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September 11, 1998

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Emile L. Julian, Assistant
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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Hydro Resources Inc., No. 40-8968-ML

Dear Mr. Julian:

Enclosed please find the original signed Third Affidavit of Michael G. Wallace (September 2, 1998). A faxed copy of the affidavit was filed on September 2 as an attachment to ENDAUM's and SRIC's Prehearing Conference Brief, because counsel did not receive the original in time to file it with the brief. Please substitute the enclosed original for the copy.

Sincerely,

Diane Curran

cc w/o encl.: Service List

DS03

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

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");

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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").

and the Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint New Mexico (NUREG-1508) (February 1997) (hereinafter, "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

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

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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 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.

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 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

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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

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 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

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connection" through the intervening Brushy Basin Shale. Wallace Affidavit I, ¶ 27; Wallace Affidavit II, ¶¶ 20-23.

[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").

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:

- 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.

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[14] HRI Bifurcation Request at 5.

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 effectively 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. Adolfa M. Wolke, Notary NM