17 The licensee shall update the Highland Uranium Project schedule as described in Section 1.4 of the approved license application on an annual basis. [Applicable Amendments: 17, 36, 45]~~ *Deleted-licensee already tied to the license application under license condition 9.3*

SECTION 10.0: Operations, Controls, Limits, and Restrictions

~~10.1 The licensee shall conduct aquifer hydrologic tests in accordance with Section 7.3 of the Operations Plan of the approved license application, as revised by the submittal dated October 15, 1992. Any substitution of the Neumann-Witherspoon analytical method shall require prior NRC approval.~~ *Change made to conform to the Performance-Based License Condition.*

~~**The licensee shall perform additional hydrologic tests of the aquitard underlying the mine unit aquifer at monitor wells FMU-3, FMU-4, and FMU-5, prior to commencement of production activities in the portion of the F-Wellfield monitored by these wells.** *Check for completion/if complete delete*~~
~~[Applicable Amendments: 2, 44, 45, 51]~~

~~10.2 The licensee shall conduct injection and recovery well installation in conformance with Section 6.3 of the Operations Plan of the approved license application. [Applicable Amendments: 45]~~ *Deleted-licensee already tied to the license application under license condition 9.3*

10.~~3~~ The licensee shall perform mechanical well integrity tests on each injection and production well before the wells are utilized and on wells that have been serviced. Integrity tests shall be performed using techniques approved in the Underground Injection Control program administered by the State of Wyoming and ~~Section 6.6 of~~ the Operations Plan of the approved license application. Any failed well casing that cannot be repaired to pass the integrity test shall be plugged and abandoned. [Applicable Amendments: 45]

10.~~4~~ Baseline ground-water quality sampling shall provide representative pre-mining ground-water quality data and restoration criteria as described in ~~Section 7.5 and 7.6 of~~ the Operations Plan of the approved license application. ~~Baseline ground-water quality for all new mining units shall be submitted 2 months prior to lixiviant injection.~~ The data shall, at a minimum, consist of analyses for ground-water constituents as described below and in conjunction with Section 7.5.2, Table 1 (short list), Section 7.5.3, Table 2 (long list), and 7.6.2 (upper control limits) of the approved license application:

- Production pattern (MP) wells: Two long lists and two short lists
- Monitor ring(M) and trend (T) wells: One long list; three UCL suites
- Overlying (MO) and underlying (MU) wells: Two long lists; two UCL suites

[Applicable Amendments: 4, 6, 9, 12, 16, 17, 22, 30, 36, 43, 45, 48]

10.~~5~~ The wells for establishing baseline ground-water quality shall be placed in each mining unit at the following points: (1) all mining unit perimeter monitor wells, (2) at least one upper and lower aquifer monitor well per 3-acre area of production pattern area, and (3) at least one production zone monitor well per 3 acres of production pattern area. A minimum of five of these wells shall be installed per mine unit. [Applicable Amendments: 2, 24, 38, 45]

~~10.6~~ ~~For the following mining units, UCLs are approved as delineated in the licensee's referenced submittals:~~

~~Mining Unit~~	~~Submittal Date~~
~~Section 21:20 Sand (A Wellfield)~~	~~November 30, 1987, and November 2, 1988~~
~~Section 21:30 Sand (B Wellfield)~~	~~November 2, 1988~~
~~Section 14:50 Sand (North) (C Wellfield)~~	~~February 13, 1989 and July 20, 1992~~
~~Section 14:50 Sand (South) (C Wellfield)~~	~~April 2, 1990~~
~~Section 22/23:40 Sand (D Wellfield)~~	~~March 12, 1991~~
~~Section 15/22/23:50 Sand (E Wellfield)~~	~~September 5, 1991 and September 13, 1992~~
~~Section 14\23:50 Sand and 40 Sand (C and D Wellfield)~~	~~February 19, 1992~~
~~Section 21:30 Sand (B Wellfield, Well M-63)~~	~~November 5, 1993~~
~~Sections 20/21/22/27/28/29: 40 , 50 , and 60 Sand~~	~~November 10, 1993~~

~~(F-Wellfield)~~
[Applicable Amendments: 4, 6, 9, 12, 16, 17, 22, 30, 36, 43, 45, 49, 51] *Combined with License Condition 11.3.*

~~10.7 The licensee shall utilize a carbon dioxide solution as the lixiviant with an oxygen or hydrogen peroxide oxidant. Any variation from this combination shall require a license amendment. [Applicable Amendments: 12, 36, 45]~~ *Deleted-licensee already tied to the license application under license condition 9.3/ also changed to conform to the Performance-Based License Condition.*

~~10.8 Injection well pressures shall be maintained in accordance with commitments in Section 3.2 of the Operations Plan of the approved license application. [Applicable Amendments: 45]~~ *Deleted-licensee already tied to the license application under license condition 9.3*

~~10.9 Any significant changes which alter a production zone injection\recovery balance or processing plant circuit as illustrated in Figure 2 of the Operations Plan of the approved license application shall be reviewed by the CRSO and shall require prior approval by the NRC in the form of a license amendment. [Applicable Amendments: 36, 45]~~ *Deleted-licensee already tied to the license application under license condition 9.3*

10.~~10~~11 To ensure the total satellite capacity is not exceeded, the annual throughput shall not exceed an average flow rate of 7500 gallons per minute, exclusive of restoration flow. Yellowcake production shall not exceed 1.897 million pounds annually. [Applicable Amendments: 17, 36, 45]

10.~~11~~12 Radium settling ponds shall have at least 3 feet of freeboard. The Satellite 1 and Satellite 2 purge storage reservoirs shall have a 2-foot freeboard requirement until July 5, 1994, and a 4-foot requirement thereafter. The licensee shall at all times maintain sufficient capacity in the Satellite 1 purge storage reservoirs to enable transferring the contents of any one radium settling pond to the reservoir. In the event of a radium settling pond leak and subsequent transfer of liquid, the freeboard requirements for the purge storage reservoir may be suspended during the repair period. [Applicable Amendments: 45, 52, 53]

10.~~12~~13 All liquid effluents ~~(solutions)~~ from process buildings and other process waste streams, with the exception of sanitary wastes, shall be disposed as described in ~~returned to the process circuit, or discharged to the waste solution well in accordance with Section 4.4 of~~ the Operations Plan of the approved license application. ~~All changes to disposal methods described in Section 4 of the Operations Plan shall be approved by license amendment.~~ [Applicable Amendments: 45] *Change made to conform to the Performance-Based License Condition.*

10.~~13~~14 The licensee shall maintain effluent control systems as specified in ~~Section 9.14 of~~ the license application, with the following additions:

A. Yellowcake drying and packaging operations shall be immediately suspended if any of the emission control equipment for yellowcake drying or packaging areas is not operating within specifications for design performance.

B. The licensee shall, during all periods of yellowcake drying operations, assure that the manufacturer's recommended pressure is maintained for the package and dryer scrubbers. This shall be accomplished by either (1) performing and documenting

checks of air pressure approximately every 4 hours during operation, or (2) installing instrumentation which will signal an audible alarm if the air pressure does not meet the manufacturer's recommended levels. If an audible alarm is used, its operation shall be checked and documented daily.

[Applicable Amendments: 36, 45]

10.~~814~~ For work in restricted areas or areas as defined in 10 CFR 20.1003 the licensee shall issue radiation work permits in conformance with Regulatory Guide 8.31. ~~where the potential for exposure to radioactive materials exists and for which no SOP exists, a radiation work permit (RWP) shall be required.~~ Such permits shall describe the following:

A. The scope of the work to be performed.

B. Any precautions (such as supplemental radiological monitoring and sampling) necessary to reduce exposure to radioactive materials to levels as low as reasonably achievable (ALARA).

Non-routine maintenance activities which expose workers to airborne uranium or its daughters shall require use of continuous breathing-zone monitors.

The RSO, RST, or their designees shall indicate by signature that each RWP has been reviewed prior to initiating the work. Exposure calculations shall be performed in accordance with ~~Section 9.4 of~~ the license application.
[Applicable Amendments: 45] *Change made to reference appropriate guidance as the performance standard.*

10.~~915~~ Any visitor, including contractors, shall be required to register at the main office and shall be appropriately instructed in security, safety, and radiation protection prior to entering process areas. Visitors, including contractors, shall be required to register at a designated sign-in station and shall be instructed in security, safety, and radiation protection, when appropriate, prior to entering a well field. [Applicable Amendments: 45]

10.~~1016~~ DELETED by Amendment No. 50.

10.~~1117~~ The licensee shall require that all process and maintenance workers who work in uranium recovery areas: or work on equipment contaminated with radioactive materials, wear protective clothing including coveralls, rubber gloves, and boots or shoe covers. [Applicable Amendments: 45]

10.~~1218~~ Within restricted areas, eating shall be allowed only in designated eating areas. [Applicable Amendments: 45]

10.~~1319~~ Before leaving any restricted area, all process workers shall shower or monitor themselves in conformance with Regulatory Guide 8.30. In addition, all radiation survey instruments shall be operationally checked in conformance with Regulatory Guide 8.30. ~~using a calibrated alpha survey instrument. Surveys meeting or exceeding the radiation action level of 1000 dpm/100 cm^2 shall require personnel to decontaminate and resurvey~~

~~themselves until contamination is less than the action level. The Site RSO or designee shall perform and document spot surveys for alpha contamination at least quarterly on workers leaving the restricted area.~~ [Applicable Amendments: 45] *Change made to reference appropriate guidance as the performance standard.*

10.~~1420~~ All radiation monitoring, sampling, and detection equipment shall be recalibrated after each repair and as recommended by the manufacturer, or at least annually, whichever is more frequent. In addition, all radiation survey instruments shall be operationally checked with a radiation source each day when in use. [Applicable Amendments: 45]

10.~~1521~~ The licensee shall maintain an area within the restricted area boundary and at each satellite facility for temporary storage of contaminated materials. All contaminated wastes shall be disposed at a licensed radioactive waste disposal site authorized to accept 11(e)2 byproduct material. [Applicable Amendments: 20, 45]

SECTION 11.0: Monitoring, Recording, and Bookkeeping Requirements

11.1 Flow rates for production wells shall be measured and recorded on a daily basis. Injection flow rates shall be measured and recorded at least every 3 days. [Applicable Amendments: 45]

11.2 The licensee shall conduct well-field monitoring in accordance with the Operations Plan dated _____ and contained in section ___ of the license application. Each specific wellfield shall have an independent monitoring program for demonstrating compliance with the Upper Control Limits established for each wellfield, as described by License Condition 11.3. Well-field monitoring wells shall be monitored once every 2 weeks, in accordance with ~~Section 8.2 of~~ the Operations Plan. ~~of the approved license application. In addition, the following monitoring program revisions are approved:~~

~~May 19, 1988 — A- and B-Well Field monitor well modification~~
~~May 2, 1990 — C-Well Field monitor well identification~~
~~July 23, 1991 — C- and D-Well Field monitoring for only water levels in some wells~~
~~August 19, 1991 — B-Well Field excursion well monitoring~~
~~May 13, 1992 — C-, D-, E-Well field monitor well modification~~
~~October 8, 1992 — B-Well Field excursion well monitoring~~

[Applicable Amendments: [8, 23, 33, 34, 42, 45]

11.3 The licensee shall establish Upper Control Limits (UCL) for each mining unit, prior to operation, in conformance with the Operations Plan of the license application dated _____ and appropriate SOPs. UCL criteria shall be calculated as described in the Operation Plan. UCLs shall be applied to all monitor wells in conformance with the Operation Plan and the Reclamation Plan of the license application. Lixiviant excursions shall be verified and monitored in conformance with the Operation Plan. Corrective actions for confirmed excursions may be, but are not limited to, those described in the Operation Plan.

~~Upper control limit (UCL) criteria shall be applied to all monitor wells to determine when action must be taken to control excursions during production and restoration activities. During production activities, each monitor well shall be sampled and analyzed for~~

~~chloride, bicarbonate, and conductivity (excursion indicators) once every 2 weeks in accordance with Section 8.2 of the Operations Plan of the approved license application. During restoration, monitor wells shall be sampled and analyzed in accordance with Section 4.5 of the Reclamation Plan of the approved license application.~~

~~If two UCLs are exceeded in a well, the licensee shall take a confirmatory water sample within 24 hours and analyze it for the excursion indicators. If the first confirmatory sample does not indicate exceedance of UCLs, a third sample shall be taken within 48 hours of receiving data for the first sample. If neither the second or third sample indicate exceedance, the first sample shall be considered in error.~~

~~If the second or third sample indicates an exceedance, the well in question shall be placed on excursion status. Upon confirmation of an excursion, the licensee shall implement corrective action. During excursion status, sampling and testing frequency shall be increased to weekly for all monitor wells on excursion. An excursion is considered concluded when the concentrations of all excursion indicators are below the levels that define an excursion, for 3 consecutive weekly samples.~~ [Applicable Amendments: 12, 28, 45] *Change made to conform to the Performance-Based License Condition.*

11.4 The licensee shall establish an effluent and environmental monitoring program in accordance with ~~Section 9.7 and 9.8 of~~ the Operations Plan of the approved license application and ~~Attachment 2 of~~ the WDEQ-Water Quality Division Wastewater Land Application Permit No. 92-077 dated April 16, 1992, and Table 7 of the WDEQ-Water Quality Division Application for Satellite No. 2 Wastewater Land Application-Facility, dated September 30, 1993. Prior to release for unrestricted use, the licensee shall demonstrate that radionuclide levels meet applicable criteria. [Applicable Amendments: 36, 45, 53]

11.5 The results of sampling, analyses, surveys, monitoring, equipment calibration, reports on audits and inspections, all meetings and training courses required by this license, and any subsequent reviews, investigations, and corrective actions, shall be documented. Unless otherwise specified in the NRC regulations, all such documentation shall be maintained for at least 5 years. [Applicable Amendments: 45]

11.6 During production, the RSO, RST, or a trained designee shall perform and document a daily walk-through inspection of all operating areas to ensure all radiation protection and monitoring requirements are being followed. [Applicable Amendments: 36, 45]

11.7 DELETED by Amendment No. 50.

11.8 DELETED by Amendment No. 50.

11.9 The licensee shall perform alpha contamination surveys of the change rooms, eating areas, and offices in conformance with ~~Section 1.5 and Table 1 of~~ Regulatory Guide 8.30. If bioassay samples are analyzed in house, the licensee shall survey laboratory work surfaces as specified in ~~Section 3.5 of~~ Regulatory Guide 8.31. [Applicable Amendments: 45]

11.10 The calculation of occupational exposures to soluble uranium shall be performed and documented within 1 week of the end of the regulatory compliance period as specified in 10 CFR 20.1201(e). Routine air particulate samples shall be analyzed in a timely manner to allow exposure calculations to be performed in accordance with this condition. Non-routine samples shall be analyzed and the results reviewed by the RSO or designee within 2 working days after sample collection.
[Applicable Amendments: 45, 50]

11.11 The pipeline that transports waste water from the Satellite 2 to Satellite 1 treatment facility shall be monitored as follows:

A. Standpipes shall be utilized at 1000-foot intervals along the pipeline route for leak detection. Standpipes shall be monitored for leak detection and integrity on a monthly basis. All observations and maintenance checks shall be recorded.

B. Logs for pump rates and volumes shall be maintained on a daily frequency.

[Applicable Amendments: 17, 36, 45]

11.12 The licensee shall implement a urinalysis program as outlined in ~~Revision 1 to~~ Regulatory Guide 8.22 and ~~Section 9.5 of~~ the Operations Plan of the approved license application.
[Applicable Amendments: 36, 45]

11.13 The licensee shall perform and document a weekly visual inspection of the Satellite No. 1 radium settling ponds and liners, and the Satellite No. 1 and No. 2 storage reservoir embankments and fences, as well as measurements of pond and reservoir freeboard. Weekly checks of the Satellite No. 1 radium setting pond leak detection system shall also be documented. Should analyses indicate that a pond is leaking, the pond contents shall be transferred into an alternate impoundment and repairs undertaken. [Applicable Amendments: 5, 45, 53]

SECTION 12.0: Reporting Requirements

12.1 ~~At least 2 months prior to lixiviant injection in each mining unit, the mine unit hydrologic test results depicting hydrologic properties controlling ground water flow, and the baseline water quality data, shall be submitted to the NRC. The submittal shall propose UCLs for chloride, bicarbonate, and conductivity in all monitoring wells for each mining unit in accordance with Section 7 of the Operations Plan of the approved license application. Authorization to begin lixiviant injection and associated activities shall be in the form of a license amendment to approve the proposed UCLs.~~
[Applicable Amendments: 9, 12, 24, 30, 45] *Change made to conform to the Performance-Based License Condition.*

12.2 The results of effluent and environmental monitoring shall be reported to the NRC in accordance with 10 CFR 40.65. This report shall also include the following:

A. Results from employee urinalyses if an exposure exceeds action levels described in ~~Section 9 of~~ the Operations Plan of the approved license application.

B. Injection rates, recovery rates, and injection trunk-line pressures for each satellite

facility.

C. Monthly water quality analyses for the irrigation sprinkler discharge consisting of: pH, conductivity, TDS, Na, Ca, Mg, K, Cl, SO_4, HCO_3, As, B, Se, U_3O_8, and Ra-226.

D. Results from the Satellite No. 2 Wastewater Land Application Facility monitoring program described in Table 7 of the amendment application dated October 5, 1993.

Monitoring data shall be reported in the format shown in the attachment to this license entitled, "Sample Format for Reporting Monitoring Data."

[Applicable Amendments: 36, 45, 53]

12.3 In the event a lixiviant excursion is confirmed by ground-water monitoring, NRC shall be notified by telephone within 24 hours and by letter within 7 days from the time the excursion is confirmed. In addition, a written report shall be submitted to the NRC within 2 months of excursion confirmation. The report shall describe the excursion event, corrective actions taken, and results obtained. If the excursion is not controlled at the time the report is submitted, the licensee shall suspend injection of lixiviant within the mining unit including and adjacent to the well on excursion until such time as the excursion is considered controlled or has terminated. If, at the time of reporting, the licensee can demonstrate that the excursion is controlled, the licensee may inject lixiviant at a rate which does not change or hinder the trend in ground-water quality improvement.

Control of an excursion shall be indicated by ground-water quality data which show ~~that reveal~~ that the ~~plume of~~ degraded water plume ~~quality~~ has not increased in extent, and ~~that~~ show that the ground-water quality of the impacted area is improving. [Applicable Amendments: 12, 45]

12.4 In the event radium settling pond analyses indicate that an impoundment is leaking, the NRC shall be notified by telephone within 48 hours of verification. Standpipe water quality samples shall be analyzed for chloride and conductivity once every 7 days during the leak period and once every 7 days for at least 2 weeks following repairs. Additionally, water samples collected at the pond standpipe shall be analyzed for the full suite of parameters as defined in the WDEQ, Land Quality Division, Guideline 8, Appendix 1, at least once per month during the leak period.

A written report shall be filed with the NRC within 2 months of first notifying the NRC that a leak exists. This report shall include analytical data, describe mitigative action, and discuss the results of that action.

[Applicable Amendments: 5, 45]

12.5 The licensee shall report incidences in accordance with 10 CFR 20.2202. Additionally, 1 month subsequent to a reportable incident, a written report shall be submitted to the NRC detailing the conditions leading to the incident, corrective actions taken, and results achieved. [Applicable Amendments: 45, 50]

12.6 The licensee shall conduct restoration activities in accordance with the ground-water restoration plan included in ~~Section 4 of~~ the Reclamation Plan of the approved license application. The primary goal of restoration shall be to return the ground-water quality, on a production unit average, to baseline conditions. A secondary goal of returning the ground water to a quality consistent with the use or uses, for which the water was suitable prior to in situ leach mining, may be approved in accordance with ~~Section 4.1 of~~ the Reclamation Plan of the approved license application. [Applicable Amendments: 32, 45]

12.7 The licensee shall submit a detailed decommissioning plan to the NRC for review and approval at least 12 months prior to final shutdown of mining operations. [Applicable Amendments: 45]

12.8 An audit team comprising licensee management shall perform an annual ALARA audit of the radiation safety program in accordance with ~~Section 2.3.3 of~~ Regulatory Guide 8.31. The RSO shall accompany the audit team. A report of this audit shall be submitted to the NRC within 60 days after conducting the audit. The report shall also summarize the results of the daily walk-through inspections. [Applicable Amendments: 36, 45]

FOR THE NUCLEAR REGULATORY COMMISSION

Date: DRAFT

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

EXHIBIT 2

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

OFFICE OF THE
GENERAL COUNSEL

December 5, 1997

Chief Administrative Judge
B. Paul Cotter, Jr., Esq.*
Presiding Officer
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Administrative Judge
Thomas D. Murphy*
Special Assistant
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

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

Dear Judge Cotter:

The Staff is issuing its Safety Evaluation Report (SER) regarding the above-captioned matter. The Staff's letter to Hydro Resources, Inc. (HRI) (dated December 4 and mailed December 5, 1997) and the SER are attached. As indicated in the letter to HRI, the Staff has decided to issue a license to HRI in 30 days.

Also attached is a copy of the notice to be published in the Federal Register regarding this action.

Sincerely,

John T. Hull
Counsel for NRC Staff

cc: Service List

Attachments: as stated

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

December 04, 1997

MEMORANDUM TO: David L. Meyer, Chief
Rules Review and Directives Branch
Division of Freedom of Information
and Publication Services
Office of Administration, T 6D-39

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

SUBJECT: NOTICING THE ISSUANCE OF THE U.S. NUCLEAR REGULATORY STAFF'S SAFETY EVALUATION REPORT FOR THE CROWNPOINT URANIUM SOLUTION MINING PROJECT, CROWNPOINT, NEW MEXICO IN THE FEDERAL REGISTER

Attached please find one signed original, five copies, and an electronic version on a floppy diskette of the Federal Register Notice identified below for your transmittal to the Office of the Federal Register for publication.

☐ Notice of Finding of No Significant Impact_____

☐ Notice of Availability of Environmental Report_____

☐ Notice of Opportunity for Hearing _____

☐ Notice of Availability of License Amendment Application for:_____

☐ Notice of Availability of Draft EIS for:_____

☐ Notice of Availability of Final EIS for:_____

☐ Notice of Issuance of Facility Operating License or Amendment_____

CONTACT: Robert D. Carlson, NMSS/DWM
(301) 415-8165

☐ Notice of Preparation of Environmental Assessment_____

☐ Environmental Assessment_____

☒ Other: Notice of Issuance of the Safety Evaluation Report for the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico

Docket No. 40-1162
License No. SUA-56

Attachments: As stated (7)

[7590-01]

NUCLEAR REGULATORY COMMISSION

DOCKET NO. 40-08968

Hydro Resources, Inc.

AGENCY: Nuclear Regulatory Commission

ACTION: Issuance of the Safety Evaluation Report for the Crownpoint Uranium Solution Mining Project, Crownpoint, NM

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) staff has issued its Safety Evaluation Report (SER), dated December 1997, for Hydro Resources, Inc.'s (HRI's) proposed Crownpoint Uranium Solution Mining Project at Crownpoint, NM. The SER documents the NRC staff's safety review of the project. The SER and the Crownpoint Uranium Mining Project Final Environmental Impact Statemement (FEIS), dated February 1997 (NUREG-1508), provide the bases for NRC's decision to issue a 10 CFR Part 40 source material license to HRI. The staff will issue a license to HRI 30 days from issuance of the SER. The license will authorize HRI to construct and operate in situ leach (ISL) mining facilities at the Crownpoint Project for a period of five years. In preparing the SER, the NRC staff reviewed HRI's license application submittals and its Consolidated Operations Plan, Revision 2.0 (dated August 15, 1997), against the applicable regulations in 10 CFR Parts 19, 20, 40, and 71. The SER supports the NRC staff's finding that issuing the license to HRI will be in accordance with the aforementioned regulations, and with all applicable safety requirements of the Atomic Energy Act of 1954 (AEA), as amended.

FOR FURTHER INFORMATION CONTACT: Mr. Robert D. Carlson of the Uranium Recovery Branch, Mail Stop TWFN 7-J9, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Telephone (301) 415-8165; e-mail RDC@NRC.GOV.

SUPPLEMENTARY INFORMATION:

On April 25, 1988, HRI submitted an application to NRC proposing to construct and operate an ISL uranium mining facility in McKinley County, near Church Rock, New Mexico. HRI later amended its application to include additional ISL operations in McKinley County, near an area of land referred to as Unit 1, and Crownpoint, NM. Together, the three sites comprise HRI's Crownpoint Uranium Solution Mining Project.

The NRC staff's environmental review of the Crownpoint Project is documented in the FEIS, pursuant to 10 CFR Part 51. The NRC staff concluded that HRI's proposed Crownpoint Project was environmentally acceptable, and that potential impacts of the proposed project could be mitigated. These mitigative measures will be enumerated as conditions in HRI's source materials license. Additionally, the NRC staff completed its safety evaluation of the Crownpoint Project and documented its review in the SER. Based on its review, the NRC staff concluded that issuance of a source material license, with certain conditions specified in the license, would not be inimical to the common defense and security or to the public's health and safety, and otherwise meets the requirements of 10 CFR Parts 19, 20, 40, and 71, and the AEA. The NRC staff's conclusions in the FEIS and SER provide the bases for NRC's decision to issue a source material license to HRI 30 days from issuance of the SER.

Dated at Rockville, Maryland, this 4th day of Dec 1997.

FOR THE NUCLEAR REGULATORY COMMISSION

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

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

December 04, 1997

Richard F. Clement, Jr., President
Hydro Resources, Inc.
2929 Coors Blvd., NW
Suite 101
Albuquerque, NM 87120

SUBJECT: SAFETY EVALUATION REPORT FOR THE CROWNPOINT URANIUM MINING PROJECT

Dear Mr. Clement:

The purpose of this letter is to transmit the enclosed Safety Evaluation Report (SER) for Hydro Resources, Inc.'s (HRI's) Crownpoint Uranium Mining Project at Crownpoint, NM. The SER documents the Nuclear Regulatory Commission staff's safety review of the Crownpoint Project. The SER and the Final Environmental Impact Statement (NUREG-1508) for the Crownpoint Project, dated February 1997, provide the bases for NRC's decision to issue a source material license to HRI 30 days from the date of this letter.

The license will authorize HRI to construct and operate in situ leach mining facilities at the Crownpoint project for a period of five years. In preparing the SER, the NRC staff reviewed HRI's license application submittals and its Consolidated Operations Plan, Revision 2.0, dated August 15, 1997, against the applicable regulations in 10 CFR Parts 19, 20, 40, and 71. The SER supports the NRC staff's finding that issuing the license to HRI will be in accordance with the aforementioned regulations, and with all applicable safety requirements of the Atomic Energy Act of 1954, as amended.

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

Sincerely,

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

Enclosure: As stated

Docket No.: 40-08968

SAFETY EVALUATION REPORT

DECEMBER 1997

HYDRO RESOURCES, INCORPORATED
LICENSE APPLICATION FOR
CROWNPOINT URANIUM SOLUTION MINING PROJECT
MCKINLEY COUNTY, NEW MEXICO

DOCKET NO. 40-8968

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Division of Waste Management

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FIGURES

1.0 INTRODUCTION

On April 25, 1988, Hydro Resources, Inc. (HRI), submitted an application to the U.S. Nuclear Regulatory Commission proposing to construct and operate an in situ leach (ISL) uranium mining facility on property in Sections 8 and 17, Township (T) 16N Range (R) 16W, near Churchrock, New Mexico (hereafter, the Churchrock site). HRI later amended its application to include ISL operations on two lease areas near Crownpoint, NM: (a) an area covering parts of Sections 15-16 and 21-23, T17N R13W, approximately 2.5 miles west of Crownpoint (hereafter, the Unit 1 site); and (b) an area covering parts of Sections 24 and 25, T17N R13W, and Sections 19 and 29, T17N R12W, adjacent to Crownpoint (hereafter, the Crownpoint site). Operations at the Crownpoint site include a central processing facility (CPF) in Section 24, T17N R13W, where yellowcake will be dried and packaged. Together, the three sites comprise HRI's Crownpoint Uranium Solution Mining Project (hereafter, the Crownpoint Project). The staff's environmental review of the Crownpoint Project is set forth in NUREG 1508, *Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico* (hereafter, the FEIS [NRC 1997]). This safety evaluation report (SER) documents the staff's safety review of HRI's Crownpoint Project application materials.

HRI developed and submitted in 1996 a consolidated operation plan (COP) for the Crownpoint Project (COP Revision 0.0 [HRI 1996b]) in response to a staff request for additional information (NRC 1996a, Question 39). In response to additional requests for information, HRI submitted revised COPs in 1997 (Revision 1.0 [HRI 1997a] and Revision 2.0 [HRI 1997b]).

1.1 Description of the Proposed Action

This SER and the FEIS (NRC 1997) provide the bases for NRC's decision to issue a source material license to HRI 30 days from issuance of the SER. The license will authorize HRI to construct and operate ISL uranium mining facilities at the Crownpoint Project for a period of five years. In preparing the SER, the staff reviewed HRI's license application submittals and the COP Revision 2.0 (HRI 1997b) against the applicable regulations in 10 CFR Parts 19, 20, 40, and 71. The SER supports the staff's finding that issuing the license to HRI will be in accordance with these regulations, and with all applicable safety requirements of the Atomic Energy Act of 1954 (AEA), as amended.

1.2 Supplemental Information

After the FEIS (NRC 1997) was published, HRI provided sensitivity analyses of flow times from the Unit 1 site to the Town of Crownpoint wells as a function of variations in permeability, storage coefficient, aquifer thickness, porosity, and town of Crownpoint well pumping rates (HRI 1997c). HRI's report provided groundwater flow rates and velocities for average values, and then increasingly conservative and unlikely values that would produce faster flow velocities. Different flow times were calculated by holding all model parameters constant, while varying one or more other parameters. For the Unit 1 boundary nearest the town of Crownpoint, the sensitivity analysis produced average flow times that ranged from 2,103 years to 2,371 years. These are longer flow times than were calculated by the modeling study cited in the FEIS (NRC 1997). That study was based on more conservative values and produced a flow time of 1,657

years. With the exception of modeling runs based on unrealistically conservative values, calculated flow times were all above 1,500 years. Modeling runs based on unrealistically conservative values produced flow times from 1,059 years to 698 years. The sensitivity analyses showed that extremely long flow times to the Crownpoint water supply wells from the Unit 1 site are to be expected. This is in agreement with the conclusions in Section 3.3 of the FEIS (NRC 1997).

1.3 Review Scope

This SER details the staff's safety review of HRI's radiological protection program for the Crownpoint Project, set forth in COP Revision 2.0 (HRI 1997b). While much of the SER text repeats what is stated in COP Revision 2.0 (HRI 1997b), any HRI commitments made in the COP are enforceable whether or not such commitments are stated in the SER.

Evaluation of environmental impacts and measures to mitigate those impacts are contained in the FEIS. The SER safety review focuses on those aspects of radiological protection discussed in the COP (HRI 1997b) which were not evaluated in the FEIS (NRC 1997) and is limited to those aspects of the COP (HRI 1997b) that fall within the NRC's regulatory jurisdiction. For example, the SER does not evaluate HRI's proposed land application of restoration wastewater on Section 12, T17N R13W, north of Crownpoint. Restoration wastewater disposal is not licensed by NRC, and HRI would need to obtain the appropriate licenses and/or permits from the proper regulatory authorities.

The SER text in bold print denotes matters to be controlled by specific license conditions stated in the license. HRI cannot deviate from these conditions without first obtaining NRC approval through the license amendment process. These license conditions provide reasonable assurance that HRI's Crownpoint Project operation will be in accordance with all NRC regulatory requirements. NRC will require by license condition that:

HRI shall conduct operations in accordance with all commitments, representations, and statements made in its license application submitted by cover letter dated April 25, 1988, as supplemented, and the Crownpoint Uranium Project COP, Rev. 2.0, dated August 15, 1997, except where superseded by license conditions contained in this license. Whenever the words "will" or "shall" are used in the aforementioned licensee documents, it denotes an enforceable license requirement.

2.0 AUTHORIZED ACTIVITIES

The source material license to be issued to HRI will authorize the commercial ISL operation of the Crownpoint Project. Uranium will be extracted from the ore bodies by a sodium bicarbonate lixiviant at a rate of up to 0.25 cubic meters per second (4,000 gal/min) at each site. The uranium will be extracted from the solution, and concentrated. For uranium mined at the Churchrock and Unit 1 sites, uranium concentrate, in either the form of uranium-loaded resin beads or yellowcake slurry, will be shipped by truck to the CPF, where it will be dried and packaged into a final yellowcake product. Descriptions of the well fields, mining equipment, lixiviant, processing facilities, and recovery processes to be used at the Crownpoint Project are

contained in FEIS Sections 2.1.1.1 through 2.1.1.4 (NRC 1997). The NRC will require by license condition that:

The processing plant flow rate at each site (Church Rock, Unit 1, or Crownpoint) shall not exceed 15,142 L/min (4000 gal/min), exclusive of restoration flow. Total yellowcake production from all three sites shall not exceed 1.36 million kg (3 million lbs) annually.

3.0 MANAGEMENT ORGANIZATION AND ADMINISTRATIVE PROCEDURES

3.1 Organization

Figure 1 is a partial organization chart of HRI's Crownpoint Project. The positions and duties of HRI personnel are described below, in descending order of authority. Qualifications and experience requirements are noted, where applicable. HRI will allow a Master's degree in an appropriate field to equate to two years of work experience. HRI's organizational arrangement is consistent with Regulatory Guide 8.31 (NRC 1983b). The organizational arrangement allows radiation safety matters to be considered at any management level. To ensure clear lines of communication for radiological safety matters, NRC will require by license condition that:

Any corporate organization changes affecting the assignments or reporting responsibilities of the radiation safety staff as described in the COP of the approved license application shall conform to Regulatory Guide 8.31 (NRC 1983b).

3.1.1 C.E.O. of Uranium Resources, Inc.

The C.E.O. of Uranium Resources, Inc., will have the ultimate responsibility for all operations of Uranium Resources, Inc., including its subsidiary, HRI, Inc.

3.1.2 Vice President of Health, Safety and Environmental Affairs

The Vice President of Health, Safety and Environmental Affairs (VPHSE) will have the ultimate responsibility and authority for the radiation safety, environmental compliance, and Quality Assurance program at the Crownpoint Project, in addition to off-site project development activities. The VPHSE will provide corporate audit input to the Environmental Manager, and Radiation Safety Officer (RSO) to ensure that all radiation safety, environmental compliance, and permitting/licensing programs will be conducted in a responsible manner, and in compliance with all applicable regulations, and permit/license conditions. The VPHSE will report directly to the C.E.O. of Uranium Resources, Inc.

HRI will require the VPHSE to have either a Bachelors degree in an engineering or science field from an accredited college or university, or an equivalent level of work experience. Additionally, a minimum of five years of experience in senior engineering management and operations functions will be required.

3.1.3 President of HRI

The President of HRI is responsible for the safe operations of the Crownpoint Project. The President reports directly to the C.E.O. of Uranium Resources, Inc.

3.1.4 Environmental Manager

The Environmental Manager reports directly to the President of HRI and is responsible for the development, administration and enforcement of all environmental programs for the Crownpoint Project, including radiation safety. The Environmental Manager will also interface with the VPHSE to ensure that the environmental programs are conducted consistent with the applicable regulations. The Environmental Manager will be responsible for routinely auditing all operational and monitoring procedures and the QA/QC programs, will chair the ALARA ("As Low As Reasonably Achievable") committee, will be a member of the ALARA audit team, and a member of the Safety and Environmental Review Panel (SERP). The Environmental Manager is authorized to terminate immediately any activity that may be a threat to the employees, public

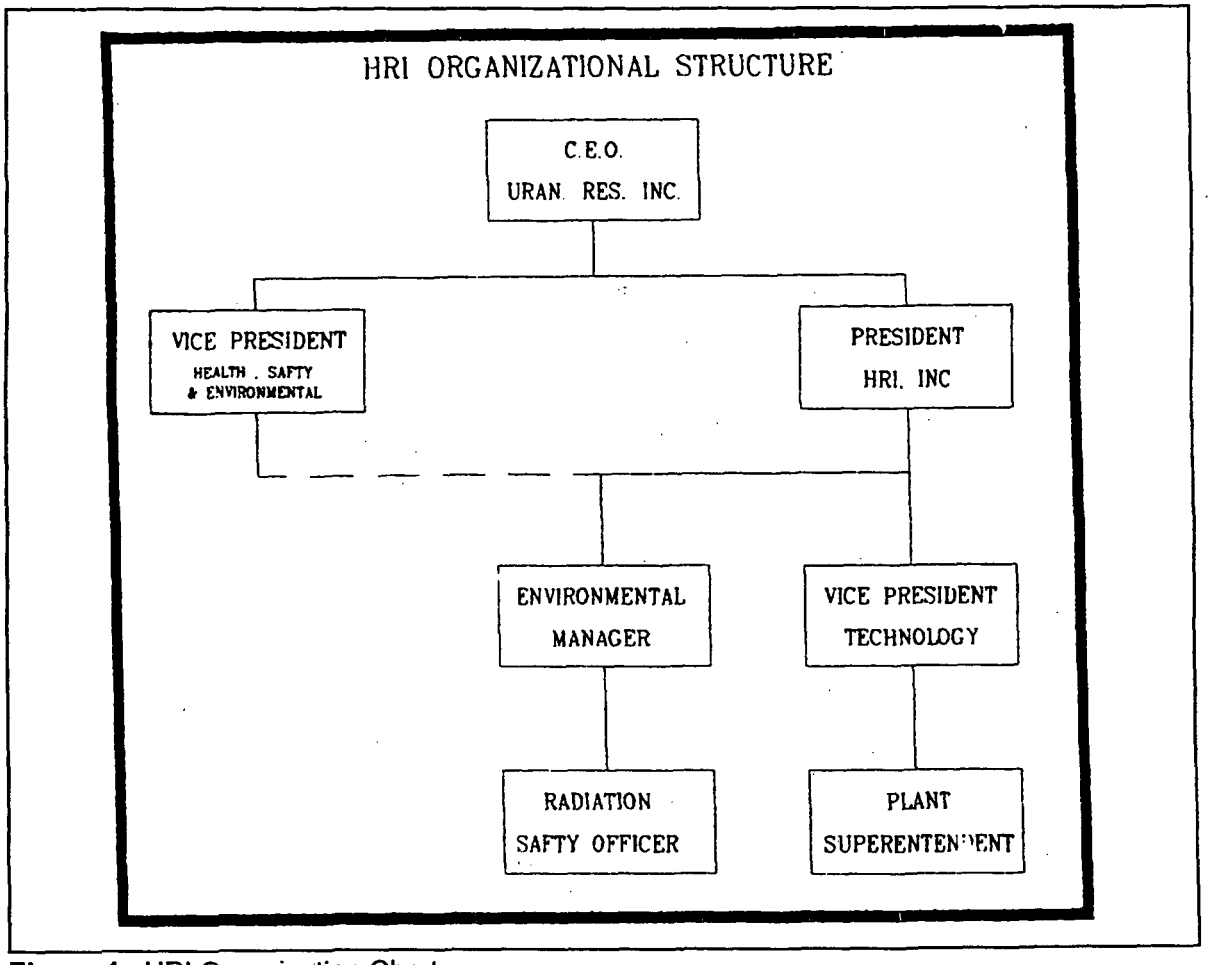


Figure 1. HRI Organization Chart.

health, or the environment, as indicated in reports from the RSO.

The Environmental Manager will develop and administer corporate radiation protection safety programs to ensure (1) employees are afforded the optimum practical protection against occupational hazards, (2) exposure of employees to radiation and radioactive materials is ALARA, and (3) all regulatory requirements are met. The Environmental Manager will assist in the development, review, and approval of sampling and analysis procedures used at the Crownpoint Project, and aid in the technical evaluation of laboratory data, as required.

HRI will require the Environmental Manager to have a bachelor's degree in the physical or biological sciences, mathematics, or engineering from an accredited college or university. Additionally, the position will require at least three years of work experience in the uranium mining industry, in the areas of applied health physics and radiation protection.

3.1.5 Vice President of Technology

The Crownpoint Project Vice President of Technology (VPT) will be directly responsible for all operations, including, implementing industrial and radiation safety, and environmental protection programs. This includes all operating procedures, radiation safety programs, industrial safety programs, environmental and groundwater monitoring programs, associated quality assurance programs, and routine and non-routine maintenance activities. The VPT will also be responsible for compliance with all regulatory license conditions, and regulations, and reporting requirements. The VPT will have the responsibility, and authority, to terminate immediately any activity that is determined to be a threat to employees, public health, or the environment. The VPT will be a member of the ALARA Committee and the ALARA audit team, and will report directly to the President of HRI.

HRI will require the VPT to have a Bachelor's degree in engineering or science from an accredited college or university, or equivalent work experience, and a minimum of five years supervisory experience. Work experience will include industrial process/production experience, and industrial process/production management.

3.1.6 Radiation Safety Officer

The RSO is responsible for the daily supervision of the environmental protection and radiation safety programs for the Churchrock, Crownpoint, and Unit 1 sites. The RSO is the designated Site QA/QC Coordinator. The RSO will be a member of the ALARA Committee, assist management with the annual ALARA Audit, and report directly to the Environmental Manager.

The RSO has responsibility for the daily supervision of all radiation and safety protection procedures, equipment and controls, including emergency procedures. Responsibilities will include developing and implementing all radiation safety and environmental programs, ensuring that all records will be correctly maintained, and assisting the VPT in ensuring compliance with NRC regulations and license conditions. The RSO will conduct routine training programs for the supervisors and employees with regard to the proper application of radiation protection, emergency response, and environmental control programs. The RSO will inspect the facilities to verify compliance with all applicable radiological health and safety requirements and the

QA/QC program. Additionally, the RSO will annually review all operating procedures to ensure that radiation exposures will be maintained ALARA.

HRI will require the RSO to have a bachelor's degree in the physical or biological sciences, or engineering. Additionally, the RSO must have at least three years of appropriate experience in environmental compliance, permitting, radiation protection, and technical supervision. At least two of the three years experience will be in a position at an operation where knowledge of radiation protection programs has been obtained. The RSO position will also require 40 hours of formal radiation protection training on a biennial basis. This is consistent with the guidance in Regulatory Guide 8.31 (NRC 1983b). To emphasize the importance of the RSO's background, the NRC will require by license condition that:

The RSO, or his designee, shall have the education, training, and experience as specified in Regulatory Guide 8.31 (NRC 1983b).

3.1.7 Plant Superintendent

The Crownpoint, Churchrock, and Unit 1 sites will each have a Plant Superintendent, who will be responsible for the site's operational and maintenance activities and procedures. The Plant Superintendents will implement, and annually review, a training program for operation and maintenance personnel. The Plant Superintendents will report to the VPT. Development and review of procedures involving radiological safety concerns will be coordinated with the radiation staff.

3.1.8 Radiation Safety Technicians

At least one radiation safety technician (RST) will be present at each site. The RSTs will conduct the sampling, surveys and other duties necessary as part of the established environmental protection and radiation safety programs for the Churchrock, Crownpoint, and Unit 1 sites. The RSTs will be members of the ALARA Committee, assist management with the annual ALARA Audit, and report directly to the RSO.

The RSTs will conduct environmental and radiological surveys; collect air, water, soil, and vegetation samples; perform analyses; collect data for the radiation safety program; perform calculations of employee radiation exposures; generate records; and conduct various other activities associated with implementation of the environmental and radiation protection programs. The RSTs will report all radiation protection data to the RSO prior to submittal to the Environmental Manager.

HRI has proposed to require that a minimum of a high school diploma, or alternatively, an equivalent combination of experience and training in uranium mill radiation protection for prospective RSTs. A Bachelor's degree in physical or biological sciences, engineering, or a related discipline from an accredited college or university with no experience will also be acceptable to HRI. This is not completely consistent with the guidance in Regulatory Guide 8.31 (NRC 1983b). The NRC will require by license condition that:

The RSTs shall have the qualifications specified in Regulatory Guide 8.31 (NRC 1983b). Any person newly hired as an RST shall have all work reviewed and approved by the RSO as part of a comprehensive training program until appropriate course training is completed, and at least for 6 months from the date of appointment.

3.1.9 Conclusions

HRI has described its management and organization to show that the RSO and RSTs will be responsible for implementing the daily environmental protection and radiation safety programs for the Crownpoint Project. Their responsibilities are to ensure that HRI's radiation safety programs are complied with by all HRI employees and visitors, and that radiation exposures are maintained in accordance with ALARA principles. The RSTs report to the RSO, who in turn reports to the Environmental Manger, who has overall responsibility for HRI's radiation safety program. HRI has an acceptable corporate organization that defines management responsibilities and authority at each level. HRI's definition of the responsibilities with respect to development, review, approval, implementation, and adherence to operating procedures, radiation safety programs (including record keeping and reporting), environmental and groundwater monitoring programs, QA programs, routine/non-routine maintenance activities, and changes to any of these is acceptable. The qualifications required for personnel conducting the radiation safety program at the Crownpoint Project are acceptable, as they are consistent with the guidance in NRC Regulatory Guide 8.31 (NRC 1983b).

Based on the information provided in the application and the detailed review conducted of the corporate organization for HRI, the NRC staff has concluded that the proposed corporate organization, modified as above by the stated license conditions, is acceptable. The NRC staff also concludes that HRI's proposed organizational structure will help ensure implementation of an effective radiation protection program, in accordance with 10 CFR 20.1101(a).

3.2 Management Control Program

3.2.1 Performance-Based Licensing Condition

The following license condition describes the process under which HRI will have the latitude to initiate changes and conduct tests without obtaining prior NRC review and approval. All changes made by HRI at the Crownpoint Project are subject to NRC inspection and enforcement actions. The inclusion of the following condition in the license does not alter or affect NRC's inspection function, nor does it allow HRI to change license conditions without first obtaining NRC review and approval. Requesting changes to license conditions would require filing license amendment applications pursuant to 10 CFR 40.44.

HRI may, without prior NRC review or approval: (a) make changes in the Crownpoint Project's facilities or processes as described in Revision 2.0 of the COP; (b) make changes in its standard operating procedures; and (c) conduct tests or experiments, if HRI ensures that the following conditions are met:

(1) the change, test, or experiment does not conflict with any requirement specifically stated in HRI's license, or impair HRI's ability to meet all applicable NRC regulations;

(2) there is no degradation in the safety or environmental commitments made in COP Revision 2.0 (HRI 1997b), or in the approved reclamation plan for the Crownpoint Project; and

(3) the change, test, or experiment is consistent with NRC's findings in the FEIS (NRC 1997) and the SER dated December 1997 for the Crownpoint Project.

If any of these conditions are not met for the change, test, or experiment under consideration, HRI is required to submit a license amendment application for NRC review and approval. HRI's determinations as to whether the above conditions are met will be made by a Safety and Environmental Review Panel (SERP). All such determinations shall be documented, and the records kept until license termination. All such determinations shall be reported annually to the NRC. The retained records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for determining whether or not the conditions are met.

HRI shall provide an annual report to NRC that describes all changes, tests, and experiments, including a summary of the safety and environmental evaluation of each such action. As part of this annual report, HRI shall include any COP pages revised in accordance with the performance-based license condition.

3.2.2 Safety and Environmental Review Panel

The SERP shall operate as required by the following license condition:

The SERP shall consist of a minimum of three individuals employed by HRI, and one of these shall be designated the SERP Chairperson. One member of the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and, one member shall be the Environmental Manager, with the responsibility of ensuring that changes conform to radiological safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, ground-water hydrology, surface water hydrology, earth sciences, and other technical disciplines. Temporary members, or permanent members other than the three identified above, may be consultants.

3.2.3 Record Keeping

The record keeping program outlined by HRI in its COP Revision 2.0 (HRI 1997b) deals with two aspects of facility operation. The first is a commitment to keep records of any changes authorized by the SERP until license termination. The records will include written safety and environmental evaluations made by the SERP as part of its analysis for determining if applicable changes were made consistent with the license. Additionally, in the COP Revision 2.0 (HRI 1997b) HRI describes the employee exposure records system that it will implement. These records will include exposures monitored in accordance with Regulatory Guide 8.34, as well as NUREG 8.22. HRI employees will be advised of their annual exposure consistent with 10 CFR 20.2106, and Regulatory Guide 8.7. Posting of employee annual doses will be performed quarterly, and will contain the equivalent of information found on NRC Form 5.

Although HRI has not specified in its application the length of time records will be maintained, 10 CFR Part 20, Subpart L specifies the NRC requirements for record keeping and retention. Adequate record keeping is necessary to allow NRC to inspect and review the performance of a licensee. In addition to the applicable requirements of 10 CFR Part 20, Subpart L, the NRC will require by license condition that:

The results of the following activities, operations, or actions shall be documented: sampling; analyses; surveys or monitoring; survey/monitoring equipment calibrations; reports on audits and inspections; emergency generator use and maintenance records; all meetings and training courses required by the license; and any subsequent reviews, investigations, or corrective actions. Unless specified otherwise in NRC regulations or the license, all documentation required by the license shall be maintained for a period of at least five (5) years by HRI at its facility, and is subject to NRC review and inspection.

Compliance with the requirements of 10 CFR 20.2108 will be reviewed if HRI, after obtaining any necessary permits, chooses to dispose of waste on-site.

3.2.4 Standard Operating Procedures

All principal work assignments will be conducted in accordance with written standard operating procedures (SOPs). Supervisory and management personnel will routinely observe their employees at work and thus will be able to ensure adherence to the written procedures. If employees are found deviating from a procedure, they will be counseled by their supervisor(s), and instructed to adhere to the written procedures. Follow up supervision will also occur to ensure the success of the counseling session. Such deviations and follow-up counsel will be documented, and the documentation maintained on file at the project site. Prior to implementation, all new, or revised, operating procedures affecting radiation safety will be reviewed by the SERP. The Environmental Manager will annually audit all operational and monitoring procedures to assure they are still appropriate and are not in conflict with newly established radiation safety policies or regulatory requirements. Additionally, the RSO will annually review all operating procedures to ensure that radiation exposures will be maintained as low as reasonably achievable (ALARA). The NRC views the use of SOPs to be critical to safe operations. Therefore, the NRC will require by license condition that:

Written SOPs shall be established and followed for: (1) all operational activities involving radioactive materials that are handled, processed, stored, or transported by employees; (2) all non-operational activities involving radioactive materials including in-plant radiation protection and environmental monitoring; and (3) emergency procedures for potential accident/unusual occurrences including significant equipment or facility damage, pipe breaks and spills, loss or theft of yellowcake or sealed sources, and significant fires. The SOPs shall include appropriate radiation safety practices to be followed in accordance with 10 CFR Part 20. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. A copy of the current written procedures shall be kept in the area(s) of the production facility where they are utilized. All SOPs for activities described in the COP shall be reviewed and approved as presently described in the COP.

3.2.5 Radiation Work Permits

Non-routine work or maintenance activities which may result in personnel exposure to radioactive materials and are not covered by an active SOP will be carried out in accordance with a radiation work permit (RWP). The RWP may require additional monitoring or safeguards when performing the non-routine work, such as respirators. The procedures for developing an RWP include contacting the radiation safety staff prior to the start of work. The RSO, or RST, will survey the area for radiation and/or contamination levels, as appropriate, and conduct a discussion of precautions to be taken during the planned work to minimize exposures. RWPs will be supervised with the job supervisor directing the work to minimize exposures. Air samples will be taken, as necessary, to evaluate the exposures of all involved personnel. To ensure that RWPs contain the proper information and that RWPs are not used in lieu of SOPs, NRC will require by license condition that:

RWPs shall include, at a minimum, the information described in Section 2.2 of Regulatory Guide 8.31 (NRC 1983b).

3.2.6 Conclusions

HRI has an acceptable management control program that assures that all activities can be conducted according to written operating procedures. HRI has acceptably identified radiation protection, maintenance activities (especially in radiation areas), development of well fields, and SERP reviews as areas where SOPs are acceptable. HRI has demonstrated that non-routine work or maintenance activity will comply with radiation safety requirements and has included, as one means of comparison, the issuance of radiation work permits for activities where SOPs do not apply.

HRI will establish a SERP with at least three individuals representing expertise in management/financial, operations/construction, and radiation safety matters. HRI has committed that specific technical issues will be dealt with by the SERP, with support from other qualified staff members, or consultants, as appropriate. Annually, HRI will furnish a written report to the NRC that provides the bases for any changes in the approved programs along with any appropriate page changes.

Based on the information provided in the application and the detailed review conducted of the management control program for the Crownpoint Project, the NRC staff has concluded that the management control program, modified as above by the stated license conditions, is acceptable. The use of a SERP to approve changes to the facility commensurate with licensed activities is in accordance with 10 CFR 20.1101(a). The SOPs and RWPs described above are procedures to maintain radiation doses ALARA, in accordance with the applicable requirements of 10 CFR 20.1101(b). The record keeping provisions described above ensure compliance with the applicable requirements of 10 CFR Part 20, Subpart L.

3.3 Audits and Inspections

3.3.1 Inspections

The RSO will conduct weekly inspections of all work and storage areas and shall document all findings pertaining to compliance with license conditions and radiation safety practices. The RSO, or designated radiation safety technician, will conduct daily walk-through inspection of all work and storage areas of the CPF to ensure proper implementation of good radiation safety procedures. Results of these inspections, including any corrective actions or preventive maintenance required by the inspection, will be documented and maintained on site. In addition to the site maintenance inspections, daily visual inspections will be made for locating yellowcake contamination on surfaces in areas of yellowcake processing. To ensure that the results of inspections can provide management with the information necessary to conduct an appropriate ALARA program, NRC will require by license condition that:

Site inspections and reviews shall be completed and documented by HRI as described in Section 2.3.1 and 2.3.2 of Regulatory Guide 8.31 (NRC 1983b).

3.3.2 ALARA Audit

Members of the HRI ALARA Audit team will conduct annual audits of the radiation protection and ALARA program, under the direction of the Environmental Manager and the VPHSE. The audit will address the topics listed in Section 2.3.3 of Regulatory Guide 8.31 (NRC 1983b). The results of the audit, including any ALARA-based corrective actions recommended in the audit findings, will be reviewed and approved by the President of HRI, prior to submittal to NRC.

3.3.3 QA/QC Audit

An annual audit of the water quality sampling and analysis program, radiological monitoring sampling, and QA/QC programs will be conducted in conjunction with the annual ALARA audit by the Environmental Manager, and the VPHSE. The Environmental Manager may designate individuals qualified in chemistry and monitoring techniques who will not have direct responsibilities in the areas being audited to assist in the audit. Audit results will be reviewed with the RSO, VPT, and President of HRI. The results of the audit, and any corrective actions to be taken based on the audit results, will be documented and maintained on site.

3.3.4 Conclusions

Based on the information provided in the application and the detailed review conducted of the management audit and inspection programs, modified as above by the stated license condition, for the Crownpoint Project, the NRC staff has concluded that the proposed programs are acceptable and ensure compliance with 10 CFR 20.1101(c), which requires periodic reviews of the radiation protection program.

HRI has acceptable management audit and inspection programs that provide frequencies, types, and scopes of audits and inspections sufficient to implement the proposed actions. HRI will fully document and maintain records of audits and inspections results, including any corrective actions to be taken based on the results.

3.4 Radiation Safety Training

A training program on radioactive material handling and radiological safety will be administered to all new site employees at the Crownpoint Project. Information provided in the training will be consistent with the information found in NUREG 1159 (McElroy 1986) and Regulatory Guide 8.29 (NRC 1996b). The RSO, or his or her designee, will conduct the training. The level of training will be based on the trainee's expected degree of access to the restricted area. Each employee's understanding of the training materials will be assessed. A written record of all training and testing will be maintained on site.

The radiation protection standards (10 CFR Part 20) have changed since the publishing of NUREG 1159 (McElroy 1986). To ensure proper training of individuals in accordance with the revised 10 CFR Part 20, NRC will require by license condition that :

HRI shall implement and maintain a training program for all site employees as described in Regulatory Guide 8.31, and as detailed in the COP. All training materials shall incorporate the information from current versions of 10 CFR Part 19 and 10 CFR Part 20. Additionally, classroom training shall include the subjects described in Section 2.5 of Regulatory Guide 8.31 (NRC 1983b). All personnel shall attend annual refresher training, and HRI shall conduct regular safety meetings on at least a bi-monthly basis, as described in Section 2.5 of Regulatory Guide 8.31 (NRC 1983b).

COP Revision 2.0 (HRI 1997b) contains an operational definition of a "Uranium Work Area" for contamination control and radiation protection purposes. Any areas in HRI processing facilities in which employees could potentially come into contact with yellowcake will be designated by HRI as Uranium Work Areas. These areas include the filter press area, elution area, IX columns, sand filters, RO unit area, dryer area, and yellowcake drum storage area. HRI will require employees to survey as described in SER Section 4.5.1 before exiting a Uranium Work Area.

3.4.1 Operations Personnel

Personnel who work within a Uranium Work Area will be provided operations personnel training. These individuals will typically be required to work with radioactive materials. In addition to

classroom instruction consistent with NUREG 1159 (McElroy 1986), operational personnel will receive on-the-job training from plant supervisors and the RSO. As part of each plant employee's annual job performance appraisal, the employee's performance with respect to radiation protection will be evaluated. If necessary, plant employees will be retrained in deficient areas. In addition, as noted in SER Section 3.2.4, plant supervisors will conduct routine observation of work habits to ensure adherence to the SOPs.

3.4.2 Clerical and Office Support Staff

Clerical training will be an abridged version of the operational personnel training. Staff members that classify as this type of employee will typically work outside of the Uranium Work Area.

3.4.3 Supervisory Personnel

Supervisors will receive all the training for operations personnel, as well as additional training, such as, ALARA philosophy, contamination control, and work practices. In the event that they should have to act in the absence of the RSO/RST, supervisors will be required to be cognizant of certain surveys which may be required prior to releasing equipment. In addition, supervisory personnel will be able to provide specific job related training, and evaluate their subordinates' performances.

3.4.4 RSO Training

The RSO will attend 40 hours of formal training from an outside source on a biennial basis, consistent with Regulatory Guide 8.31 (NRC 1983b). Topics may include radiation measurements, biological effects, ALARA philosophy, audit techniques, rules and regulations, and methods for controlling radiation doses.

3.4.5 Prenatal Information for Female Employees

Female employees will receive an additional detailed training session, in addition to the regular training for the job type, regarding the hazards of prenatal exposure to radiation. Such instruction will be consistent with the guidance in Regulatory Guide 8.13 (NRC 1987b), and in accordance with the requirements of 10 CFR Part 19 and Part 20.

3.4.6 Special Training for Yellowcake Transport Accidents

Members of the response team will have a good background knowledge in radiation safety as gained from initial employee training, and/or prior job experience (with respect to those members who are part of HRI's radiological safety staff). Further training of response team members in containment, recovery, decontamination, and the equipment needed to control a spill will be given on an annual basis.

3.4.7 Visitors

Visitor training will detail the hazards and proper precautions to be taken while at the site. Visitors will be instructed as to the hazards of yellowcake ingestion, and will be instructed to avoid contact with visible yellowcake in any location containing radioactive materials.

3.4.8 Conclusions

The radiological protection training program for personnel at the Crownpoint Project adheres to the guidance and acceptable approaches contained in NRC Regulatory Guides 8.31 (NRC 1983b), 8.13 (NRC 1987b), and 8.29 (NRC 1996b). The content of the training material, testing, on-the-job training, and the extent and frequency of retraining are acceptable.

Based on the information provided in the application and the detailed review conducted of the radiological protection training program, modified as above by the stated license condition, for the Crownpoint Project, the NRC staff has concluded that the radiological training program is acceptable, and in accordance with the applicable requirements of 10 CFR 20.1101. Additionally, the staff finds that the training program will ensure compliance with 10 CFR 19.12, which requires appropriate instruction to workers of radiation protection and worker responsibilities. The training described above will help ensure acceptable implementation of the radiation protection program.

4.0 RADIATION SAFETY CONTROLS AND MONITORING

4.1 Design Features for Airborne Effluent Control

At ISL facilities, there are two potential major radioactive airborne effluents: radon gas from production solutions and uranium particulates from the yellowcake drying and packaging area. FEIS Section 2.1.2.1 (NRC 1997) describes HRI's proposed engineering designs to minimize airborne effluents. As described in FEIS Section 4.1.3 (NRC 1997), to ensure environmentally safe operation of the vacuum dryer, NRC will require by license condition that:

HRI shall ensure that the manufacturer-recommended vacuum pressure is maintained in the drying chamber during all periods of yellowcake drying operations. This shall be accomplished by continuously monitoring differential pressure and installing instrumentation which will signal an audible alarm if the air pressure differential falls below the manufacturer's recommended levels. The alarm's operability shall be checked and documented daily. Additionally, yellowcake drying operations shall be immediately suspended if any emission control equipment for the yellowcake drying or packaging areas is not operating within specifications for design performance.

As part of the environmental monitoring program, HRI will, on a quarterly basis, measure the radon release from the bleed and restoration water by sampling and conducting same time radon measurements on leach solution from the main trunkline on the pregnant side of each process facility, and on the main trunkline of the barren side of each process facility.

Based on the information provided in the application and the detailed review conducted of the radiation safety design features for airborne effluent control at the Crownpoint Project, as discussed primarily in the FEIS (NRC 1997), the NRC staff has concluded that these features are acceptable and will ensure compliance with 10 CFR 20.1301 (regarding dose limits for individual members of the public), and the applicable provisions of 10 CFR 20.1101(b), requiring the use of engineering controls to reduce doses in accordance with ALARA principles.

HRI has acceptable radiation safety controls for effluents at the Crownpoint Project and has demonstrated that important airborne effluent streams are controlled and monitored. HRI will use an acceptable pressurized processing tank system and appropriate ventilation systems in buildings where radon gas is vented. Acceptable control of the yellowcake dryer system is evidenced by the use of a vacuum dryer and other appropriate particulate scrubber equipment on the dryer stack.

4.2 Restricted Area Monitoring Programs

HRI has committed to performing monitoring of radiation levels and/or contamination levels by two main methods: fixed monitoring locations and surveys. Figure 2.1-1, Figure 2.1-2, and Table 9.4-2 of the COP (HRI 1997b) note monitoring locations for both external and airborne radioactivity. Proposed standardized survey locations, frequencies, and lower limits of detection (LLDs) are noted in Table 9.4-3 of the COP (HRI 1997a). Table 2 of Regulatory Guide 8.30 (NRC 1983c) provides NRC guidance on acceptable monitoring programs. HRI's proposed program has, for many areas, less frequent surveys and higher LLDs than Table 2 of Regulatory Guide 8.30 (NRC 1983c). To ensure adequate radiation surveys of the Crownpoint Project, NRC will require by license condition that:

For all required types of surveys, HRI shall, at a minimum, use the survey locations, frequencies, and lower limits of detection established in Table 2 of Regulatory Guide 8.30 (NRC 1983c).

4.2.1 External Monitoring Program

Each work area at the Crownpoint Project will receive a baseline monitoring prior to plant startup. During operation, each work area and all vessels containing radioactive material will be monitored with thermoluminescent dosimeters (TLDs), which will be read quarterly. On a quarterly basis, a gamma survey of the work areas will be performed.

HRI has committed to issuing TLD badges for at least the first year of operations. Badging frequencies will be on a quarterly basis. As per 10 CFR 20.1502, on an annual basis, HRI can evaluate the external hazards and decide whether TLD badging is necessary.

4.2.2 Airborne Monitoring Program

In the dryer/packaging area at the CPF, HRI will perform continuous monitoring of airborne uranium concentrations during yellowcake operations. The sampling will utilize a low volume pump (e.g., an Eberline RAS-1). During continuous yellowcake operations, the filters will be changed and analyzed as needed to maintain proper airflow rates through the pump. During

discontinuous yellowcake operations, filters from each batch will be analyzed. During periods that drying/packaging activities are not occurring, filters will be changed and analyzed on a weekly basis.

On a monthly basis, grab samples will be taken beneath each site's filter presses to survey for airborne particulate levels. Surveys of all other areas of the process facilities will be performed on a quarterly basis. During non-routine work activities, area air samples or breathing zone samples will be utilized to determine airborne uranium particulate levels.

Prior to each site's start up, a background evaluation of radon daughter concentrations on the plant scaffolding will be performed. After startup, radon daughter measurements will be performed on a monthly basis. In addition, non-routine sampling will be performed, as required, for an RWP.

HRI has committed to having an airborne monitoring program consistent with guidance in Regulatory Guides 8.25 (NRC 1992a) and 8.30 (NRC 1983c).

4.2.3 Conclusions

HRI has acceptable restricted area radiation exposure monitoring programs at the Crownpoint Project. HRI has provided an acceptable set of charts that depict the facility layout and the location of both external and airborne radiation monitors. The radiation monitors are acceptably placed. HRI has established appropriate criteria to determine which employees should receive external radiation monitoring. HRI has committed to using radiation monitors with the appropriate range and sensitivity that will support protection of health and safety of employees during the full range of facility operations. All planned radiation surveys are acceptable. Planned documentation of radiation exposures and surveys is acceptable. HRI's external monitoring program is acceptable to protect workers from beta and gamma radiation. HRI's program for monitoring of uranium and sampling of radon or its daughters is acceptable and the results of this monitoring will be used for employee exposure calculations.

Based on the information provided in the application and the detailed review conducted of the restricted area monitoring programs at the Crownpoint Project, as modified above by the stated license condition, the NRC staff has concluded that the restricted area monitoring programs are acceptable and ensure compliance with the applicable requirements of (1) 10 CFR 20.1101; (2) 10 CFR Part 20, Subpart C (occupational dose limits); and (3) 10 CFR Part 20, Subpart F (requirements for surveys and monitoring).

4.3 Environmental Monitoring Program

HRI has committed to performing environmental monitoring, including sampling and monitoring of air effluents, process fluids, groundwater, surface water, sediment, soil and sludge, as described in Table 9.5-1 of the COP (HRI 1997b). Three months prior to operations at each site, sampling and monitoring will begin at each environmental monitoring station. The types of samples, general locations, sampling frequency, and analyses described in Table 9.5-1 of the COP (HRI 1997b) are consistent with the guidance in Regulatory Guide 4.14 (NRC 1980). HRI has committed to implementing a quality assurance/quality control program for the

environmental monitoring program, as discussed in SER Section 4.7, consistent with the guidance in Regulatory Guide 4.15 (NRC 1979). The NRC will require by license condition that:

Prior to injecting lixiviant at any of the sites, HRI shall submit an NRC-accepted, procedure-level, detailed effluent and environmental monitoring program.

The detailed program will indicate SOPs, such as sampling methods, equipment, analytical procedures, and lower limits of detection. The program will indicate proposed environmental monitoring locations based on "as built" construction, and provide rationales for their selection.

To ensure proper development and implementation of the procedure-level, detailed environmental monitoring program, NRC will require by license condition that:

HRI shall develop and administer its radiological effluent and environmental monitoring program consistent with Regulatory Guide 4.14 (NRC 1980). HRI shall maintain, at a minimum, three airborne effluent environmental monitoring stations at each site, at the locations described in COP Table 9.5-1 (HRI 1997b).

Each monitoring station will contain a TLD (for gamma measurement), and a track-etch detector (for radon measurement). Exact positions for the sampling stations will be provided as part of the detailed environmental program HRI will submit. Environmental monitoring for uranium is not required as emissions are expected to be minimal and not a significant contributor to public doses, as found in FEIS Section 4.6.1.1 and 4.6.1.2 (NRC 1997). NRC will require by license condition that:

HRI shall submit the required effluent reports in accordance with 10 CFR Section 40.65. HRI shall submit information specified in Section 7 of Regulatory Guide 4.14 (NRC 1980), in addition to the reports required by 10 CFR 40.65.

Based on the information provided in the application and the detailed review conducted of the airborne effluent and environmental monitoring program at the Crownpoint Project, as modified above by the stated license conditions, the NRC staff has concluded that the airborne effluent and environmental monitoring program is acceptable and will ensure compliance with 10 CFR 20.1302 (regarding dose limits for individual members of the public); and 10 CFR 20.1501 (survey and monitoring requirements).

HRI has established in the COP (HRI 1997b) an acceptable airborne effluent and environmental monitoring program at the Crownpoint Project. The overall program is consistent with guidance in Regulatory Guide 4.14 (NRC 1980). HRI will sample radon, surface soils, subsurface soils, vegetation, direct radiation, and sediment. The general locations of air monitoring stations are consistent with Regulatory Guide 4.14 (NRC 1980). Instrumentation is appropriate for the measurement task and is acceptable. All reporting and record keeping is done in accordance with the applicable requirements of 10 CFR Part 20, Subpart L.

4.4 Internal Radiation Control Program

4.4.1 Airborne Radioactivity Areas

HRI has committed to post any area, room, or enclosure as an "Airborne Radioactivity Areas" if it meets one of two definitions:

1) if at any time the uranium concentration exceeds one derived air concentration (DAC) for solubility class W, or;

2) if the potential exposure to an individual without respiratory protection could exceed an intake of 10 percent of the annual limit on intake (ALI) in one week.

While the first definition is consistent with the 10 CFR 20.1003 definition, the second definition is not. Therefore, HRI shall post "airborne radioactivity areas" consistent with the 10 CFR 20.1003 definition, and pursuant to the requirements of 10 CFR 20.1902(a-d).

4.4.2 Respiratory Protection Program

HRI has committed to using, to the extent practicable, process or other engineering controls to minimize the airborne concentrations of radionuclides. One example is the use of the vacuum dryer design, which will minimize yellowcake dusting in the workplace and the environment. When it is not practicable to use process or other engineering controls to maintain an area below the limits that define an airborne radioactivity area, HRI will, consistent with maintaining the total effective dose equivalent (TEDE) ALARA, employ one or more of the following means to limit intakes:

(a) control of access,
(b) limitation of exposure times,
(c) use of respiratory protection equipment, and/or
(d) other controls.

HRI will employ respiratory protection if workers may be potentially exposed to air concentrations that will result in exceedence of 10 DAC-hr/wk and/or 3.3 working level-hour/wk, for airborne uranium and radon progeny, respectively.

HRI's proposed respiratory protection program described in the COP Section 9.11 (HRI 1997b) meets the requirements of 10 CFR Part 20, Subpart H. The RSO or his or her designee will be responsible for the respirator maintenance, fitting, and training programs. Records of respirator training and maintenance shall be kept for inspection. Every respirator wearer must be properly fitted and have annual medical approval. HRI will perform random fit testing using irritant smoke in addition to an HRI requirement that each respirator wearer perform a negative, or positive, pressure fit tests. HRI has proposed performing a random alpha survey of respirators before reuse. As stated previously, NRC shall require that HRI shall implement Table 2 of Regulatory Guide 8.30 (NRC 1983c), which includes requiring surveys of all respirator face pieces and hoods prior to reuse.

4.4.3 Bioassay - Urinalysis

The purpose of the bioassay program is to confirm the effectiveness of the radiation protection programs and to verify the results of the calculated exposures. HRI is planning on implementing a bioassay program consistent with that described in Revision 1 of Regulatory Guide 8.22 (NRC 1988). Employees routinely exposed to airborne yellowcake or excessive levels of yellowcake will be bioassayed. Bioassays will be conducted at least once a month for routinely exposed workers and declared pregnant females. Workers that have been temporarily exposed shall have a bioassay performed within 48 to 72 hours after the exposure. The initial action level will be set at 15 μg/l, which will begin an investigation. The actions, including appropriate corrective measures, described in the COP (HRI 1997b), are consistent with those described in Revision 1 of Regulatory Guide 8.22 (NRC 1988). To ensure HRI establishes individual baselines, NRC will require by license condition that:

HRI shall implement a comprehensive bioassay sampling program that conforms to Regulatory Guide 8.22.

4.4.4 Conclusions

Based on the information provided in the application and the detailed review conducted of the internal radiation control and monitoring programs at the Crownpoint Project, as modified above by the stated license condition, the NRC staff has concluded that the internal radiation control and monitoring programs are acceptable and ensure compliance with 10 CFR 20.1204 (requirements for determining internal exposure), and the applicable requirements of 10 CFR Part 20, Subpart H (licensees to limit doses to individuals by controlling access, limiting exposure times, prescribing the use of respiratory equipment, or use of other controls).

HRI has described acceptable respiratory protection and bioassay programs for the Crownpoint Project. Individuals routinely exposed to yellowcake dust are part of the bioassay program. An acceptable action program to curtail uranium intake, including action levels and corrective measures, has been described. HRI's programs include record keeping protocols in conformance with the applicable requirements of 10 CFR Part 20, Subpart L.

4.5 Contamination Control

4.5.1 Personnel Contamination

HRI has committed to requiring all employees leaving the uranium work areas to change clothing and shower or monitor themselves for alpha contamination. Employees that shower and change clothes are considered to be free of significant contamination. In lieu of showering, employees will be required to survey their clothing, shoes, hands, face and hair with an alpha survey instrument. Records of survey results, or showering, will be documented and maintained on site. Employees who exceed the maximum allowed contamination level of 1,000 dpm per 100 cm^2 will be required to decontaminate and, then, resurvey. The RSO or his or her designee will perform unannounced spot check surveys on at least a quarterly basis.

4.5.2 Surface Contamination

HRI has committed to surveying the designated eating areas, change rooms, and office areas (i.e., building areas not designated as uranium work areas) for contamination on a monthly basis. In the uranium work areas, HRI has committed to a daily survey using a visual inspection for obvious signs of contamination and routine instrument surveys to determine total alpha contamination. If the total alpha survey indicates a total contamination greater than 1000 dpm/100 cm^2, a smear survey will be conducted to evaluate the amount of removable contamination. Results will be documented on the survey data sheet. In areas outside the uranium work area, if the smear results indicate removable contamination greater than 200 dpm/100 cm^2, the area will be decontaminated promptly, resurveyed, and the RSO will investigate the cause of the contamination. HRI commits to adhering to the limits for surface contamination in Regulatory Guide 8.30 (NRC 1983c), which are based on the values from Regulatory Guide 1.86 (AEC 1974). To minimize the chance that radioactive material will be inadvertently ingested, NRC will require by license condition that:

Within restricted areas, eating shall be allowed only in designated eating areas.

4.5.3 Release of Contaminated Equipment

All equipment being removed from the restricted areas for use outside of the restricted area, resale, or maintenance will be surveyed, consistent with the guidance in Regulatory Guide 8.30 (NRC 1983c) and Regulatory Guide 1.86 (AEC 1974). Equipment that fails to meet the release limits will be decontaminated, if possible, and resurveyed. Equipment that fails to achieve the unrestricted release criteria can still be used within the uranium work area, sold and transferred to another source material licensee, and will be disposed in an offsite NRC-licensed or Agreement State-licensed 11e.(2) byproduct material disposal cell at the end of the equipment's useful life.

The limits for surface contamination have been updated in a 1987 NRC staff position since publication of Regulatory Guide 8.30 (NRC 1983c). HRI has committed to follow the new guidance. NRC will require by license condition that:

Release of equipment, materials, or packages from the restricted area shall be in accordance with NRC staff position, *"Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials"* (NRC 1987a), or suitable alternative procedures approved by the NRC prior to any such release.

4.5.4 Yellowcake Drums

Yellowcake drums will be shipped as radioactive material of Low Specific Activity (LSA). Each drum will be labeled on two sides with the drum number, net yellowcake weight, and radioactivity stickers including LSA, and "Caution - Radioactive Materials." Packaged drums filled with dry yellowcake will be smear surveyed prior to shipment. The truck and trailer loaded with yellowcake drums will be surveyed for the external exposure rate. The surveys will be recorded and included as part of the yellowcake drum shipment. HRI has committed to meeting

the contamination limits imposed by 49 CFR 173.400 and 49 CFR 173.443 for shipping yellowcake drums, which specify the allowable external exposure rate at the exterior of the trailer and the removable contamination limits, respectively. Additionally, as previously noted in Section 4.5.3, the drums will be required to meet the limits imposed for the release of contaminated equipment from the restricted area. In general, NRC limits for release of contaminated equipment are lower than those promulgated by U.S. Department of Transportation (DOT) regulations. Therefore, drums meeting the NRC limits for surface contamination will meet the contamination release limits of DOT.

4.5.5 Slurry Transports

Yellowcake slurry will be transported in DOT approved slurry trailers which are placarded according to DOT specifications in accordance with 10 CFR 71.5. Slurry transports will be surveyed before, and after positioning on the processing pad. These transports will be surveyed for the external exposure rate and smear surveyed for alpha contamination. HRI is exempted from all other requirements of 10 CFR Part 71, pursuant to 10 CFR 71.10(b), except as noted above.

4.5.6 Conclusions

HRI has described an acceptable contamination control program for the Crownpoint Project. The program is consistent with Regulatory Guide 8.30 (NRC 1983c). Acceptable controls will be in place to prevent contaminated employees from entering clean areas or leaving the site. The SOPs will include provisions for contamination control such as maintaining changing areas and personal alpha radiation monitoring prior to leaving Uranium Work Areas. Acceptable action levels have been set in accordance with Regulatory Guide 8.30 (NRC 1983c) and plans for surveys are in place for skin and personal clothing contamination. HRI has established that all items removed from the restricted area are surveyed by the radiation safety staff and meet release limits. All reporting and record keeping is done consistent with protocols established in Regulatory Guide 8.7 (NRC 1992b). HRI has demonstrated that the range, sensitivity, and calibration of monitoring equipment will support protection of the health and safety of employees during the full range of facility operations. HRI has committed to establishing that contamination on material, equipment, or scrap will be within the limits specified in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials" (NRC 1987a). Yellowcake drums and slurry transports will be surveyed and monitored for contamination prior to leaving the restricted area, and transported in accordance with applicable DOT regulations.

Based on the information provided in the application and the detailed review conducted of the contamination control program for the Crownpoint Project, modified as above by the stated license conditions, the NRC staff has concluded that the contamination control program is acceptable, and ensures compliance with the applicable requirements of (1) 10 CFR 20.1101; (2) 10 CFR 20.1501 (survey and monitoring provisions); (3) 10 CFR 20.1702 (methods for controlling concentrations of airborne radioactive material); and (4) 10 CFR 71.5 (requirements for transportation of licensed material).

4.6 Annual Dose Determinations

4.6.1 Worker Dose Determinations

HRI will monitor employees for external radiation using TLDs and base calculations of internal exposure on area monitoring, breathing zone samples, and bioassay results, as appropriate. HRI has committed to monitoring employees in accordance with Regulatory Guide 8.34 (NRC 1992c) and recording and reporting annual exposures in accordance with Regulatory Guide 8.7 (NRC 1992b).

Radiation exposures at the various worker stations are primarily a function of the time spent at the station and the concentration of uranium and radon or its daughters. HRI will base its calculations of internal doses on the area air monitoring or breathing zone air sampling. Occupancy factors will be determined from time card data. Annual personnel exposure will also include any calculations of exposure due to non-routine work performed under RWPs. HRI plans on using the derived air concentration (DAC) system from 10 CFR Part 20, Appendix B. HRI will calculate the number of DAC-hours of exposure for the appropriate workers. The DAC-hours will be totaled weekly and entered in the employee's Occupational Exposure Record. Under this system, in general, 2,000 DAC-hours are equal to 50 mSv (5 rem).

Results of the committed effective dose equivalent will be summed with the deep dose results from the individual's TLD badge, if appropriate, to compare with the annual worker protection dose limit of 50 mSv (5 rem). In addition, HRI will determine weekly the intake of soluble uranium to compare with the regulatory limit of 10 mg per week of soluble uranium. Workers will be informed of annual exposures via a tabulated posting on a bulletin board in the central office. Terminating employees can request an exposure history.

4.6.2 Embryo/Fetus Dose Determination

Declared pregnant female workers will have, in addition to their annual exposure, estimates of the dose equivalent to the embryo/fetus. To ensure proper calculation, HRI will calculate embryo/fetus doses in accordance with Regulatory Guide 8.36 (NRC 1992d).

4.6.3 Administrative Action Levels

HRI has committed to establishing the following administrative action levels:

(1) 3 mg intake per calendar week for soluble uranium.

(2) 130 DAC-hours per quarter for insoluble uranium and/or radon progeny.

(3) 3 mSv (300 mrem) per quarter for TLD badges.

If an action level is exceeded, the RSO will initiate an investigation into the cause of the occurrence, determine any corrective actions that will reduce future exposures, and document the corrective actions taken.

4.6.4 Conclusions

HRI has described acceptable techniques for performing exposure calculations at the Crownpoint Project. HRI's exposure calculations for natural uranium and airborne radon daughter exposure are acceptable and are consistent with the guidance in NRC Regulatory Guide 8.30 (NRC 1983b) and NRC Regulatory Guide 8.34 (NRC 1992c). HRI has committed to calculating prenatal and fetal radiation exposures consistent with NRC Regulatory Guides 8.13 (NRC 1987b) and 8.36 (NRC 1992d). HRI's commitments regarding record keeping and reporting ensure compliance with the applicable requirements of 10 CFR Part 20, Subparts L and M. Based on the information provided in the application, the NRC staff has also concluded that the applicable occupational dose limits of 10 CFR Part 20, Subpart C, will be met at the Crownpoint Project.

4.7 Quality Assurance and Calibration

HRI has committed in the COP (HRI 1997b) to implementing a quality assurance program for all radiological and non-radiological effluent and environmental monitoring, and bioassay programs at the Crownpoint Project. The COP (HRI 1997b) describes a program that addresses the elements discussed in Regulatory Guide 4.15 (NRC 1979). Elements of the quality assurance program will include standard operating procedures for radiological and water quality sampling, training of individuals in quality control, inter-laboratory comparisons using split samples, and the use of blanks and spiked samples. Annually, an audit of the water quality sampling and analysis program, radiological monitoring sampling programs, and quality assurance/quality control program will be conducted in conjunction with the annual ALARA audit.

HRI has committed that all radiation monitoring, sampling, and detection equipment shall be recalibrated at least annually, as well as after each repair. Prior to each usage, a documented constancy check will be made of the survey instrument to ensure proper response. To ensure survey instrumentation is performing appropriately, NRC will require that:

All radiation survey instruments shall be operationally checked in conformance with Regulatory Guide 8.30 (NRC 1983c).

HRI has described an acceptable QA program for the Crownpoint Project. The QA program will be applied to all radiological, effluent, and environmental programs consistent with NRC Regulatory Guides 4.14 (NRC 1980) and 4.15 (NRC 1979).

Based on the information provided in the application and the detailed review conducted of the QA program for the Crownpoint Project, modified as above by the stated license condition, the NRC staff has concluded that the QA program is acceptable, and will ensure compliance with 10 CFR 20.1101(c), which requires periodic licensee reviews of its radiation protection programs.

5.0 SECURITY

The Crownpoint Project is located on three separate multi-acre sites which HRI has committed to surrounding with fences. The restricted area at the Crownpoint Project will be defined by the fenced areas which will encompass all buildings, wellfield patterns, and associated equipment. Signs reading "CAUTION - RADIOACTIVE MATERIALS" or "ANY AREA WITHIN THE FACILITY MAY CONTAIN RADIOACTIVE MATERIAL" will be posted around the restricted area fences. This posting is in accordance with the requirements stated in 10 CFR 20.1902. Section 20.1902(e) requires that cautionary signs be posted within a facility at each area or room where licensed material above a specified quantity is used or stored. Due to the access controls described below, and the HRI commitment to surround the Project sites with fencing, NRC has considered granting HRI an exemption to the Section 20.1902(e) posting requirements, pursuant to 10 CFR 20.2301.

Access to the restricted areas will be through the main gate of the appropriate site (Crownpoint, Churchrock or Unit 1) which will be electronically controlled and can be opened by entering a combination or by contacting an HRI employee inside the property. The applicant has proposed daily and weekly facility maintenance inspections throughout the plant site and well fields. These inspections can be used as an active access control, in support of the passive controls of fencing and posting. All individuals entering the restricted area will be required to register at the appropriate site offices.

Due to these access controls, NRC finds that posting of individual areas or rooms is not necessary, and would impose a redundant requirement since cautionary signs will be posted on or along the perimeter fencing. Posting of individual areas or rooms would lead to over-posting, and the risk that the cautionary signs might eventually be ignored. Accordingly, NRC finds, pursuant to 10 CFR 20.2301, that granting HRI an exemption from the requirements of Section 20.1902(e) is authorized by law and would not result in undue hazard to life and property.

NRC will grant by license condition the following exemption:

HRI is hereby exempted from the requirements of 10 CFR 20.1902(e) for areas within the process facility, provided that all entrances to the facility are conspicuously posted in accordance with Section 20.1902(e), and with the words, "ANY AREA WITHIN THE FACILITY MAY CONTAIN RADIOACTIVE MATERIAL."

The security measures planned for the Crownpoint Project are acceptable active and passive constraints on ingress to the licensed and restricted areas. HRI has identified acceptable reasonable passive controls including fencing, locked gates, and warning signage for site control.

Based on the information provided in the application and the detailed review conducted of the security measures for the Crownpoint Project, the NRC staff has concluded that the security measures are acceptable, and ensure compliance with the requirements of 10 CFR Part 20, Subpart I (security of stored material and control of material not in storage).

6.0 EMERGENCY PROCEDURES AND PREVENTIVE MEASURES

6.1 Transportation Accident Response

As part of the COP (HRI 1997b), HRI has submitted emergency procedures for responding to a transportation accident involving either yellowcake or ion exchange resin. The contingency procedure for uranium transportation accidents specifies appropriate individuals to contact, health and decontamination procedures to follow, and area clean up methods. HRI's contingency procedure is based on three phases of action: (1) immediate containment, (2) accurate and proper notification, and (3) decontamination using trained, dedicated personnel and equipment. Accompanying the shipping papers for every uranium shipment, a short letter detailing the hazards, preliminary containment procedures, and persons to contact immediately, will be present, in case the driver is unable to communicate the information to first responders. Each transporter will be equipped with proper equipment to quickly contain a spill, while any other equipment necessary for decontamination will be brought by the response team. After initial notification of VPT, VPHSE, and Plant Superintendent, these individuals will in turn notify the proper individuals to handle the situation, including the response team, proper authorities (State Police or Navajo Police), and NRC. The response team will decontaminate the area to current standards for unrestricted areas and survey all individuals who came in contact with the spill. Proper implementation of the contingency procedure will ensure an adequate level of safety to individuals and the environment.

In addition, HRI has committed to coordinate with local emergency services and develop an action plan for equipping and training local emergency officials in the event an accident occurs involving source, or byproduct material. HRI has proposed that a Memorandum of Agreement (MOA) be developed with local emergency services that delineates responsibilities and requirements. NRC will require by license condition that:

Prior to injection of lixiviant, HRI shall have all applicable MOAs between HRI and local authorities, the fire department, medical facilities, and other emergency services, ratified and in effect. At a minimum, the MOAs shall identify individual party responsibilities, coordination requirements, and reporting procedures for all emergency incident responses.

6.2 Wellfield Pipe Breaks

As an integral part of operations, HRI will monitor the current pressure in the wellfield piping. Extraction rates from the mine zone must exceed the injection rates. To monitor the flow, HRI will use flow meters at either the wellheads, or in the meter house, in addition to flow meters in the facility. Alarm set points for the flow meters will be established by HRI such that false positive alarms due to natural variability and/or wellfield pressure balancing will be minimized. In case of a significant pressure drop, such as might occur if a pipe were to break and begin releasing lixiviant to the surface, an alarm will sound in the applicable processing facility (CPF or satellite facility) which will cause an immediate investigation of the appropriate area of the wellfield or facility by a member of the operations staff to discover the cause. Additionally, operational staff will perform at least weekly inspections of the well fields to evaluate maintenance needs.

If a spill or pipe break were discovered, personnel would immediately discontinue the flow of lixiviant through that pipe. Radiological staff would survey the spill area, and decontaminate areas above release limits. In the case of a significant spill, HRI would be required to report the incident to NRC. To ensure proper documentation at the time of decommissioning, NRC will require by license condition that:

Until license termination, HRI shall maintain documentation on all spills of source or 11e.(2) byproduct materials, and all spills of process chemicals. Documented information shall include the date, volume of spill, total activity, survey results, corrective actions, results of remediation surveys, and a map showing spill location and impacted area. After any spill, HRI shall also determine whether the NRC must be notified.

6.3 Conclusions

HRI has acceptably described the anticipated significant effects of accidents from facility operations involving radioactivity, including transportation accidents. The planned response programs are acceptable and include the appropriate mitigation and remediation measures. The response program, modified as above by the stated license conditions, will comply with the notification requirements of 10 CFR 20.2202 and 10 CFR 20.2203.

7.0 WASTE MANAGEMENT

Waste management strategies are discussed in FEIS Section 2.1.2 (NRC 1997). HRI has committed to pre-treating waste water as part of its general waste management strategy. Prior to performing any waste disposal option, HRI will add barium chloride to effectively remove radium, resulting in radionuclide concentrations that are consistent with ALARA principles. HRI is currently considering up to five different final disposal options for waste waters (both process-generated and restoration waters): (1) surface discharge, (2) land application, (3) brine concentration, (4) waste retention ponds, and (5) deep well disposal. HRI has not provided all of the detailed information necessary for approval of any of these methods for NRC-licensed material. Currently, HRI would be limited to using either surface discharge (with appropriate State or Federal permits/licenses), brine concentration, waste retention ponds, or a combination of the three options to dispose of process waste water. Although waste retention ponds remain a viable option for disposal of process waste water, HRI must comply with the following guidance discussed in Section 7.1. Pursuant to 10 CFR 20.2007, NRC approval of a disposal method does not relieve the licensee from complying with other applicable Federal, State, and local regulations governing other toxic or hazardous properties of materials that may be disposed of under 10 CFR Part 20.

7.1 Waste Retention Ponds

HRI's proposed waste retention ponds must be designed to meet the applicable requirements of 10 CFR Part 40, Appendix A. To meet these requirements with respect to flooding and erosion, the licensee will be required to provide a design that ensures that contaminated materials will not be released during operations. The waste retention ponds will need to be adequately protected against rainfall and runoff from severe precipitation events. To provide

such protection, the staff concludes that it will be necessary for the licensee to construct certain design features that will safely store or discharge run-off from large storm events.

The staff developed several documents that provide hydrologic design guidance and acceptable design methods for meeting the requirements of 10 CFR Part 40 by safely storing or discharging large storm events. WM-8201, "Hydrologic Design Criteria for Tailings Retention Systems," provides general criteria for the design and operation of design features needed to accommodate large storm events. In addition, Final Staff Technical Position (FSTP), "Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites," provides detailed guidance for the design of specific features associated with waste retention ponds, such as diversion channels, riprap erosion protection, and flood analyses. Further, Standard Review Plans (SRPs) have been developed for staff analysis of flooding and erosion at uranium recovery facilities, and these SRPs provide detailed staff review procedures that will be used in the analysis of hydraulic designs.

HRI provided preliminary engineering analyses for the proposed sites (Espey, Huston & Associates, Inc. 1993, 1996a-c). In those analyses, HRI concluded that flooding and erosion will not pose significant problems at any of the sites. However, HRI also indicated that the final locations and design details of the waste retention ponds, berms, diversion channels, and other features had not yet been determined due to unresolved operational considerations (e.g., obtaining appropriate groundwater permits, determining groundwater restoration approach, etc.). HRI further concluded that routine hydraulic design features, such as diversion channels and riprap protection, could be designed to provide adequate flood protection.

Using the criteria provided in WM-8201, the FSTP, and the SRPs, the staff independently reviewed the information provided by HRI, and conducted site visits to each of the three sites. During its site visits, the staff confirmed there were no anomalous site conditions requiring unique design features as a result of potential flooding and erosion, and that any such problems could be adequately addressed by routine hydraulic design features. The staff's review and conclusions for each of the sites are discussed in detail as follows:

Crownpoint:

Based on the staff's review of the aforementioned hydrologic information provided by HRI, and a site visit conducted on February 6, 1996, the most significant flooding issue at the Crownpoint site involves the presence of an ephemeral stream that flows immediately in the site vicinity adjacent to the existing ponds. The stream has a relatively large drainage area, and the Probable Maximum Flood (PMF) could potentially erode the side slopes of above-grade waste retention ponds, if proper design precautions are not taken.

The staff's review indicates that HRI has adequately defined the scope of the flooding problem that could exist at the site. HRI provided PMF analyses using run-off models recommended by the staff in the FSTP, including peak flow rates, times of concentration, drainage areas, rainfall distributions, and infiltration losses. In accordance with review procedures recommended in the SRP, the staff reviewed these calculations and analyses and compared the results with historic flood data. Based on this review, the flood estimates are considered to be acceptable for design purposes.

It will be necessary for HRI to provide engineered design features to prevent erosion of the side slopes of the waste retention ponds. The staff's review indicates there may be several design options available to HRI. HRI could construct a new diversion channel located well away from the waste retention pond side slopes, provide riprap erosion protection for the existing channel, modify the slopes and grades of the existing channel to eliminate the need for riprap, or provide a design that incorporates a combination of these options. Regardless of the design option selected, the staff notes there are no anomalous site conditions requiring unique design and construction of diversion channels or riprap erosion protection features.

Unit 1:

Based on the staff's review of the hydrologic information provided by HRI, and a site visit conducted on February 6, 1996, there are no significant flooding issues at the Unit 1 site. The site is located on a high ridge between two shallow arroyos and the local drainage areas affecting any site features are likely to be minimal. The staff concludes that a waste retention pond could be constructed in several locations where the drainage area is minimal, thus eliminating the need for a large, heavily-protected diversion channel.

HRI provided flooding analyses to document that the flows in the arroyos would not affect the design of retention ponds located on, or near the top of, the ridge. HRI used NRC-recommended methods to estimate peak flow rates and indicated that waste retention ponds and other structures would be located well away from arroyos or areas of flood flows. HRI also indicated that one drainage area may need to be rerouted by a diversion channel, depending on the final location and size of the waste retention ponds and structures. HRI proposed that this rerouting could be accommodated by a 3-foot deep trapezoidal channel, thus demonstrating that such drainage modifications would be minor.

As discussed above in the Crownpoint Site analysis, the staff has concluded there are no anomalous site conditions at Unit 1 requiring unique design and construction of diversion channels or riprap erosion protection features.

Church Rock:

Based on the staff's review of the hydrologic information provided by HRI, and a site visit conducted on July 16, 1997, there are two potential hydrologically-significant issues affecting the design of the waste retention ponds. First, an ephemeral stream with a relatively large drainage area flows through the site area. Therefore, the waste retention ponds will need to be located far enough from this stream, or protected by engineered design features from erosion associated with this stream. Second, most of the potential pond locations will have some upgradient drainage area, making it likely that a diversion channel will be required to divert flood flows around the waste retention ponds.

Using models recommended by the staff in the FSTP, HRI provided PMF analyses, including peak flow rates, times of concentration, drainage areas, rainfall distributions, and infiltration losses. In accordance with review procedures recommended in the SRP, the staff reviewed these calculations and analyses and compared the results with historic flood data. Based on this review, the flood estimates are considered to be acceptable for design purposes.

To protect any above-grade waste retention pond side slopes from the large ephemeral stream that flows through the site, HRI would need to locate the ponds and facility structures in an area not subject to flooding from this stream. Alternately, HRI could provide riprap to protect the waste retention pond side slopes from erosion.

The staff concluded that some small upland drainage area will probably exist regardless of the waste retention pond location. Therefore, HRI will need to provide a diversion channel and/or erosion protection to prevent erosion due to run-off from these small drainages. The staff's review indicates there may be several design options available to HRI. To protect the side slopes of the waste retention pond from run-off due to the localized drainage areas, HRI could construct diversion channels with the necessary riprap erosion protection features. The channel could be designed with a relatively flat slope across the site to minimize the need for riprap, or a design could be provided that incorporates a combination of these options. Regardless of the design selected, the staff concludes there are no anomalous site conditions requiring unique design and construction of diversion channels or riprap erosion protection features.

HRI states in the COP Revision 2.0 (HRI 1997b) that it plans to build only below-ground level retention ponds, if possible. This would eliminate the potential for embankment failure that could result in any release of waste water. Should HRI have to construct an above-ground retention pond(s) that: (1) has an embankment that is greater than or equal to 25 feet in height and a storage capacity greater than 15 acre-feet; or (2) has a storage capacity greater than or equal to 50 acre-feet and an embankment greater than 6 feet in height; or (3) poses a potentially significant downstream hazard, then the NRC staff would use Regulatory Guide 3.11 (NRC 1977) to review the design, construction, inspection, and maintenance features of the proposed above-grade embankment. In addition, any above-ground retention ponds meeting the aforementioned criteria would be included in the NRC Dam Safety Program, and would be subject to Section 215, "National Dam Safety Program," of the Water Resources Development Act of 1996.

Regardless of whether below-ground or above-ground retention ponds are used, HRI would still need to satisfy the design requirements of 10 CFR Part 40, Appendix A, Criterion 5A, regarding the hydrogeologic setting, the structural integrity of the liner, and the overall stability of surface impoundments.

If HRI decides to construct above-ground waste retention ponds, the staff has concluded that there are no site conditions which would require a unique design feature. Based on its review of the seismic slope stability for the United Nuclear Corporation Church Rock tailings site (located adjacent to the Crownpoint Project site), the NRC staff concluded that embankment slopes can be designed to remain stable for 1,000 years, to the extent reasonably achievable. Therefore, the NRC staff has further concluded that an equal or greater level of stability can be achieved for the proposed 20 year lifetime of any conventionally designed waste retention pond(s) constructed by HRI for the Crownpoint Project.

HRI has committed to using a double-lined, impermeable synthetic membrane for its waste retention ponds in accordance with 10 CFR Part 40, Appendix A requirements. The liners will be separated by 4-5 inches of sand or equivalent medium, and a drainage network of open

piping which forms an underdrain leak detection system. The inner liner will provide secondary containment for any leakage that may occur. HRI states that it will conduct daily inspections for leakage, and that fluid found in the leak detection system will be cause for immediate corrective action, including notification of the NRC.

Based on further discussions with HRI since the FEIS (NRC 1997) was published, NRC will impose the following conditions with respect to waste retention ponds, rather than those stated in FEIS Section 4.2.3 (NRC 1997):

Prior to injecting lixiviant at a site, or processing licensed material at the Crownpoint site, HRI shall provide and receive NRC acceptance - for that site - information, calculations, and analyses to document the adequacy of the design of waste retention ponds and their associated embankments (if applicable), liners, and hydrologic site characteristics. HRI shall demonstrate that the criteria described in the following documents have been met: 10 CFR Part 40, Appendix A, Criterion 5A regarding surface impoundment design; Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills"; WM-8201, "Hydrologic Design Criteria for Tailings Retention Systems,"; and Final Staff Technical Position, "Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites." As applicable, based on the designs selected, HRI shall provide information in the following areas:

a) **maps and detailed drawings outlining drainage areas of principal water courses and drainage features at the site;**

b) **drainage basin characteristics, including soil types and characteristics, vegetative cover, local topography, flood plains, geomorphic characteristics, and surficial and bedrock geology;**

c) **maps and detailed drawings showing the location of site features, particularly the location of the retention ponds and diversion channels;**

d) **analyses and calculations for peak flood flows, including the PMF, and documenting the methods and assumptions used to compute the floods;**

e) **analyses and calculations for water surface profiles and velocities associated with the ability of the retention ponds or diversion channels to resist or limit erosion and flooding;**

f) **analyses and computations of riprap or erosion protection needed to protect the retention ponds;**

g) **specific details on the design, construction, maintenance, and operation of the waste retention ponds and embankments (where applicable);**

h) **specific details on the design, construction, maintenance, and operation of the liners and leak detection system.**

i) **any other analyses and computations which demonstrate that applicable design criteria have been met.**

7.2 Solid Radioactive Waste Disposal

All solid 11e.(2) byproduct material will be shipped to an NRC- or Agreement State-licensed 11e.(2) byproduct material disposal cell. HRI has a contract with International Uranium Corporation (IUC) to ship 11e.(2) byproduct material for disposal in the tailings cells at IUC's White Mesa Uranium Mill in Blanding, Utah (HRI 1996a). Contaminated materials would be stored adjacent to the waste retention ponds prior to shipment for disposal. To ensure HRI maintains access to disposal capacity, NRC will require by license condition that:

HRI shall dispose of 11e.(2) byproduct material from the Crownpoint Project at a waste disposal site licensed by the NRC or an Agreement State to receive 11e.(2) byproduct material. At each Project site, HRI shall maintain an area within the restricted area boundary for storing contaminated materials prior to their disposal. HRI's approved waste disposal agreement must be maintained on site. Should this agreement expire or be terminated, HRI shall notify the NRC in writing within seven (7) working days after the agreement expires or is terminated. A new agreement shall be ratified within 90 days of expiration or termination of the previous agreement, or HRI will be prohibited from further lixiviant injection.

Pursuant to 10 CFR 20.2108, HRI will maintain records of all transfers of byproduct material for disposal until license termination.

7.3 Conclusions

HRI has acceptably described the common liquid effluents to be generated at the Crownpoint Project. While HRI has discussed a wide range of acceptable control methods, HRI would be limited to using either surface discharge (with appropriate State or Federal permits/licenses), brine concentration, waste retention ponds, or a combination of the three to dispose of process waste water. In addition, HRI has provided preliminary hydrologic engineering analyses for the Crownpoint Project site. Based on its review of this data and the information gathered during its site visits, the NRC staff concludes there are no anomalous site conditions at any of the three sites that would require unique designs for constructing waste retention ponds, diversion channels, or riprap erosion protection features. Similar type waste retention ponds, diversion channels, and riprap erosion protection are common design features at numerous other uranium mill sites, and the staff has considerable expertise in evaluating the performance of these engineered features. Furthermore, HRI has committed to following design criteria enumerated in Regulatory Guide 3.11 (if applicable), WM-8201, and the FSTP when constructing its waste retention ponds. Therefore, the staff concludes that an acceptable detailed design can be readily provided by HRI to meet 10 CFR Part 40, Appendix A, Criterion 5A requirements, once the project's operational issues have been resolved.

HRI has committed that sump capacity for each process building will be sufficient to contain the volume of the largest vessel. Each site facility will have acceptable alarms to notify the operator of loss of or excess pressure within the production circuits. HRI has an acceptable plan for the

disposal of contaminated solid wastes that are generated by the Crownpoint Project, including storage of contaminated material that either cannot, or will not, be decontaminated and released for unrestricted use, prior to disposal. HRI will dispose of contaminated solid waste periodically at a licensed waste disposal site, and will maintain an agreement/contract for future disposal capacity.

Based on the information provided in the application, site visits conducted by the staff, and the detailed review conducted of the effluent control systems for liquids and solids for the Crownpoint Project, as modified above by the stated license conditions, the NRC staff has concluded that HRI's waste management plans ensure compliance with the applicable requirements of (1) 10 CFR Part 20, Subpart K (waste disposal); (2) 10 CFR Part 40, Appendix A, Criterion 2 (disposal of byproduct material); and (3) 10 CFR Part 40, Appendix A, Criteria 5A (surface impoundment requirements).

Because the waste retention ponds are operational features used for waste water management, the monitoring requirements listed in 10 CFR Part 40, Appendix A, Criterion 7 are not applicable to this project. Specifically, the monitoring requirements in Criterion 7 apply to disposal cells which are used for the long-term stabilization of uranium mill tailings.

8.0 DECOMMISSIONING AND RECLAMATION

HRI included a preliminary schedule for mining related activities in the COP (HRI 1997b). Decommissioning and reclamation of the CPF and satellites will take place after all mining and groundwater restoration at the site is complete. Groundwater restoration and wellfield decommissioning will be accomplished as wellfields are mined out.

HRI has committed to submitting a detailed reclamation plan to NRC for review and approval at least 12 months prior to the planned final shutdown of mining operations. As part of the COP (HRI 1997b), HRI has submitted a conceptual reclamation plan. The main goal of the plan is to return areas affected by mining activities to a condition which supports the premining land use of sheep and cattle grazing, and associated wildlife habitats. The conceptual reclamation plan provides reasonable assurance that the goal can be reached for surface reclamation activities. Information on the groundwater restoration activities can be found in the FEIS Section 4.3 (NRC 1997).

HRI has committed to decontaminating to unrestricted release standards, or disposing of, all radiologically contaminated buildings, process vessels, and other structures, and affected areas prior to final reclamation. Decontamination will include using acid and water wash downs of structures and concrete. The resulting wastewater will be disposed by disposal well, brine concentration, and/or evaporation. Equipment which cannot be decontaminated will be dismantled and disposed as 11e.(2) byproduct material or utilized at another NRC licensed uranium site. Retention ponds will have the liners and pond sludge removed and disposed as 11e.(2) byproduct material, if the pond had been used for process waste water.

HRI has committed to providing information to NRC, prior to release of an area for unrestricted use, verifying that radionuclide concentrations meet the applicable radiation standards in 10 CFR Part 40, Appendix A, Criterion 6(6), for allowable radium concentrations.

Areas unaffected by process wastes but contaminated by restoration waste waters will need to meet the appropriate standards of the State of New Mexico or the Navajo Nation.

Based on the information provided in the application, the NRC staff has concluded that the proposed reclamation program is acceptable, and that the applicable decommissioning requirements of 10 CFR 40.42 can be met.

9.0 SURETY REQUIREMENTS

10 CFR Part 40, Appendix A, Criterion 9, requires the licensee to establish a financial surety arrangement to assure that sufficient funds will be available to carry out the decontamination and decommissioning of the site. The surety is based on an estimate which must account for the total costs that would be incurred if an independent contractor were contracted to perform the work. The surety estimate must be approved by NRC and based on a NRC-approved decommissioning and reclamation plan. HRI must also provide the surety arrangement through a financial instrument acceptable to NRC. The licensee's surety mechanism will be reviewed by NRC annually to ensure that sufficient funds are available to complete reclamation. Additionally, the amount of the surety should be adjusted to recognize any increases or decreases in liability resulting from inflation, changes in engineering plans, or other conditions affecting cost. NRC will require by license condition that:

As a prerequisite to operating under its license, HRI shall submit an NRC-approved surety arrangement to cover the estimated costs of decommissioning, reclamation, and groundwater restoration. Generally, these surety amounts shall be determined by the NRC based on cost estimates for a third party completing the work in case HRI defaults. Surety for groundwater restoration of the initial well fields shall be based on 9 pore-volumes. Surety shall be maintained at this level until the number of pore volumes required to restore the groundwater quality of a production-scale well field has been established by the restoration demonstration. If at any time it is found that well field restoration requires greater pore-volumes or higher restoration costs, the value of the surety will be adjusted upwards. Upon NRC approval, HRI shall maintain the NRC-approved financial surety arrangement consistent with 10 CFR Part 40, Appendix A, Criterion 9.

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

HRI shall provide an NRC-approved updated surety before undertaking any planned expansion or operational change which has not been included in the annual surety

update. This surety update shall be provided to the NRC at least 90 days prior to the commencement of the planned expansion or operational change.

HRI shall also provide the NRC with copies of surety-related correspondence submitted to the State of New Mexico, a copy of the State's surety review, and the final approved surety arrangement. HRI must also ensure that the surety, where authorized to be held by the State, identifies the NRC-related portion of the surety and covers the above-ground decommissioning and decontamination, the cost of off-site disposal, soil and water sample analyses, and groundwater restoration associated with the site. The basis for the cost estimate is the NRC-approved site closure plan or the NRC-approved revisions to the plan.

10.0 CONCLUSION AND SAFETY LICENSE CONDITIONS

Upon completion of the safety review of HRI's license application for a source material license, the staff concludes that the requirements of 10 CFR 40.32 have been satisfied, and that issuance of a license to HRI containing the following conditions will not be inimical to the common defense and security or to the public's health and safety. The staff further concludes that there is adequate assurance that the applicable requirements of 10 CFR Parts 19, 20, 40, and 71, and the AEA, have been or will be met.

Additional license conditions (not included in this SER) regarding environmental protection are stated in the FEIS, and will be included in the 10 CFR Part 40 license to be issued to HRI. Therefore, the staff recommends granting a source material license to HRI 30 days after the issuance of this SER, subject to the following conditions:

- The licensee shall conduct operations in accordance with all commitments, representations, and statements made in its license application submitted by cover letter dated April 25, 1988, as supplemented, and the Crownpoint Uranium Project COP, Rev. 2.0, dated August 15, 1997, except where superseded by license conditions contained in this license. Whenever the words "will" or "shall" are used in the aforementioned licensee documents, it denotes an enforceable license requirement.

- The processing plant flow rate at each site (Church Rock, Unit 1, or Crownpoint) shall not exceed 15,142 L/min (4000 gal/min), exclusive of restoration flow. Total yellowcake production from all three sites shall not exceed 1.36 million kg (3 million lbs) annually.

- Any corporate organization changes affecting the assignments or reporting responsibilities of the radiation safety staff as described in the COP (HRI 1997b) shall conform to Regulatory Guide 8.31 (NRC 1983b).

- The Radiation Safety Officer (RSO) shall have the education, training, and experience as specified in Regulatory Guide 8.31 (NRC 1983b).

- The Radiation Safety Technician (RST) shall have the qualifications specified in Regulatory Guide 8.31 (NRC 1983b). Any person newly hired as an RST shall have all work reviewed and approved by the RSO as part of a comprehensive training program

until appropriate course training is completed, and at least for 6 months from the date of appointment.

- The licensee may, without prior NRC review or approval: (a) make changes in the Crownpoint Project's facilities or processes as described in Revision 2.0 of the COP; (b) make changes in its standard operating procedures; and © conduct tests or experiments, if the licensee ensures that the following conditions are met:

  (1) the change, test, or experiment does not conflict with any requirement specifically stated in the license, or impair the licensee's ability to meet all applicable NRC regulations;

  (2) there is no degradation in the safety or environmental commitments made in COP Revision 2.0 (HRI 1997b), or in the approved reclamation plan for the Crownpoint Project; and

  (3) the change, test, or experiment is consistent with NRC's findings in the FEIS (NRC 1997) and SER dated November , 1997, for the Crownpoint Project.

  If any of these conditions are not met for the change, test, or experiment under consideration, the licensee is required to submit a license amendment application for NRC review and approval. The licensee's determinations as to whether the above conditions are met will be made by a Safety and Environmental Review Panel (SERP). All such determinations shall be documented, and the records kept until license termination. All such determinations shall be reported annually to the NRC. The retained records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for determining whether or not the conditions are met.

  The licensee shall provide an annual report to NRC that describes the changes, tests, or experiments, including a summary of the safety and environmental evaluation of each such action. As part of this annual report, the licensee shall include any COP pages revised in accordance with the performance-based license condition.

- The SERP shall consist of a minimum of three individuals employed by the licensee, whereby one shall be designated the SERP Chairperson. One member of the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and, one member shall be the Environmental Manager, with the responsibility of ensuring that changes conform to radiological safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, ground-water hydrology, surface water hydrology, earth sciences, and other technical disciplines. Temporary members, or permanent members other than the three identified above, may be consultants.

- The results of the following activities, operations, or actions shall be documented: sampling; analyses; surveys or monitoring; survey/monitoring equipment calibrations;

reports on audits and inspections; emergency generator use and maintenance records; all meetings and training courses required by the license; and any subsequent reviews, investigations, or corrective actions. Unless specified otherwise in NRC regulations or the license, all documentation required by the license shall be maintained for a period of at least five (5) years by the licensee at its facility, and is subject to NRC review and inspection.

- Written SOPs shall be established and followed for: (1) all operational activities involving radioactive materials that are handled, processed, stored, or transported by employees; (2) all non-operational activities involving radioactive materials including in-plant radiation protection and environmental monitoring, and (3) emergency procedures for potential accident/unusual occurrences including significant equipment or facility damage, pipe breaks and spills, loss or theft of yellowcake or sealed sources, and significant fires. The SOPs shall include appropriate radiation safety practices to be followed in accordance with 10 CFR Part 20. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. A copy of the current written procedures shall be kept in the area(s) of the production facility where they are utilized. All SOPs for activities described in the COP shall be reviewed and approved as described in the COP.

- Radiation Work Permits shall include, at a minimum, the information described in Section 2.2 of Regulatory Guide 8.31 (NRC 1983b).

- Site inspections and reviews shall be completed and documented, as described in Section 2.3.1 and 2.3.2 of Regulatory Guide 8.31 (NRC 1983b).

- The licensee shall implement and maintain a training program for all site employees as described in Regulatory Guide 8.31 (NRC 1983b), and as detailed in the COP. All training materials shall incorporate the information from current versions of 10 CFR Part 19 and 10 CFR Part 20. Additionally, classroom training shall include the subjects described in Section 2.5 of Regulatory Guide 8.31 (NRC 1983b). All personnel shall attend annual refresher training, and HRI shall conduct regular safety meetings on at least a bi-monthly basis, as described in Section 2.5 of Regulatory Guide 8.31 (NRC 1983b).

- The licensee shall ensure that the manufacturer-recommended vacuum pressure is maintained in the drying chamber during all periods of yellowcake drying operations. This shall be accomplished by continuously monitoring differential pressure and installing instrumentation which will signal an audible alarm if the air pressure differential falls below the manufacturer's recommended levels. The alarm's operability shall be checked and documented daily. Additionally, yellowcake drying operations shall be immediately suspended if any emission control equipment for the yellowcake drying or packaging areas is not operating within specifications for design performance.

- For all required types of surveys, the licensee shall, at a minimum, use the survey locations, frequencies, and lower limits of detection established in Table 2 of Regulatory Guide 8.30 (NRC 1983c).

- Prior to injecting lixiviant at any of the sites, the licensee shall submit an NRC-accepted, procedure-level, detailed environmental monitoring program.

- The licensee shall develop and administer its radiological effluent and environmental monitoring program consistent with Regulatory Guide 4.14 (NRC 1980). The licensee shall maintain, at a minimum, three airborne effluent environmental monitoring stations, as described in COP Section 9.7.3 and Table 9.5-1 (HRI 1997b).

- The licensee shall submit the required effluent reports in accordance with 10 CFR 40.65. The licensee shall submit information specified in Section 7 of Regulatory Guide 4.14 (NRC 1980), in addition to the reports required by 10 CFR 40.65.

- The licensee shall implement a comprehensive bioassay sampling program that conforms to Regulatory Guide 8.22.

- Within restricted areas, eating shall be allowed only in designated eating areas.

- Release of equipment, materials, or packages from the restricted area shall be in accordance with NRC Staff Position, *Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials* (NRC 1987a), or suitable alternative procedures approved by the NRC prior to any such release.

- All radiation survey instruments shall be operationally checked in conformance with Regulatory Guide 8.30 (NRC 1983c).

- The licensee is hereby exempted from the requirements of 10 CFR 20.1902(e) for areas within the process facility, provided that all entrances to the facility are conspicuously posted in accordance with Section 20.1902(e), and with the words, "ANY AREA WITHIN THE FACILITY MAY CONTAIN RADIOACTIVE MATERIAL."

- Prior to injection of lixiviant, the licensee shall have all applicable MOAs between the licensee and local authorities, the fire department, medical facilities, and other emergency services, ratified and in effect. At a minimum, the MOAs shall identify individual party responsibilities, coordination requirements, and reporting procedures for all emergency incident responses.

- Until license termination, the licensee shall maintain documentation on all spills of source or 11e.(2) byproduct materials, and all spills of process chemicals. Documented information shall include the date, volume of spill, total activity, survey results, corrective actions, results of remediation surveys, and a map showing spill location and impacted area. After any spill, the licensee shall also determine whether the NRC must be notified.

- Prior to injecting lixiviant at a site, or processing licensed material at the Crownpoint site, HRI shall provide and receive NRC acceptance - for that site - information, calculations,

and analyses to document the adequacy of the design of waste retention ponds and their associated embankments (if applicable), liners, and hydrologic site characteristics. HRI shall demonstrate that the criteria described in the following documents have been met: 10 CFR Part 40, Appendix A, Criterion 5A regarding surface impoundment design; Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills"; WM-8201, "Hydrologic Design Criteria for Tailings Retention Systems,"; and Final Staff Technical Position, "Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites." As applicable, based on the designs selected, HRI shall provide information in the following areas:

a) maps and detailed drawings outlining drainage areas of principal water courses and drainage features at the site;

b) drainage basin characteristics, including soil types and characteristics, vegetative cover, local topography, flood plains, geomorphic characteristics, and surficial and bedrock geology;

c) maps and detailed drawings showing the location of site features, particularly the location of the retention ponds and diversion channels;

d) analyses and calculations for peak flood flows, including the PMF, and documenting the methods and assumptions used to compute the floods;

e) analyses and calculations for water surface profiles and velocities associated with the ability of the retention ponds or diversion channels to resist or limit erosion and flooding;

f) analyses and computations of riprap or erosion protection needed to protect the retention ponds;

g) specific details on the design, construction, maintenance, and operation of the waste retention ponds and embankments (where applicable);

h) specific details on the design, construction, maintenance, and operation of the liners and leak detection system.

i) any other analyses and computations which demonstrate that applicable design criteria have been met.

- The licensee shall dispose of 11e.(2) byproduct material from the Crownpoint Project at a waste disposal site licensed by the NRC or an Agreement State to receive 11e.(2) byproduct material. At each Project site, the licensee shall maintain an area within the restricted area boundary for storing contaminated materials prior to their disposal. The licensee's approved waste disposal agreement must be maintained on site. Should this agreement expire or be terminated, the licensee shall notify the NRC in writing within seven (7) working days after the agreement expires or is terminated. A new agreement

shall be ratified within 90 days of expiration or termination of the previous agreement, or the licensee will be prohibited from further lixiviant injection.

- As a prerequisite to operating under its license, the licensee shall submit an NRC-approved surety arrangement to cover the estimated costs of decommissioning, reclamation, and groundwater restoration. Generally, these surety amounts shall be determined by the NRC based on cost estimates for a third party completing the work in case the licensee defaults. Surety for groundwater restoration of the initial well fields shall be based on 9 pore- volumes. Surety shall be maintained at this level until the number of pore volumes required to restore the groundwater quality of a production-scale well field has been established by the restoration demonstration. If at any time it is found that well field restoration requires greater pore-volumes or higher restoration costs, the value of the surety will be adjusted upwards. Upon NRC approval, the licensee shall maintain the NRC-approved financial surety arrangement consistent with 10 CFR Part 40, Appendix A, Criterion 9.

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

  The licensee shall provide an NRC-approved updated surety before undertaking any planned expansion or operational change which has not been included in the annual surety update. This surety update shall be provided to the NRC at least 90 days prior to the commencement of the planned expansion or operational change.

  The licensee shall also provide the NRC with copies of surety-related correspondence submitted to the State of New Mexico, a copy of the State's surety review, and the final approved surety arrangement. The licensee must also ensure that the surety, where authorized to be held by the State, identifies the NRC-related portion of the surety and covers the above-ground decommissioning and decontamination, the cost of off-site disposal, soil and water sample analyses, and groundwater restoration associated with the site. The basis for the cost estimate is the NRC-approved site closure plan or the NRC-approved revisions to the plan.

11.0 REFERENCES

AEC (U.S. Atomic Energy Commission) 1974. *Termination of Operating Licenses for Nuclear Reactors.* Regulatory Guide 1.86. June 1974.

Espey 1993. Espey, Huston & Associates, Inc. *Surface Water Drainage Analysis for Proposed HRI, Inc., Churchrock In-Situ Uranium Leach Project, McKinley County, New Mexico.* August 1993.

Espey 1996a. Espey, Huston & Associates, Inc. *Crownpoint, NM Uranium Solution Mining License Application Surface Drainage and Erosional Stability Analysis.* February 1996.

Espey 1996b. Espey, Huston & Associates, Inc. *Supplement to Surface Water Drainage Analysis for Proposed HRI, Inc., Churchrock In-Situ Uranium Leach Project, McKinley County, New Mexico.* September 1996.

Espey 1996c. Espey, Huston & Associates, Inc. *Surface Water Drainage Conditions for the Unit 1 Uranium Mining Site, near Crownpoint, New Mexico.* September 1996.

HRI (Hydro Resources, Inc.) 1996a. *Response to Request for Further Clarification and Additional Information of Responses; Safety Analysis Review and Environmental Review for the Hydro Resources, Inc., Uranium Solution Mining License Application, Crownpoint, New Mexico.* August 15, 1996.

HRI 1996b. *Crownpoint Uranium Project Consolidated Operations Plan.* Revision 0.0. September 30, 1996.

HRI 1997a. *Crownpoint Uranium Project Consolidated Operations Plan.* Revision 1.0. May 12, 1997.

HRI 1997b. *Crownpoint Uranium Project Consolidated Operations Plan.* Revision 2.0. August 15, 1997.

HRI 1997c. Transmittal to NRC from HRI. *HRI response to NRC Q99 :Sensitivity Analysis of Modeled Unit Site Ground-Water Flow.* August 18, 1997.

McElroy 1986. McElroy N. and Brodsky A. *Training Manual for Uranium Mill Workers on Health Protection from Uranium.* NUREG-1159. NRC. January 1986.

NRC (U.S. Nuclear Regulatory Commission) 1977. *Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills.* Regulatory Guide 3.11, Revision 2, December 1977.

NRC 1979. *Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment.* Regulatory Guide 4.15. Revision 1. February 1979.

NRC 1980. *Radiological Effluent and Environmental Monitoring at Uranium Mills.* Regulatory Guide 4.14. Revision 1. April 1980.

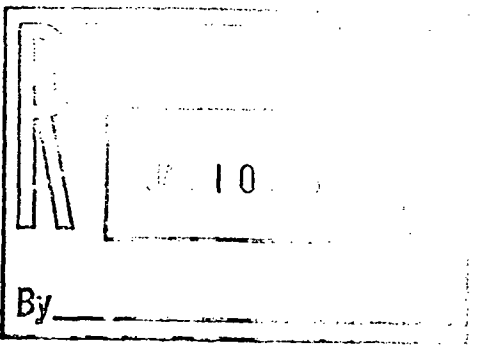
NRC 1983a. *Hydrologic Design Criteria for Tailings Retention Systems.* Staff Technical Position WM-8201. January 1983.

EXHIBIT 3

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

OFFICE OF THE
GENERAL COUNSEL

January 5, 1998



Chief Administrative Judge
B. Paul Cotter, Jr., Esq.*
Presiding Officer
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Administrative Judge
Thomas D. Murphy*
Special Assistant
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

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

Dear Judges Cotter and Murphy:

The Staff is issuing a source material license to Hydro Resources, Inc. (HRI) in the above-captioned matter. The Staff's letter to HRI dated January 5, 1998 and a copy of the license are attached.

Sincerely,

John T. Hull
Counsel for NRC Staff

Attachments: As Stated

cc w/attachments: Service List

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

January 05, 1998

Mr. Richard F. Clement, Jr., President
Hydro Resources, Inc.
2929 Coors Blvd., NW
Suite 101
Albuquerque, NM 87120

SUBJECT: ISSUANCE OF SOURCE MATERIAL LICENSE SUA-1508, FOR THE IN SITU LEACH URANIUM MINING PROJECT AT CROWNPOINT, NEW MEXICO

Dear Mr. Clement:

The U.S. Nuclear Regulatory Commission staff has completed its review of Hydro Resources, Inc.'s (HRI's) license application, dated April 25, 1988 (as supplemented by the licensee submittals listed in Attachment A of the enclosed source material license SUA-1508), and the Crownpoint Uranium Project Consolidated Operations Plan (COP), Rev. 2.0, dated August 15, 1997. Based on its review of these documents as discussed below, the NRC staff hereby issues HRI a source material license SUA-1508 for its in situ leach uranium mining project at Crownpoint, NM, effective January 5, 1998.

The NRC staff determined, in accordance with 10 CFR 51.20 and 10 CFR 51.25, that preparation of an environmental impact statement (EIS) was necessary to document its review. The NRC staff issued a final EIS (FEIS) for the Crownpoint Project in February 1997 documenting its environmental review. Based on its review, the NRC staff concluded that HRI's proposed Crownpoint Project was environmentally acceptable, and that potential impacts of the proposed project could be mitigated. These mitigative measures are enumerated as conditions in the enclosed source material license.

In addition, the NRC staff conducted its safety review of the Crownpoint Project, and documented its analyses in the Safety Evaluation Report, dated December 4, 1997. Based on its review, the NRC staff concluded that issuance of a source material license, with certain conditions specified in the enclosed license, would not be inimical to the common defense and security or to the public's health and safety, and otherwise meets the applicable requirements of 10 CFR Parts 19, 20, 40, and 71, and the Atomic Energy Act of 1954, as amended.

The SER and the FEIS provide the bases for the NRC's decision to issue a 10 CFR Part 40 source material license to HRI. As such, HRI's source material license SUA-1508 is enclosed, and is valid for five years from its effective date. HRI will be required to submit a license renewal application six months prior to the expiration date of January 5, 2003.

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

Sincerely,

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

Enclosure: As stated

Docket No. 40-8968
License No. SUA-1508

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee Hydro Resources, Inc. 2929 Coors Blvd, NW Suite 101 Albuquerque, NM 87120	3. License Number: SUA-1508
2.	4. Expiration Date: January 5, 2003
	5. Docket or Reference No.: 40-8968

6. Byproduct, Source, and/or Special Nuclear Material	7. Chemical and/or Physical Form	8. Maximum Amount that Licensee May Possess at Any One Time Under This License
Uranium	Any	Unlimited

SECTION 9: ADMINISTRATIVE CONDITIONS

9.1 The authorized place of use shall be the licensee's Crownpoint Uranium Project which includes the Crownpoint, Unit 1, and Church Rock uranium recovery and processing facilities in McKinley County, New Mexico.

9.2 All written notices and reports required under this NRC license (with the exception of effluent monitoring reports required under License Condition (LC) 12.3 and 10 CFR Part 40.65, which shall also be submitted to Region IV) shall be addressed to the Chief, Uranium Recovery Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Mail Stop T-7J9, Washington, DC 20555. Incidents and events that require telephone notification shall be made to the NRC Operations Center at (301) 816-5100.

9.3 The licensee shall conduct operations in accordance with all commitments, representations, and statements made in its license application submitted by cover letter dated April 25, 1988 (as supplemented by the licensee submittals listed in Attachment A), and in the Crownpoint Uranium Project Consolidated Operations Plan (COP), Rev. 2.0, dated August 15, 1997 - except where superseded by license conditions contained in this license. Whenever the licensee uses the words "will" or "shall" in the aforementioned licensee documents, it denotes an enforceable license requirement.

9.4 A) The licensee may, without prior NRC review or approval: (i) make changes in the Crownpoint Project's facilities or processes as described in the COP (Rev. 2.0); (ii) make changes in its standard operating procedures; and (iii) conduct tests or experiments, if the licensee ensures that the following conditions are met:

(1) the change, test, or experiment does not conflict with any requirement specifically stated in this license, or impair the licensee's ability to meet all applicable NRC regulations;

(2) there is no degradation in the safety or environmental commitments made in the Crownpoint Uranium Project Consolidated Operations Plan (COP), Revision 2.0, or in the approved reclamation plan for the Crownpoint Project; and

(3) the change, test, or experiment is consistent with NRC's findings in NUREG-1508, the Final Environmental Impact Statement (FEIS, dated February 1997) and the Safety Evaluation Report (SER, dated December 1997) for the Crownpoint Project.

If any of these conditions are not met for the change, test, or experiment under consideration, the licensee is required to submit a license amendment application for NRC review and approval. The licensee's determinations as to whether the above conditions are met will be made by a Safety and Environmental Review Panel (SERP). All such determinations shall be documented, and the records kept until license termination. All such determinations shall be reported annually to the NRC, pursuant to LC 12.8. The retained records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for determining whether or not the conditions are met.

B) The SERP shall consist of a minimum of three individuals employed by the licensee, and one of these shall be designated the SERP chairman. One member of the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and, one member shall be the Environmental Manager, with the responsibility of ensuring that changes conform to radiation safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, groundwater hydrology, surface-water hydrology, specific earth sciences, and other technical disciplines. Temporary members or permanent members, other than the three above-specified individuals, may be consultants.

9.5 As a prerequisite to operating under this license, the licensee shall submit an NRC-approved surety arrangement to cover the estimated costs of decommissioning, reclamation, and groundwater restoration. Generally, these surety amounts shall be determined by the NRC based on cost estimates for a third party completing the work in case the licensee defaults. Surety for groundwater restoration of the initial well fields shall be based on 9 pore-volumes. Surety shall be maintained at this level until the number of pore volumes required to restore the groundwater quality of a production-scale well field has been established by the restoration demonstration described in LC 10.28. If at any time it is found that well field restoration requires greater pore-volumes or higher restoration costs, the value of the surety will be adjusted upwards. Upon NRC approval, the licensee shall maintain the NRC-approved financial surety arrangement consistent with 10 CFR Part 40, Appendix A, Criterion 9.

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

The licensee shall provide an NRC-approved updated surety before undertaking any planned expansion or operational change which has not been included in the annual surety update. This surety update shall be provided to the NRC at least 90 days prior to the commencement of the planned expansion or operational change.

The licensee shall also provide the NRC with copies of surety-related correspondence submitted to the State of New Mexico, a copy of the State's surety review, and the final approved surety arrangement. The licensee must also ensure that the surety, where authorized to be held by the State, identifies the NRC-related portion of the surety and covers the above-ground decommissioning and decontamination, the cost of off-site disposal, soil and water sample analyses, and groundwater restoration activities associated with the site. The basis for the cost estimate is the NRC-approved site closure plan or the NRC-approved revisions to the plan.

9.6 The licensee shall dispose of 11e.(2) byproduct material from the Crownpoint Project at a waste disposal site licensed by the NRC or an Agreement State to receive 11e.(2) byproduct material. At each project site, the licensee shall maintain an area within the restricted area boundary for storing contaminated materials prior to their disposal. The licensee's approved waste disposal agreement must be maintained on-site. Should this agreement expire or be terminated, the licensee shall notify the NRC pursuant to LC 12.6. A new agreement shall be ratified within 90 days of expiration or termination of the previous agreement, or the licensee will be prohibited from further lixiviant injection.

9.7 The licensee shall implement and maintain a training program for all site employees as described in Regulatory Guide 8.31, and as detailed in the COP of the approved license application. All training materials shall incorporate the information from current versions of 10 CFR Part 19 and 10 CFR Part 20. Additionally, classroom training shall include the subjects described in Section 2.5 of Regulatory Guide 8.31. All personnel shall attend annual refresher training, and the licensee shall conduct regular safety meetings on at least a bi-monthly basis, as described in Section 2.5 of Regulatory Guide 8.31

The Radiation Safety Officer (RSO), or his designee, shall have the education, training and experience as specified in Regulatory Guide 8.31. A Radiation Safety Technician (RST) shall have the qualifications specified in Regulatory Guide 8.31. Any person newly hired as an RST shall have all work reviewed and approved by the RSO as part of a comprehensive training program until appropriate course training is completed, and at least for 6 months from the date of appointment.

9.8 Written standard operating procedures (SOPs) shall be established and followed for: (1) all operational activities involving radioactive materials that are handled, processed, stored, or transported by employees; (2) all non-operational activities involving radioactive materials including in-plant radiation protection and environmental monitoring; and (3) emergency procedures for potential accident/unusual occurrences including significant equipment or facility damage, pipe breaks and spills, loss or theft of yellowcake or sealed sources, and significant fires. The SOPs shall include appropriate radiation safety practices to be followed in accordance with 10 CFR Part 20. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. A copy of the current written procedures shall be kept in the area(s) of the production facility where they are utilized. All SOPs for activities described in the COP shall be reviewed and approved as presently described in the COP.

9.9 Release of equipment, materials, or packages from the restricted area shall be in accordance with NRC staff position, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials,"

dated May 1987, or suitable alternative procedures approved by the NRC prior to any such release.

9.10 Any corporate organization changes affecting the assignments or reporting responsibilities of the radiation safety staff as described in the COP of the approved license application shall conform to Regulatory Guide 8.31.

9.11 The licensee is hereby exempted from the requirements of 10 CFR Section 20.1902(e) for areas within the process facility, provided that all entrances to the facility are conspicuously posted in accordance with Section 20.1902(e), and with the words, "ANY AREA WITHIN THIS FACILITY MAY CONTAIN RADIOACTIVE MATERIAL."

9.12 Before engaging in any construction activity not previously assessed by the NRC, the licensee shall conduct a cultural resource inventory. All disturbances associated with the proposed development will be completed in compliance with the National Historic Preservation Act of 1966, as amended, and its implementing regulations (36 CFR Part 800), and the Archaeological Resources Protection Act of 1979, as amended, and its implementing regulations (43 CFR Part 7).

In order to ensure that no unapproved disturbance of cultural resources occurs, any work resulting in the discovery of previously unknown cultural artifacts shall cease. The artifacts shall be inventoried and evaluated in accordance with 36 CFR Part 800, and no disturbance shall occur until the licensee has received written authorization to proceed from the State and Navajo Nation Historic Preservation Offices.

9.13 Prior to injection of lixiviant, the licensee shall have all applicable Memoranda of Agreements (MOAs) between the licensee and local authorities, the fire department, medical facilities, and other emergency services, ratified and in effect. At a minimum, the MOAs shall identify individual party responsibilities, coordination requirements, and reporting procedures for all emergency incident responses.

9.14 Prior to injection of lixiviant, the licensee shall obtain all necessary permits and licenses from the appropriate regulatory authorities.

SECTION 10: OPERATIONS, CONTROLS, LIMITS, AND RESTRICTIONS

10.1 The licensee shall use a lixiviant composed of native ground water, carbon dioxide gas or sodium bicarbonate, and dissolved oxygen or air, as specified in the COP of the approved license application.

10.2 The processing plant flow rate at each site (Church Rock, Unit 1, or Crownpoint) shall not exceed 4000 gal/min (15,140 L/min), exclusive of restoration flow. Total yellowcake production from all three sites shall not exceed 3 million lbs (1.36 million kg) annually.

10.3 Injection well operating pressures shall be maintained at less than formation fracture pressures, and shall not exceed the well's mechanical integrity test pressure.

10.4 Only steel or fiber glass well casing shall be used at the Unit 1 and Crownpoint sites for all wells completed into the Dakota Sandstone, Westwater Canyon, and Cow Springs aquifers.

10.5 A leak detection monitoring system shall be installed for all retention ponds. The licensee shall measure and document pond freeboard and fluid levels in the leak detection system daily, including weekends and holidays. If fluid levels greater than 6 in (15.2 cm) are detected

in the leak detection sumps, the fluid in the sumps shall be sampled and analyzed for specific conductance and chloride. Elevated levels of these parameters shall confirm a retention pond liner leak, at which time the licensee shall take the following corrective actions: (a) analyze standpipe water quality samples for leak parameters once every 7 days during the leak period, and once every 7 days for at least 14 days following repairs; and (b) locate and repair the area of liner damage. After a confirmed leak, the licensee shall also file a report pursuant to LC 12.2. At all times, sufficient reserve capacity shall be maintained in the retention pond system to enable transferring the contents of one pond to the other ponds. In the event of a leak and subsequent transfer of liquid, the freeboard requirements may be suspended during the repair period.

10.6 At the Crownpoint site, from initial lixiviant injection through the completion of groundwater restoration activities, the licensee shall at all times maintain sufficient emergency generator capacity to provide a 50 gal/min (189 L/min) bleed from the Westwater Canyon aquifer. The licensee shall document all required uses of the emergency generator, pursuant to LC 11.1.

10.7 Liquid oxygen tanks shall be located within the well fields. Other chemical storage tanks shall be located on the concrete pad near a waste retention pond. All yellowcake shall be stored inside the designated restricted area.

10.8 For all required types of surveys, the licensee shall, at a minimum, use the survey locations, frequencies, and lower limits of detection established in Table 2 of Regulatory Guide 8.30. Additionally, all radiation survey instruments shall be operationally checked in conformance with Regulatory Guide 8.30.

10.9 The licensee shall ensure that the manufacturer-recommended vacuum pressure is maintained in the drying chamber during all periods of yellowcake drying operations. This shall be accomplished by continuously monitoring differential pressure and installing instrumentation which will signal an audible alarm if the air pressure differential falls below the manufacturer's recommended levels. The alarm's operability shall be checked and documented daily. Additionally, yellowcake drying operations shall be immediately suspended if any emission control equipment for the yellowcake drying or packaging areas is not operating within specifications for design performance.

10.10 All liquid effluents from process buildings and other process waste streams, with the exception of sanitary wastes, shall be disposed of in accordance with the requirements of 10 CFR Part 20, Subpart K.

10.11 Within restricted areas, eating shall be allowed only in designated eating areas.

10.12 An excursion shall have occurred if, in any monitor well: (a) any two upper control limit parameters exceed their respective upper control limits; or (b) a single upper control limit parameter exceeds its upper control limit by 20 percent. A verification sample shall be taken within 24 hours after results of the first analyses are received. If the second sample shows that either of the excursion criteria in (a) or (b) are present, an excursion shall be confirmed. If the second sample does not show that the excursion criteria in (a) or (b) are present, a third sample shall be taken within 48 hours after the second set of sampling data was acquired. If the third sample shows that either of the excursion criteria in (a) or (b) are present, an excursion shall be confirmed. If the third sample does not show that the excursion criteria in (a) or (b) are present, the first sample shall be considered to be an error.

10.13 If an excursion is not corrected within 60 days of confirmation, the licensee shall either: (a) terminate injection of lixiviant within the well field until aquifer cleanup is complete; or (b)

increase the surety in an amount to cover the full third-party cost of correcting and cleaning up the excursion. The surety increase for horizontal and vertical excursions shall be calculated using the method described on page 4-22, Section 4.3.1 of the FEIS. The surety increase shall remain in force until the NRC has verified that the excursion has been corrected and cleaned up. The written 60-day excursion report, filed pursuant to LC 12.1, shall identify which course of action [(a) or (b) listed above] the licensee is taking.

10.14 At the Unit 1 or Crownpoint sites, if a vertical excursion is confirmed in the Dakota Sandstone aquifer, the licensee shall complete and sample monitor wells to determine if the vertical excursion has impacted any other overlying aquifers that could sustain yields greater than 150 gal/day (568 L/day). The specific aquifers to be monitored shall be identified in the licensee's 60-day excursion report, filed pursuant to LC 12.1.

10.15 At the Crownpoint site, from initial lixiviant injection through the completion of groundwater restoration activities, the licensee shall maintain a continuous bleed (pumping) until the groundwater quality in the well fields has been determined by the NRC to be fully restored to the required limits established pursuant to LC 10.21.

10.16 During groundwater restoration activities at production-scale well fields within either the Unit 1 or Crownpoint sites, the licensee shall reimburse the operators of the Crownpoint water supply wells for any increased pumping and well work-over costs associated with a drop in water levels due to groundwater restoration activities. This reimbursement requirement does not apply to restoration demonstrations of small-scale well fields.

10.17 Prior to injection of lixiviant in a well field, monitor wells shall be completed in the Westwater Canyon aquifer and shall encircle the well field at a distance of 400 ft (122 m) from the edge of the production or injection wells and 400 ft (122 m) between each monitor well. The angle formed by lines drawn from any production well to the two nearest monitor wells shall not exceed 75 degrees. At the Church Rock site, Westwater Canyon aquifer monitor wells shall be located by treating production mine workings as if they were injection or production wells. Sampling frequencies for all monitor wells completed in the Westwater Canyon aquifer shall be as stated in LC 11.3.

10.18 Prior to injection of lixiviant in a well field at the Unit 1 or Crownpoint sites, monitor wells shall be completed in the Dakota Sandstone aquifer. Such wells shall be placed at a minimum density of one well per 4 acres (1.62 ha) of well field. Sampling frequencies for these wells shall be as stated in LC 11.3.

10.19 Prior to injection of lixiviant at the Unit 1 site, the licensee shall complete a minimum of three monitor wells in the overlying Dakota Sandstone aquifer between the well fields and the town of Crownpoint water supply wells, in addition to the wells required by LC 10.18. Groundwater restoration goals and upper control limits for these wells will be established pursuant to LCs 10.21 and 10.22, except that upper control limits shall be established for these wells on a well-by-well basis. Sampling frequencies for these wells shall be as stated in LC 11.3.

10.20 Prior to injection of lixiviant in a well field at the Church Rock site, monitor wells shall be completed in: (a) the Brushy Basin "B" sand aquifer; and (b) the Dakota Sandstone aquifer. Monitor wells completed in the Brushy Basin "B" sand aquifer shall be placed at a minimum density of one well per 4 acres (1.62 ha) of well field. Monitor wells completed in the Dakota sandstone aquifer shall be placed at a minimum density of one well per 8 acres (3.24 ha) of well field. Any openings of the existing mine workings into the Brushy Basin "B" sand, or Dakota Sandstone aquifers, shall be monitored by Brushy Basin "B" sand or Dakota Sandstone monitor wells placed within 40 ft (12 m) of the openings. These wells shall be

placed down-gradient from the openings. Sampling frequencies for all monitor wells completed in the Brushy Basin and Dakota Sandstone aquifers shall be as stated in LC 11.3.

10.21 Lixiviant shall not be injected into a well field before groundwater quality data is collected and analyzed to establish groundwater restoration goals for each monitored aquifer of the well field, as follows:

A) The licensee shall establish groundwater restoration goals by analyzing three independently-collected groundwater samples of formation water from: (1) each monitor well in the well field; and (2) a minimum of one production/injection well per acre of well field. Samples shall be collected a minimum of 14 days apart from each other. Groundwater restoration goals shall be established on a parameter-by- parameter basis, with the primary restoration goal to return all parameters to average pre-lixiviant injection conditions. If groundwater quality parameters cannot be returned to average pre-lixiviant injection levels, the secondary goal shall be to return groundwater quality to the maximum concentration limits as specified in the U.S. Environmental Protection Agency (EPA) secondary and primary drinking water regulations. The secondary restoration goal for barium and fluoride shall be set to the State of New Mexico primary drinking water standard. The secondary restoration goal for uranium shall be 0.44 mg/L (300 pCi/L).

B) In establishing restoration goals, the following parameters shall be measured: alkalinity, ammonium, arsenic, barium, bicarbonate, boron, cadmium, calcium, carbonate, chloride, chromium, copper, fluoride, electrical conductivity, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, nitrate, pH, potassium, combined radium-226 and radium-228, selenium, sodium, silver, sulfate, total dissolved solids, uranium, vanadium, zinc, gross Beta, and gross Alpha (excluding radon, uranium, and radium). The restoration goal for each of these parameters shall be established by calculating the baseline mean of the data collected. Prior to calculating a groundwater restoration goal for a parameter, outliers shall be eliminated using methods consistent with those specified in EPA's 1989, "Statistical Analysis of Ground-Water Monitoring Data at RCRA [Resource Conservation and Recovery Act] Facilities, Interim Guidance." Parameter concentrations determined to be high or low outliers will not be used in establishing groundwater restoration goals.

10.22 Lixiviant shall not be injected into a well field before groundwater quality data is collected and analyzed to establish upper control limits for each monitored aquifer of the well field, as follows:

A) The licensee shall analyze three independently-collected groundwater samples of formation water from each monitor well in the well field. Samples shall be collected a minimum of 14 days apart from each other.

B) The upper control limit parameters shall be chloride, bicarbonate, and electrical conductivity [corrected to a temperature of 25°C (77°F)]. The concentrations of these upper control limit parameters shall be established for each well field by calculating the baseline mean of the upper control limit parameter concentration, and adding 5 standard deviations. Prior to calculating upper control limits, outliers shall be eliminated using methods consistent with those specified in EPA's 1989, "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Guidance". Values determined to be high and low outliers will not be used in the calculation of upper control limits.

10.23 Prior to injection of lixiviant in a well field, groundwater pump tests shall be performed to determine if overlying aquitards are adequate confining layers, and to confirm that horizontal monitor wells for that well field are completed in the Westwater Canyon aquifer.

10.24 The licensee shall perform mechanical well integrity tests on each injection and production well: (a) before the well is first used for *in situ* leach uranium extraction; (b) after each time the well has been serviced with equipment or otherwise subjected to procedures that could damage well casing; and (c) at least once every 5 years the well is in use. After a well has been completed and opened into the aquifer, a packer shall be set above the well screen and each well casing shall be filled with water. The well shall be pressurized with either air or water to 125 psi (862 kPa) at the land surface, or 25 percent above the expected operating pressure, whichever is greater. A well shall have passed the test if a pressure drop of no more than 10 percent occurred over 30 minutes.

10.25 If it is determined that a vertical connection exists in a well field between the Westwater Canyon aquifer and the Cow Springs aquifer, monitor wells will be completed in the Cow Springs aquifer within that well field at a minimum density of one well per 4 acres (1.62 ha) of well field. Groundwater restoration goals and upper control limits will be established for these wells, pursuant to LCs 10.21 and 10.22. Sampling frequencies for all monitor wells completed in the Cow Springs aquifer shall be as stated in LC 11.3.

10.26 Prior to injecting lixiviant at a site, or processing licensed material at the Crownpoint site, HRI shall provide and receive NRC acceptance - for that site - information, calculations, and analyses to document the adequacy of the design of waste retention ponds and their associated embankments (if applicable), liners, and hydrologic site characteristics. HRI shall demonstrate that the criteria described in the following documents have been met: 10 CFR Part 40, Appendix A, Criterion 5A regarding surface impoundment design; Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills"; WM-8201, "Hydrologic Design Criteria for Tailings Retention Systems,"; and Final Staff Technical Position, "Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites." As applicable, based on the designs selected, HRI shall provide information in the following areas:

A) maps and detailed drawings outlining drainage areas of principal water courses and drainage features at the site;

B) drainage basin characteristics, including soil types and characteristics, vegetative cover, local topography, flood plains, geomorphic characteristics, and surficial and bedrock geology;

C) maps and detailed drawings showing the location of site features, particularly the location of the retention ponds and diversion channels;

D) analyses and calculations for peak flood flows, including the PMF, and documenting the methods and assumptions used to compute the floods;

E) analyses and calculations for water surface profiles and velocities associated with the ability of the retention ponds or diversion channels to resist or limit erosion and flooding;

F) analyses and computations of riprap or erosion protection needed to protect the retention ponds;

G) specific details on the design, construction, maintenance, and operation of the waste retention ponds and embankments (where applicable);

H) specific details on the design, construction, maintenance, and operation of the liners and leak detection system.

I) any other analyses and computations which demonstrate that applicable design criteria have been met.

10.27 Prior to the injection of lixiviant at the Crownpoint site, the licensee shall:

A) Replace the town of Crownpoint's water supply wells NTUA-1, NTUA-2, BIA-3, BIA-5, and BIA-6, construct the necessary water pipeline, and provide funds so the existing water supply systems of the Navajo Tribal Utility Authority (NTUA) and the Bureau of Indian Affairs (BIA) can be connected to the new wells. Any new wells, pumps, pipelines, and other changes to the existing water supply systems, made necessary by the replacement of the wells specified above, shall be made such that the systems can continue to provide at least the same quantity of water as the existing systems. The new wells shall be located so that the water quality at each individual well head does not exceed the EPA's primary and secondary drinking water standards, and does not exceed a concentration of 0.44 mg/L (300 pCi/L) uranium, as a result of *in situ* leach uranium extraction activities at the Unit 1 and Crownpoint sites. To determine the appropriate placement of the new wells, the licensee shall coordinate with the appropriate agencies and regulatory authorities, including BIA, NTUA, the Navajo Nation Department of Water Development and Water Resources, and the Navajo Nation EPA.

B) Abandon and seal wells NTUA-1, NTUA-2, BIA-3, BIA-5, and BIA-6 in accordance with applicable requirements so these wells cannot become future pathways for the vertical movement of contaminants.

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

10.29 Before starting uranium extraction operations beyond the first well field at the Church Rock site, the licensee shall submit an NRC-approved groundwater restoration plan for the entire project. At a minimum, this plan shall include: (a) a proposed restoration schedule; (b) a general description of the restoration methodology; and (c) a description of post-restoration groundwater monitoring.

10.30 Prior to injecting lixiviant at any of the sites, the licensee shall submit an NRC-approved procedure-level, detailed effluent and environmental monitoring program. In addition, the licensee shall develop and administer its radiological effluent and environmental monitoring program consistent with Regulatory Guide 4.14. The licensee shall maintain, at a minimum, three airborne effluent monitoring stations at each site, at the locations described in COP (Rev.2.0) Table 9.5-1.

10.31 Prior to the injection of lixiviant at the Church Rock site, the licensee shall conduct a Westwater Canyon aquifer step-rate injection (fracture) test within the Church Rock site boundaries, but outside future well field areas. One such test at the Unit 1 or Crownpoint site shall also be performed before lixiviant injection begins at either of these sites.

10.32 Prior to the injection of lixiviant at any of the sites, the licensee shall: (a) collect sufficient water quality data to generally characterize the water quality of the Cow Springs aquifer beneath each of the project sites, by completing and sampling wells for the following water quality parameters: alkalinity, ammonium, arsenic, barium, bicarbonate, boron, cadmium, calcium, carbonate, chloride, chromium, copper, fluoride, electrical conductivity, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, nitrate, pH, potassium, combined radium-226 and radium-228, selenium, sodium, silver, sulfate, total dissolved solids, uranium, vanadium, zinc, gross Beta and gross Alpha (excluding radon, uranium, and radium); and (b) conduct sufficient pumping tests to determine if the Cow Springs aquifer beneath each of the sites is hydraulically confined from the Westwater Canyon aquifer.

SECTION 11: MONITORING, RECORDING AND BOOKING REQUIREMENTS

11.1 The results of the following activities, operations, or actions shall be documented: sampling; analyses; surveys or monitoring; survey/ monitoring equipment calibrations; reports on audits and inspections; emergency generator use and maintenance records; all meetings and training courses required by this license; and any subsequent reviews, investigations, or corrective actions. Unless otherwise specified in a license condition or applicable NRC regulation, all documentation required by this license shall be maintained for a period of at least five (5) years by the licensee at its facility, and is subject to NRC review and inspection.

11.2 Flow rates on each injection and production well, and injection manifold pressures on the entire system, shall be measured and recorded daily.

11.3 Formation water, from monitoring wells at well fields undergoing uranium extraction or groundwater restoration activities, shall be sampled for upper control limit parameters at least once every 14 days, and the results documented pursuant to LC 11.1. During corrective action for a confirmed excursion, sample frequency shall be increased to once every seven days for the upper control limit parameters until the excursion is concluded. An excursion shall be considered corrected when all upper control limit parameters are reduced to their upper control limits.

11.4 Radiation Work Permits shall include, at a minimum, the information described in Section 2.2 of Regulatory Guide 8.31.

11.5 Site inspections and reviews shall be completed and documented by the licensee as described in Section 2.3.1 and 2.3.2 of Regulatory Guide 8.31.

11.6 The licensee shall implement a comprehensive bioassay sampling program that conforms to Regulatory Guide 8.22.

11.7 Until license termination, the licensee shall maintain documentation on all spills of source or 11e.(2) byproduct materials, and all spills of process chemicals. Documented information shall include date, volume of spill, total activity, survey results, corrective actions, results of remediation surveys, and a map showing spill location and impacted area. After any spill the licensee shall also determine whether the NRC must be notified, pursuant to LC 12.4.

11.8 Prior to land application of waste water, the licensee shall submit and receive NRC acceptance of a plan outlining how the licensee will monitor constituent buildup in soils resulting from the land application. The plan should identify the constituents resulting from land application that will be monitored, constituent threshold values for discontinuing land application and justification for the values selected.

SECTION 12: REPORTING REQUIREMENTS

12.1 The licensee shall notify the NRC by telephone within 24 hrs of confirming a lixiviant excursion, and by letter within 7 days from the time the excursion is confirmed, pursuant to LC 10.12. A written report describing the excursion event, corrective actions taken, and the corrective action results shall be submitted to NRC within 60 days of the excursion confirmation. If wells are still on excursion when the report is submitted, the report shall also contain a schedule for submitting additional reports to the NRC describing the excursion event, corrective actions taken, and results obtained. In the case of a confirmed vertical excursion, the report shall also contain a projected completion date for characterization of the extent of the vertical excursion.

12.2 The licensee shall notify the NRC by telephone within 48 hours of confirming a retention pond liner leak, pursuant to LC 10.5. A written report shall be submitted to the NRC within 30 days of the leak confirmation. This report shall include analytical data, describe the corrective action taken, and discuss the results of that action.

12.3 The licensee shall submit the required effluent reports in accordance with 10 CFR Part 40.65. The licensee shall submit the information specified in Section 7 of Regulatory Guide 4.14, in addition to the reports required by 10 CFR Part 40.65.

12.4 The licensee shall notify the NRC by telephone within 48 hours of any spill of source or 11e.(2) byproduct materials, and all spills of process chemicals, that might have a radiological impact on the environment. The notification shall be followed, within 7 days, by submittal of a written report detailing the conditions leading to the spill, corrective actions taken, and results achieved. This shall be done in addition to meeting the requirements of 10 CFR Part 20 and 40.

12.5 In addition to reporting exposures of individuals to radioactive material in accordance with 10 CFR Part 20.2202, the licensee shall submit to the NRC a written report within 30 days of such reportable incidents, detailing the conditions leading to the incident, corrective actions taken, and results achieved.

12.6 In the event the licensee's approved waste disposal agreement expires or is terminated, the licensee shall notify the NRC in writing within 7 working days after the expiration date.

12.7 As part of the licensee's decommissioning activities for a site, the licensee shall submit to the NRC for review and approval a detailed site reclamation plan. The plan shall be submitted at least 12 months prior to the planned final shutdown of uranium extraction operations at the site. If depressions appear at the land surface due to subsurface collapse from *in situ* leach uranium extraction activities, the licensee shall return the land surface to its general contour as part of the surface reclamation activities. Before release of any site to unrestricted use, the licensee shall provide information to the NRC verifying that radionuclide concentrations, due to licensed materials, meet radiation standards for unrestricted release.

12.8 The licensee shall provide in an annual report to NRC, a description of all changes, tests, and experiments made or conducted pursuant to LC 9.4, including a summary of the safety and environmental evaluation of each such action. As part of this annual report, the licensee shall include any COP pages revised pursuant to LC 9.4.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number
SUA-1508

Docket or Reference Number
40-8968

FOR THE NUCLEAR REGULATORY COMMISSION

Date: Jan 5, 1998

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

ATTACHMENT A

The licensee shall conduct its operations in accordance with all commitments, representations, and statements made in the following submittals, which are hereby incorporated by reference, except where superseded by license conditions in this license:

- May 8, 1989 (Crownpoint Facility Supplemental Environmental Report)
- July 13, 1989 (Crownpoint Cultural Resources Survey)
- January 6, 1992 (Unit 1 Allotted Lease Program Environmental Assessment (EA))
- July 31, 1992 (Unit 1 and Crownpoint Project Environmental Reports)
- October 9, 1992 (Unit 1 Underground Injection Control (UIC) Application)
- October 30, 1992 (Cultural Resources-Environmental Assessment and Management Plan for Crownpoint, NM)
- March 16, 1993 (Churchrock Project Revised Environmental Report)
- March 16, 1993 (Section 9 Pilot Summary Report)
- April 5, 1993 (page changes)
- April 6, 1993 (page changes)
- July 26, 1993 (page changes)
- October 11, 1993 (page changes)
- October 18, 1993 (Analysis of Hydrodynamic Control at Crownpoint and Churchrock)
- October 19, 1993 (Churchrock Surface Hydrology Analysis)
- October 19, 1993 (Churchrock and Crownpoint Aquifer Modeling Supplement)
- November 11, 1993 (page changes)
- January 24, 1994 (page changes)
- November 20, 1993 (Response to NRC Request for Additional Information)
- February 23, 1994 (Description of Radon Emission Controls)
- January 6, 1995 (EA Allotted Lease Program Unit 1)
- October 9, 1995 (Unit 1 UIC Application)
- February 20, 1996 (Response to NRC Comments)
- April 10, 1996 (Response to NRC Comments)
- May 3, 1996 (Response to NRC Comments)
- June 18, 1996 (Unit 1 Water Quality Information)
- August 15, 1996 (Response to NRC Comments)
- August 16, 1996 (Response to NRC Comments)
- August 21, 1996 (page changes)
- August 30, 1996 (Response to NRC Comments)
- September 5, 1996 (Surface Water Drainage Analysis at Churchrock)
- September 6, 1996 (page changes)
- September 13, 1996 (Response to NRC Comments)
- September 27, 1996 (Response to NRC Comments)
- September 30, 1996 (Crownpoint Uranium Project COP, Rev. 0.0)
- October 15, 1996 (Response to NRC Comments)
- October 18, 1996 (Restoration Standards Commitment)
- October 20, 1996 (Response to NRC Comments)
- October 29, 1996 (Response to NRC Comments)
- November 18, 1996 (Response to NRC Comments)
- November 26, 1996 (Response to NRC Comments)
- December 20, 1996 (NRC Proposed Requirements and Recommendations)
- December 26, 1996 (HRI Acceptance Letter to NRC Proposed Requirements and Recommendations)
- April 1, 1997 (NRC Proposed Requirements)
- April 25, 1997 (HRI Acceptance Letter to NRC Proposed Requirements)
- May 15, 1997 (Crownpoint Uranium Project COP, Rev 1.0)
- June 16, 1997 (Churchrock Design Specifications for Surface Water Diversion Channel)
- July 9, 1997 (HRI Electric Power Supply Commitment)
- August 18, 1997 (Response to NRC Comments)
- October 24, 1997 (HRI Commitment on Groundwater Baseline Sampling)

EXHIBIT 4

POLICY ISSUE
(Information)

June 11, 1998

FOR: The Commissioners

FROM: L. Joseph Callan
Executive Director for Operations

SUBJECT: RISK-INFORMED, PERFORMANCE-BASED AND RISK-INFORMED, LESS-PRESCRIPTIVE REGULATION IN THE OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

PURPOSE:

To inform the Commission of the staff's approach for increasing the use of risk-informed, performance-based (RIPB) regulation in the Office of Nuclear Material Safety and Safeguards (NMSS). Also, to inform the Commission that a framework for applying probabilistic risk assessment (PRA) to nuclear material uses is likely to differ from the framework for applying PRA to reactor regulation, because of important differences between nuclear material uses and reactors and between their respective licensee communities.

SUMMARY:

This paper addresses the direction in the SRM of April 15, 1997 that was specifically concerned with the use of RIPB regulatory approaches for nuclear material uses and radioactive waste disposal. To establish an overall context, it starts with the definitions and discussion of regulatory approaches in the staff discussion of RIPB regulation (forwarded to the Commissioners' assistants by James Blaha on May 4, 1998). This is followed by consideration of (1) the need for a framework for the application of RIPB approaches to the regulation of nuclear materials uses and (2) the applicability of the SECY-95-280 framework for reactors to

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nuclear materials regulation. Based on these considerations, the paper concludes that a framework for applying RIPB to nuclear materials uses is timely and that such a framework likely will differ from the reactor framework. Finally, the paper discusses various issues that will need to be addressed before developing a nuclear materials framework and presents the staff's plan for developing such a framework.

BACKGROUND:

In the Commission's Strategic Assessment and Rebaselining initiative, one of the Direction-Setting Issues (DSIs) was Risk-Informed, Performance-Based Regulation (DSI-12). The Commission expressed its view on the matters that were discussed in the DSI-12 issue paper in a Staff Requirements Memorandum (SRM) issued on April 15, 1997. Regarding NMSS, the SRM states:

> The staff should also reexamine the applicability of its risk-informed, performance-based or risk-informed less prescriptive approaches with regard to nuclear material licensees and to high-level waste issues to ensure that the needs of those licensees and those areas receive adequate consideration. The staff should perform a review of the basis for nuclear materials regulations and processes, and should identify and prioritize those areas that are either now, or could be made, amenable to risk-informed, performance-based or risk-informed less prescriptive approaches with minimal additional staff effort/resources. This assessment should eventually lead to the development of a framework for applying PRA to nuclear material uses similar to the one developed for reactor regulation (SECY-95-280), where appropriate.

The application of risk-analysis methods to nuclear materials uses is guided by the PRA Policy Statement and the PRA Implementation Plan; however, as the SRM notes, a framework for applying such methods to nuclear materials has not been developed. The framework for reactors that is referenced in the SRM was transmitted to the Commission in November 1995. Since that time, the Offices of Nuclear Reactor Regulation (NRR) and Nuclear Regulatory Research (RES) have made substantial progress toward completing the six-step process that was envisioned for implementing the framework. In particular, the staff issued draft NUREG-1602, five draft Regulatory Guides, and related draft Standard Review Plans for public comment. A proposed final revision of the general guide was transmitted to the Commission by SECY-98-015 and approved by the SRM of May 21, 1998. Proposed final revisions of the guides on inservice testing, technical specifications, and graded quality assurance were transmitted to the Commission by SECY-98-067.

DISCUSSION:

It is useful first to establish a common understanding of RIPB and other regulatory approaches. The definitions and discussion in the following eight paragraphs have been excerpted from the staff discussion of RIPB regulation.

The *triplet definition of risk*[1] is used in this paper because it defines risk at a fundamental level that can be applied to the entire range of activities involving NRC licensed use of Atomic Energy Act (AEA) materials. The risk triplet definition takes the view that when one asks, "What is the risk?" one is really asking three questions: "What can go wrong?" "How likely is it?" and "What are the consequences?" A risk assessment is a systematic method for addressing the risk triplet as it relates to the performance of a particular system (which may include a human component) to understand likely outcomes, sensitivities, areas of importance, system interactions and areas of uncertainty. From this assessment the important scenarios can be identified.

All safety regulation ultimately is concerned with risk and addresses the three questions of the risk triplet. In practice, NRC addresses these three questions through the body of regulations, guidance, and license conditions that it uses to regulate the many activities under its jurisdiction. The current body of regulations, guidance and license conditions is based largely on a "deterministic" approach. As described in the PRA Policy Statement, the deterministic approach to regulation establishes requirements for engineering margin and for quality assurance in design, manufacture, and construction. In addition, it assumes that adverse conditions can exist and establishes a specific set of design basis events (i.e., what can go wrong?). The deterministic approach involves implied, but unquantified, elements of probability in the selection of the specific accidents to be analyzed as design basis events. It then requires that the design include safety systems capable of preventing and/or mitigating the consequences (i.e., what are the consequences?) of those design basis events in order to protect public health and safety. Thus, a deterministic approach explicitly addresses only two questions of the risk triplet.

A probabilistic approach to regulation (also described in the PRA Policy Statement) considers risk (i.e., all three questions) in a more coherent and complete manner. The probabilistic approach explicitly addresses a broad spectrum of initiating events and their event frequency. It then analyzes the consequences of those event scenarios and weights the consequences by the frequency, thus giving a measure of risk.

The term "risk insights", as used here, refers to the results and findings that come from risk assessments. The most fundamental results relate directly to public health effects, as in the Commission's Safety Goals. For specific applications the results and findings may take other forms. For example, for reactors these include such things as identification of dominant accident sequences, estimates of core damage frequency (CDF)[2] and large early release frequency (LERF)[3], and importance measures of structures, systems, and components. In other areas of

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[1]Kaplan, S. and B.J. Garrick, "On the Quantitative Definition of Risk," *Risk Analysis*, Vol. 1, No. 1, March, 1981.

[2] CDF is the frequency of the combinations of initiating events, hardware failures, and human errors leading to core uncovery with reflooding of the core not imminent.

[3] LERF is the frequency of those accidents leading to significant, unmitigated releases from containment in a time-frame prior to effective evacuation of the close-in population such that there is a potential for early health effects.

NRC regulation, these include risk curves[4] for disposal facilities for radioactive wastes, frequency of accidental smelting of sealed sources at steel mills, frequency of occupational exposures, predicted dose from decommissioned sites and many others.

A "risk-informed" approach to regulatory decision-making represents a philosophy whereby risk insights are considered together with other factors to establish requirements that better focus licensee and regulatory attention on design and operational issues commensurate with their importance to health and safety. A "risk-informed" approach enhances the traditional approach by: (a) allowing explicit consideration of a broader set of potential challenges to safety, (b) providing a logical means for prioritizing these challenges based on risk significance, operating experience, and/or engineering judgment, (c) facilitating consideration of a broader set of resources to defend against these challenges, (d) explicitly identifying and quantifying sources of uncertainty in the analysis, and (e) leading to better decision-making by providing a means to test the sensitivity of the results to key assumptions. Where appropriate, a risk-informed regulatory approach can also be used to reduce unnecessary conservatism in deterministic approaches, or can be used to identify areas with insufficient conservatism and provide the bases for additional requirements or regulatory actions.

A regulation can be either prescriptive or performance-based. A prescriptive requirement specifies particular features, actions, or programmatic elements to be included in the design or process, as the means for achieving a desired objective. A performance-based requirement relies upon measurable (or calculable) outcomes (i.e., performance results) to be met, but provides more flexibility to the licensee as to the means of meeting those outcomes. A performance-based regulatory approach is one that establishes performance and results as the primary basis for regulatory decision-making, and incorporates the following attributes: (1) measurable (or calculable) parameters (i.e., direct measurement of the physical parameter of interest or of related parameters that can be used to calculate the parameter of interest) exist to monitor system, including licensee, performance against clearly defined, objective criteria, (2) licensees have flexibility to determine how to meet the established performance criteria in ways that will encourage and reward improved outcomes; and (3) a framework exists in which the failure to meet a performance criterion, while undesirable, will not in and of itself constitute or result in an immediate safety concern. The measurable (or calculable) parameters may be included in the regulation itself or in formal license conditions, including reference to regulatory guidance adopted by the licensee. This regulatory approach is not new to the NRC. The Commission previously has approved performance-based approaches in 10 CFR Parts 20, 60, and 61. In particular, the Commission weighed the relative merits of prescriptive and performance-based regulatory approaches in issuing 10 CFR Part 60.

A performance-based approach can be implemented without the use of risk assessment. Such an approach would require that objective performance criteria be based on deterministic safety analysis and performance history. This approach would still provide flexibility to the licensee in determining how to meet the performance criteria. Establishing objective performance criteria for performance monitoring may not be feasible for some applications and, in such cases, a

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[4] Risk curves are estimates of the probability that a given consequence will be exceeded.

performance-based approach would not be feasible.

A risk-informed, performance-based approach to regulatory decision-making combines the "risk-informed" and "performance-based" elements discussed above, and applies these concepts to NRC rulemaking, licensing, inspection, assessment, enforcement, and other decision-making. Stated succinctly, risk-informed, performance-based regulation is an approach in which risk insights, engineering analysis and judgment, and performance history are used, to (1) focus attention on the most important activities, (2) establish objective criteria based upon risk insights for evaluating performance, (3) develop measurable or calculable parameters for monitoring system and licensee performance, and (4) focus on the results as the primary basis of regulatory decision-making.

Starting in the mid-1970s, NMSS has developed and used various risk-analysis methods to support its existing or potential risk-informed regulatory approaches. For example, the staff has been a developer of performance assessment (PA) methodology for geologic disposal of high-level radioactive waste and land disposal of low-level radioactive waste. NMSS' current efforts in PA were discussed with the Commission in a May 1997 briefing. Similarly, the staff made early efforts to apply PRA methods to gain a better understanding of transportation risks, most notably, the "Transportation Modal Study" (NUREG/CR-4829). More recently, the staff has undertaken the new efforts that are described in Attachment 1 (a discussion of considerations related to the use of RIPB regulation in NMSS) to use or develop risk-analysis methods to satisfy a variety of purposes and objectives. For example, a recent paper, SECY-97-137, concerning proposed revision of 10 CFR Part 70, discusses the use of integrated safety analyses (ISAs) in the regulation of fuel cycle facilities. In identifying and conducting these efforts, the staff's approach has been appropriately flexible and developmental. However, as the number of staff efforts has grown and as resources become more scarce, there is an added need for policy and technical consistency and assurance that resources are being used judiciously. Accordingly, development of a framework for applying PRA to nuclear materials uses is timely.

As described in SECY-95-280, the framework for use of PRA in reactor regulation is a four part, general structure to ensure consistent and appropriate application of PRA methods. The staff's goal is to develop a framework for applying risk-analysis methods to nuclear material uses that will be consistent with the purpose and principles of the reactor framework. To assure that such a framework would address the issues of greatest concern to the nuclear materials regulatory program, the staff considered several assumptions that are implicit in the reactor framework in the context of NMSS-regulated licensees and activities. These considerations are discussed in some detail in Attachment 1, as is the staff's conclusion that a framework for applying risk-analysis methods to nuclear materials uses likely will differ from the reactor framework in some of its specifics. Most importantly, the staff concluded that, in a framework for nuclear materials: (1) PRA may be applicable to only a few specific uses and, for most licensed uses, other system analysis methods that address the three risk questions will need to be considered instead; (2) integrating deterministic and probabilistic considerations will likely be a much less important issue, and other issues, such as relating the level of analytic sophistication to the risk associated with specific nuclear materials uses, will likely be much more important in the materials framework; and (3) a broader range of licensee and regulator circumstances will need to be addressed. In brief, the staff reached these conclusions in consideration of substantial differences between: (1) nuclear reactors and the approximately 40 activities, systems, and

devices that use nuclear materials; (2) reactor licensees and the roughly 20,000 nuclear materials licensees; and (3) the reactor regulatory program and the materials regulatory program, including its Agreement State program. The staff's specific considerations are discussed in Attachment 1.

Before and while developing a framework for nuclear material uses, the staff would need to address several other essential points. More specifically, when the framework for applying PRA in reactor regulation was developed, a sound and extensive foundation of pertinent experience and policy already had been established. For the nuclear materials regulatory program, some elements of a foundation are in place, but there are important gaps. These include gaps in: (1) experience with strengths and limitations of potentially useful analytic methods; (2) knowledge of which of these methods may be applied usefully to a specific nuclear materials use; (3) established policy (e.g., a safety goal policy statement has been issued for reactors, but no similar statement has been issued for nuclear materials uses); and (4) staff training programs.

The staff would address some gaps in its experience and knowledge through the projects that are part of the PRA Implementation Plan. These projects are intended, in part, to test or develop system analysis methods for certain nuclear material uses. The staff will address the policy gaps by making recommendations to the Commission about: (1) whether a safety goal policy statement for nuclear materials use should be developed; and (2) criteria for determining whether RIPB regulation of a given materials use is appropriate. A safety goal policy statement would seem to be a valuable, if not essential, element of RIPB regulation; however, its development would be quite difficult because permissible risk levels of nuclear materials uses vary and stem, at times, from several conflicting statutes and other standard-setting sources. Criteria for determining whether a particular application of RIPB regulation would be appropriate must strike a difficult balance between several factors. Specifically, nuclear materials licensees have evinced no groundswell of interest in extending RIPB regulation--perhaps because many of them lack the necessary technical and economic resources. Also, the staff is not aware of any inadequacies in protection of public health and safety that would require substantial change in its current regulatory approaches; however, the staff recognizes, too, that the individual plant examination program revealed important potential vulnerabilities in a number of licensed reactors. Finally, with respect to training, the staff plans to determine what training will be needed to implement the framework and develop an appropriate program.

In developing the framework itself, the staff first would need to consider carefully the current NRC regulatory approaches to identify any fundamental regulatory principles (e.g., defense-in-depth) that the framework should preserve. This was an important step in developing the reactor framework. Once such principles were identified, in analogy with the reactor framework, the staff would develop appropriate "parts" of the framework and implementation steps. The staff would use as much of the reactor framework as is practicable. Because of the special concerns of the Agreement States, the staff would work closely with them throughout development of the framework. Also, the substantial progress made by NRR and RES toward implementing the reactor framework should provide useful insights for developing a framework for nuclear materials. Accordingly, the staff will coordinate its development effort with the Interoffice PRA Coordinating Committee. The staff will start with a scoping effort in which it will (1) complete a preliminary association of appropriate risk assessment methods with regulated uses of nuclear materials and (2) as appropriate for each regulated use and in coordination with

the Agreement States, identify how these associated risk assessment methods can best be used in a risk-informed regulatory framework for materials. The staff believes that this effort is an essential first step toward developing a framework and determining the ultimate feasibility of completing a framework, given NRC's resource constraints. The staff's plan and its basis are discussed more fully in Attachment 1. A schedule is provided as Attachment A to Attachment 1. In Attachment B to Attachment 1, the staff reexamines the applicability of its RIPB approaches. Consistent with its belief that experience in system analysis methods is essential to successful implementation of RIPB approaches in the nuclear materials area, the staff broadened the Commission's request to include all the Task 4 and 5 activities of the PRA Implementation Plan. The staff concludes that these approaches should be continued as resources permit. The SRM also requested that the staff review the basis for nuclear materials regulations and processes, and identify and prioritize those areas that are either now, or could be made, amenable to RIPB approaches with minimal additional staff effort/resources. In Attachment 2 (a preliminary review of NMSS' regulations and processes), the staff surveys the nature of the nuclear materials regulations and processes. The staff believes that a full response to the Commission's request must await completion of several steps in its plan to develop a framework and will provide that response upon completion of those steps.

RESOURCES:

The start of several major rulemakings, in the nuclear materials area, is planned during the next three years. The staff believes that it is important to start the tasks now that will help to determine which nuclear material uses are potential candidates for a RIPB approach and which rulemakings would be affected in turn. The staff's plan to develop a framework for nuclear material uses would begin with a scoping phase that would be completed in December 1998 and would, in part, evaluate the resources needed to complete development of and implement the framework. The scoping phase would require a 1.5 FTE effort and no contractor assistance. No resources have been budgeted for the effort described in this paper. All nuclear-materials-related rulemakings have been transferred from the RES to NMSS along with the resources budgeted for them. NMSS is assessing resource requirements for transferred rulemakings, including an assessment of status and of residual actions required. After making such an assessment, NMSS would be in a position to advise the Commission of any necessary deferrals or cancellations to accommodate the scoping effort described in this paper.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objections to its issuance. The Office of the Chief Financial Officer has reviewed this Commission Paper for resource implications and has no objections. There is no information technology impact that would result directly from this paper.

L. Joseph Callan
Executive Director
for Operations

Attachments: As stated

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ATTACHMENT 1

RISK-INFORMED, PERFORMANCE-BASED AND RISK-INFORMED, LESS-PRESCRIPTIVE REGULATION IN THE OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

1. INTRODUCTION AND BACKGROUND

In the Commission's Strategic Assessment and Rebaselining initiative, one of the Direction-Setting Issues (DSIs) was "Risk-Informed, Performance-Based Regulation" (DSI-12). The Commission expressed its view on the matters that were discussed in the DSI-12 issue paper in a Staff Requirements Memorandum (SRM) issued on April 15, 1997. The SRM stated the Commission's general view that: (1) to accomplish the principal mission of the Nuclear Regulatory Commission (NRC) in an efficient and cost-effective manner, it will, in the future, focus (in a regulatory sense) on those licensee activities that pose the greatest risk to the public; (2) this focus can be accomplished by building upon probabilistic risk assessment (PRA) concepts–where applicable–or other approaches that would allow a risk-graded approach for determining high- and low-risk activities; and (3) the use of PRA technology should be increased in all regulatory matters, to the extent supported by the state-of-the-art in PRA methods and data and in a manner that complements the NRC's deterministic approach and supports the Agency's traditional defense-in-depth philosophy.

More specifically, regarding the Office of Nuclear Material Safety and Safeguards (NMSS), the SRM states:

> The staff should also reexamine the applicability of its risk-informed, performance-based or risk-informed less prescriptive approaches with regard to nuclear material licensees and to high-level waste issues, to ensure that the needs of those licensees and those areas receive adequate consideration. The staff should perform a review of the basis for nuclear materials regulations and processes, and should identify and prioritize those areas that are either now, or could be made, amenable to risk-informed, performance-based or risk-informed less prescriptive approaches with minimal additional staff effort/resources. This assessment should eventually lead to the development of a framework for applying PRA to nuclear material uses similar to the one developed for reactor regulation (SECY-95-280), where appropriate.

The application of risk-analysis methods to nuclear materials uses is guided by the PRA Policy Statement and the PRA Implementation Plan; however, as the SRM notes, a framework for applying such methods to nuclear materials has not been developed. The framework for reactors that is referenced in the SRM was transmitted to the Commission in November 1995. Since that time, the Offices of Nuclear Reactor Regulation (NRR) and Nuclear Regulatory Research (RES) have made substantial progress toward completing the six-step process that was envisioned for implementing the SECY-95-280 framework. In particular, the staff issued draft NUREG-1602, five draft Regulatory Guides, and related draft Standard Review Plans for public comment. A proposed final revision of the general guide was transmitted to the Commission by SECY-98-015 and approved by the SRM of May 21, 1998. Proposed final revisions of the guides on inservice testing, technical specifications, and graded quality assurance were transmitted to the Commission by SECY-98-067.

The purpose of this paper is: (1) to present the staff's plan to develop a framework that would guide increased use of risk-informed, performance-based (RIPB) approaches in NMSS regulation; and (2) to reexamine preliminarily the applicability of the RIPB approaches that are supported by Task 4 and 5 activities of the PRA Implementation Plan--primarily those for nuclear materials licensees and high-level waste (HLW) issues, but also those for low-level waste (LLW) disposal, spent fuel storage facilities, and transportation.

To establish an overall context, the paper starts with the definitions and discussion of regulatory approaches in the staff discussion of RIPB regulation (forwarded to the Commissioners' assistants by James Blaha on May 4, 1998. This is followed by a discussion of the need for a framework for the application of RIPB approaches to the regulation of nuclear materials uses and, for context, a description of the reactor framework that is referenced in the SRM of April 15, 1997. The paper then evaluates the applicability of the SECY-95-280 framework to nuclear materials regulation by considering four assumptions that are implicit, in this framework, in the context of nuclear materials uses, nuclear materials licensee communities, and the Agreement State program. Based on these considerations, the paper concludes that a framework for applying RIPB to nuclear materials uses is timely and that such a framework likely will differ from the reactor framework (e.g., in a framework for nuclear materials, PRA may be applicable to only a few specific uses and, for most licensed uses, other system analysis methods[1] that address the three risk questions will need to be considered instead). Finally, the paper discusses various issues that will need to be addressed before developing a nuclear materials framework. The staff's plan to address these issues and develop a nuclear materials framework is outlined in Attachment A. Attachment B, reexamines the applicability of the RIPB approaches that are now supported by the PRA Implementation Plan.

2. REGULATORY APPROACHES

It is useful first to establish a common understanding of RIPB and other regulatory approaches. The definitions and discussion in this section have been excerpted verbatim from the staff discussion of RIPB regulation.

Risk and Risk Assessment: The *triplet definition of risk*[2] is used in this paper because it defines risk at a fundamental level that can be applied to the entire range of activities involving NRC licensed use of Atomic Energy Act (AEA) materials. The risk triplet definition

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[1] There are many definitions of the term "system analysis." The "Fault Tree Handbook" (NUREG-0492) offers the following: "System analysis is a directed process for the orderly and timely acquisition and investigation of specific system information pertinent to a given decision." The fault tree method, a deductive method of system analysis, is the principal focus of NUREG-0492; however, the NUREG also discusses the event tree method and several other inductive methods of system analysis.

[2] Kaplan, S. and B.J. Garrick, "On the Quantitative Definition of Risk," *Risk Analysis*, Vol. 1, No. 1, March, 1981.

takes the view that when one asks, "What is the risk?" one is really asking three questions: "What can go wrong?" "How likely is it?" and "What are the consequences?"

The first question, "What can go wrong?" is usually answered in the form of a "scenario" (a combination of events and/or conditions that could occur) or a set of scenarios. Examples might include the failure of a valve to operate in a reactor or a syringe containing a radio-pharmaceutical being dropped in a hospital.

The second question, "How likely is it?" can be answered in terms of the available evidence and the processing of that evidence to quantify the probability and the uncertainties involved. In some situations, data may exist on the frequency of a particular type of occurrence or failure mode (e.g., accidental overexposures). In other situations, there may be little or no data (e.g., core damage in a reactor) and a predictive approach for analyzing probability and uncertainty will be required.

The third question, "What are the consequences?" can be answered for each scenario by assessing the probable range of outcomes (e.g., dose to the public) given the uncertainties. The outcomes or consequences are the "end states" of the analyses. The choice of consequence measures can be whatever seems appropriate for reasonable decision-making in a particular regulated activity and could involve combinations of end states.

A risk assessment is a systematic method for addressing the risk triplet as it relates to the performance of a particular system (which may include a human component) to understand likely outcomes, sensitivities, areas of importance, system interactions and areas of uncertainty. From this assessment the important scenarios can be identified.

Traditional and Probabilistic Approaches: All safety regulation ultimately is concerned with risk and addresses the three questions of the risk triplet. In practice, NRC addresses these three questions through the body of regulations, guidance, and license conditions that it uses to regulate the many activities under its jurisdiction. The current body of regulations, guidance and license conditions is based largely on a "deterministic" approach. As described in the PRA Policy Statement, the deterministic approach to regulation establishes requirements for engineering margin and for quality assurance in design, manufacture, and construction. In addition, it assumes that adverse conditions can exist and establishes a specific set of design basis events (i.e., what can go wrong?). The deterministic approach involves implied, but unquantified, elements of probability in the selection of the specific accidents to be analyzed as design basis events. It then requires that the design include safety systems capable of preventing and/or mitigating the consequences (i.e., what are the consequences?) of those design basis events in order to protect public health and safety. Thus, a deterministic approach explicitly addresses only two questions of the risk triplet.

A probabilistic approach to regulation (also described in the PRA Policy Statement) considers risk (i.e., all three questions) in a more coherent and complete manner. The probabilistic approach explicitly addresses a broad spectrum of initiating events and their event frequency. It then analyzes the consequences of those event scenarios and weights the consequences by the frequency, thus giving a measure of risk.

"Risk Insights" and "Risk-Informed" Approach: The term "risk insights," as used here, refers to the results and findings that come from risk assessments. The most fundamental results relate directly to public health effects, as in the Commission's Safety Goals. For specific applications the results and findings may take other forms. For example, for reactors these include such things as identification of dominant accident sequences, estimates of core damage frequency (CDF)[3] and large early release frequency (LERF)[4], and importance measures of structures, systems, and components. In other areas of NRC regulation, these include risk curves[5] for disposal facilities for radioactive wastes, frequency of accidental smelting of sealed sources at steel mills, frequency of occupational exposures, predicted dose from decommissioned sites and many others.

Risk insights have already been incorporated successfully into numerous regulatory activities, and have proven to be a valuable complement to traditional approaches. Given the current maturity of some risk assessment methodologies and the current body of event data, risk insights can be incorporated more explicitly into the regulatory process in a manner that will improve both the efficiency and effectiveness of current regulatory requirements.

A "risk-informed" approach to regulatory decision-making represents a philosophy whereby risk insights are considered together with other factors to establish requirements that better focus licensee and regulatory attention on design and operational issues commensurate with their importance to health and safety. A "risk-informed" approach enhances the traditional approach by: (a) allowing explicit consideration of a broader set of potential challenges to safety, (b) providing a logical means for prioritizing these challenges based on risk significance, operating experience, and/or engineering judgment, (c) facilitating consideration of a broader set of resources to defend against these challenges, (d) explicitly identifying and quantifying sources of uncertainty in the analysis, and (e) leading to better decision-making by providing a means to test the sensitivity of the results to key assumptions. Where appropriate, a risk-informed regulatory approach can also be used to reduce unnecessary conservatism in deterministic approaches, or can be used to identify areas with insufficient conservatism and provide the bases for additional requirements or regulatory actions.

"Performance-Based": A regulation can be either prescriptive or performance-based. A prescriptive requirement specifies particular features, actions, or programmatic elements to be included in the design or process, as the means for achieving a desired objective. A performance-based requirement relies upon measurable (or calculable) outcomes (i.e., performance results) to be met, but provides more flexibility to the licensee as to the means of meeting those outcomes. A performance-based regulatory approach is one that

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[3] CDF is the frequency of the combinations of initiating events, hardware failures, and human errors leading to core uncovery with reflooding of the core not imminent.

[4] LERF is the frequency of those accidents leading to significant, unmitigated releases from containment in a time-frame prior to effective evacuation of the close-in population such that there is a potential for early health effects.

[5] Risk curves are estimates of the probability that a given consequence will be exceeded.

establishes performance and results as the primary basis for regulatory decision-making, and incorporates the following attributes: (1) measurable (or calculable) parameters (i.e., direct measurement of the physical parameter of interest or of related parameters that can be used to calculate the parameter of interest) exist to monitor system, including licensee, performance against clearly defined, objective criteria, (2) licensees have flexibility to determine how to meet the established performance criteria in ways that will encourage and reward improved outcomes; and (3) a framework exists in which the failure to meet a performance criterion, while undesirable, will not in and of itself constitute or result in an immediate safety concern. The measurable (or calculable) parameters may be included in the regulation itself or in formal license conditions, including reference to regulatory guidance adopted by the licensee. This regulatory approach is not new to the NRC. The Commission previously has approved performance-based approaches in 10 CFR Parts 20, 60, and 61. In particular, the Commission weighed the relative merits of prescriptive and performance-based regulatory approaches in issuing 10 CFR Part 60.

A performance-based approach can be implemented without the use of risk assessment. Such an approach would require that objective performance criteria be based on deterministic safety analysis and performance history. This approach would still provide flexibility to the licensee in determining how to meet the performance criteria. Establishing objective performance criteria for performance monitoring may not be feasible for some applications and, in such cases, a performance-based approach would not be feasible.

As applied to inspection, a performance-based approach tends to emphasize results (e.g., does the pump work?) over process and method (e.g., was the maintenance technician trained?). Note that a performance-based approach to inspection does not supplant or displace the need for compliance with NRC requirements, nor does it displace the need for enforcement action, as appropriate, when non-compliance occurs.[6]

As applied to licensee assessment, a performance-based approach focuses on a licensee's actual performance results (i.e., desired outcomes), rather than on products (i.e., outputs). In the broadest sense, a performance-based approach to regulatory oversight will focus more attention and NRC resources on those licensees whose performance is declining or less than satisfactory.

"Risk-Informed, Performance-Based": A risk-informed, performance-based approach to regulatory decision-making combines the "risk-informed" and "performance-based" elements discussed above, and applies these concepts to NRC rulemaking, licensing, inspection, assessment, enforcement, and other decision-making. Stated succinctly, RIPB regulation is an approach in which risk insights, engineering analysis and judgment, and performance history are used, to (1) focus attention on the most important activities, (2) establish objective criteria based upon risk insights for evaluating performance, (3) develop measurable or

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[6] Not every aspect of licensed activities can or should be inspected using this approach. For example, if a licensee is unsuccessful in meeting the criteria defined by a performance-based regulation, the inspector should then focus on the licensee's process and method, to understand the root cause of the breakdown in performance and to understand how future poor performance may be avoided.

calculable parameters for monitoring system and licensee performance, and (4) focus on the results as the primary basis of regulatory decision-making.

3. FRAMEWORK FOR APPLYING PRA

NMSS has made several efforts toward using and developing risk-analysis methods to support existing or potential risk-informed regulatory approaches. Some of these efforts started as early as the mid-1970s. For example, the staff has been a developer of performance assessment (PA) methodology for geologic disposal of HLW and land disposal of LLW. NRC's effort has been both national and international in scope and its contributions include the development of Latin Hypercube Sampling, a method for propagating uncertainty that is commonly used in PRA and other risk-analysis methods, as well as in PA. NMSS' current efforts in PA were discussed with the Commission in a May 1997 briefing. Similarly, the staff made early efforts to apply PRA methods to gain a better understanding of transportation risks. Most notably, these included the "Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes" (NUREG-0170) and the "Transportation Modal Study" (NUREG/CR-4829). The Modal Study showed that the performance-based regulations for tests of spent fuel transportation casks provided adequate safety. In addition, the Modal Study has given the public a better understanding of the level of protection provided by spent fuel packages in transportation.

More recently, the staff has undertaken new efforts to use or develop risk-analysis methods for nuclear materials uses to satisfy a variety of purposes and objectives. For example, the staff sponsored a study that applied PRA methods to a new medical technology, Gamma Stereotactic Surgery. This study was the first step in gaining insight into the feasibility and advisability of applying PRA technology to medical devices. Similarly, a staff project is applying PRA technology to independent spent fuel storage installations (ISFSIs). Another recently started effort, the "Nuclear Byproduct Material Risk Review," is attempting to develop the basis for using a risk-graded approach to regulating the many uses of byproduct material that are under the jurisdiction of NMSS' Division of Industrial and Medical Nuclear Safety. Among other approaches, it will evaluate the possibility of using actuarial analyses of event data for this purpose. Finally, a recent paper, SECY-97-137, concerning proposed revision of 10 CFR Part 70, discusses the use of integrated safety analyses (ISAs) in the regulation of fuel cycle facilities.

The staff's approach has been appropriately flexible and developmental. However, as the number of staff efforts has grown and as resources become more scarce, there is an added need for technical and policy consistency and assurance that resources are being used judiciously. Accordingly, the development of a framework for applying PRA to nuclear material uses is timely. The staff expects to gain the same benefit from development of a nuclear materials framework as was gained by the development of the reactor framework.

4. THE FRAMEWORK FOR APPLYING PRA IN REACTOR REGULATION

In discussing the development of a framework for applying PRA to regulation of nuclear materials use, it is useful to summarize first the salient features of the referenced framework for use of PRA in reactor regulation (SECY-95-280). As described in SECY-95-280, the reactor framework is a general structure to ensure consistent and appropriate application of

PRA methods. It has four parts. The first defines regulatory application areas in which PRA can play a role in NRC's decision-making process. The areas are grouped by the expected sophistication of the PRA required (ranging from PRAs based on generic data to state-of-the-art PRAs using plant-specific data). The second part entails an evaluation of the deterministic engineering considerations underlying the application area to ensure that the existing deterministic engineering approach is altered only after careful consideration. Factors to be considered include: defense-in-depth, the single-failure criterion, and appropriate codes and standards. The third part of the framework is an evaluation of risk issues in support of the proposed regulatory action. Elements of this evaluation include: scope and level of detail of the PRA, human and equipment reliability, sensitivity and uncertainty analyses, and assurance of technical quality. The final part integrates the deterministic and risk considerations to ensure a consistent and scrutable decision-making process and to ensure that the underlying bases for rules, regulations, regulatory guides, and staff review guidance are maintained or modified to the extent supported by the risk and engineering conclusions of parts two and three.

As described in SECY-95-280, the framework is implemented through a six-step process. The first step is to identify specific regulatory applications that are amenable to expanded use of PRA information and to identify responsible staff organizations and pilot plants. The second is to conduct pilot programs for selected regulatory application areas. These projects provide insight into the treatment of issues, the selection of risk metrics, and the development of standards and guidance. The third step of the implementation process is to develop and document the acceptance process and criteria. The fourth step is to make near-term regulatory decisions in response to industry requests and initiatives. The fifth is to develop formal PRA standards, working with appropriate professional societies and industry groups. Finally, the sixth step is to make long-term modifications to the regulations, if necessary.

Development of the referenced framework served as a mechanism to figure out how to integrate a number of programmatic elements related to the application of PRA to power reactors. The framework provides a general structure to guide regulatory implementation of PRA. More specifically, it serves to ensure that: (1) fundamental regulatory principles are not overlooked in specific applications; (2) the development of processes and procedures for consistent implementation takes place; (3) pilot projects are used for testing of regulatory applications of PRA; and (4) there is an appropriate alignment of level of sophistication of analytic techniques (and their attendant costs and benefits) with risks (real and perceived).

In the time since the referenced framework was developed, the staff has made substantial progress toward completing the six-step implementation process. More specifically, the staff issued draft NUREG-1602, five draft Regulatory Guides, and related draft Standard Review Plans for public comment and has held a public workshop. A proposed final revision of the general guide was transmitted to the Commission by SECY-98-015 and approved by the SRM of May 21, 1998. Proposed final revisions of the guides on inservice testing, technical specifications, and graded quality assurance were transmitted to the Commission by SECY-98-067. Thus, the reactor framework now has advanced well beyond the description in SECY-95-280. The staff expects that it could develop a framework for applying risk-analysis methods to nuclear material uses that will be consistent with the purpose and principles of the framework for application of PRA in reactor regulation. To work out the specifics of a framework that would address the issues of greatest concern to NMSS, the staff believes that

the more rudimentary framework of SECY-95-280 is the appropriate starting point and that the assumptions implicit in that framework must be considered carefully in the context of NMSS-regulated licensees and activities.

5. ASSUMPTIONS IMPLICIT IN THE REACTOR FRAMEWORK OF SECY-95-280 AND NMSS-REGULATED ACTIVITIES/LICENSEES

Although no attempt is made in this paper to note and discuss all the assumptions that are implicit in the SECY-95-280 framework for application of PRA in reactor regulation, as will be discussed in this section, four assumptions, in particular, do not generally apply to NMSS' regulatory situation. These are the following:

- PRA is the risk-analysis method of choice;
- A significant number of licensees desire broad and rapid implementation of RIPB regulation and have the technical and economic resources to support it;
- Integration of deterministic and probabilistic considerations is the pivotal issue in applying PRA in NRC's decision-making process; and
- Risk-analysis methods will be used by both staff and licensees.

To see why these assumptions that are clearly sound for the reactor program are not generally so for the nuclear materials program, it is necessary to first review the nature of the nuclear materials program.

In contrast with the reactor program, which regulates a few highly complex systems (i.e., types of reactors), the nuclear materials program regulates approximately 40 different activities, devices, and systems. In terms of complexity, these range from simple devices using low-activity sealed sources to large fuel-cycle facilities or a geologic repository for HLW disposal. The accident potential and hazard varies from one application to another and the initiators of concern vary too. The data that are available for risk-analysis include large sets of event data, which may be suitable for actuarial analyses of some uses (e.g., gauges); however, for others (e.g., a geologic repository for HLW), the data situation is more like that of reactors, so that a similarly predictive approach to risk-analysis is needed. Moreover, nuclear materials systems differ collectively from reactors in terms of engineering complexity, depth of safety systems, degree of reliance on human actions to assure safety, training and sophistication of personnel, and the degree to which administrative controls may be assumed to be reliable. In summary, the nuclear materials program involves about 40 activities, devices, and systems that differ significantly from one another and from reactors. These differences will be important considerations in applying RIPB approaches to specific nuclear materials uses.

Again, in contrast with the reactor program, which regulates a few tens of fairly similar licensees, there are estimated to be more than 20,000 NRC and Agreement State materials licenses held by not quite as many thousands of licensees. They are as varied as the regulated uses of nuclear materials. Although some materials licensees are large enough entities to be able to marshal significant technical and economic resources, most cannot.

The smaller commercial firms, in particular, operate in highly competitive economic environments and have only the technical and economic resources that are essential for conducting their business. Thus, some materials licensees have fairly significant (nuclear) technical resources at their disposal, but most have very few. Some materials users have trade associations with a strong (nuclear) technical capability, but most do not. Moreover, in some cases where trade associations exist, the competitive nature of the business does not allow for significant sharing of technical information. Finally, nuclear materials licensees, in general, have fewer technical and economic resources, than reactor licensees, that can be brought to bear on radiation safety. In brief, the materials program involves roughly 20,000 licensees most of which differ significantly from one-another and from reactor licensees. These differences will be important considerations in applying RIPB approaches to specific nuclear materials uses.

Yet another potentially important consideration in developing a framework for nuclear material uses is the Agreement State program. The majority of materials licensees are regulated by Agreement States instead of NRC. This is quite unlike the reactor program in which all licensees are regulated directly by NRC. The Agreement States have a special relationship with the NRC in which NRC relinquishes its regulatory authority to such States which are then required to maintain adequate and compatible regulatory programs. The Agreement State regulatory programs vary greatly in terms of size and availability of technical and economic resources. In commenting on the DSI-12 issue paper, the Organization of Agreement States (OAS) and the Conference of Radiation Control Program Directors noted that the paper failed to discuss the impact of compatibility determinations, by NRC, on RIPB regulations it promulgates. OAS expressed the concern that risk and cost/benefit analyses require assumptions to be made that may not be applicable to specific Agreement State circumstances, creating a significant conflict. In addition, although it was not explicitly raised in their comments, increased use of RIPB approaches could strain the resources of at least some Agreement States. Any effective framework must recognize the circumstances, abilities, and resources of the Agreement States.

In considering how well the four assumptions that were stated above represent the NMSS regulatory situation, it is useful to think in terms of NRC having jurisdiction over a number of "regulated systems." Each such system consists of: (1) a particular radioactive material (or group of materials); (2) an activity involving that material; (3) possibly a device or physical system that incorporates the material; and (4) the group of licensees that engage in the activity. When viewed from this perspective, the reactor program includes a few, quite similar regulated systems that are clearly well-represented by the four assumptions. It is less clear which, if any, of the roughly 40 nuclear materials regulated systems of concern to NRC and the Agreement States are also well-represented. In fact, preliminary consideration indicates that the representation is generally not good, but also suggests some promising directions for eventual development of a framework for nuclear material uses. The paragraphs below discuss each assumption in turn.

PRA is the risk-analysis method of choice: The staff believes that this assumption is not generally representative of nuclear materials regulated systems for two reasons. First, in its May 15, 1997, briefing of the Commission on the status of the PA program, the staff discussed how PA, like PRA, is a type of system analysis that addresses the three risk questions. Further, the staff discussed the types of systems to which PA applies and

contrasted these systems with the type of systems to which PRA can be effectively applied. PRA and PA are only two examples of system analysis–there are, in fact, others that also can be used to address the three risk questions, but which are more or less appropriate for different systems and circumstances. The staff expects that a framework for applying risk-analysis technology to nuclear material uses will need to address the entirety of system analysis methods. This is not surprising and is consistent with how PRA came to be the method of choice for addressing the risk questions as they apply to reactors. Specifically, when the Atomic Energy Commission sponsored the first study intended to address realistically the risk questions for power reactors, the "Reactor Safety Study" (WASH-1400; NUREG 75/014), the investigators made a considered and deliberate choice when they adopted PRA. Subsequent to that initial choice, NRC and industry have gone to considerable effort to confirm, refine, and develop PRA specifically for power reactors. Similar considered and deliberate choices and likely some research and development will need to be made for the nuclear materials regulated systems. One consideration, but certainly not the only one, for making these choices, may be a graded approach to evaluation based on risk. For example, a straightforward dosimetric approach may show that the intrinsic risk posed by a device is only a small fraction of the dose limit for members of the public. Given such a situation, more sophisticated analyses may not be appropriate. (This approach is similar in concept to the screening approach used in the individual plant examination of external events program.)

Second, and more fundamentally, PRA is a method of estimating risk for systems that have had too few end-point failures to permit an actuarial analysis. This is a principal reason for PRA having been chosen as the basis for the "Reactor Safety Study." The staff believes that for some materials regulated systems there are sufficient data to support actuarial analyses. Accordingly, the staff considers that risk analytic approaches other than PRA may enable it to better achieve the Commission's objectives–i.e., to expand the use of RIPB approaches and regulate commensurate with risk while using minimal additional resources

A significant number of licensees desire broad and rapid implementation of RIPB regulation and have the technical and economic resources to support it: The staff believes that this assumption is not generally representative of nuclear materials regulated systems. To carry out the individual plant examination (IPE) program, reactor licensees made a significant investment in PRA. Having made this initial investment, most reactor licensees are positioned to support RIPB regulatory approaches and make effective use of their potential flexibility and possible cost reduction. In contrast, few materials licensees have done a PRA or have the resources to do one. This situation is reflected in the approximately 20 comment letters that addressed the nuclear materials use aspects of DSI-12. The letters came from Agreement States, large licensees, and organizations. Most of these commentors favored moving toward an RIPB approach in regulating radioactive materials, provided that it is done only if cost-effective. The commentors noted that, because of the diversity of activities regulated within NMSS, there would need to be differing approaches taken, depending on the nature of the circumstances. It also should be noted that, taken together, the commentors represent a fraction of materials licensees. The staff believes that the many small independent licensees that did not comment would be concerned about a potential drain of their limited resources resulting from RIPB approaches.

Integration of deterministic and probabilistic considerations is the pivotal issue in applying PRA in NRC's decision-making process: The staff believes that this assumption may not be generally representative of nuclear materials regulated systems. The governing regulations for some such regulated systems (e.g., Part 60, which is applicable to geologic repositories) embody a RIPB approach as they stand. In such cases, the integration of deterministic and probabilistic considerations is addressed in the existing regulations and guidance. Moreover, it is not clear from the outset that such integration generally would be the issue of greatest concern in applying RIPB approaches to other nuclear materials regulated systems. While that could be the case for some nuclear materials regulated systems (e.g. fuel cycle facilities), it may not be for others.

Risk-analysis methods will be used by both staff and licensees: The staff believes that this assumption may not be representative of nuclear materials regulated systems. Its validity will depend on the particular system analysis method and RIPB approach that might be chosen for a given regulated system. Accordingly, the staff views this as a consideration that would be addressed separately for each regulated system in developing the framework.

6. DEVELOPING A FRAMEWORK FOR APPLYING SYSTEM ANALYSIS TO REGULATION OF NUCLEAR MATERIALS

In the discussion of the previous section about certain assumptions that are implicit in the SECY-95-280 framework for reactors, several points were identified that would need to be addressed in developing a framework for applying system analysis methods to the regulation of nuclear materials. There also are several other points that would need to be addressed. These additional points are discussed below.

First, when the framework for applying PRA in reactor regulation was developed, a sound and extensive foundation of pertinent experience and policy already had been established. For the nuclear materials regulatory program, some elements of a foundation are in place, but there are important gaps that would need to be filled as part of the process of developing the framework. Although there are some regulated systems (e.g. the HLW repository area) for which the staff and licensees have had extensive experience with an appropriate system analysis method, this is not generally the case. For the most part the staff has started only in the last few years to investigate the applicability of PRA and other system analysis methods to nuclear material regulated systems. Not surprisingly, some applications appear promising and some less so. This is in marked contrast with the reactor situation prior to development of the framework. In that program, there had been WASH-1400, the IPE program, NUREG-1150, and pilot projects, in addition to a body of research that had been conducted by NRC, the Electric Power Research Institute and others both nationally and internationally. As a result, much was already known about what worked and what did not, when the framework was developed.

The staff now has several nuclear-materials-related projects underway that are part of the PRA Implementation Plan. These projects are discussed in Attachment B to this paper. In part, the intent of these projects is to test or develop system analysis methods for certain nuclear material regulated systems. The staff believes that such studies are an essential aspect of determining which nuclear materials regulated systems may be amenable to RIPB approaches. Therefore, as these projects continue, the staff intends to use the knowledge

gained as input to its effort to develop a framework for applying system analysis methods to nuclear materials regulated systems.

Relative to the reactor situation, there also may be some important policy gaps. When the SECY-95-280 framework was developed, the Commission's policy statement on a safety goal for reactors had been issued. No similar policy statement exists for materials use. The DSI-12 commentors raised the issue of whether one is needed. There are some obvious advantages to having one. Specifically, such a statement could serve as the vehicle for promulgating the Commission's objectives in applying system analysis methods to nuclear materials uses. It could also serve to address issues that pertain to assuring that resource expenditures are commensurate with risk. These resource allocation issues could be very complex because system analysis methods used for different regulated systems are expected to vary. Also, public perceptions of risk must somehow be given appropriate account. However, the development of such a policy statement for nuclear materials uses could be challenging. Not only would it have to address the roughly 40 regulated systems that constitute nuclear materials use, but it would also have to address the fact that these systems currently have risk levels that vary and are set implicitly from several, at times conflicting, sources (i.e., EPA, the International Commission on Radiation Protection, the National Committee on Radiation Protection, the Uranium Mill Tailings Radiation Control Act of 1978, etc.). In addition, the issue that is now of some interest, in the reactor area, about whether a safety goal that was developed for a class of facilities should also apply to individual facilities also may be germane to the materials area. The staff's plan for developing a framework provides for a recommendation to the Commission on whether such a policy statement should be developed.

Another policy issue that the staff believes will need to be addressed before developing a framework arises from the following considerations: (1) the licensees associated with most nuclear materials regulated systems have evinced no groundswell of interest in a transition to RIPB approaches; and (2) the staff is not aware of any inadequacies in protection of public health and safety that would require substantial change in its current regulatory approaches with respect to these systems; however, the staff recognizes that the IPE program found potential vulnerabilities in a number of licensed reactors. Accordingly, the staff believes that criteria are needed to determine whether such regulated systems are, in fact, appropriate candidates for RIPB regulation. The staff's plan for developing a framework provides for recommending such criteria to the Commission.

Second, when the SECY-95-280 framework was developed, the fundamental viability of risk-informed regulation based on the use of PRA was not in question. The situation regarding many nuclear materials regulated systems is different. Consistent with the above discussion of assumptions, before it could develop a framework, NMSS would need to give careful consideration to the potential for applying some combination of a risk-informed approach and a system analysis method to each regulated system. Such consideration would have to include several factors related to each such system. More specifically, each choice would depend on such factors as hazard, device or system complexity, failure modes, analytic method complexity, licensee technical resources, licensee economic resources, staff resources, and likely others. Thus the staff's plan includes the selection of RIPB approaches and system analysis methods that are appropriate for different regulated systems and the criteria for making these choices. Because Agreement State and licensee input would be

valuable, if not essential, in this process, the staff's plan includes workshops at appropriate points. Once potential associations have been identified, the need for pilot projects may be identified. The staff also recognizes, however, that any such projects will have to be conducted with limited resources. Accordingly, the staff's plan for developing a framework includes development of criteria to prioritize future pilot projects.

Third, in the staff's plan, development of the framework itself first would include careful consideration of current NRC regulatory approaches to identify any fundamental regulatory principles (e.g., defense-in-depth) that the framework should preserve. Once such principles were identified, in analogy with the SECY-95-280 framework, the "parts" of the framework and implementation steps would be developed. The staff would intend to use as much of the reactor framework as is practicable. Because of the special concerns of the Agreement States, the staff would work closely with them throughout development of the framework.

Finally, the staff would determine what staff training would be needed to implement the framework. In the past, nuclear materials risk-analysis training needs have been limited and have been addressed through the occasional development of specialized courses (e.g., courses in PA for radioactive waste repositories and ISA for fuel cycle facilities). Development of the framework would present an opportunity and a need to take a broader, more long-term view.

The staff will start with a scoping effort in which it will (1) complete a preliminary association of appropriate risk assessment methods with licensed uses of nuclear materials and (2) as appropriate for each regulated use and in coordination with the Agreement States, identify how these associated risk assessment methods can best be used in a risk-informed regulatory framework for materials. The staff believes that this effort is an essential first step toward developing a framework and determining the ultimate feasibility of completing a framework, given NRC's resource constraints.

Carrying out this plan will require knowledge of system analysis and nuclear materials regulated systems. It will also require a sustained effort in which the knowledge gained from completion of one task serves as important input to the next. The staff believes that this can be accomplished best by a working group drawn from all NMSS divisions. To be most effective the working group also would include NRR/RES and Agreement State representation. Accordingly, the first step in the staff's plan is to establish such a group.

A milestone schedule for the staff's plan is provided as Attachment A.

7. CONCLUSION

In recent years, the staff's efforts to apply PRA and other system analysis methods to the regulation of nuclear materials have expanded from a relatively few, focused activities to include additional pilot and trial activities. The staff has intended that its efforts be consistent with the Commission's view that: (1) to accomplish NRC's principal mission in an efficient and cost-effective manner, it will, in the future, focus (in a regulatory sense) on those licensee activities that pose the greatest risk to the public; (2) this focus can be accomplished by building on PRA concepts--where applicable--or other approaches that would allow a risk-graded approach for determining high- and low-risk activities; and (3) the use of PRA

technology should be increased in all regulatory matters, consistent with the state-of-the-art and NRC's safety philosophy.

The staff recognizes, however, that any increase in the use of system analysis technology must occur within a framework that will ensure that: (1) fundamental regulatory principles are not overlooked in specific applications; (2) the development of processes and procedures for consistent implementation takes place; (3) pilot projects are used for testing of regulatory applications of PRA; and (4) there is an appropriate alignment of level of sophistication of analytic techniques (and their attendant costs and benefits) with risks (real and perceived). The staff also recognizes that any such increase must be accomplished with a commitment of only minimal additional resources. Accordingly, the staff believes that it is timely to undertake the development of a framework for the application of RIPB approaches to nuclear materials regulated systems. Notwithstanding the many significant differences among the approximately 40 nuclear materials regulated systems and the contrasts between those systems and the reactor regulated systems, the staff will pursue development of a framework that will be consistent with the purpose and principles of the framework for application of PRA in reactor regulation consistent with the level of budgeted resources. Attachment A outlines the staff's current plans in this regard.

ATTACHMENT A

PLAN AND SCHEDULE TO DEVELOP A FRAMEWORK FOR APPLYING RISK ANALYSIS METHODS TO THE REGULATION OF NUCLEAR MATERIALS

Activity	Completion Date
A. Establish a team from all NMSS divisions to complete Tasks B through D below. (Include Agreement State representation as soon as that can be arranged, and NRR/RES representation.)	July 1998
B. Preliminarily associate appropriate risk assessment methods with nuclear materials uses and identify how associated risk assessment methods could be used in a risk-informed, performance-based (RIPB) framework for nuclear materials.	November 1998
1. Identify groupings of materials uses that may be amenable to similar risk analysis methods.	
2. Develop criteria to match candidate risk analysis methods with regulated systems.	
3. Develop criteria to match regulated systems with risk-informed approaches.	
4. Relate groupings of materials uses to candidate risk-informed approaches using the above criteria.	
C. Determine which information from the regulatory activities that are identified in the PRA Implementation Plan can contribute. (See Attachment B for a discussion of these activities.)	November 1998
D. Determine the scope of a framework for applying RIPB approaches to the regulation of nuclear materials. Evaluate the resources needed to develop such a framework and make a recommendation to the Commission about its feasibility, given NRC's resource constraints.	December 1998
E. Recommend to the Commission: (1) whether a safety goal policy should be developed for nuclear material uses; and (2) criteria for imposing regulatory approaches when not requested by licensees.	TBD
F. Identify and prioritize regulated systems that may be amenable to RIPB approaches.	TBD
1. Hold workshops for Agreement State and licensee input.	

Activity	Completion Date
2. Develop criteria to match regulated systems with performance-based approaches	
3. Develop criteria to prioritize pilot projects.	
4. Identify and prioritize pilot projects.	
5. Do a final re-examination of current approaches by applying the criteria.	
6. Do a final review of the regulations and processes for candidate areas by applying the criteria.	
7. Hold workshops for Agreement State and licensee feedback.	
8. Incorporate workshop results.	
9. Report progress to the Commission.	
G. Develop framework.	TBD
1. Identify fundamental regulatory principles in cooperation with the Agreement States.	
2. In analogy with the SECY-95-280 framework, identify "parts" of a framework for nuclear materials uses.	
3. Develop implementation steps.	
4. Hold workshops for Agreement State and licensee feedback.	
5. Incorporate workshop results.	
6. Transmit framework to the Commission	
H. Develop a plan for staff training.	TBD

ATTACHMENT B

PRELIMINARY RE-EXAMINATION OF CURRENT RISK-INFORMED, PERFORMANCE-BASED AND RISK-INFORMED, LESS-PRESCRIPTIVE APPROACHES

The Staff Requirements Memorandum (SRM) of April 15,1997, requested that the staff reexamine the applicability of its risk-informed, performance-based (RIPB) and risk-informed, less prescriptive approaches with regard to nuclear material licensees and to high-level radioactive waste (HLW) issues, to ensure that the needs of those licensees and those areas receive adequate consideration. In this appendix, the staff provides a preliminary response to the Commission's request. Consistent with the staff's belief that building a base of experience in system analysis methods is essential to successful implementation of RIPB approaches in the nuclear materials area, the staff has broadened the Commission's request to include the approaches that are supported by Tasks 4 and 5 of the "PRA Implementation Plan." However, the staff considers that only a preliminary response is possible now because some conclusions and priorities may well change as it proceeds with its plan to develop a framework.

The staff is undertaking an extensive project to update and consolidate all existing Division 10 regulatory guides (general), policy and guidance directives, and standard review plans, concerning nuclear material uses. To the maximum extent possible, the existing licensing guidance documents will be consolidated into NUREGs, containing both application and review information in one document for use by the regulated community and Nuclear Regulatory Commission reviewers. Those existing documents not readily lending themselves to consolidation will be updated. In addition to making the guidance documents "user friendly," the planned degree of prescriptiveness of the guidance will be consistent with the degree of risk associated with the use of byproduct material being addressed. The RIPB concept will be applied to the extent possible. For example, industrial radiography guidance will be rather prescriptive compared with guidance associated with the use of gas chromatography. As another example, the staff recently issued draft NUREG-1556, Volume 1, which takes a graded, more performance-based approach to licensing portable gauges and reduces the information needed in support of an application. The staff believes that this effort will benefit licensees while providing the staff with an opportunity to gain experience in formulating RIPB approaches.

Over the past decade, the staff has attempted, through its contractors, to quantify the risks associated with unaccounted-for devices, with limited success. In May 1995, the staff initiated an in-house risk assessment that employs the methodology currently used for reactor PRAs. The assessment includes establishing the probabilities of devices being lost, causing exposure to members of the public, entering the metals manufacturing stream, being smelted, and other incidents. The scope of the assessment comprises only industrial devices containing cesium-137 or cobalt-60, because of the relatively higher risk of these devices to health, safety, property, and the environment, and because, when smelted, these types of devices are of particular concern. The risk assessment is to be completed in September 1998. Once complete, the staff will evaluate the methodology to determine whether it can be used to develop similar risk assessments for other types of devices.

Recently, the staff started the nuclear byproduct material risk review to: (1) identify and document a technical basis for a risk-informed approach to the regulation of nuclear byproduct material; and (2) develop plans for a graded approach to nuclear byproduct material regulation based on risk information. This effort is using qualitative and, to the extent possible and reasonable, quantitative tools, to identify and evaluate risks associated with

nuclear byproduct material systems. Its ultimate objective is to establish a risk-graded approach to regulating the Division of Industrial and Medical Nuclear Safety's regulated systems by developing and applying an analytical risk-ranking model. This effort responds in a direct way to the Commission's direction, regarding Direction Setting Issue (DSI)-7 and DSI-12, that the staff focus its resources in a way that is commensurate with risk. The staff believes that this project may yield relatively straightforward ways (e.g., using event data in an actuarial approach) of achieving this objective for some nuclear materials regulated systems.

The staff has had a significant performance assessment (PA) program to address HLW issues for almost two decades. It is currently performing analyses that will support its upcoming review of the U.S. Department of Energy's (DOE's) viability assessment PA and its eventual rulemaking to develop a site-specific HLW disposal regulation for Yucca Mountain consistent with the Energy Policy Act of 1992. The staff considers that its PA program is consistent with comments made by DOE on DSI-12.

The staff has prepared a draft of a branch technical position (BTP) on PA for low-level radioactive waste (LLW) disposal facilities and has issued it for comment. The staff will analyze the comments and issue a final position in FY 1999. The staff had planned to conduct a test case analysis to illustrate the application of the BTP, but has had to defer the effort in favor of higher priorities.

Although there is no requirement in the current 10 CFR Part 70 for fuel cycle facility licensees to perform an Integrated Safety Analysis (ISA), the staff has encouraged such licensees to make formal commitments in their licenses to perform an ISA to identify the hazards at their facility, analyze how those hazards could result in accidents, and identify those items relied on to prevent or mitigate the accidents. For some facilities, qualitative methods are cost-effective; for high-risk facilities, or for high-risk systems within otherwise low-risk facilities, qualitative methods could be supplemented by quantitative methods if necessary data are available. As was recently communicated to the Commission in SECY-97-137, the staff continues to think that ISAs are an essential and appropriate element of RIPB regulation of fuel cycle facilities.

The staff has sponsored PRAs of transportation of radioactive materials, the results of which show that 10 CFR Part 71 provides adequate protection of public health and safety. The current staff position is to base future changes to Part 71 on RIPB criteria. An example of this would be the addition of the Type C package that was recently added to the International Atomic Energy Agency regulations for air shipment of large quantities of radioactive material. The new requirement emphasizes RIPB criteria.

The staff started testing an approach to applying PRA techniques to dry-cask storage systems. The approach consisted of a pilot PRA study of one dry-storage system design at one site and entailed the following:

- An analysis to identify and characterize the cask(s) and fuel damage that would be required to occur to reach the accident dose limits in 10 CFR 72.106(b).

- A comprehensive analysis to identify potential sequences that could lead to the consequences identified above.

- For sequences identified, a probabilistic analysis to determine the likelihood of the sequences.

This study originally was scheduled for completion in FY98; however, it has now been suspended consistent with current budget constraints. Potentially, the results of this study could have been used to support the adequacy of the existing dry-storage system designs, procedures, and regulations. Also, the results were expected to be used to make recommendations about the extent to which an expansion of PRA methods for dry-cask storage would provide further useful information. The staff believes this study should be resumed when resources permit.

ATTACHMENT 2

PRELIMINARY REVIEW OF NUCLEAR MATERIALS REGULATIONS AND PROCESSES

The Staff Requirements Memorandum (SRM) of April 15, 1997, in part requested that the staff perform a review of the basis for nuclear materials regulations and processes, and identify and prioritize those areas that are either now, or could be made, amenable to risk-informed, performance based (RIPB) or risk-informed, less-prescriptive approaches, with minimal additional staff effort/resources. In this attachment, the staff surveys the nature of the nuclear materials regulations and processes. The staff believes that a final response to the Commission's request must await completion of several steps in its plan to develop a framework and will provide that response on completion of those steps.

The structure of the regulations and the associated licensing and inspection processes for materials reflect risk to varying degrees. For example, very low quantities of certain radionuclides may be distributed to individuals exempt from regulation. Devices that are typically low in risk are distributed through a general license approach with minimal Nuclear Regulatory Commission (NRC) oversight. Higher-risk devices (e.g., irradiators and industrial radiography devices) are subject to specific licensure and inspections. In general, the inspection (in both frequency and intensity) of nuclear materials licensees is based upon the type and quantity of byproduct material being used and therefore upon qualitative risk considerations.

The overarching 10 CFR Part 20 contains quantitative radiation protection standards that apply to all licensees. These standards establish limits on allowable doses (which can be converted to risk) and in Part 20 are implemented using a fundamentally performance-based approach. Thus, the central standards on which all nuclear materials regulation is ultimately based are implemented at a first level using a risk-informed, performance-based regulatory approach. At a second level, Part 20 contains prescriptive requirements that preclude some of the more likely events that could result in overexposure and prescriptive requirements of an administrative nature.

Parts 20 and 30 through 33 of the 10 CFR , in and of themselves, contain the essential requirements for licensing uses of byproduct material. Although they contain a number of prescriptive requirements (many of which are administrative), their fundamental approach is performance based. For some uses of byproduct material, radiography, medical uses, irradiators, and well-logging, there is both a potential for and had been a history of overexposures. In consequence, a third level of prescriptive requirements, those of Parts 34 through 39, were developed to reduce the frequency of overexposures related to those specific uses of byproduct materials.

10 CFR Parts 20 and 40 contain the essential requirements for licensing source and certain byproduct material, including the disposition of uranium mill tailings. At a first level, the approach is again performance-based. However, at a second level Part 40 imposes a number of prescriptive requirements. Some licensees have argued that aspects of NRC's implementation of the uranium mill tailings regulations (e.g., some license conditions) have been unnecessarily burdensome, overly prescriptive, and not warranted *vis a vis* costs and benefits. The office of Nuclear Material Safety and Safeguards (NMSS) has adopted a new licensing approach, for uranium recovery facilities, that provides licensees with more flexibility in the way they meet the conditions of their licenses, and allows licensees to make changes to their facilities or operations, under certain conditions, without involving the NRC.

10 CFR Parts 20 and 60 contain the essential requirements for licensing geologic repositories for high-level radioactive wastes (HLW). At a first level the regulatory approach is performance based. It is also risk-informed. However, at a second level, Part 60 contains many deterministic and prescriptive requirements. In developing site-specific HLW regulations for Yucca Mountain, the Commission has endorsed and the staff is adopting a more RIPB approach than is embodied in Part 60.

Like Part 60, 10 CFR Part 61 contains many deterministic and prescriptive requirements. Thus, Parts 20 and 61, which are the basis for licensing shallow land burial of low-level radioactive wastes (LLW), provide a fundamentally RIPB regulatory approach for LLW facilities supplemented at a second level by a more deterministic and prescriptive approach.

Operators of fuel cycle facilities are required to meet 10 CFR Part 20 requirements and are licensed to possess special nuclear material under 10 CFR Part 70. Part 70 primarily has requirements that are prescriptive, but it does include risk-informed elements (e.g. an emergency plan is required if credible releases of radioactive material result in doses to the public in excess of specified levels).

The regulations of 10 CFR Part 71 are mostly prescriptive and deterministic. However, the type B package test requirements for normal and accident conditions are performance-based. Complications arise in implementing RIPB changes to Part 71 because of the impact changes would have on the international community and other Federal regulatory bodies. More specifically, because transportation regulations affect international and interstate commerce, other entities are involved. The International Atomic Energy Agency (IAEA) develops model regulations through an international consensus process and the United States and other nations make reasonable efforts to be consistent with the IAEA regulations so that international trade is not burdened unnecessarily. Similarly, the U.S. Department of Transportation (DOT) has broad regulatory authority over transportation in the United States and NRC regulations must be consistent with those of DOT.

Independent spent fuel storage installations and monitored retrievable storage facilities must meet Part 20 and Part 72. The regulations under Part 72 are generally deterministic and prescriptive. The extent to which Part 72 could be changed to reflect a more RIPB format is limited by the directive of Section 218(a) of the Nuclear Waste Policy Act of 1982, which states: "...The Secretary [of DOE] shall establish a demonstration program in cooperation with the private sector, for the dry storage of spent nuclear fuel at civilian nuclear power reactor sites, with the objective of establishing one or more technologies that the [Nuclear Regulatory] Commission may, by rule, approve for use at the sites of civilian nuclear power reactors without, to the maximum extent practicable, the need for additional site-specific approvals by the Commission." A major shift toward risk-informed regulations pertaining to design criteria would require site-specific, probabilistic hazards analyses and, therefore, would require site-specific approvals by the Commission.

Safeguards requirements are found in 10 CFR Parts 73-75. Physical protection of plants and materials is addressed in Part 73. This part is predominantly deterministic and contains many prescriptive requirements. Power reactor licensees have expressed the opinion that Part 73 is too prescriptive. Part 74 contains the requirements for control and accounting of special nuclear material. It has performance-based and prescriptive elements. Part 75 is also

deterministic and prescriptive in its approach.

10 CFR Part 76 contains requirements that are prescriptive, performance-based, risk-informed, and deterministic. For example, the requirements for material control and accounting are similar to the performance-based and prescriptive requirements of 10 CFR Part 74. Section 76.35 has a performance-based character in requiring descriptions of equipment and management controls that are necessary to protect health and safety. The criticality monitor requirements have a risk-informed component in that they must be capable of detecting prescribed dose levels. The requirement to assess accidents is an example of deterministic regulation.

The above summary illustrates the variety of regulatory approaches that are incorporated in NMSS' regulations and processes. There may well be potential to shift the balance more toward RIPB approaches; however, the staff believes that it is premature to make that determination.

EXHIBIT 5

September 1, 1998

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before Administrative Judge
Peter B. Bloch, Presiding Officer

Administrative Judge
Thomas D. Murphy, Special Assistant

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

THIRD AFFIDAVIT OF MICHAEL G. WALLACE

Michael G. Wallace, being duly sworn, states as follows:

1. My name is Michael G. Wallace. I am of sound mind and body and competent to make this affidavit. I know the information stated herein from my personal knowledge and from my review of documents and affidavits described herein, except that the information stated as my opinion is my professional opinion.

Professional Qualifications:

2. My education and experience as a professional hydrologist are described in my résumé and summarized in Paragraph 2 of my affidavit of January 13, 1998 (hereinafter "Wallace Affidavit I"), which is attached as Exhibit 12 to ENDAUM's and SRIC's January 15, 1998, Motion for Stay, Request for Prior Hearing, and Request for Temporary Stay (hereinafter, "ENDAUM-SRIC Stay Motion").

Documents Reviewed:

3. In preparing this affidavit, I have reviewed and am familiar with the contents of my January 13, 1998, affidavit, as well as my affidavit of March 4, 1998 (hereinafter "Wallace Affidavit

II"), which I gave in support of ENDAUM's and SRIC's Reply to HRI's and NRC Staff's Responses to Stay Motion (March 6, 1998). I have also reviewed the contents of the two affidavits given by Richard Abitz, Ph.D., on January 9, 1998, and March 2, 1998 (hereinafter, "Abitz Affidavit I" and "Abitz Affidavit II"), also in support of the ENDAUM-SRIC Stay Motion and Reply. I remain familiar with the content of the 36 documents I cited in my January 13 Affidavit (Wallace Affidavit I at 2-6), and I am well-acquainted with the professional geologic and hydrogeologic literature relevant to the project areas. I have also reviewed several other documents that have been generated in this proceeding in the past several months, including HRI's Bifurcation Request,[1] ENDAUM's and SRIC's Opposition to HRI's Bifurcation Request,[2] Judge Bloch's Memorandum and Order granting ENDAUM's and SRIC's petitions for hearing,[3] and NRC Staff memoranda concerning the findings of Professor Shlomo Neuman, a University of Arizona hydrologist, regarding the FEIS for the Crownpoint Project.[4] I am also familiar with the affidavits filed by HRI and the NRC Staff in response to ENDAUM's and SRIC's Stay Motion, including the Affidavit of William Ford, NRC Staff (February 20, 1998) ("Ford Affidavit"). I am familiar with Source Materials License SUA-1508, issued to HRI by the NRC Staff on January 5, 1998 (hereinafter, "HRI License"); portions of the NRC Staff's Safety Evaluation Report (December 5, 1998) (hereinafter, "SER"); HRI's Consolidated Operations Plan, Revision 2.0 (August 15, 1997) (hereinafter, "COP Revision 2.0"); and the Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint New Mexico (NUREG-1508) (February 1997) (hereinafter,

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[1] HRI's Request for Partial Clarification or Reconsideration of Presiding Officer's Memorandum and Order of May 13, 1998; and Request for Bifurcation of the Proceeding (June 4, 1998) (hereinafter, "HRI's Bifurcation Request").

[2] ENDAUM's and SRIC's Opposition to HRI's Request for Reconsideration or Clarification of LBP-98-9 and HRI's Request for Bifurcation (June 22, 1998) (hereinafter "ENDAUM-SRIC Opposition Brief").

[3] Memorandum and Order (Ruling on Petitions and Areas of Concern; Granting Request for Hearing; Scheduling) (LBP 98-9) (May 13, 1998) (hereinafter "LBP 98-9" or "Hearing Order").

[4] Memorandum from Joseph J. Holonich, NRC Staff, to Peter B. Bloch, Atomic Safety and Licensing Board, concerning "Supplement to February 27, 1998, Notification of New Information Potentially Relevant and Material to the Proceeding in the Matter of Hydro Resources, Inc. (ASLBP Number 95-706-01-ML): March 19, 1998, Teleconference with Professor Neuman (April 20, 1998) ("Holonich Memorandum II"); and Memorandum from Joseph J. Holonich, NRC Staff, to B. Paul Cotter, Atomic Safety and Licensing Board, concerning "New Information Potentially Relevant and Material to the Proceeding in the Matter of Hydro Resources, Inc. (ASLBP No. 95-706-01-ML)", and attaching overheads from a January 29, 1998, presentation to the NRC Staff by Professor Shlomo P. Neuman, University of Arizona, titled, "Hydrogeologic Conceptualization for Environmental Safety Assessment: Case Studies and Steps Toward a Strategy" (February 27, 1998) (hereinafter, "Holonich Memorandum I, Neuman Presentation").

"FEIS"). Any other documents I relied on in preparing this affidavit are cited in full in either the text or footnotes herein.

Purpose of This Affidavit:

4. License Condition ("LC") 9.1 of the HRI License authorizes the use of source material (i.e., uranium) at "the licensee's Crownpoint Uranium Project ["CUP"] which includes the Crownpoint, Unit 1 and Church Rock uranium recovery and processing facilities in McKinley County, New Mexico." HRI License at 1. In other words, HRI is authorized to conduct solution mining activities at all three sites, subject to certain conditions. Nevertheless, it is my understanding that the Presiding Officer is considering HRI's request to bifurcate or split up this proceeding geographically, beginning the hearing with Section 8 of the Church Rock site only. I understand that the Presiding Officer is thinking of postponing other portions of the hearing until HRI has collected more information through the implementation of license conditions. The purpose of this affidavit is to elaborate on three main reasons why I believe that the Crownpoint Project is more appropriately reviewed as a whole.

Expert Conclusions:

5. In summary, my reasons for believing that the Crownpoint Project is more appropriately reviewed as a whole are as follows:

(a) The major hydrogeologic issues of concern in this case *are the same* for all three proposed mining sites (i.e., Church Rock, Unit 1 and Crownpoint). It would be extremely wasteful of expert resources to hold separate hearings on the same hydrogeologic information for three different sites.

(b) Postponing part of the hearing to await the gathering of further data through license conditions would be inappropriate and of questionable value. The entire HRI license application suffers from critical deficiencies in hydrogeologic information and analyses. These deficiencies are so significant as to raise fundamental doubts about whether the quality of groundwater will be adequately protected by HRI's operation. They are not minor issues subject to "fine tuning." Moreover, HRI and the Staff have either ignored or misinterpreted important data for which future testing is unlikely to yield contrary results.

© There are compelling hydrologic reasons for *considering together* Sections 8 and 17 of the Church Rock site, and not splitting them up.

The basis for my opinion is described below.

I. The Hydrogeologic Issues of Concern Are the Same for the Proposed Church Rock, Unit 1, and Crownpoint Mining Sites.

6. The three proposed mining sites — actually, *four* sites if Section 17 is considered to be "separate" from Section 8, even though they are contiguous — share several common hydrogeologic characteristics. Moreover, HRI has made erroneous assumptions about the hydrogeologic characteristics of the region that have misinformed virtually all of its hydrologic analyses and design elements for all three sites.

7. Regional Nature of Hydrogeology and Geochemistry. All three sites would produce uranium from ore deposits in the Westwater Canyon Member of the Morrison Formation. At all three sites, the Westwater Canyon Member is bounded above and below by the same basic hydrogeologic units. FEIS at 3-14 and 3-19. All of these hydrogeologic units, including the Westwater, have similar basic aquifer properties. Id., at 3-31, 3-34 and 3-40. The Westwater Canyon Member is a *regional* aquifer used for domestic water supplies throughout the San Juan Basin of northwestern New Mexico. Id., at 3-22 to 3-40.[5] The quality of the groundwater in both the Westwater and Dakota aquifers is excellent to very good at all three sites. Id., Tables 3.12, Table 3.13 [revised], Table 3.14, Table 3.16, Table 3.17, and Table 3.19. In both the Crownpoint-Unit 1 area and at the Church Rock site, groundwater in the Westwater Canyon and Dakota aquifers meets U.S. Environmental Protection Agency ("USEPA") criteria as an "underground source of drinking water." Id., at 3-24; ENDAUM-SRIC Second Amended Request, n. 55 at 72.

8. HRI Misconceptualization of CUP Hydrogeology. At all three sites, the Westwater is a highly heterogeneous sandstone, owing principally to its fluvial depositional history.[6] The heterogeneous nature of the Westwater is well established in the published literature on the subject. See., e.g., Exhibits 15 and 19 to ENDAUM-SRIC Second Amended Request. The heterogeneity of the Westwater is also borne out by HRI's own descriptions of one of the sand channels at the Crownpoint site and the ore bodies at the Church Rock site.[7] Ignoring the body of published

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[5] See, also, ENDAUM-SRIC Second Amended Request, n. 16 at 35.

[6] The Westwater was deposited some 160 million years ago as a sequence of stacked, sinuous, buried stream channels, of relatively narrow width, embedded within a finer-grained matrix. Abitz Affidavit I, 9-10. These are the very stream channels in which the uranium ore has concentrated, hence the sinuous, stacked nature of the ore bodies themselves. Id., 9; Wallace Affidavit I, ¶¶8-9. In fact, the sites all have the same sediments, originating from the same distant source, transported in the same manner, and deposited in the same geologic time frame. All areas have the same additional features associated with fluvial depositional environments, such as scour and fill zones. Wallace Affidavit I, ¶¶ 6-7.

[7] Dr. Abitz and I both referred to HRI's graphic depiction of the "LB Sand", a snake-like channel measuring 80 feet to 140 feet in width at the Crownpoint site. Abitz Affidavit I, ¶ 10; Wallace Affidavit II, ¶ 8 and Exhibit A. In addition, an HRI executive recently testified in a water rights transfer hearing before the New Mexico State Engineer that the ore bodies at the Church Rock site range from "8.6 feet to 14.9 feet" thick. See, testimony of Mark S. Pelizza in Transcript of Proceedings (Volume I), In the Matter of the Application of HRI, Inc., to Change

literature and its own staff's observations, HRI's numerous submissions treat the Westwater as a homogenous, hydrologically isolated, massive, uniform sandstone, more akin to an aeolian (i.e., sand dune) deposit, sandwiched between two "perfect" marine shales. The NRC Staff also largely accepts HRI's assumption. Abitz Affidavit I, ¶ 7. As our previous affidavits addressed in great detail, HRI's erroneous conceptualization of the Westwater tainted virtually all of its hydrologic analyses and hydrologic design measures, from travel time calculations and groundwater modeling to the design of the groundwater monitoring system and the analytical methodology used to evaluate pump test data. See, e.g., Abitz Affidavit I, ¶¶ 15-17; Wallace Affidavit I, ¶¶ 12-16, 21-22. See, also, the examples provided in ¶ 13 below, virtually all of which apply to all three sites.

9. Critical Hydrogeologic Data Are Missing. As I explained in detail in my March 4 Affidavit, ¶¶ 6-10, HRI has not provided certain information that is critical for interpreting the geology and hydrogeology of all three proposed mining sites. An important example is the absence in any of the application documents I have reviewed of structural cross-sections or fence diagrams, which graphically depict the geologic strata of a site, correlated by elevation. These are tools of geologic interpretation used to observe the existence and magnitude of subsurface faults. Stratigraphic cross-sections included in HRI's environmental and technical reports for *each* of the three sites are correlated *by formation*, not by elevation, and as such have no value in determining the magnitude or even the existence of faults.[8] I want to stress that the lack of such critical geologic interpretative data that explicitly address the issue of faulting is a *projectwide* problem; it is not particular to Section 8 or any other subunit of the CUP. Accordingly, I am of the opinion that this critical issue should be addressed in the hearing because it goes to the heart of whether HRI will be able to contain lixiviant in the ore zones at *all three sites*.

10. Dr. Neuman's Concern. At about the same time that Dr. Abitz and I submitted affidavits stressing the importance of having a clear and complete understanding of the conceptual hydrogeology of the proposed mining sites, an internationally recognized hydrologist and part-time consultant to the NRC used the Crownpoint Uranium Project as one of three "case studies" to illustrate "the complexity of hydrogeologic conceptualization, its numerous pitfalls and potential to

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Place or Purpose of Use and Points of Diversion of Underground Waters, before the New Mexico State Engineer (March 24, 1998).

[8] I should note here that HRI's groundwater modeling consultants asserted that they "examined in detail" "*structural cross sections* prepared by HRI" for the Crownpoint site to conclude that "there is no indication that faults . . . are present within the mine area." Geraghty and Miller, Inc., Analysis of Hydrodynamic Control, HRI, Inc., Crownpoint and Church Rock New Mexico Uranium Mines (October 7, 1993) (NRC PDR ACN 9312160178) (hereinafter "Geraghty and Miller Report"). Geraghty and Miller Report at 3 (emphasis added). For the Church Rock site, the consultants reached a nearly identical conclusion: "A review of *structural cross sections* prepared by HRI indicates that no significant faults are present within the Churchrock Mine area." Id. at 7 (emphasis added). If such cross-sections exist, they were not included in any of the license application documents I reviewed.

constitute a major source of uncertainty in assessing the expected safety performance" of a particular site. Holonich Memorandum I, Neuman Presentation at 1. In a presentation to the NRC Staff on January 29, 1998, Professor Shlomo P. Neuman, a hydrologist at the University of Arizona, wrote that HRI's modeling of the Westwater Aquifer as "hydraulically uniform, isotropic and perfectly confined" failed to consider that drawdown effects of pump tests often are obscured in a "multiaquifer" setting, as in the case of the CUP. Id., Attachment at 16. Professor Neuman concluded that the "hydrogeologic [c]onceptual [f]ramework behind the FEIS [for the CUP] is flawed (neither realistic nor conservative) and therefore indefensible."[9] Id. I have reviewed Dr. Neuman's findings and concur in his conclusion that the conceptual framework is flawed and indefensible.

11. Aquifer Test Results. In my view, a very important issue in this case is the proper interpretation of aquifer pump test results. As I stated in both of my previous affidavits, "pump tests and pump-test data are the best tools for determining aquifer interconnections." Wallace Affidavit II, ¶ 20. HRI, the NRC Staff, and the Intervenors all take different general positions on the use of pump tests, and the differences are significant. In my view, despite deficiencies in the design and implementation of HRI's 1991 pump tests at the Crownpoint site, the results indicated interaquifer communication.[10] Wallace Affidavit I, ¶ 27. HRI interpreted the same tests to show that there is no interaquifer communication. HRI, Inc., Crownpoint Project In Situ Technical Report (June 12, 1992), at 55. Reversing an earlier position that aquifer pump testing is necessary, the NRC recently distanced itself from relying on any previous pump-test data in favor of much less reliable water level

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[9] I was not present for Professor Neuman's January 29 presentation, but examined closely a NRC Staff memorandum to which was attached copies of the overheads from his presentation. I also was not present at a March 19 teleconference between the NRC Staff and Dr. Neuman. (It is my understanding that a request by counsel for ENDAUM and SRIC to be present on that call was denied by the NRC Staff.) In a memorandum summarizing Dr. Neuman's views during that call, the NRC Staff stated that Dr. Neuman:

> did not indicate it was his opinion that the staff's conclusions were wrong regarding the potential for vertical excursions to occur at the [Crownpoint] site. Furthermore, he did not specifically identify anything in NUREG-1508 that he believed would disqualify the site from ISL mining. Instead, he was concerned the staff had assumed the aquifers beneath the proposed sites are not hydraulically connected, and that NUREG-1508 does not contain a compelling argument showing the geologic materials of the Brushy Basin Shale will adequately prevent vertical excursions."

Holonich Memorandum II at 2.

[10] As I pointed out in my January and March affidavits, *previous* pump test data and historic water level data from monitoring wells at the Unit 1 and Crownpoint sites, *when analyzed by the appropriate "leaky aquifer" method* (Wallace Affidavit I, ¶¶ 23-26), indicate that the Westwater Aquifer and the overlying Dakota Aquifer have "significant hydraulic connection" through the intervening Brushy Basin Shale. Wallace Affidavit I, ¶ 27; Wallace Affidavit II, ¶¶ 20-23.

data that, in my professional opinion, do not by themselves prove aquifer confinement. Wallace Affidavit II, ¶ 19.[11] The correct resolution of these differing approaches is significant for all of the proposing mining sites, and therefore should not be addressed piecemeal.[12]

12. In summary, these commonalities underscore my view that there is no valid scientific reason to split up this hearing along geographic lines.

II. Critical Hydrogeologic Deficiencies of the Application Should Have Been Resolved Prior to Licensure, and Will Not Be Resolved by the License's Conditions.

13. In several previous pleadings in this case, Intervenors ENDAUM and SRIC have noted critical deficiencies in HRI's description and discussion of the hydrogeology of the three mining sites.[13] In my view, these deficiencies raise significant questions about HRI's ability to protect groundwater quality in conducting the Crownpoint Uranium Project, such that they should have been resolved before the HRI license was issued. Moreover, resolution of these deficiencies would require much more than the "fine-tuning" asserted by HRI.[14] Summarized, these deficiencies include, but are not limited to:

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[11] An NRC Staff hydrologist's statement in February that "[t]he staff did not rely on the cited pump tests in making decisions on vertical confinement at the HRI project site" (Ford Affidavit, n. 10 at 21, cited in Wallace Affidavit II, ¶ 19) stood in stark contrast with the much-repeated conclusion in the FEIS that "[n]o aquifer interconnection was detected by the [HRI pump] test[s]" (FEIS at 3-29, 3-31, 3-35; Wallace Affidavit II, n. 12 at 14). What was troubling about this admission was not so much NRC's backtracking on a crucial component of the project, but on its insistence that vertical confinement can be demonstrated on the basis of six different factors, none of which include results of previous pump tests. The six factors cited by the NRC staff were, in summary form, (1) thickness of "confining unit" between Westwater and Dakota; (2) water level differences between the Westwater and Dakota; (3) sealed boreholes in mining areas; (4) lined and grouted mine shafts at Crownpoint site; (5) "lack of significant displacement" of sands in Westwater; and (6) "commitments by the applicant" to conduct new pump tests, monitor overlying aquifers, and tests wells for integrity. Holonich Memorandum I at 2-3.

[12] Moreover, as discussed in ¶ 15 below, it is unlikely that additional aquifer testing, required by Licensing Condition 10.23, will shed any new light on whether there is interaquifer communication.

[13] See, e.g., Petitioners ENDAUM and SRIC's Second Amended Request for Hearing, Petition to Intervene, and Statement of Concerns (August 19, 1997), at 33-75; Abitz Affidavits I and II; and Wallace Affidavits I and II (hereinafter, "ENDAUM-SRIC Second Amended Request").

[14] HRI Bifurcation Request at 5.

- Inaccurate conceptualization and characterization of the hydrogeology of the Westwater Canyon Aquifer's heterogeneous sandstones (ENDAUM-SRIC Second Amended Request at 43-45 and Exhibits 18 and 19; Abitz Affidavit I, ¶¶ 7-13; Wallace Affidavit I, ¶¶ 5-9) (see also ¶¶ 7, 8 above);

- Inadequately designed and implemented aquifer pump tests at the Crownpoint site (Wallace Affidavit, ¶¶ 17-27) (see also ¶ 11 above);

- Selection of the wrong model for evaluating aquifer confinement at all three sites and fundamental errors in ground-water modeling (Id., ¶¶ 23-27, 31-40; Wallace Affidavit II, ¶¶ 19-26);

- Evidence of lack of confinement of the Westwater Canyon Aquifer by the overlying Brushy Basin Shale at the Crownpoint site (Wallace Affidavit I, ¶ 27);

- No aquifer pump test information for Section 17 at the Church Rock site where underground mine workings have perturbed the hydrogeologic setting (see, n. 13, ¶ 18 of this affidavit; see, also, ENDAUM-SRIC Second Amended Request at 73-74);

- Groundwater velocities at the Unit 1 site three orders of magnitude *faster* than those calculated by HRI (Wallace Affidavit I, ¶¶ 10-15; Wallace Affidavit II, ¶¶ 14-17);

- Inappropriately designed (i.e., uniformly spaced) monitoring-well networks at all three sites (ENDAUM-SRIC Second Amended Request at 49-53; Abitz Affidavit I, ¶¶ 14-20; Wallace Affidavit II, ¶¶ 11-13);

- Inappropriate and inadequate definitions of excursions (ENDAUM-SRIC Second Amended Request at 53-61; Abitz Affidavit I, ¶¶ 21-26);

- Fundamental concerns about HRI's ability to restore groundwater to baseline conditions (Abitz Affidavit I, ¶¶ 27-36); and

- The applicability of a restoration demonstration at the Church Rock site (presumably, in Section 8) to conditions at any of the other three proposed mining sites. ENDAUM-SRIC Second Amended Request at 67-69; see, also, License Condition 10.28.

Together, these deficiencies leave substantial doubt about whether HRI will be able to contain pregnant lixiviant within the mining zones, detect excursions from the mining zones, and restore polluted groundwater to premining, baseline conditions.

14. Moreover, in my view, these problems are too serious and too numerous to be remedied by license conditions. For instance, as discussed above in ¶ 11, aquifer pump tests, when evaluated correctly, indicate that there is interaquifer communication in the Westwater. By imposing a license condition requiring further pump testing (LC 10.23), the NRC Staff has affectively postponed until a later date resolution of a fundamental issue regarding the safety of the project — whether the CUP has *adequate confining layers overlying and underlying the mining zones.* Moreover, the resolution of this important issue was delegated to HRI's Safety and Environmental Review Panel, not to the NRC Staff.

15. In addition, notwithstanding the proven efficacy of aquifer pump tests to determine aquifer characteristics and interaquifer connections, it is my professional opinion that the deficiencies observed in the design and implementation of HRI's previous pump tests and in the interpretation of the results of those tests will not be resolved by LC 10.23. The new groundwater pump tests required by LC 10.23 are unlikely to change any of the aquifer parameters or yield new information verifying geologic confinement, since aquifers do not evolve hydraulically over such a short period of time.

16. In summary, the HRI license application contains critical deficiencies that are far too significant and numerous to be cured by license conditions. Moreover, I do not believe that additional information gathered under the license conditions will demonstrate the safety of the HRI project. Thus, there is no reason to delay addressing the fundamental problems with the entire HRI license.

III. From a Hydrogeologic Perspective, Sections 17 and 8 of the Church Rock Site Should Be Considered Together, Not Separately.

17. HRI's proposal to split the Church Rock site into two units (i.e., Section 8 and Section 17), and to conduct a hearing limited only to issues relevant to Section 8, is not defensible scientifically, for several reasons. First, the ore bodies, consisting of several stacked sinuous channels, form continuous zones across Section 8 to the north and Section 17 to the south. In fact, the only "break" between the sections is the section boundary, which is a geographic and political demarcation that has nothing to do with the subsurface environment. Otherwise, the same aquifer, the Westwater Canyon Member, and the same overlying and underlying formations are involved at both sections. See, generally, Section 2.7 of Church Rock Revised Environmental Report, HRI, Inc. (March 1993). Moreover, as a practical matter, HRI's license application has considered the Church Rock site as a whole at least since 1993 when Section 17 was added to the CUP. COP Revision 2.0 at 9.

18. Second, the mining sequence anticipated by HRI would have injection beginning in the southern portion of Section 8 and working northward, in the general down-gradient direction of groundwater flow and the dip of the beds. Id., Figure 1.4-8 at 22. Mining would then move to Section 17, progressing southward in an *upgradient* direction. Id., Figures 1.4-6 and 1.4-7 at 18-19.

Mining Section 8 first and Section 17 second would be extremely imprudent and could compromise the eventual cleanup of the site, a bad idea hydrologically, because the mining sequence between the two sections would proceed in a direction, north to south, that is *opposite* to that of the groundwater flow, which is south to north. Accordingly, a lixiviant-mobilized contaminant plume escaping from a wellfield in Section 17 would not be recaptured by the nearest wellfield in Section 8, which presumably would already have been mined and restored.

19. Third, the extensive underground mine workings[15] in Section 17 represent a major hydrologic feature of the entire Church Rock site, and would have to be considered even if the hearing were "limited" to issues related only to Section 8. In other words, the hydrology of Section 8 cannot be considered independent of the hydrology of Section 17 because a single, hydraulically connected hydrologic system underlies the entire site. As I noted above, the mine workings in Section 17 are hydraulically *upgradient* of the ore bodies in Section 8 and therefore are assured of having a profound effect on the hydrology of Section 8.[16] As an experienced, professional groundwater modeler, I would account for the effect of the mine workings in modeling groundwater flows at the Church Rock site. In my opinion, HRI's determination that it was not necessary to account for the hydrologic effects of the mine workings was a serious error in HRI's modeling of the hydrology of the Church Rock site, and throws into question the accuracy and validity of those results.[17] See, HRI Response to NRC Request for Additional Information ("RAI") No. 87, attached to letter from Mark S. Pelizza, HRI, to Joseph Holonich, NRC Staff (April 1, 1996) (NRC PDR ACN 9604030208).

20. Finally, because of the underground mine workings, Section 17 presents special restoration problems that are not likely to be anticipated by the pilot restoration demonstration,

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[15] The mine workings are shown in Figure 2.6-12 of HRI's Church Rock Revised Environmental Report (March 1993).

[16] Based on my inspection of various documents in this case, including HRI's Church Rock Revised Environmental Report of March 1993, I do not believe that HRI has ever conducted an aquifer test in Section 17 in or adjacent to the underground mine workings. Thus, the aquifer properties are in Section 17 are not actually known at this time.

[17] It's worth noting here that, in my opinion, the AQUASIM model used by HRI's consultants is not appropriate for the geologic heterogeneity encountered at the Church Rock site. See, Attachment 87-1 to HRI Response to NRC RAI No. 87. I would note further that HRI's consultants used aquifer parameters derived from pump tests conducted in Section 8 to model groundwater flows in both Section 17 and Section 8. HRI Response to NRC RAI No. 87 at 2. Those parameters may or may not be applicable to flows in Section 17 because they were derived from hydrologic conditions particular to Section 8.

which would occur in Section 8 and is required by License Condition 10.28. Restoration in Section 8 will be done entirely in porous sandstone, not in flooded mine caverns. Restoration in Section 17 would encounter much larger volumes of contaminated groundwater, thereby increasing the volume of restoration wastewater that must be disposed.

Summary of Conclusions:

20. For the reasons set forth herein, it is my professional opinion that because of (1) the commonality of critical, unresolved hydrogeologic issues, (2) the significance of the deficiencies in the HRI license and the unsuitability of addressing them through license conditions, and (3) the unique characteristics of the Church Rock site warranting unified treatment, the Crownpoint Uranium Project should be reviewed in this proceeding in its entirety.

I declare on this 2nd day of September 1998, at Albuquerque, New Mexico, under penalty of perjury that the foregoing is true and correct.

Michael G. Wallace

Sworn and subscribed before me, the undersigned, a Notary Public in and for the State of New Mexico, on this 2nd day of September 1998, at Albuquerque, New Mexico. My Commission expires on 12-26-99. Adelfa M. Adelke, Notary NM