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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL ADJUDICATION STAFF

OFFICE OF SECRETARY  
RULEMAKING AND  
ADJUDICATION STAFF

Before Administrative Judges:  
Peter B. Bloch, Presiding Officer  
Thomas D. Murphy, Special Assistant

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	)	
	)	

HYDRO RESOURCES, INC.'S RESPONSE  
TO LBP 99-15 MEMORANDUM AND ORDER (QUESTIONS CONCERNING  
RADIOACTIVE AIR EMISSIONS)

I. INTRODUCTION

Hydro Resources, Inc. ("HRI") respectfully submits the following in response to LBP 99-15 Memorandum and Order (Questions Concerning Radioactive Air Emissions), dated March 18, 1999 (hereinafter, "Memorandum"). In LBP 99-9, the Presiding Officer posed five (5) questions to the parties<sup>1</sup> relating to Intervenor Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Center ("SRIC") (hereinafter "Intervenor") allegations regarding air emissions contained in their written presentation of January 11, 1999. Specifically, the Presiding Officer expressed concern regarding Intervenor's claim that "HRI and NRC Staff fail to provide reasonable assurance that radioactive emissions from the Crownpoint Project will be maintained within the regulatory limits in 10 C.F.R. Part 20

<sup>1</sup> The Presiding Officer's question regarding whether the FEIS adequately addressed the combined impacts of radiation from the project and from elevated radiation in the area of the project need only be addressed by NRC Staff as HRI and ENDAUM/SRIC have already submitted a responsive discussion. See Mem. at 11.

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... as existing non-background levels of radiation at the Church Rock [sic] already exceed regulatory limits, thus precluding the addition of a new source that would further jeopardize public health and safety.” See Mem. at 2. In addition, the Presiding Officer expressed concern regarding Intervenors’ assertion that the FEIS “misrepresents, distorts, or fails to disclose key information about the significant impacts of airborne emissions . . . .” The Presiding Officer concerns should be allayed however, as Intervenors’ claims are unfounded because they are based on a misunderstanding of the facts and the law.

## II. DISCUSSION

Prior to addressing the specific factual questions calling for empirical evidence and analysis posed by the Presiding Officer in LBP 99-9, it is necessary to briefly revisit the legal issue posed by Intervenors’ complaints and the Presiding Officer’s questions. In sum, Intervenors’ allegations (and for that matter the Presiding Officer’s questions) can be boiled down to a simple issue: whether HRI and NRC Staff correctly addressed potential radiation exposure resulting from operations at Church Rock Section 8. More specifically, whether HRI’s operations at Church Rock Section 8 will comply with 10 C.F.R. § 20.1302(b) which requires HRI to show compliance with the annual radiation dose limit by demonstrating through measurement or calculation that the total effective dose equivalent (“TEDE”) to the individual likely to receive the highest dose from the licensed operation does not exceed the annual dose limit. See 10 C.F.R. §§ 20.1301, 20.1302(b); Mem. at 10.

Intervenors, relying in part on the testimony of Bernd Franke, complain that when calculating the dose in the Environmental Report (“ER”) and FEIS, HRI and the Staff improperly excluded contributions from sources of radon and gamma radiation at Church Rock Section 8 by

“mischaracterizing them as natural background.” Mem. at 2; Intervenor’s Brief at 8. Thus, Intervenor’s complaint hinges on the legal definition of “background radiation.”

Recognizing this fact, the Presiding Officer looks to 10 C.F.R. § 20.1301 and the definition of “background radiation” set forth at 10 C.F.R. §§ 40.4 and 20.1003. See Mem. at 5-

6. 10 C.F.R. § 20.1301 states:

- (a) Each licensee shall conduct operations so that--
  - (1) The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 millisievert) in a year, exclusive of the dose contributions from background radiation . . . .

(emphasis added); Mem. at 6. As the Presiding Officer points out, “this definition places a limit on the “total effective dose equivalent” and “then defines a class of contributions to dose that are excluded,” e.g., background radiation. Thus, the Presiding Officer correctly concluded that “if the source of a dose is not excluded then it is included in the total effective dose equivalent from licensed operations, for the purpose of complying with 10 C.F.R. §§ 20.1301 and 20.1302.” Id.

Since background radiation is excluded from the TEDE, it is important to understand the legal definition of background when calculating the TEDE for purposes of complying with NRC regulations. The regulatory definition of background radiation is:

“Background radiation” does not include radiation from source, byproduct, or special nuclear materials regulated by the Commission.

10 C.F.R. § 40.4 and 10 C.F.R. § 20.1003 (emphasis added). Thus, as the Presiding Officer states at page 6, “background radiation *includes* radiation from ‘naturally occurring radioactive material’” (“NORM”), id., but does not include radiation from source or byproduct material that is regulated by the Commission. Therefore, if source or byproduct material is regulated by the

Commission, it does not fall within the definition of background radiation and must be considered when calculating the TEDE. It is therefore necessary to determine whether any material at Church Rock Section 8 contains source, byproduct or special nuclear materials regulated by the Commission in order to determine whether the TEDE was correctly calculated by HRI and the Staff.<sup>2</sup>

There are no source, byproduct or special nuclear materials regulated by the Commission at the Church Rock Section 8 site.<sup>3</sup> See Pelizza Affidavit at E1. Accordingly, any radiation from source material, byproduct material or special nuclear material located at Church Rock Section 8 falls within the definition of "background radiation" and should be excluded from the calculation of the TEDE. For this reason, HRI and the Staff properly did not include radiation from source, byproduct material, or special nuclear material in their calculation of the TEDE.

With respect to the remaining questions posed by the Presiding Officer in LBP 99-9, the attached affidavits of Douglas B. Chambers, Ph.D. and Mark S. Pelizza specifically address the questions and provide empirical and analytical support for the Staff's determinations in granting HRI its license to operate.

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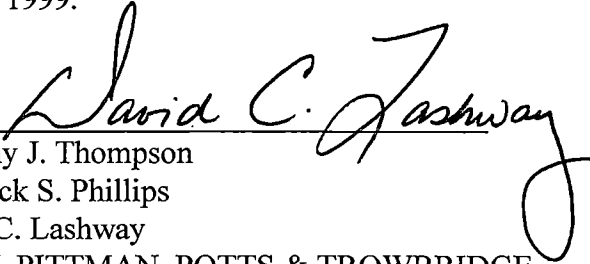
2 Intervenor's seem to ignore the plain language of the regulation with respect to the exemption from the definition of background for source, by product and special nuclear material regulated by the Commission. Intervenor's reading is incorrect because otherwise reference to "regulated by the commission" would be "mere surplusage, entirely without meaning." Marbury v. Madison, 5 U.S. 137 (1803); Jay v. Boyd, 35, U.S. 345 (1956).

3 While there may be materials at the Church Rock Section 8 site meeting the definition of source material, they are not presently, nor can they be, regulated by the Commission as the NRC does not regulate natural outcrops of uranium or thorium nor does it regulate mining activities or mine wastes. See NUREG-0706, Final Generic Environmental Impact Statement on Uranium Milling (Sept. 1980) at A-94. Uranium ore only becomes material for which an NRC license is required "after removal from its place of deposit in nature." Atomic Energy Act, Section 62, 42 U.S.C. § 2092; see also April 28, 1980, NRC legal opinion, Attachment A, at 3-4 and n.6, attached Exhibit G to HRI's February 11, 1999, presentation. Moreover, any radioactive borings resulting from exploratory drilling at the site are not regulated by NRC. With respect to the presence of byproduct material at Church Rock Section 8, as there has never been any processing of any kind at the site, no byproduct material is present. See Pelizza Affidavit at E2. Finally, with regard to special nuclear materials, the Presiding Officer correctly notes that there is no reason to suspect that such materials are present at the site. Mem. at 8, fn. 5.

III. CONCLUSION

For the reasons set forth in HRI's February 19, 1999 brief regarding air emissions, those discussed above, and those in the attached Affidavit, of Douglas B. Chambers, Ph.D and Mark S. Pelizza, Intervenors' request for relief should be denied.

Respectfully submitted this 7th day of April, 1999.

  
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April 7, 1999

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

**AFFIDAVIT OF DOUGLAS B. CHAMBERS Ph.D.  
PERTAINING TO RADIATION**

**A. PERSONAL**

My name is Douglas B. Chambers, Ph.D. The factual matters set out herein are within my personal knowledge.

**B. PROFESSIONAL QUALIFICATIONS**

A detailed summary of my professional qualifications is attached to my Affidavit that was filed with HRI's Response to Petitioners' Motion to Intervene dated February 19, 1998.

**C. MATERIALS REVIEWED**

- Report of Bernd Franke attached to ENDAUMS's and SRICS's January 11, 1999 Radiation Brief.
- Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico, USNRC, 1997 (NUREG 1508).

- Affidavit of Mark S Pelizza, HRI Resources Inc., Pertaining to Radiation.

#### **D. EXPERT OPINION**

1. This Affidavit attempts to address various of the questions concerning air emissions raised in the Memorandum of March 18, 1999 from Peter B. Bloch, Administrative Judge and Presiding Officer.

##### **Ambient radon levels in the Church rock area consistent with natural background.**

2. Ionizing radiation is ubiquitous. All of us are exposed to ionizing radiation all the time. The National Council on Radiation Protection and Measurement (NCRP) in Report No. 94 (1987) describes the exposure of people in the United States to natural background radiation. According to the NCRP, the annual average radiation dose to someone living in the United States is about 300 mrems (at 48) [The millirems or mrems measure of radiation dose is in units of total effective dose equivalent or TEDE dose that is referred to in the memorandum].

3. The natural background dose is highly variable. Dr. Gail de Planque, a Commissioner of the NRC, has commented that the dose from cosmic radiation in Denver, at an elevation of about one mile, will be about a factor of 2 higher than the national average and that because of natural variations in the concentration of uranium and other radionuclides in the soil, that the natural background gamma radiation can easily vary by a factor of 10 across the country. ("In Search of ...Background" NRC Workshop on Site Characterization for decommissioning. Rockville Maryland. Nov 29, 1994).

4. All soils and rocks release radon-222 to the atmosphere. The rate of release will vary with the radium-226 content of the soil or rock and other factors. Data reported by the NCRP (ibid. at 94) suggests that [average] soils release radium-226 at the rate of about 0.5 pCi [pico curies, a measure of the amount of radioactivity] per square meter per second. For

example, an acre of soil containing radon at average levels [of about 1pCi per gram of soil] would release radon to the air at a rate of about 2000 pCi per second.

5. Radon levels in the Church Rock area would be expected to be naturally elevated as a consequence of natural geologic formations which contain elevated levels of radioactivity. Likely sources of ambient radon in the Church Rock area are the geologic outcrops of the Morrison and Dakota formations. These formations contain much of the uranium mineralization in the San Juan Basin. The attached map shows the regional extent of this outcrop which, within the area shown on the map, amounts to more than 12,000 acres. Mineralization occurs throughout the host formation typically with the highest-grade mineable ore found in the smallest areas with increasingly greater areas that contain progressively lower concentrations of uranium.

6. Thus, in addition to normal soils which release radon, the widely spread mineralization will contribute regionally to an elevated ambient natural background concentration of radon-222. NCRP Report No. 94 (at 95) provides data that indicates the ambient outdoor radon levels typically range from about 0.1pCi/L to 0.5pCi/L, with levels in Colorado Springs as high as 1.2pCi/L. Thus, ambient outdoor levels in the range of 1 to 2 pCi/L are not surprising in areas with local mineralization. Such levels are also well within the range of variability [of about 10] suggested by Dr. de Planque.

7. Given the extensive natural mineralization in the local area, natural background level in the area should be in the range of 1 to 2 pCi/L, which is consistent with the levels measured by HRI.

8. In 1985, I investigated the natural background levels of radon-222 in the region of Grants, New Mexico. ["Exploratory Analysis of Radon Data from Ambrosia Lake, New

Mexico" SENES Consultants, 1986]. Natural sources of radon in the Grants area, as in the Church Rock area, include local soils and outcroppings of naturally elevated mineralization including the Mancos shale, the Morrison formation and the Todelto formation. My analysis indicated that in the Grants area, natural outdoor ambient radon levels are likely to be in the range of 0.5 to 2.0 pCi/L, consistent with the levels measured at Springstead and the Church Rock site and in the expected range of natural variation.

**No elevated gamma radiation levels are expected outside of the licensed areas**

9. Production areas of the Crownpoint ISL project are fenced preventing access by members of the public.

10. Gamma radiation levels decrease rapidly with increasing distance from the source of the gamma radiation.

11. The USEPA also acknowledges that gamma radiation decreases rapidly with distance. In discussing radiation from uranium mill tailings piles (much larger sources of radiation than an ISL facility) the EPA states that " The gamma radiation from a pile, however, decreases rapidly with distance; at more than a few tenths of a mile from most of the inactive tailings piles, the increase cannot be differentiated from the normal background..." [Final Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites (40 CFR 192) Volume I. Oct 1982.

12. Gamma radiation should not be considered to contribute to the TEDE dose from the CUP for members of the public.

**Question 2: What portion of the TEDE dose from the Church Rock site should *not* be considered to be background radiation ?**

13. The FEIS report estimated doses [TEDE doses] for maximum releases and simultaneous operation of the Church Rock, Crownpoint and Unit 1 facilities [at 4-78]. The maximum dose estimated for the nearest resident, assumed to be adjacent to the Crownpoint

plant site, less than 0.6 miles away, is reported as 0.76mrem per year. This is less than 1% of the dose limit of 100 mrems per year. The maximum dose is an even smaller percent of natural background. If we assume a natural background of 300 mrems per year, a value which in my opinion may be too low for the Church Rock area, then the TEDE dose from the ISL operations is at most 0.25% of the TEDE dose from natural background.

**Question 3: How should the TEDE dose be calculated?**

14. The approach used by the NRC in the FEIS was appropriate for estimating the TEDE dose to members of the public. In brief, the NRC procedure involved:

- estimating the maximum release of radioactivity from the ISL facilities ( which includes radon and particulate)
- the locations of the possible receptors, especially the nearest resident, appear to be reasonable
- the MILDOS-AREA code was then used to evaluate the potential radiation doses to the various receptors
- the predicted doses were compared to regulatory standards and found to represent at most a small percent of the regulatory limit.

15. My experience suggests that the use of the MILDOS code is unlikely to underestimate the TEDE dose.

16. For reasons given earlier in this Affidavit, the contribution, if any, to the TEDE dose from regulated source material or byproduct material is inconsequential in comparison to the dose from natural background.

**Question 4: What is the appropriate location of the individual likely to receive the highest dose from the HRI Church Rock operations?**

18. The NRC [FEIS at 4-78] reports a dose of 0.25 mrems per year to the nearest resident at Church Rock receptor CRR 4. In my opinion, the NRC have properly selected this receptor location, located a few hundred feet north-east of the brine concentration pond at Church Rock.

19. The NRC [FEIS at 4-78] reports doses for numerous receptors at Crownpoint, Unit 1, and at Church Rock.

**Question 5: How did you determine the geographic area that should be considered part of the HRI operations?**

20. The geographic area is determined by the area licensed for operations.

**Question 6: Has the FEIS adequately addressed the combined impacts of radiation from the project and from elevated levels of radiation in the area?**


21. The generally accepted practice is to assess the incremental levels of radiation dose from the operations against relevant standards. In my opinion, this has been properly done.

22. In my opinion, the elevated levels of radioactivity in the region are from natural sources not man-made sources.

FURTHER AFFIANT SAYETH NOT

I swear under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Dated this 7<sup>th</sup> day of April 1999 at Toronto, Ontario, Canada.

  
Douglas B. Chambers, Ph.D.



April 5, 1999

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before Administrative Judges:  
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_____	)	

**AFFIDAVIT OF MARK S. PELIZZA  
PERTAINING TO RADIATION**

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

**A. PERSONAL**

My name is Mark S. Pelizza. The factual matters set out herein are within my personal knowledge or my corporate knowledge within my official capacity as set out herein. The factual matters set out herein are based upon data and analytic techniques reasonably and customarily used by qualified environmental professionals to form opinions and draw scientific inferences for the purposes of important health, safety, environmental and regulatory decisions.

**B. PROFESSIONAL QUALIFICATIONS**

I am Vice President of Health, Safety and Environmental Affairs with Uranium Resources, Inc., parent company to HRI, Inc. and URI, Inc. A complete discussion of my qualifications is presented with my Affidavit Pertaining to Groundwater Issued Dated February 19, 1999.

**C. MATERIALS PREPARED**

All of the submittals that are shown within Attachment A of SUA-1508 were either prepared by me or under my direct supervision. I prepared the Crownpoint Uranium Project Consolidated Operations Plan Revision 2.0, August 17, 1997. (COP Rev. 2.0)

**D. MATERIALS REVIEWED**

- Report of Bernd Franke attached to ENDAUMS's and SRICS's January 11, 1999 Brief
- Testimony of Dr. Christine J. Benally attached to ENDAUMS's and SRICS's February 19, 1999 Environmental Justice Brief

**E. MATERIALS AT SITE**

1. There are no source, byproduct or special nuclear materials regulated by the Commission at the Church Rock Section 8 site.
2. A review of the history of the Church Rock Section 8 site shows that there has never been any processing of any kind at the Site, therefore, no byproduct material is present.

**F. RESTRICTED AREAS AND CONTROLS**

3. The CUP is designed to restrict the public's access to radioactive materials. The COP Rev. 2.0 commits 62 single spaced pages to the Radiation Safety program at the Crownpoint Uranium Project and includes a description of how the site will be restricted, and

essentially all of the components of occupational and environmental radiation safety, instrumentation, monitoring, transportation, management, quality assurance ... etc.

4. Church Rock Restricted Area as defined by 10 C.F.R. § 20.1003 will be inside of the License Area.

5. The COP Rev. 2.0 § 9.13 further describes the restricted area and the security that will be maintained to prevent public access to the restricted area as follows:

“HRI will minimize access, and provides accountability for all persons entering the CUP restricted area. Restricted areas will include the CCP, and individual satellites. The restricted area includes the facilities inside the fenced area of the CUP. This will include all buildings, and wellfield patterns, and associated equipment. Access to this area will be through the main gate which will be electronically controlled, and will only be opened by entering a combination into the key pad, or by contacting a HRI employee inside the property on the call box.

All non-employees entering the CUP will be required to log in at the main office after receiving visitor training or, as appropriate for the work they will be performing. The combination to the main gate will be changed at irregular intervals to ensure that the restricted area security is maintained.”

6. Access to the CUP facilities will be off limits to the general public, and intervenors concerns pertaining to radiation that may be measured in the restricted areas cannot be compared to the radiation released to the general public. This would include radiation and environmental justice, because the “community” will not be allowed access where they could receive exposure. Cumulative impacts inside the restricted area are not an issue because the restricted area is controlled by HRI and will be subject to NRC decommissioning before it will be opened to unrestricted use. Only the affects of radiation outside the restricted area are eligible

for cumulative radiation impact evaluation and potential impact to the local community. Attachment 2 contains a map that shows the approximate location of a fence that would surround the proposed facilities at the Church Rock site. This fence would mark the restricted area boundary.

#### **G. MONITORING**

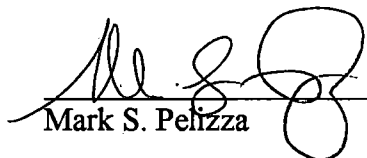
7. The general components of the radiological monitoring program are presented in the COP Rev. 2.0 pp. 101-106. LC 10.30 strengthens the monitoring requirement by requiring a procedural-level, detailed effluent environmental monitoring program approved before lixiviant injection begins. HRI will have to demonstrate with empirical monitoring results that the exposure to the public meets the requirements of 10 C.F.R. Part 20. Monitoring analysis will be performed on a short enough frequency to assure trends can be measured and action taken well in advance of the time that an annual cumulative exposure would occur. All of HRI's monitoring results will be subject to NRC inspection and enforcement.

8. Included in the monitoring program will be a station at residence CRR4. HRI has elected CRR4 as the closest residence because of simple distance and because it is directly in the downstream path of the prevailing wind. Radon, radon progeny and direct gamma radiation will be measured at this location to prove compliance with 10 C.F.R. § 20.1301(a)(1).

FURTHER AFFIANT SAYETH NOT.

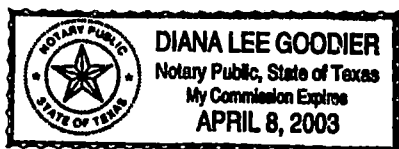
I swear under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Dated this 5th day of April, 1999.

  
Mark S. Pelizza

Voluntarily signed and sworn to before me this 5th day of April, 1999, by the signer, whose identity is personally known to me or was proven to me on satisfactory evidence.

  
NOTARY PUBLIC



STATE OF TEXAS  
COUNTY OF DALLAS

My Commission Expires: April 8, 2004