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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD PANEL

OFFICE OF SECRETARY
RULEMAKING AND
ADJUDICATIONS STAFF

Before Administrative Judge Peter B. Bloch

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

Docket No. 40-8968-ML

ASLBP No. 95-706-01-ML

**ENDAUM'S AND SRIC'S RESPONSE TO HRI'S AND NRC STAFF'S ANSWERS
TO LBP-99-15, QUESTIONS CONCERNING RADIOACTIVE AIR EMISSIONS**

Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest
Research and Information Center ("SRIC") hereby respectfully submit their response to
Hydro Resources Inc.'s ("HRI's") and the NRC Staff's responses to the questions posed by
LBP-99-15.¹ Hydro Resources, Inc.'s Response to LBP-99-15 Memorandum and Order
(Questions Concerning Radioactive Air Emissions) (April 7, 1999) ("HRI Response");
Letter from John Hull, NRC counsel and Affidavit of Christopher McKenney (April 7,
1999) ("McKenney Affidavit"). This response is supported by the attached Response
Declaration of Bernd Franke ("Franke Response") (Exhibit 1), and by the Response
Affidavit of Dr. Richard J. Abitz ("Abitz Response") (Exhibit 2).

In their responses to LBP-99-15, neither HRI nor the Staff presents any new

¹ LBP-99-15 provides that each response shall be limited to 12 pages. *Id.* at 11.
Because this filing combines ENDAUM's and SRIC's responses to the Staff and HRI, it is
less than 24 pages in length including this brief and the attached affidavits.

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evidence regarding air emissions at Church Rock beyond the data collected in 1987 and 1988, which are reported in HRI's 1993 Environmental Report and discussed in ENDAUM's and SRIC's presentation on air issues. Those data indicate ambient levels of radioactivity are extremely high. Instead, HRI and the Staff propose various theories to explain why, despite this situation, the HRI project emissions would be acceptable. And, the Staff argues the project emissions were adequately addressed in the Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico NUREG-1508 (February 29, 1997) ("FEIS") (Hearing Record ACN 9703200270). These theories not only contradict NRC standards for radioactive emissions and the requirements of NEPA, but they are inconsistent with each other.

I. HRI AND THE NRC STAFF MISINTERPRET THE SCOPE OF 10 C.F.R. PART 20 IN RESPONDING TO QUESTIONS 2 AND 3 IN LBP-99-15.

HRI's and the Staff's responses to LBP-99-15 Questions 2 and 3 are based on a misrepresentation of the NRC regulatory framework. HRI asserts that it "is 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." HRI Response at 4. On page 4 of his affidavit on behalf of the Staff, Mr. McKenney states that "[t]he key factor is whether the licensed activity itself will meet the 100 millirem requirement." In 10 C.F.R. § 20.1001(b) and in other forums, however, the Commission has repeatedly stated that the

100 mrem annual dose limit is designed to protect the public from radiation doses from all man-made sources. See ENDAUM's and SRIC's Response to LBP-99-15, at 1-6 (April 7, 1999) ("ENDAUM's and SRIC's Response").

Mr. McKenney admits that there is a "relatively high concentration of old uranium mines in the Church Rock chapter area", and therefore "these sites could potentially be a substantial source for the difference in the measured background radon concentrations between HRI's Church Rock site and the town of Crownpoint." McKenney Affidavit at 5-6. To avoid including these sources in the calculation of the public dose, however, he argues the abandoned mines cannot be included in the calculation, because they are "technologically enhanced, naturally occurring radioactive material," ("TENORM") which is not regulated by the Commission. *Id.* at 5. Mr. McKenney is incorrect. NRC regulations do not include TENORM in the definition of "background" radiation that is not subject to Part 20 dose limits. Nor do NRC regulations even contain a definition of TENORM. As explained in detail in ENDAUM's and SRIC's responses to LBP-99-15, 10 C.F.R. Part 20 sets an annual public dose limit from all anthropogenic sources, excluding only natural background, global fallout from weapons testing and accidents, and medical-related doses. ENDAUM and SRIC Response at 1-6.

TENORM is a regulatory term used only by the EPA for purposes of regulating emissions which are not otherwise subject to its jurisdiction. The term is broadly described by the EPA as:

exposure to natural sources of radiation which is increased by (or would not occur without) a human activity. Examples of such sources include radon and its progeny accumulated in buildings; wastes from mineral ores, including ores which are mined for uses or purposes other than for their radioactive isotopes; wastes and/or emissions from the burning of coal, oil and natural gas; ion exchange resins and sludge from drinking water treatment; scale in oil and gas-field piping; articles made from naturally occurring radioactive materials, such as thorium in lantern mantles and in certain optical glasses, and uranium in certain ceramic glazes; and cosmic rays experienced during high altitude airplane flights.

Proposed Rule, Federal Radiation Protection Guidance for Exposure of the General Public, 59 Fed.Reg. 66414, 66415, 66427 (December 23, 1994).² It is important to note that the EPA recommends including TENORM in calculating the recommended 100 mrem/yr annual public dose limit. In situations where the 100 mrem limit cannot be reasonably achieved, such as the case of "individuals living near radioactive contamination that has not yet been cleaned up," EPA recommends that the dose may be temporarily allowed to increase to a limit of 500 mrem. *Id.* at 66421. EPA cautions that such exceptions "should be made only for highly unusual circumstances" and should make authorization of an exception public record. *Id.* at 66425.

The NRC has never created a category of TENORM in its regulation. The NRC considered and failed to adopt a specific proposal to include TENORM as a part of the

²In support of his argument, Mr. McKenney relies solely on a report produced by the National Academy of Sciences for the Environmental Protection Agency ("EPA"), Evaluation of Guidelines for Exposures to Technologically Enhanced Naturally Occurring Radioactive Materials. McKenney Affidavit, note 5. This report specifically states that it is concerned only with the EPA's regulation of TENORM, and specifically excludes consideration of materials produced in the nuclear fuel cycle. Evaluation of Guidelines, executive summary, at 2.

definition of background. When Part 20 was first revised to include a general public dose limit the following definition was proposed:

"Natural background exposure" means exposure to cosmic and terrestrial sources of naturally occurring radioactive material, including technologically enhanced radioactive material, such as plasterboard and fertilizer, but not including byproduct material or radioactive material specifically intended to be a radiation source.

Standards for Protection Against Radiation; Republication, proposed rule, 51 Fed.Reg. 1092 (January 9, 1986).³ The present definition of background, however, contains no reference to TENORM. 10 C.F.R. § 20.1003.

Significantly, the U.S. Department of Energy ("DOE") specifically excludes TENORM from its definition of background material in a 1993 regulation for occupational radiation protection of workers at its facilities, which DOE asserts is designed to be consistent with the NRC definition of background in 10 C.F.R. Part 20. Final Rule, Occupational Radiation Protection, 58 Fed.Reg. 65458, 65464-65, 65466-67 (December 14, 1993). The DOE's definition of "background" is radiation from:

- (i) Naturally occurring radioactive materials **which have not been technologically enhanced;**
- (ii) Cosmic sources;
- (iii) Global fallout as it exists in the environment (such as from the testing

³Notably, even this proposed definition does not link abandoned mines with background radiation, but rather focused on common household sources of TENORM such as plasterboard and fertilizer. These sources are distinct in that they are more difficult to document or measure than radioactive emissions from former uranium mines.

of nuclear explosive devices);

(iv) Radon and its progeny in concentrations or levels existing in buildings or the environment which have not been elevated as a result of current or prior activities; and

(v) Consumer products containing nominal amounts of radioactive material or producing nominal amounts of radiation.

Id. at 65486; 10 C.F.R. Part 835.2 (emphasis added). The only difference between this rule and the NRC's definition of background is the inclusion of consumer products by DOE.

Accordingly, technologically enhanced sources of radiation are not included in the NRC's definition of background radiation. Moreover, HRI's argument that anything which is not source, byproduct, or special nuclear material regulated by the Commission constitutes background is fallacious. HRI Response at 3-4. The first sentence of the definition of background radiation establishes what is included in background. The last sentence of the definition is not superfluous; it clarifies some of the emissions sources that are not included in background.

Moreover, even if TENORM emissions were to be included in the NRC's definition of naturally occurring background, the NRC has not demonstrated that the emissions at the Church Rock site come primarily from TENORM. As discussed in the Franke Response at 2-3, and the Abitz Response at 3-5, the data provided in HRI's Environmental Report provides an insufficient basis for determining whether or not

source material constitutes a significant contributor to the radiation levels on the site. Moreover, the Staff's attempt to argue that the mine shafts from which radon is emitted constitute TENORM is inconsistent with the regulations and with Mr. McKenney's own pronouncements. Franke Response at 3-4. Source material is uranium "in any physical or chemical form" that is at least 0.05% by weight. 10 C.F.R. § 20.1003. Uranium does not need to be removed from the ground to become source material. Franke Response at 3. And, as noted by Mr. Franke, the Staff ignores the source and byproduct material that likely remains on the surface of the old mining and milling site in Church Rock. *Id.* at 4.

II. THE STAFF'S RESPONSE TO LBP-99-15 QUESTION 6 DEMONSTRATES THE FEIS IS INADEQUATE WITH REGARD TO RADIOACTIVE AIR EMISSIONS.

The Staff's response to Question 6 regarding the FEIS only served to confirm ENDAUM's and SRIC's claim that the preparation of the FEIS violated of the National Environmental Policy Act ("NEPA"). *See* ENDAUM and SRIC Air Brief at 19-23. First, the Staff confirms that it looked at the impacts of HRI's own operation in a vacuum without considering the combined impacts of ongoing and future radiological emissions. The Staff admits that "the FEIS was not prepared in order to evaluate impacts of prior uranium mining. The object of the FEIS was to evaluate the impacts of the ISL mining as proposed by HRI." McKenney at 9. The Staff's failure to consider the impacts of the proposed action in the larger context of combined ongoing and future impacts constitutes a clear violation of NEPA. Baltimore Gas & Electric Company v. Natural Resources

Defense Council, 462 U.S. 87, 106-107 (1983); Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989).

Second, Mr. McKenney's assertion that the addition of HRI's projected emissions is small in comparison is beside the point. HRI's emissions are not adequately reported and he fails to address Mr. Franke's criticisms. See Franke Response at 4. Moreover, even assuming that his calculations of the project dose are correct, the FEIS misrepresents the condition of the affected environment and utterly fails to honestly assess the total impacts of the project. With the public already receiving such a high dose of radiation from prior mining, Mr. McKenney should have considered whether any increase to that dose is at all appropriate. The Staff's approach in the FEIS is akin to a man telling a friend he can drive the friend home because he only had one drink at the bar, without disclosing that he also had ten drinks at the bar next door.

Third, Mr. McKenney argues that "Many sections of the FEIS refer to the elevated concentrations present in the Church Rock area." McKenney Affidavit at 9. These sections are each vague and conclusory, lacking in scientific data. NEPA is an environmental full disclosure law that requires the appropriate balance of nontechnical and scientific information. Sierra Club v. U.S. Army Corps of Engineers, 701 F.2d 1011, 1029 (2d Cir. 1983) (citations omitted). Nowhere does the FEIS inform either the decision-maker or the public that the ongoing ambient radioactivity levels at Church Rock are unusually high due to past mining activity, and that these levels exceed

regulatory standards, or that the addition of another mine will make the situation worse. Any scientific information that would be cause for concern is not included in the FEIS. For instance, the Staff does not disclose that the existing radioactivity from multiple sources in Church Rock exceeds the public dose limit, and HRI's emissions will have the cumulative effect of increasing that radioactivity further beyond the public dose limits.⁴ Rather it states that the old mines have just affected the health of mine workers, and emphasizes that at the end of the life of the project, HRI *may* clean up some of the existing radioactivity on its site. FEIS at 4-86, 4-117, 4-121, 4-124, 4-125. This approach ignores the fact that there are several other sources besides the old mine on Section 17 contributing to dose levels and that the ambient radioactivity affects the entire local population, rather than just the former mine workers. It also gives baseless and misleading hope that issuance of the license will improve rather than degrade the public health conditions at Church Rock.

For instance, section 4.6.2.1 states that "areas of the [Church Rock] site have greater concentrations of residual radioactivity present than would be allowed in decommissioning the site." FEIS at 4-86. The actual level of ambient concentrations is not acknowledged nor that fact that during operations, the public dose will increase. The

⁴ In his affidavit, Mr. McKenney calculates that the "elevated background levels of radon in the area from the old uranium mines" to be "650 person rem". McKenney Affidavit at 10-11. This information is omitted from the DEIS and the FEIS, and in conflict with the information in those documents. The FEIS provides only dose calculations for natural background and HRI's projected emissions. FEIS at 4-124-125. The effects of prior mining are represented as a problem of the past. Id.

sources of the existing radioactivity are not identified. The section goes on to spin the situation out as a positive for the community, asserting that "Under the proposed action, these areas would generally be cleaned up as part of the well field decontamination." *Id.* at FEIS 4-86. As discussed in the testimony of Intervenor's expert on environmental justice, Dr. Robert Bullard, at 25-31, these assertions are unsupported. Similarly, section 4.6.4, does not mention sources of contamination beyond that on HRI's site, omits details about the existing level of exposure and points out that decommissioning "would generally be cleaned up" during decommissioning. FEIS at 4-88.

Section 4.12.4 inaccurately boasts that no alternative, not even the no action alternative, "would exceed allowable limits for radiation exposure to the public." *Id.* at 4-117. It again fails to point out that multiple sources on and off site are contributing to a high ambient concentration. It refers to "the cumulative effect of the long history of uranium mining in the area," but dismisses it as a problem of the past "that occurred primarily to miners and resulted in a high incidence of cancer among them." *Id.*

Section 4.13.2, vaguely states that, "The region's geology has been affected, and could be affected in the future, by underground uranium mining," and "The region's soils have also been affected by underground uranium mining, and could be affected in the future by both underground and ISL mining." *Id.* at 4-121. Although quantitative data on the subject exist, no attempt is made to present them or even to qualitatively address the gravity of the problem. Section 4.13.2 also misrepresents the clean up at Section 17,

stating "the site has been decommissioned to remove any radioactive material left behind in surface soils or previous pond areas." Id. Such a statement is direct conflict with the soil sample results reported in the DEIS at pages 3-19 and 3-20, and the State of New Mexico's refusal to approve reclamation at the site. See ENDAUM's and SRIC's Response at 9-10. It also claims that the UNC mill "has been dismantled and decommissioned, and the tailings pile is being stabilized and reclaimed." FEIS at 4-121. However, the FEIS fails to describe or evaluate ongoing emissions from the mill site, the impact on Church Rock, or the residual radioactivity in the Rio Puerco from the mill discharges.

Finally, while Section 4.13.6, regarding cumulative impacts on health physics and radiological impacts, is the section where a full discussion of the past mining activities would certainly be appropriate, it fails entirely to address the current problems at Church Rock. Section 4.13.6 generally mentions that "Northwest New Mexico has a long history of uranium mining and milling." FEIS at 4-124. Although, the past exposure of underground mine workers is mentioned, the FEIS cheerfully adds that "information gathered on these workers resulted in development of risk factors on radon." Id. The FEIS next mentions that "the methods used to mine and mill the uranium (i.e. "conventional mining") resulted in very large amounts of radioactivity and chemically contaminated sands and slimes, also known as tailings." Id. at 4-125. However, in the next sentence it touts UMTRA as the statute that required these sites to be cleaned up. Id.

The different histories of Church Rock and Crownpoint are omitted. And, of course, any detail on the old mines and other source sites is missing. Two dose measurements are provided — natural background (170 man Sv/year) and HRI's project emissions (0.01 man Sv/year). FEIS at 4-124. This section is misleading in that it dismisses the cumulative impacts of past mining as a problem of the past with the only dose currently existing in the area being natural background.

III. HRI'S CLAIMS THAT NATURAL MINERALIZATION ACCOUNTS FOR THE AMBIENT RADIOACTIVITY AT CHURCH ROCK ARE WITHOUT BASIS AND PROFFERED BY AN UNQUALIFIED WITNESS.

The Chambers Affidavit in HRI's response to LBP-99-15 should be disregarded by the Presiding Officer. Dr. Chambers mostly attempts to argue the elevated ambient radioactivity levels at Church Rock are due to surface mineralization. Dr. Chambers is not qualified to testify as he is not trained or educated as a geologist and it does not appear that he has viewed the geology at Church Rock. Intervenors' expert, Dr. Abitz is a geologist, and he has visited Church Rock numerous times to view the geology. Abitz Response at 2. In addition, Dr. Chambers' allegations are baseless. As Dr. Abitz points out in his Response, "there is no mineralized source for radon on the surface other than that brought to the surface by anthropogenic activities (i.e. uranium mining)." Id. at 2-3.

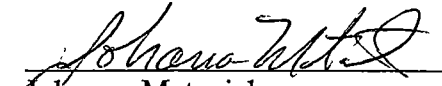
Even the NRC Staff rejects HRI's farfetched argument. The DEIS states, "Because the proposed mining areas are not mineralized at the surface, naturally


occurring radionuclide levels in the soil should not be elevated." DEIS at 3-19.

CONCLUSION

For the foregoing reasons, the Presiding Officer should reject the responses to LBP-99-15 filed by the NRC Staff and HRI, and grant Intervenors' request for relief on their area of concern regarding radioactive air emissions.

Respectfully submitted,


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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD PANEL

OFFICE OF SECRETARY
RULEMAKING AND
ADJUDICATIONS STAFF

Before Administrative Judge Peter B. Bloch, Presiding Officer

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

CERTIFICATE OF SERVICE

I hereby certify that:

On April 21, 1999, I caused to be served copies of the following:

ENDAUM'S AND SRIC'S RESPONSE TO HRI'S AND NRC STAFF'S ANSWERS TO LBP-99-15, QUESTIONS CONCERNING RADIOACTIVE AIR EMISSIONS

to the following parties marked by an asterisk via e-mail. Service was also made upon the following persons by U.S. mail, first class, and in accordance with the requirements of 10 C.F.R. § 2.712. The envelopes were addressed as follows:

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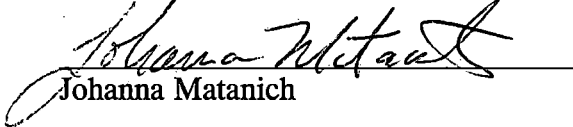
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Dated at Santa Fe, New Mexico,
April 21, 1999,


Johanna Matanich

Because the elevated radiation levels are the result of human activity, they are not part of naturally occurring background radiation. As I will explain below in paragraph 2, the NRC has failed to establish that source materials are not the source of radioactivity on the site.

2. Based on 1987 soil sampling data reported in Table 2.9-1 of HRI's 1993 Church Rock Revised Environmental Report ("ER"), Mr. McKenney asserts that there is no source material present on the ground surface of Section 17, where the old underground mine site and ore pad were located. McKenney Affidavit, par. 3. In addition he states that only one soil sample in Section 8 exceeded the weight specification for source material, *i.e.*, contained more than 0.05% uranium by weight. *Id.* These two conclusions form the basis for numerous other statements made in Mr. McKenney's Affidavit at pages 3 and 4, regarding the size and significance of the non-background dose to the public in the Church Rock area.

3. In my professional opinion, not enough information has been provided about the samples reported in the ER to demonstrate a reasonable basis for Mr. McKenney's conclusion regarding the lack of source material on Section 17 and the amount of source material on Section 8. In particular, no specific information is provided about the size of the area sampled or the number of cores that were sampled at each testing location. Without this information, it is impossible to determine whether the sampling was representative of naturally occurring conditions in the area, or instead reflected isolated and potentially anomalous readings. Given that only 25 locations were sampled in an area measuring what appears to be $\frac{1}{4}$ mile by $\frac{1}{2}$ mile, and given that the portion of the area lying within Section 17 contains only seven of these locations, this is an important omission. See ER, Figure 2.9-2.

4. In light of the lack of information regarding the size of sampling locations, Mr. McKenney's assumption of a 10 square meter area for purposes of calculating radon emissions from sampling location 8S-16 is completely arbitrary. Considering that the Section 8 area of the Church Rock site consists of 640,000 square meters, that Figure 2.9-2 of the ER reports 18 sampling locations in that area, and that nearest sample points are separated by about 60 meters, the sample point density is not sufficient to conclude that the contamination is within an area of 10 square meters. This was pointed out by Dr. Abitz who in his response affidavit in this matter suggests using an area closer to 3,600 square meters (i.e., 60 x 60) which results in an estimate of the total radon production of 72 Ci/yr for sample 8S-16. Using this source term, and applying an annual average atmospheric dispersion coefficient of 2×10^{-4} seconds per cubic meter¹ for the unrestricted areas, I calculated the annual concentration of radon in ambient air as 0.46 pCi/l, which is more than four times the Part 20 limit for radon concentrations.

5. Mr. McKenney correctly states that a non-ISL underground uranium mine can increase radon releases into the environment by providing preferential "fast" pathways for radon gas from "deep ore deposits" to reach the atmosphere through the mine's various shafts and conduits. McKenney Affidavit at 4-5. He also correctly states that there is a concentration of old uranium mines in the Church Rock Chapter. *Id.* at 5. He is incorrect and even contradicts himself, however, in stating that the radon releases from old mines come from "a technologically enhanced, naturally occurring radioactive material." *Id.* As Mr. McKenney recognizes, the source of the radon gas is deep ore deposits. The NRC's definition of background radiation specifically excludes radon emanating from source material, which includes uranium ore regardless of its location.

¹ I selected the median value in Figure 8 of my January 5 report.

Moreover, Mr. McKenney neglects to discuss the residual radioactivity on the surface of the old Church Rock mines and mills, nor does he discuss the radioactivity in the Rio Puerco, where byproduct material was discharged from the UNC milling site.

6. In paragraph 4, Mr. McKenney restates his criticisms of my Report, which he made in his first piece of testimony regarding air emissions. I have already answered those criticisms in my Declaration of April 6, 1999. In his most recent Affidavit, Mr. McKenney does not address my April 6 Declaration or say anything he has not said previously. Therefore, in response to paragraph 4, I stand on my statements in my April 6 declaration.

7. In paragraph 5, Mr. McKenney addresses the appropriate location of the individual likely to receive the highest dose from HRI's Church Rock operations. He identifies CRR4 as this location. This might be appropriate if the source term for the HRI operation did not fluctuate, but that is not the case here. The data that have been provided show that the source term from the HRI operation will fluctuate significantly, and is accompanied by significant uncertainty. Under these circumstances, a person standing at the HRI fence line could get a higher dose in one hour than a local resident spending 24 hours/day at a more distant location. Therefore, it is conservative to place the individual likely to receive the highest dose at the HRI site boundary.

8. In paragraph 7, Mr. McKenney asserts that HRI has performed site clean-up activities, centered around the old ore pads and mineshaft of the underground Church Rock mine. To this date, neither HRI nor the Staff has provided any data showing the results of those clean-up efforts, or any specific evidence that soils were removed from areas besides the sludge removed from the waste ponds. In the absence of such basic

information, there is no way to evaluate the extent of the alleged clean-up or its effectiveness.

9. In paragraph 7, Mr. McKenney addresses the issue of population doses. He calculates an annual local exposure (per individual) of 650 millirem from radon-222 and adds to this a national average background dose of 225 mrem for a total dose of 875 mrem/yr. Mr. McKenney contends that the additional dose from HRI's operation would raise the collective dose by an insignificant amount, i.e., less than 0.5%. I disagree with his calculations and conclusion on several grounds. First, Mr. McKenney incorrectly attributes the 650 mrem dose to background radiation. Second, his calculations are uncertain since they are based on assumptions about indoor exposures and not actual measurements in houses. The estimated non-background dose of 900 mrem/yr, which I provided in my April 9 declaration, is more reliable because it is based on an actual data. Third, as discussed in my January report, HRI has underestimated the incremental impact of its own operation, which in fact is significant and likely to exceed regulatory limits. Finally,, in evaluating the significance of the cumulative dose, it is important to note that the exposure of the local population in the Church Rock area from non-background sources is far above the national average of 225 millirem per year from all sources, as quoted by Mr. McKenney, and also significantly above Part 20's limit of 100 mrem/yr for the public dose from all sources. Therefore, special consideration should be given to the fact that the local population already has an unusually high exposure to non-background radiation with the associated health risks.

AFFIRMATION

I declare on this 21st day of April 1999, at Heidelberg, Germany, under penalty of perjury that the foregoing is true and correct to the best of my knowledge, and the opinions expressed herein are based on my best professional judgment.

Bernd Franke

Bernd Franke

April 16, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD PANEL

Before Administrative Judge Peter B. Bloch

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

RESPONSE AFFIDAVIT OF DR. RICHARD J. ABITZ

I, Richard J. Abitz, being duly sworn, make the following statement in response to the Affidavits of Dr. Douglas B. Chambers ("Chambers Affidavit") and Mr. Christopher A. McKenney ("McKenney Affidavit"), attached to Hydro Resources, Inc.'s Response and the NRC Staff's Response, respectively, to LBP-99-15 Memorandum and Order (Questions Concerning Radioactive Air Emissions):

1. In ¶15 of his Affidavit, Dr. Chambers asserts that:

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.

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EXHIBIT
2

In my professional opinion, Dr. Chambers' conclusion that radon levels in the Church Rock area would be expected to be naturally elevated is incorrect and unsupported by the available information regarding the local geology.

2. As a preliminary matter, Dr. Chambers does not have appropriate professional qualifications or experience to render the geological opinions that he provides. Dr. Chambers is not a geologist, and his affidavit shows his unfamiliarity with general concepts of geology and with the specific conditions at Church Rock, New Mexico. It does not even appear that Dr. Chambers has visited the Church Rock area. Unlike Dr. Chambers, I am a trained and experienced geologist and have made several trips during my career to observe the surface geology at Church Rock.

3. Dr. Chambers' assertions in ¶5 of his Affidavit demonstrate his lack of understanding of the uranium mineralization in the Church Rock area. He notes that the Dakota and Morrison Formations contain elevated levels of radioactivity due to the uranium mineralization, which is correct. However, he fails to understand that the uranium mineralization is over five hundred feet below the ground surface in the area of Church Rock. Therefore, contrary to Chambers' conclusion, radon levels are not expected to be elevated in the Church Rock area.

4. Additionally, Dr. Chambers notes that the regional extent of the Dakota and Morrison outcrop south of Church Rock is more than 12,000 acres, and uranium mineralization occurs throughout the host formation. This leads Dr. Chambers to the false conclusion that there is uranium mineralization in the outcrop area, which is not the case. The rocks of the Dakota and Morrison Formations that crop out a few miles south of Church Rock are barren with respect to uranium mineralization. Any significant

uranium mineralization in the outcrop has long since leached out, because the outcrop is the recharge area where oxidized precipitation enters the formation. Therefore, there is no mineralized source for radon on the surface other than that brought to the surface by anthropogenic activities (i.e., uranium mining).

5. Dr. Chambers incorrectly draws the same conclusion in ¶7 of his affidavit:

“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.” Extensive natural mineralization does not exist in the “local area” to which Dr. Chambers refers (i.e., the Church Rock area at the surface). As noted in my Reply Testimony, the elevated level of radon measured by HRI in the Church Rock area is tied to surficial uranium contamination from past mining operations. Additionally, my Reply Testimony noted that background radon levels are less than 1 pCi/L in Ambrosia Lake and Crownpoint, and there is no basis for natural background radon values to be higher in the Church Rock area.

6. Nothing said by Dr. Chambers alters my previous conclusion that naturally occurring radon levels in the Church Rock area should not be expected to be elevated over levels seen at Crownpoint or Ambrosia Lake.

7. In ¶3 of the McKenney Affidavit, Mr. McKenney states: “Under the definition of the term “source material” in 10 C.F.R. § 20.1003, a material qualifies as such if it is ore which contains, by weight, 0.05 percent, or more, of uranium/thorium. There is no such material present on the ground surface of Section 17, where the old underground mine site and ore pad were located.” This statement is based on 4 soil samples and 3 sediment samples over an area of approximately 40 acres, which is too small of a sample

population to draw the conclusion that no source material is present. Sampling statistics generally show that 8 to 16 samples per acre are required to make a confident decision on the distribution of a constituent in the soil. At the Fernald superfund site, where I serve as a consultant, 12 to 16 samples per acre are required to establish at the 95 percent confidence level that the distribution of uranium contamination meets the final remediation level (i.e., less than 82 mg/kg). This scenario is no different than the Church Rock site, as the hypothesis to be tested at Church Rock is whether the uranium/thorium concentration in soil exceed 0.05 percent (i.e., 500 mg/kg). Therefore, before Mr. McKenney can conclude no such material is present, an adequate number of samples must be collected and analyzed to support his conclusion.

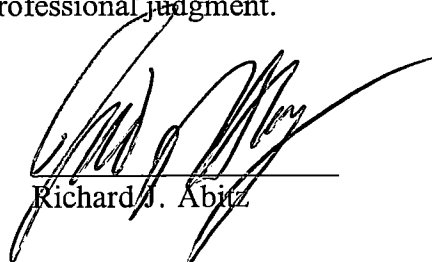
8. Mr. McKenney continues in ¶13 of his affidavit with the following statement on the soil sample in Section 8 that has a uranium concentration of 650 mg/kg:

“If I conservatively assume that the sample is representative for an area of 10 square meters at a depth of 0.3 meters (1 foot), the total radon production of this volume over one year would be 0.2 Ci.” Mr. McKenney is not being conservative in his assumption of the sample being representative of a 10 square meter area. If one looks at the map showing sample locations (Figure 2.9-2 of the Church Rock Revised Environmental Report), it is immediately apparent that the nearest sample points are separated by about 60 meters. Therefore, since the sample point density is not sufficient to conclude that the contamination is within an area of 10 square meters, Mr. McKenney should have used an area closer to 3,600 square meters (i.e., 60 x 60). The true conservative estimate of the total radon production from this volume then becomes 72 Ci (i.e., 360 x 0.2).

It is also of note that the Section 8 soil sample containing uranium at 650 mg/kg comes from an area that has not had active mining. The presence of this source material in Section 8 suggests that drill cuttings from the exploration holes drilled into the ore body may have been spread on the surface. William Ford, in ¶10 his February 20, 1998, affidavit stated that there are more than 174 holes in the southeastern quarter of Section 8.

AFFIRMATION

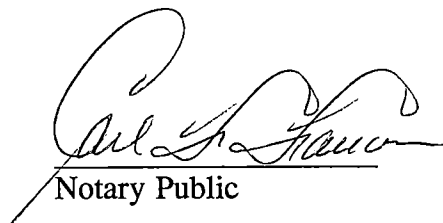
I declare on this 16 day of April, 1999, at ROSS, Ohio, under penalty of perjury that the foregoing is true and correct to the best of my knowledge, and the opinions expressed herein are based on my best professional judgment.


Richard J. Abitz

Sworn and subscribed before me, the undersigned, a Notary Public in and for the State of Ohio, on this 16 day of April, 1999, at ROSS, Ohio.

My Commission expires on _____.

**CARL F. FAUVER
NOTARY PUBLIC
IN AND FOR THE STATE OF OHIO
MY COMMISSION EXPIRES 4 MAY 2000**


Notary Public