April 21, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE PRESIDING OFFICER

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

NRC STAFF'S RESPONSE TO INTERVENORS' AIR EMISSIONS ANSWERS

INTRODUCTION

Pursuant to Judge Bloch's March 18, 1999 order (LBP-99-15, "Questions Concerning Radioactive Air Emissions") (March 18 Order), at 10, ¶¶ 9-10, as later modified by the parties, the NRC Staff hereby responds to Intervenors Eastern Navajo Diné Against Uranium Mining (ENDAUM's) and Southwest Research and Information Center (SRIC's) "Response To LBP-99-15, Questions Concerning Radioactive Air Emissions," dated April 7, 1999 (E/S Answers), which included as Exhibit A the "Declaration of Bernd Franke" (Franke Declaration). The E/S Answers regarded four questions propounded by the Presiding Officer concerning radioactive air emissions in the area of Hydro Resources, Inc.'s (HRI's) Church Rock site, which would be produced as the result of HRI's proposed *in situ* leach (ISL) uranium mining there. *See* March 18 Order, at 10, ¶¶ 2-5.

As discussed below, the opinions and legal argument contained in the Franke Declaration and the E/S Answers fail to directly respond to the questions asked, and should be given little, if any, weight in this proceeding.

DISCUSSION

ENDAUM and SRIC fail to show that the annual dose limit of 10 C.F.R. § 20.1301 will be exceeded (or even approached) as the result of HRI's proposed ISL mining operations at its Church Rock site. This regulation states in relevant part as follows:

> Each licensee shall conduct operations so that -- (1) The total effective dose equivalent [TEDE] to individual members of the public from the licensed operation does not exceed 0.1 rem [100 millirem] (1 millisievert) in a year, exclusive of the dose contributions from background radiation.

10 C.F.R. § 20.1301(a)(1). To properly understand this requirement, one must be familiar with the term "background radiation," which is defined as including radiation from "naturally occurring radioactive material," but excluding "radiation from source, byproduct, or special nuclear materials regulated by the Commission." 10 C.F.R. § 20.1003. Seeking discussion on these points, the Presiding Officer's first question asked what portion of the TEDE from the Church Rock site should not be considered part of "background radiation," either because it is from "source material" or from "byproduct material." *See* March 18 Order, at 10, ¶ 2. As shown below, neither the Franke Declaration, nor the E/S Answers, properly respond to this question.

Rather than directly citing and discussing 10 C.F.R. § 20.1301(a)(1), ENDAUM and SRIC simply reference the annual dose limit of 100 millirem (mrem), as if any annual radiation received by an individual above this amount meant that the NRC's Part 20 limits had been violated. *See* E/S Answers, at 3, 5, 6, and 8. The discussion fails to acknowledge that such violations occur only if

an individual receives an annual 100 mrem dose from an NRC-licensed operation.[1] This dose limit requirement of 10 C.F.R. § 20.1301(a)(1) is clear. Resort to various interpretations of the Part 20 requirements, which are taken out of context, is not necessary to properly apply this dose limit provision. *See* E/S Answers, at 3-5. Similarly, reliance on a mathematical formula is not necessary to answer the Presiding Officer's first question. *See* E/S Answers, at 6-7 (referencing the Franke Declaration).

In failing to address the regulatory definition of "background radiation," Mr. Franke also fails to properly respond to the Presiding Officer's first question. Instead, Mr. Franke fills his statement with undefined and irrelevant terms such as "ambient radon" levels (Franke Declaration, at 2, and 6); or "non-background" doses (*id.*, at 7, 8, 9, and 20); or "non-natural background radon" (*id.*, at 12, and 13); or "natural background" (*id.*, at 18, 20, 21, and 22). Similarly, Mr. Franke's factors C, D, and E (used in his math formula), which he describes as "non-background contributions" to "natural background" radiation levels (*id.*, at 2, and 8), fail to account for the regulatory definition of "background radiation." Mr. Franke's answer to the Presiding Officer's first question also improperly assumes the presence of "source material" and "byproduct material" at HRI's Church

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[1] Mr. Franke's failure to grasp the regulatory wording is shown by his contention that a licensee could violate the Part 20 dose limit without releasing anything, if the licensee "chooses to do business" in an unfavorable geographic area. Franke Declaration, at 7.

Rock site, and in the wider Church Rock area. *Id.*, at 3-4, and 6-7.[2] Mr. Franke's discussion shows no awareness that these terms have a defined meaning *(see* the definitions in 10 C.F.R. § 20.1003), which must be understood when discussing background levels of radiation, since these terms are used in the definition of "background radiation." This failure to address the relevant definitions is particularly evident in his simplistic discussion of his factor D, which confuses the radon dose with the byproduct material (mill tailings) producing the dose (*see id.*, at 4); and his conclusion that pursuant to 10 C.F.R. § 20.1301 "all licensed and unlicensed materials above background have to be accounted for ... If source and byproduct materials are affecting the area, it does not matter where they are located." Franke Declaration, at 7. This is not what 10 C.F.R. § 20.1301 requires, and such a regulatory scheme would be unworkable.

The Presiding Officer's second question asked for the proper method to calculate the annual TEDE to the individual member of the public likely to receive the highest dose from HRI's Church Rock operations. *See* March 18 Order, at 10, ¶ 3. As part of their response, ENDAUM and SRIC cited radiation from (a) the 1979 tailings spill; (b) the uranium tailings pile at the United Nuclear Corporation's (UNC's) mill site; and (c) ten abandoned uranium mines, as contributors to the TEDE. *See* E/S Answers, at 10. In addition to not being responsive to the question asked (TEDE to the individual likely to receive the highest dose from HRI's Church Rock operations), concerns

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[2] Later, Mr. Franke again simply assumes the presence of such materials at HRI's Church Rock site, in reaching his conclusion that the TEDE would be 1,250 mrem. *See* Franke Declaration, at 20. In their answers, ENDAUM and SRIC similarly assume the presence of source and byproduct material on HRI's Church Rock site. *See* E/S Answers, at 9, *citing* the affidavit of HRI's expert, Dr. Alan Eggleston, at 2-3. On the contrary, Dr. Eggleston testifies there that such material has been removed from the site.

regarding these pre-existing sources of contamination were ruled to be not germane in this proceeding. *See* LBP-98-9, 47 NRC 261, 283 (1998). Moreover, radiation from such sources is all part of the background radiation at HRI's Church Rock site, and is excluded from the TEDE pursuant to 10 C.F.R. § 20.1301(a)(1). Later in their response to the Presiding Officer's second question, ENDAUM and SRIC seem to acknowledge this fact. *See* E/S Answers, at 11 n.2 (radon from UNC's uranium tailings pile causes "an elevated background condition" over the larger area).

In responding to the Presiding Officer's second question, Mr. Franke relies on these same off-site sources to inflate his TEDE calculation. *See* Franke Declaration, at 9 (referencing "radium-bearing tailings" from abandoned mine sites being transported by winds); and 19-20 (referencing radon from the Puerco River as the result of the 1979 tailings spill, and radon from UNC's uranium tailings pile). For all of the reasons discussed above regarding the ENDAUM and SRIC answers to the Presiding Officer's second question, this proffered testimony of Mr. Franke is not responsive to the question asked; it involves non-germane concerns; and it includes background radiation in the TEDE calculation, contrary to the standard stated in 10 C.F.R. § 20.1301(a)(1). Accordingly, the Presiding Officer should give no weight to Mr. Franke's testimony in this regard.

The Presiding Officer's third question asked for the appropriate location of the individual likely to receive the highest dose from HRI's Church Rock operations, and for annual TEDE estimates at locations specified by other parties. *See* March 18 Order, at 10, ¶ 4. In their response, ENDAUM and SRIC argue that a hypothetical shepherd or construction worker temporarily located at HRI's site boundary, rather than the closest permanent resident, should be the dose receptor for purposes of calculating TEDE. *See* E/S Answers, at 11-12. As support for their position, ENDAUM

and SRIC rely on Mr. Franke's opinion that the highest dose from ISL operations over the course of a year would be generated in a matter of hours. *Id.*, at 12; *see also* Franke Declaration, at 21.

The approach advocated makes no regulatory sense. The necessary confluence of events (*i.e.*, the posited maximum release from ISL operations occurring during a windless period of time, and coinciding with the temporary presence of an individual at the site boundary) would be impossible to plan for or predict. Basing TEDE calculations on such a confluence of events would be meaningless. The fallacy of ENDAUM's and SRIC's position is shown by their admission that Mr. Franke's TEDE analysis would not change even if the nearest resident is used to make the TEDE calculation. They state Mr. Franke's analysis would not change "because the elevated levels of radon in the area are present over a large area." E/S Answers, at 12. The NRC's individual dose limit pertains to doses produced by a licensed operation, not doses produced by general background levels present over a large area. *See* 10 C.F.R. § 20.1301(a)(1). Accordingly, the Presiding Officer should reject the approach advocated by ENDAUM and SRIC in their response to the Presiding Officer's third question.

The Presiding Officer's fourth question asked how the determination was made regarding the geographic area that should be considered part of HRI operations in answering the second question. *See* March 18 Order, at 10, ¶ 5. In their response, ENDAUM and SRIC state that "the entirety" of Sections 8 and 17 should be regarded as the geographic area in question, as well as unspecified "portions" of Section 16 and Section 12. *See* E/S Answers, at 12. Section 16 is directly east of Section 17. *See* Figure 2.8, at FEIS page 2-25. Section 12 is not even contiguous with

Sections 8 and 17, being located two sections west of Section 8. *See* fourth page of Exhibit E to Mr. Franke's January, 1999 report ("Drawing Number NM81-433-B2").[3]

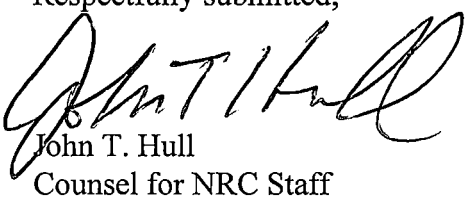
As stated in the Staff's letter to the parties dated April 7, 1999, at 2, the lease area boundaries depicted in the FEIS Figures show the proper geographic area. These boundary lines do not encompass "the entirety" of Sections 8 and 17, but only portions thereof. HRI's lease areas do not extend into Section 16, or Section 12. Accordingly, the geographic area in question should be regarded as encompassing only portions of Sections 8 and 17, as detailed in the Staff's April 7 letter.

A further response to the E/S Answers, and the Franke Declaration, is contained in the affidavit of Christepher McKenney, attached hereto as Staff Exhibit 1.

CONCLUSION

For the reasons discussed above, and in Staff Exhibit 1, the Presiding Officer should give little or no weight to the E/S Answers, and the Franke Declaration.

Respectfully submitted,



John T. Hull
Counsel for NRC Staff

Dated at Rockville, Maryland
this 21st day of April, 1999

[3] Mr. Franke's Declaration, at 22, does not explain how he calculated the TEDE contribution from the non-contiguous Section 12.

Staff Exhibit 1

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2929 Coors Road, Suite 101	)	
Albuquerque, New Mexico 87120	)	

AFFIDAVIT OF CHRISTEPHER A. MCKENNEY

I, Christepher A. McKenney, being duly sworn, declare as follows:

1. I am competent to make this affidavit, and the opinions expressed herein are based on my best professional judgment. My resume has previously been filed in this proceeding, and describes my general background, training, and other qualifications to express the opinions stated herein. This affidavit focuses mainly on the statements made in Mr. Franke's Declaration, dated April 6, 1999.

2. I first reiterate that, contrary to the assumptions made by Mr. Franke, there is no evidence, nor is there any reason to suspect, that byproduct or source material is present on HRI's Sections 8 and 17 (the Lease Areas), other than one small area on Section 8. Therefore, as stated in my April 7, 1999, affidavit, almost all of the radiation levels now present in the Lease Areas constitute background radiation, and would thus be excluded from the calculation of the total effective dose equivalent (TEDE) from HRI operations, pursuant to 10 C.F.R. § 20.1301(a)(1).

3. Mr. Franke's Declaration, at 2, divides the TEDE into five factors: (A) Dose from natural background; (B) Dose from ISL operations; (C) Dose from existing source and

byproduct materials at HRI's Lease Area; (D) Dose from other source and byproduct materials outside the Lease Area, but which are regulated by the NRC; and (E) Dose from off-site sources that are not regulated by the NRC. Only Factors B and C apply to the calculation of TEDE, pursuant to 10 C.F.R. § 20.1301. Below, I briefly discuss each of these Factors.

4. Factor A - Natural Background. Pursuant to 10 C.F.R. § 20.1301, and the Part 20 definition of background radiation, the "natural background" factor used by Mr. Franke should not be included in the calculation of TEDE. I note that Mr. Franke, in the end, discounts the dose from "natural background" radiation in his calculation of the total TEDE, but the summation equation on Franke Declaration page 2 implies that the TEDE calculation would include this factor.

5. Factor B - Dose from ISL Operations. I acknowledge the errors I made in my February, 1999 affidavit, which Mr. Franke's Declaration points out. However, while the corrections made by Mr. Franke drop the calculated source term down to 980,000 pCi/l (*see* Franke Declaration, at 15), Mr. Franke fails to acknowledge four highly conservative assumptions that remain in his calculation of exposure: (1) his calculation ignores the volume of space the resin displaces in the HRI satellite facility's ion exchange column, which is approximately 60% or more of the volume; (2) his calculation assumes 100% radon release, while realistically only a fraction (75%-90%) of the radon would be released; (3) the individual is assumed to be exposed to the puff of radon for an hour, even though the puff would be of very limited size, given the low wind speed conditions he posits. For example, if the wind speed was 0.5 mph (0.23 m/s), a 60-second release would create a puff

approximately 14 meters long. To be exposed for an hour, the individual would need to walk with this radon puff as it traveled away from HRI's Lease Areas. Moreover, no puff dissipation is assumed to occur as it moves through the air; and (4) his dose assessment assumes 100% equilibrium for the entire hour.

6. Factor C - Dose From Source Or Byproduct Material Currently Onsite. Mr. Franke's Declaration contains no discussion of what material, or how much material, on the HRI Lease Areas, can be considered source material or byproduct material. From his statement that the measured gamma levels from 1987 "are a clear indicator of the presence of radium-226 in soils and wastes at the site," Mr. Franke apparently thinks that nearly all of the possible radon emanating from the surface of HRI's Lease Areas is from source material or byproduct material. However, the presence or absence of radium is not a determining factor in whether something could be considered source material or byproduct material. Therefore, it is still my opinion that any radon emanating from the ground surface of HRI's Lease Areas is part of background radiation.

I continue to disagree with Mr. Franke's highly conservative calculation of the possible external dose to an individual who stands on Highway Route 566, 24 hours a day, 365 days a year. First, the source of this dose is not germane to the calculation requested by the Presiding Officer, because the material emitting the gamma rays is neither source nor byproduct material. Second, the exposure time used by Mr. Franke is ludicrous. The hazard from this technologically enhanced material is low, as an individual would have to be exposed for over 24 hours to receive even one millirem of dose. Third, Mr. Franke does not

account for the removal of material from HRI's Lease Areas. *See* Eggleston Affidavit, dated February 10, 1999, at 15.

7. Factor D - Dose From Other NRC Licensees. Mr. Franke's calculations include the possibility of contributions from other NRC-licensed facilities, but ignore the fact that HRI is not accountable for releases from offsite sources which have nothing to do with how HRI will conduct its operations. *See* the Presiding Officer's March 18, 1999, Order, at 9. Therefore, Mr. Franke's discussion of offsite contributions runs contrary to the terms of the Order. As a technical matter, I disagree that the UNC Church Rock mill tailings pile is contributing greater that 0.2 pCi/l to the average radon concentrations. As stated in Mr. Franke's Declaration, the average radon flux from the pile was 5.71 pCi/m^2s, which for a 400 acre site would be a total radon release rate of 9.25 μCi/s. If one uses an average wind speed of 6.5 mph, which is less than the averages discussed on page 3-3 of the FEIS to limit dispersion, and a general stability class of C (slightly unstable conditions, which is the most common stability class, especially for long-term average calculations), UNC's mill tailings pile contributes approximately 0.02 pCi/l to the local area.

8. Factor E - Dose From Other Offsite Sources

Mr. Franke does not quantify the contribution from any such sources, which in any event are not germane here for the reasons stated in ¶ 7. Additionally, any contributions from such sources, such as abandoned uranium mines, would be considered background radiation, since these sources are not regulated by the Commission. Furthermore, ENDAUM and SRIC note that several of the abandoned uranium mines are downwind of HRI's Lease Area. Only

sources upwind of HRI's Lease Area could be primary contributors to Section 8 and 17 ambient levels, on an annual basis.

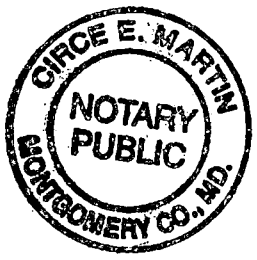
9. Total Dose Estimate. I strongly disagree with Mr. Franke's total dose estimate of 1250 millirem per year on a number of grounds. First, the major sources he relies on either lie off the HRI Lease Areas, or are neither source nor byproduct material. Second, I disagree with adding the gamma dose (which allowing for Mr. Franke's receptor is upwind of the satellite facility and a majority of the well fields) to the radon doses calculated for the downwind receptor. Third, even using Mr. Franke's highly conservative bounding calculation for the dose estimate from HRI's ISL operations, this dose estimate to the receptor at HRI's site boundary, as posited by Mr. Franke, is well within the Part 20 public dose limit of 100 millirem.

10. Conclusions. I disagree with a number of assumptions made by Mr. Franke in identifying possible contributors to a HRI public dose compliance calculation. Mr. Franke includes a large amount of dose estimates that are either (1) not from source or byproduct material, (2) from offsite locations not under HRI's control, or (3) based on unrealistic scenarios and conservative assumptions resulting in a large overestimation in the public dose. These contributors account for more than 95% of Mr. Franke's dose estimate. When one excludes these contributors, Mr. Franke's calculations show a very high probability that HRI's releases would result in doses far below the public dose limit.

11. The foregoing is true and correct to the best of my knowledge, information and belief.

Christepher A. McKenney

Sworn and subscribed to before me
this 21st day of April, 1999



Circe E Martin
Notary Public
My commission expires: March 1, 2003

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NUCLEAR REGULATORY COMMISSION

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

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S RESPONSE TO INTERVENORS' AIR EMISSIONS ANSWERS" in the above-captioned proceeding have been served on the following by U.S. Mail, first class, or, as indicated by a single asterisk through deposit in the Nuclear Regulatory Commission's internal mail system, or, as indicated by double asterisks, via e-mail, this 21st day of April 1999:

Administrative Judge
Peter B. Bloch*
Presiding Officer
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555
FAX: 301-415-5595

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

Diane Curran, Esq.**
Harmon, Curran, Spielberg,
& Eisenberg, L.L.P.
2001 S Street, N.W., Suite 430
Washington, D. C. 20009
FAX: 202-328-6918

Jep Hill, Esq.
Jep Hill and Associates
P.O. Box 2254
Austin, Texas 78768-2254

Richard F. Clement, Jr.
President
Hydro Resources, Inc.
2929 Coors Road
Suite 101
Albuquerque, New Mexico 87120

Mitchell W. Capitan, President
Eastern Navajo-Diné Against
Uranium Mining
P.O. Box 471
Crownpoint, New Mexico 87313

Douglas Meiklejohn, Esq.**
New Mexico Environmental
Law Center
1405 Luisa Street, Suite 5
Santa Fe, New Mexico 87505
FAX: 505-989-3769

W. Paul Robinson
Chris Shuey
Southwest Research
and Information Center
P. O. Box 4524
Albuquerque, New Mexico 87106

Anthony J. Thompson, Esq.**
Counsel for Hydro Resources, Inc.
Shaw, Pittman, Potts & Trowbridge
2300 N Street, N.W.
Washington, D. C. 20037-1128
FAX: 202-663-8007

Secretary* (2)
Attn: Rulemakings and
Adjudications Staff
Mail Stop: OWFN-16 C1
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Roderick Ventura**
Samuel D. Gollis
DNA - People's Legal Services, Inc.
P. O. Box 306
Window Rock, Arizona 86515
FAX: 520-871-5036

Office of Commission Appellate
Adjudication*
Mail Stop: OWFN-16 C-1
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

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Atomic Safety and Licensing Board
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Atomic Safety and Licensing Board
Panel*
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

John T. Hull
Counsel for NRC Staff