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April 9, 2002



**BY ELECTRONIC, U.S. REGULAR MAIL, AND FACSIMILE**

U.S. Nuclear Regulatory Commission
Office of the Secretary
Attn: Rulemaking and Adjudications Staff
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Re: In the Matter of: International Uranium (USA) Corporation
Docket No: 40-8681-MLA-11
ASLBP No: ~~01-789-01-MLA~~
02-795-02-MLA

Dear Sir or Madam:

Please find attached for filing Response of International Uranium (USA) Corporation to Ute Mountain Ute Tribe's Written Presentation in the above-captioned matter. Copies of the enclosed have been served on the parties indicated on the enclosed certificate of service. Additionally, please return a file-stamped copy in the self-addressed, postage prepaid envelope attached herewith.

If you have any questions, please feel free to contact me at (202) 496-0780. Thank you for your time and consideration in this matter.

Sincerely,

Anthony J. Thompson
Law Offices of Anthony J. Thompson, P.C.
Counsel of Record to IUSA

Enclosures

(IUCMOLYCORPCOVERLTR.DOC)

Template = SECY-021

SECY-02

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**

**ATOMIC SAFETY AND LICENSING BOARD**

Before Administrative Judges:

Alan S. Rosenthal, Presiding Officer
Richard F. Cole, Special Assistant

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| In the Matter of<br>International Uranium (USA) Corporation | Docket No.: 40-8681-MLA-11<br>ASLBP No. 01-789-01-MLA<br>Date: April 9, 2002 |
| (Source Material License Amendment) | |

**RESPONSE OF INTERNATIONAL URANIUM (USA) CORPORATION TO UTE MOUNTAIN UTE TRIBE'S WRITTEN PRESENTATION (DOCKET NO. 40-8681-MLA-11)**

International Uranium (USA) Corporation ("IUSA") submits this Response to the Ute Mountain Ute Tribe's (the "Tribe's") written presentation requesting the withdrawal of IUSA's license amendment allowing receipt and processing of alternate feed material from Molycorp, Inc.'s site in Mountain Pass, California (the "Molycorp material"). IUSA respectfully requests that the Presiding Officer find that the Tribe's written presentation is without merit and deny its request for the withdrawal of IUSA's license amendment.

## I. BACKGROUND AND PROCEDURAL HISTORY

On December 11, 2001, NRC published a Federal Register notice relating to IUSA's license amendment to process the Molycorp material and noticing a *second*

opportunity for a hearing on the license amendment for the Molycorp material. Two intervenors, Mr. William E. Love and the Glen Canyon Group of the Sierra Club (the "Group") (collectively the "Petitioners") submitted hearing requests on December 15, 2001 and January 10, 2002, respectively. IUSA submitted timely responses to both these hearing requests on December 31, 2001, and January 25, 2002, respectively.

In an order dated January 30, 2002, the Presiding Officer granted Petitioners standing to intervene in this matter. IUSA appealed the Presiding Officer's decision granting standing to the Commission on February 11, 2002. On April 3, 2002, the Commission affirmed the Presiding Officer's grant of standing to Petitioners and his denial of Petitioners' stay motions, thereby allowing a hearing on the merits to proceed.

During a telephone conference on February 21, 2002, the Presiding Officer discussed scheduling for a hearing on the merits. *See* Memorandum and Order, (February 15, 2002). At the conclusion of the telephone conference, the Presiding Officer ordered Petitioners to submit their written presentations no later than April 1, 2002, and IUSA to submit its written presentations by May 1, 2002.

After the telephone conference, on February 27, 2002, Mr. Tom Rice ("Mr. Rice"), on behalf of the Tribe, filed a motion requesting that the Tribe be granted participational status in this proceeding as an interested State. *See* 10 C.F.R. § 2.1211(b). After the Tribe submitted its motion, on March 15, 2002, the Group filed an additional motion requesting that the Presiding Officer issue an order determining whether the Tribe would be granted participational status in this proceeding. In an order dated March 18, 2002, the Presiding Officer granted the Tribe participational status as an interested State and set a deadline of April 1, 2002 for the Tribe's written presentation. IUSA received

the Tribe's written presentation by electronic mail on March 28, 2002. Based on the issues raised in the Tribe's written presentation, in an order dated April 1, 2002, the Presiding Officer ordered IUSA and NRC Staff to respond to the Tribe's written presentation no later than April 9, 2002.[1] Pursuant to the Presiding Officer's April 1, 2002, order, IUSA submits this response and respectfully requests that the Presiding Officer deny the Tribe's request for withdrawal of its license amendment.

## II. ARGUMENT

As will be shown below, the allegations in the Tribe's written presentation are insufficient to warrant withdrawal of IUSA's license amendment. Accordingly, the Tribe's request should be denied.

### A. The Tribe's Claims that NRC Staff Violated Executive Orders 12898 and 13175 are Without Merit

The Tribe's claims that IUSA's license amendment should be revoked based on alleged NRC Staff violations of Executive Orders 12898 and 13175 are without merit because neither Executive Order creates any judicial rights for parties to enforce its provisions on Federal agencies or IUSA.

#### 1. Executive Order 12898

On February 11, 1994, the Clinton Administration issued Executive Order 12898 entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. More specifically, Section 2-2 entitled *Federal Agency Responsibilities for Federal Programs* states:

> "[e]ach Federal agency shall conduct its programs, policies, and activities that *substantially* affect human health or the environment, in a manner that ensures

[1] After the issuance of the April 1, 2002, order, the Presiding Officer, on the same day, ordered NRC Staff to become a party to this proceeding.

> that such programs, policies, and activities do not have the effect of excluding persons...from participation in, denying persons...the benefits of, or subjecting persons...to discrimination under, such, programs, policies, and activities, because of their race, Color or national origin."

Relying on this language, the Tribe claims that, because NRC Staff allegedly failed to consult with the Tribe on the Molycorp license amendment, "NRC is therefore prohibited from approving IUC's request for the Molycorp waste." Tribe Presentation at 2.

Further, the Tribe notes that Section 4-4 of Executive Order 12898 entitled *Subsistence Consumption of Fish and Wildlife* states:

> "[i]n order to assist in identifying the need for ensuring protection of populations with different patterns of subsistence consumption of fish and wildlife, Federal agencies, whenever practicable and appropriate, shall collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence."

This language, according to the Tribe, imposes a requirement on NRC Staff to collect information regarding the consumption and subsistence habits of the Tribe in the area of the White Mesa Mill, and the fact that allegedly "there is no evidence that information...has been gathered..." on these subjects constitutes a violation of Executive Order 12898 and warrants withdrawal of IUSA's license amendment.

The Tribe has no grounds to enforce the provisions of Executive Order 12898 on NRC or IUSA. The plain language of Executive Order 12898, Section 6-609 entitled *Judicial Review* states:

> "[t]his order *shall not* be construed to create any right to judicial review involving the compliance or noncompliance of the United States, its agencies, its officers, or any other person with this order." (emphasis added)

Further, the Commission itself has stated that "President Clinton's executive order stated expressly that *it created no new legal rights or remedies*; accordingly, it imposed no legal requirements upon the Commission." *Louisiana Energy Services, L.P.*, (Claiborne

Enrichment Center), CLI-98-3, 47 N.R.C. 77, 102 (1998) (emphasis added); *see also Hydro Resources, Inc.*, LBP-98-5, 1998 NRC LEXIS 8, *43-44 (April 2, 1998). The Commission has found that the purpose of the Order's provisions was to "underscore certain provision[s] of existing law." *Id.*; *see also Private Fuel Storage, L.L.C.*, CLI-98-13, 48 N.R.C. 69, *17-19 (July 30, 1998).

Accordingly, the Commission found in the *Private Fuel Storage* case that Executive Order 12898 environmental justice claims (i.e., "*disparate impact*" issues) are best advanced in the context of NEPA evaluations. *Id.* at *18-19. In the NEPA context, it is well-settled that NRC, as an independent regulatory agency, is not bound by the Council of Environmental Quality's ("CEQ's") NEPA regulations to the same extent as other federal administrative agencies. Indeed, the Commission has stated:

> "as a matter of law, the NRC as an independent regulatory agency can be bound by CEQ's [Council on Environmental Quality's] regulations only so far as those regulations are procedural or ministerial in nature. NRC *is not bound* by those portions of CEQ's regulations which have a substantive impact on the way in which the Commission performs its regulatory functions."

49 Fed. Reg. 9352 (March 12, 1984) (emphasis added).

In regard to NEPA analysis for NRC licensing activities, "the Commission's general approach to the consideration of alternatives from the standpoint of NEPA is closely tailored to the nature and scope of the Commission's licensing and related regulatory functions..." *See* 49 Fed. Reg. at 9356 (March 12, 1984). With this in mind, courts have frequently agreed that "the nature and form of environmental analysis required in any given case are matters left to the discretion of the agency involved." *Id.* The given complexities involved in conducting the types of environmental analysis used by agencies like NRC leads to the conclusion that, the judgment of the NRC as the

agency with the requisite technical expertise should govern." *Id.* The Commission, therefore, has made it clear that NRC will determine the proper approach to NEPA evaluations for NRC regulatory actions such as granting IUSA's license amendment.[2]

In the broadest sense, NRC began its NEPA analysis of uranium mills and mill tailings impoundments in 1980 with NUREG-0706 entitled *Final Generic Environmental Impact Statement on Uranium Milling* ("GEIS"). The GEIS provided a generic assessment of potential environmental and public health issues associated with uranium mills during operations, mill decommissioning, and after site closure. The GEIS, however, specifically indicated that evaluations for activities at any given mill site could require site-specific analysis. As a result, NRC Staff has conducted several NEPA analyses for the White Mesa Mill including the 1979 Environmental Statement, subsequent environmental assessments ("EAs") in 1985 and 1997, and the current EA specifically addressing the receipt, processing, and disposal of the Molycorp material. NRC Staff's EA for the Molycorp license amendment yielded a finding of no significant impact ("FONSI"), thus demonstrating that *no significant impacts* to public health and safety and the environment would occur as a result of the Molycorp license amendment.[3] Therefore, NRC Staff, generally and specifically, has conducted the required NEPA analysis to support the Molycorp license amendment, and, for these reasons, the Tribe has no basis to enforce Executive Order 12898 on NRC or the licensee. Indeed, by issuing a

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[2] The policy employed by NRC to address environmental justice considerations is contained in NMSS Policy and Procedures Letter 1-50, Revision 1, as cited in the Molycorp EA.

[3] Therefore, there is no need to make any further inquiries into consumption patterns.

FONSI, NRC Staff has found that there are no *disparate impact* issues associated with the Molycorp license amendment.[4]

### 2. Executive Order 13175

On November 6, 2000, the Clinton Administration issued Executive Order 13175 entitled *Consultation and Coordination with Indian Tribal Governments*. In this order, President Clinton stated this Executive Order was issued to:

> "establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen government relationships with Indian Tribes..."

More specifically, Section 5 entitled *Consultation* states:

> "[e]ach agency shall have an accountable process to ensure meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications."

The Tribe alleges that no evidence exists that NRC Staff consulted with the Tribe prior to publishing the Molycorp EA. This lack of evidence of compliance with the Executive Order, in the Tribe's view, constitutes a violation of the NEPA because NRC Staff's failure to consult with the Tribe "ignores...how (NEPA) directs the NRC to operate regarding consultation with tribes and therefore is grounds for withdrawal of License Amendment #20 [IUSA's license amendment]." *Id.*

Similarly, Executive Order 13175 creates no rights for parties, including Indian tribes, to enforce the Order's provisions on the United States, its agencies, (including

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[4] Under most circumstances, no environmental justice review should be conducted where an EA is prepared. If it is determined that particular action will have no significant environmental impact, then there is no need to consider whether the action will have disproportionately high and adverse impacts on certain populations. *See* NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs*.

independent regulatory agencies like NRC) or IUSA. Executive Order 13175, Section 10 entitled *Judicial Review* states:

> "[t]his order is intended only to improve the internal management of the executive branch, and is not intended to create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law by a party against the United States, its agencies, or any person."

Moreover, since Executive Order 13175 is designed "to establish regular and meaningful consultation and collaboration with tribal officials in development of *federal policies* that have tribal implications," and the term "policies that have tribal implications" is defined as "regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on one or more Indian Tribes...," any issues falling under Executive Order 13175's purview, in the context of this proceeding, would implicate NRC's entire Alternate Feed Policy.

NRC's Alternate Feed Policy has been the subject of two extensive public comment proceedings[5] in which *all* potentially interested or affected parties, including Indian tribes, were given ample opportunity to submit comments on the creation of, and revisions to, the policy. In addition, the policy was the subject of a National Mining Association White Paper, an IUC Petition, resulting NRC Staff submissions to the Commission, and Commission Staff Requirements Memoranda ("SRMs") endorsing the Alternate feed Policy, all of which are part of the extensive public record on the subject.[6]

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[5] 57 Fed. Reg. 20525, 20532 (May 13, 1992); SECY-95-211, *Final "Revised Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e. (2) Byproduct Material in Tailings Impoundments," and "Final Position and Guidance on the Use of Uranium Feed Materials Other than Natural Ores;"* (August 15, 1995).

[6] National Mining Association, *Recommendations for a Coordinated Approach to Regulating the Uranium Recovery Industry*, (April 26, 1998); International Uranium (USA) Corporation, *Petition for Reconsideration of The Nuclear Regulatory Commission's "Final Position and Guidance on the Use of Uranium Feed Material Other than Natural Ores"* (1997); SECY-99-012, *Use of Uranium Mill Tailings Impoundments for the Disposal of Waste Other than 11e.(2) Byproduct Material and Reviews of*

Thus, there can be no question that all groups and individuals within such groups were given appropriate opportunities to provide input on this policy and potential actions, such as the Molycorp license amendment, which might be taken pursuant thereto. Therefore, even if Executive Order 13175 were enforceable against NRC or IUSA, it cannot be held as valid grounds to order the withdrawal of IUSA's license amendment.

### B. The Tribe's Claims That IUSA's Tailings Cells Leak And That IUSA's License Amendment Will Cause A Violation of the Safe Drinking Water Act And National Primary Drinking Water Regulations Are Without Merit

The Tribe's claim that IUSA's license amendment will result in a violation of Safe Drinking Water Act ("SDWA") and National Primary Drinking Water Regulations ("NPDR") is incorrect and provides no basis for the Tribe to request the withdrawal of IUSA's license amendment.

Based on the fact that the State of Utah has not *finally* determined the source of a chloroform plume at the White Mesa Mill site, and on an analysis of constituents in other shallow wells, the Tribe claims that the chloroform contamination and the existence of such constituents in the monitoring wells "*may* be linked to the manufacturing practices of the mill [White Mesa Mill]." Tribe Presentation at 2 (emphasis added). The Tribe alleges that "*if*" contamination from the site were to reach the perched groundwater zone on the White Mesa tribal lands, then it would "preclude the use of these waters from being used as part of a future public drinking water system" because the water would exceed standards under the SDWA. *Id.* Additionally, it is alleged that tribal members would risk exposure to constituents with resulting health effects from surface expressions

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*Applications to Process Material Other than Natural Uranium Ores*, (April 8, 1999). SRM-SECY-99-012, (July 26, 2000)

of this groundwater in the form of springs recharged by the perched groundwater zone. *Id.* These allegations are incorrect and/or have no direct application in this proceeding.

### 1. IUSA's Tailings Cells Do Not Discharge to the Perched Groundwater Zone

The Tribe alleges that an analysis of the constituents in shallow wells include "uranium, ammonia and gross alpha contaminants [that] *may* be linked to the manufacturing practices of the mill." Tribe Presentation at 2. Based on this allegation, the Tribe *infers* that IUSA's tailings cells are discharging to the perched groundwater zone and would allow constituents from the Molycorp material to reach a potential future drinking water source near Tribal lands. This allegation is incorrect for several reasons.

First, no evidence exists to demonstrate that IUSA's tailings cells discharge to perched groundwater. In over twenty (20) years of monitoring at the mill site, there has been no evidence of any releases to groundwater from the tailings cells. This fact has been further verified by an analysis performed by Mr. Roman Z. Pyrih, Phd., President and Consulting Geochemist of Roman Z. Pyrih and Associates, in his investigation of the chloroform plume at the site and whether or not it originated from the tailings cells. Mr. Pyrih reported that:

> "[f]or my investigation, I used established diagnostic procedures used by geochemists to fingerprint water "types." The fingerprints are based on the chemical composition of the water as described by the major-ion chemistry of the water....The relative concentrations of these major ions can be plotted in diagnostic diagrams that fingerprint the water."[7]

Pyrih Affidavit at 1.

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[7] Mr. Pyrih further states that:

> "Groundwater, for example, can be characterized by the relative concentrations of sodium, potassium, calcium, magnesium, sulfate, chloride, and bicarbonate ions that are dissolved in the water."

Pyrih Affidavit at 1.

Regarding potential discharge to perched groundwater from IUSA's tailings cells, Mr. Pyrih states:

> "Tailings solutions have a characteristic and unique major-ion fingerprint in which magnesium and sodium are the predominant cations, and sulfate and chloride are the predominant anions. *None of the monitoring wells at the Site showed groundwater with the major-ion fingerprint diagnostic of tailings solutions.*"

Pyrih Affidavit at 1 (emphasis added).

Based on this evidence, Mr. Pyrih concludes, "the tailings cells at the Site were not leaking. Tailings solutions were not flowing into the monitoring wells." Pyrih Affidavit at 1.

The Tribe alleges that the presence of the chloroform plume makes it reasonable to assume that IUSA's tailings cells discharge to perched groundwater. However, after analyzing the possibility of on-site or off-site sources for the chloroform, the land-use history of the site, potential off-site industrial or agricultural uses of chloroform, and even mischievous tampering with IUSA's monitoring wells, Mr. Pyrih concludes:

> "that the source of the chloroform reported in monitoring well MW-4 was not the tailings cells, but most likely an abandoned leach field that received laboratory effluents containing chloroform between 1979 and mid-1980, prior to operation of the White Mesa Mill."

Pyrih Affidavit at 2.[8]

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[8] Further, Mr. Pyrih states:

> "The abandoned leach field has been under extensive investigation by HYDRO GEO CHEM, INC., which confirms the leach field to be the most likely source of the chloroform reported in monitoring well MW-4." Pyrih Affidavit at 2.

In support of this conclusion, Mr. Stewart J. Smith, Senior Hydrogeologist of Hydro Geo Chem., Inc., performed an analysis of, and studied data relating to, the chloroform plume. Based on his analysis, Mr. Smith stated:

> "Chloroform most likely originated from the abandoned scale house leach field, which is located upgradient and cross-gradient of IUSA's tailings cells. The leach field origin is supported by: 1) the distribution of chloroform measured in existing monitoring wells in the perched groundwater zone, 2) the correlation between elevated nitrate and elevated chloroform concentrations in those monitoring wells that have been identified to have elevated chloroform concentrations, and 3) the

Mr. Pyrih also conducted an analysis of sampling data relating to the presence of constituents in perched groundwater at the White Mesa Mill site listed by the Tribe in its written presentation, including the Tribe's allegation that constituents found in the perched groundwater at the site are evidence of IUSA's tailings cells discharging to the perched groundwater zone. In his affidavit, Mr. Pyrih explains that he conducted an analysis of various constituents and their concentration levels in monitoring wells at the site as detailed in his report to NRC entitled *Evaluation of Eight Other Parameters* (1999) and compared them to data collected in conjunction with data gathered before the start of, and during, milling operations at the White Mesa Mill site.

As a general proposition, after analyzing data from nearly twenty (20) years of monitoring regarding constituents in perched groundwater at the White Mesa Mill site, Mr. Pyrih finds that:

> "[t]hey are not indicators of any seepage of tailings solutions from the cells....I also concluded that the parameters referenced by UDEQ [Utah Department of Environmental Quality] in the May, 1999 sampling were present at concentrations consistent with monitoring results from 19 years of data collection, or with background levels measured in wells at the Site. The inorganic parameters occurred in the perched groundwater zone at the Site at natural background levels."

Pyrih Affidavit at 2.

More specifically, with respect to the alleged presence of elevated total uranium and ammonia levels, after analyzing pre-operational sampling data from 1981 and data gathered up to the above-referenced sampling in May of 1999, Mr. Pyrih concludes:

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location of the leach field upgradient of the detected chloroform."
Smith Affidavit at 1.

> "[i]n the historical data, there are instances where higher levels of total uranium were reported in monitoring wells *upgradient* of the Site than were detected downgradient. The results from the May, 1999, sampling were consistent with the monitoring results from nearly 18 years of data collection."

Pyrih Affidavit at 3 (emphasis added).

This analysis led Mr. Pyrih to conclude that "the levels of total uranium reported in the monitoring wells during the May, 1999, sampling are consistent with natural background groundwater conditions at the Site." Pyrih Affidavit at 3.

Mr. Pyrih's analysis of ammonia concentrations in IUSA's monitoring wells yields similar results. The May, 1999, samples suggest eight (8) monitoring wells with elevated ammonia concentrations. Ammonia concentrations in one (1) upgradient well were similar to two (2) downgradient wells and higher than five (5) downgradient wells. *See* Pyrih Affidavit at 3. Comparing this sampling data to pre-operational sampling data, Mr. Pyrih concludes, "[t]he levels of ammonia reported in the May, 1999, sampling are consistent with natural background conditions at the Site." Pyrih Affidavit at 3. Therefore, the Tribe's allegation that total uranium and ammonia levels in monitoring wells at the White Mesa Mill site indicate that IUSA's tailings cells are discharging to perched groundwater is incorrect and insufficient to warrant withdrawal of IUSA's license amendment.

Next, the identification of other constituents in monitoring wells at the White Mesa Mill site by the Tribe, including iron, manganese, selenium, and tetrahydrofuran, are also addressed by Mr. Pyrih in his affidavit. Mr. Pyrih, after analyzing data from May, 1999, sampling and comparing it with the pre-existing sampling data base referenced above, concludes that, with respect to iron, manganese, and selenium, "the

concentrations reported in the May, 1999, sampling were also consistent with natural background conditions at the Site." Pyrih Affidavit at 3.

Regarding concentrations of tetrahydrofuran[9] in one (1) upgradient and one (1) downgradient well at the White Mesa Mill site, Mr. Pyrih states that sampling has yielded only "*traces*" of tetrahydrofuran. Pyrih Affidavit at 3. The failure to detect more than *trace* levels of this chemical is further supported by the fact that, as Mr. Pyrih states, "IUSA has never used tetrahydrofuran at the Site." Pyrih Affidavit at 3. Thus, it is reasonable to state that, because IUSA has never used tetrahydrofuran at the White Mesa Mill and recent sampling has detected only *traces* of that contaminant, IUSA's tailings cells are *not* discharging to the perched groundwater zone at the site.[10]

Finally, the Tribe alleges that the State of Utah identified levels of *gross alpha* above State drinking water standards. However, as Mr. Pyrih notes, Utah has a standard for *gross alpha* (i.e., not including uranium and radon) and does not have a standard for *total gross alpha* (including uranium and radon). The analyses for *gross alpha* and *total gross alpha* are not interchangeable and must be distinguished:

> "On further review of the analytical data from May, 1999, sampling, I noted that the gross alpha results that appeared to be in excess of State [Utah] standards were for <u>total</u> gross alpha. Utah drinking water standards include a standard (15 pCi/L) for gross alpha <u>that excludes radon and uranium</u>

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[9] Tetrahydrofuran is produced from furfural (also known as "bran oil") from natural agricultural sources. Furfural is a component of oat hulls, rice hulls, corn cobs, sugar bagasse, and other cellulose scrap. Such agricultural scrap is present in the properties adjacent to the mill site.

[10] Tetrahydrofuran was not detected at all during the September, 1999, split sampling event. However, during the November, 2001, split sampling event, IUSA again detected "trace" levels of tetrahydrofuran in the same upgradient and downgradient wells as reported by UDEQ in 1999, as well as in one cross-gradient well. Stating that the presence of tetrahydrofuran may be attributable to past agricultural practices in the area is reasonable considering that (1) the chemical was detected both upgradient and downgradient of the site; and (2) DDT, another chemical used historically for agricultural purposes in the area which was never used at the White Mesa Mill, was also detected by IUSA in "*trace*" levels in a few of IUSA's monitoring wells.

> and not for total gross alpha. *The two analyses are not interchangeable and should not be confused.*"

Pyrih Affidavit at 3 (emphasis added).

Based on this analysis, Mr. Pyrih concludes that:

> "[e]xamination of the May, 1999, sampling results indicated that the gross alpha (minus radon and uranium) never exceeded the Utah health based groundwater standard nor Federal MCLs," and "the levels of gross alpha that were detected are consistent with natural background levels for the Site."

*Id.*

Thus, the Tribe's allegation that gross alpha would exceed State, and for that matter SDWA regulatory limits, is incorrect.

Therefore, there is no evidence that the White Mesa Mill's tailings cells are discharging to groundwater. Accordingly, the Tribe's allegation that IUSA's tailings cells *may* discharge to perched groundwater is insufficient to warrant withdrawal of IUSA's license amendment.

### 2. Any Alleged Discharge From IUSA's Tailings Cells Is Unlikely to Reach a Drinking Water Source

The Tribe alleges that since no *final* determination on the source of the chloroform contamination at the site has been made by UDEQ, the contamination could potentially reach Tribal lands or springs near the site. Tribe Presentation at 2. With respect to this allegation, the fact that a *final* determination regarding the source of the chloroform contamination has not yet been made by UDEQ does not mean that the contamination poses a potentially significant threat to Tribal waters. In fact, there is no significant threat to tribal waters.

First, Mr. Stewart J. Smith, Senior Hydrogeologist of Hydro Geo Chem., Inc., performed an analysis of the chloroform contamination and compared that to data on the natural geologic conditions at the site. Mr. Smith noted that, with respect to the directional flow of the perched groundwater: "[p]erched groundwater flow directions based on past monitoring at the site range from southerly to southwesterly. Smith Affidavit at 1. After analyzing the movement of this contamination, Mr. Smith finds:

> "[t]he chloroform plume is moving slowly and has migrated approximately 1,800 feet south of the abandoned scale house leach field in more than 20 years, a rate of approximately 90 ft./year."

Smith Affidavit at 1-2.

Using this data, Mr. Smith compares this rate of movement with the long distances to tribal lands and springs near the site. Mr. Smith finds:

> "Tribal lands are located approximately 3 miles south-southeast of the plume. At this rate, even if the plume could reach Tribal lands, it would take approximately 175 years....A small spring located approximately 2 miles southwest of the chloroform plume may be recharged by the perched water zone. At a rate of approximately 90 feet/year, even if the plume could reach the spring, it would take approximately 117 years."

*Id.*

Further, Mr. Smith after analyzing the speed and the direction of the plume over a twenty (20) year time period and comparing the results to the location of White Mesa tribal lands, Mr. Smith concludes:

> "[t]he direction of migration of the plume is to the south-southwest, toward the western "lobe" of White Mesa bounded on the west by Cottonwood Canyon. Cottonwood Canyon separates White Mesa from Black Mesa to the west. Tribal lands are located south-southeast of the plume, on a "lobe" of White Mesa that is situated to the east of the "lobe" toward which the plume is migrating. Therefore, the plume is migrating toward a portion of White Mesa that is isolated from the portion on which the Tribal lands are located."

Smith Affidavit at 2.

Based on these findings, the chloroform contamination at the White Mesa Mill site is not migrating towards White Mesa tribal lands and should not pose a threat to the Tribe.

In addition, Mr. Smith's analysis addresses the geologic conditions near the perched groundwater, the natural groundwater flow at the site and their role in the potential migration of constituents to White Mesa tribal lands. Regarding the site's geologic conditions, Mr. Smith states:

> "[t]he regional Navajo/Entrada aquifer is separated from the perched water by more than approximately 1,000 feet of very low permeability materials. The regional aquifer is under artesian pressure, so that any flow between the regional aquifer and these intervening materials would be upward in the vicinity of the site."

Smith Affidavit at 1.

These geologic conditions coupled with Mr. Smith's studies on the natural flow of groundwater in relation to such conditions led Mr. Smith to conclude:

> "[n]atural attenuation processes, including hydrodynamic dispersion, diffusion, and chemical breakdown, will reduce chloroform concentrations substantially as it continues to migrate downgradient. *It is highly unlikely that chloroform concentrations at hazardous or even detectable concentrations would ever migrate onto Tribal lands or to springs due to the large distance and travel times that would be required.*"

Smith Affidavit at 2.

Even if it would be theoretically possible for the chloroform contamination to travel off-site towards the White Mesa tribal lands and/or springs, Mr. Smith states:

> "because of the relatively slow rate of travel and large distances to the site's downgradient property boundaries, there is ample time available for active mitigation of the chloroform plume using proven methodologies before there is any possibility of offsite impact."

Smith Affidavit at 2.

Thus, the chloroform contamination does not pose a threat to White Mesa tribal lands or springs near the site.

Indeed, a recent letter to William E. Love from William Sinclair, director of UDEQ's Division of Radiation Control,[11] confirms Mr. Smith's analysis. Mr. Sinclair's letter, which addresses the investigation into chloroform contamination at the Mill site, notes that the Mill has three (3) characteristics that allow an extended investigation of the chloroform plume, and potential remedies as necessary, without concern about the existence of a significant threat to public health and safety or the environment:

> "1. The isolated location of the IUC [IUSA] facility on White Mesa that provides long distances between the contaminant plume and the facility boundaries,
> 2. The lack of shallow aquifer water wells in a downgradient direction, both on and off the IUC [IUSA] facility, that could become possible points of exposure to the public, and
> 3. *Local hydrogeologic conditions that hydraulically isolate and prevent the shallow aquifer contamination from adversely impacting the deep confined aquifer that provides drinking water to other groundwater users in the region.*" (emphasis added)

Thus, UDEQ has also found that the natural geologic and hydrogeologic conditions at the Mill *do not present a viable pathway* for any *alleged* leakage to reach a drinking water source.

### 3. Neither The SDWA Nor NPDRs *Directly* Apply To Uranium Mill Tailings Sites Like The White Mesa Mill

First, with regard to the Tribe's allegation that the SDWA applies to the White Mesa Mill and IUSA, the Tribe's allegation is not stated with sufficient particularity to demonstrate actual or potential contamination to groundwater in the perched groundwater

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[11] Letter to Bill Love from William J. Sinclair, *Re: Request for Update and Status of State Groundwater Discharge Permit Application Process and Chloroform Investigation and Remediation Plan: International Uranium Corporation Uranium Mill Near Blanding, Utah*, (February 20, 2002) (emphasis added).

zone near White Mesa tribal lands. Indeed, the Tribe's written presentation, states, "*[i]f* these waters were polluted," and presents no affirmative evidence that tribal waters *actually have been or will be polluted. Id.* Without more, the Tribe's allegation is not sufficient to warrant the withdrawal of an NRC-licensed activity.

Second, the perched groundwater zone the Tribe references in its written presentation cannot realistically be considered a present or future public drinking water source. In Mr. Pyrih's report entitled *Evaluation of Eight Other Parameters* dated November 29, 1999, Mr. Pyrih states:

> "[m]onitoring data that have been collected since 1979 (prior to milling operations) indicated that the groundwater in the perched zone was of poor and variable water quality. Groundwater is perched above mudstones and claystones that are a natural source of the inorganic parameters. Slow groundwater velocities at the Site allow the perched water to equilibrate with the local mineralogy, dissolving inorganic parameters that elevate the total dissolved solids of the groundwater into the poor water-quality range."[12]

Pyrih Affidavit at 2.

In his study of the geologic conditions at the site in and near the perched groundwater zone, Mr. Smith states, "[o]nly the perched water, which is of *naturally poor water quality*, and of *very limited usable quantity* due to low yield in wells, is affected [by the chloroform contamination]." Smith Affidavit at 1 (emphasis added). Thus, any allegation by the Tribe that waters from the perched groundwater zone located near White Mesa tribal lands could serve as a present or future public drinking water source is incorrect and insufficient to warrant withdrawal of IUSA's license amendment.

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[12] Mr. Pyrih states that several reports have concluded that the perched water under the White Mesa Mill site has always contained groundwater of poor quality. Examples of the reports referred to by Mr. Pyrih include NRC's EA for the White Mesa Mill's application for license renewal; the *Hydrogeologic Evaluation of White Mesa Uranium Mill*, dated 1994; and Mr. Pyrih's, *Evaluation of Eight Other Parameters,* dated November 29, 1999. In the latter report, Mr. Pyrih states, "[t]he perched water is of poor quality because it is dissolving minerals from the Brushy Basin Member."

Third, the provisions of the SDWA and its NPDRs do not apply to groundwater in the perched groundwater zone near White Mesa tribal lands because the SDWA and its regulations only apply to "public water systems." Under the SDWA, a primary drinking water regulation "means a regulation which...applies to public water systems..." *See* 42 U.S.C. § 300(f). The SDWA applies a regulatory scheme using maximum contaminant levels ("MCLs") defined as "the maximum permissible level of a contaminant in water which is delivered to any user of a public water system," to provide public health protection for tap water intended for public consumption. *Id.* A "public water system" is defined as, "a system for the provision to the public of water for human consumption through pipes or other constructed conveyances..." *See id.* As stated in these provisions, SDWA regulations only apply to tap water delivered by "public water systems" and not to groundwater located at mill tailings facilities, which are not "public water systems." Thus, SDWA regulations have *no direct application* to groundwater at the White Mesa Mill site.

#### 4. SDWA MCLs, Potentially Applicable Only Through NRC's Groundwater Protection Criteria, *May Not* Be the Applicable Limit For Any Given Constituents At Any Given Uranium Mill Site

To the extent that MCLs are applicable to potential groundwater contamination at the White Mesa Mill (or any other mill), they are only applicable through NRC's groundwater protection Criteria for uranium mill tailings sites which are contained in 10 C.F.R. Part 40, Appendix A.[13] The provisions of Criterion 5 expressly "incorporate the

[13] The Atomic Energy Act ("AEA"), as amended by the Uranium Mill Tailings Radiation Control Act ("UMTRCA"), directs both the Environmental Protection Agency ("EPA") (i.e., Section 275(b)(1) &(2)) and NRC (Section 84(a)(3)) to promulgate generally applicable standards/requirements for *non*-radiological (hazardous) constituents in uranium mill tailings, and EPA's (40 CFR 192) and NRC's (10 CFR 40,

basic ground-water protection standards imposed by the Environmental Protection Agency ("EPA") in 40 C.F.R. Part 192, subparts D and E which apply *during operations and prior to the end of closure.*"[14]

Under Criterion 5, there are *three* potential limits that may apply to contamination in groundwater from uranium mill processing at the point of compliance ("POC") at a mill site.

The first limit is the *natural background concentration* of the constituent in groundwater, as determined by the Commission. A background concentration is the level of a constituent that is found in nature and was present at the location as if the mill site had never been constructed or operated.

The second limit that may be applicable to potential groundwater contamination under Criterion 5 is an MCL, if one has been established for a particular constituent under the SDWA. Such MCLs may be applicable to the extent that they are above background levels.[15]

The third type of limit that may be applicable is an alternate concentration limit ("ACL"). ACLs are site-specific, risk-based limits that may be employed by a licensee and approved by the Commission where compliance with background or an MCL may be impossible or impractical, if the ACL poses "no significant hazard" to the public or the

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Appendix A) regulations specifically contemplate the presence of heavy metals like lead and organic materials such as chloroform in mill tailings impoundments. *See* 10 CFR Part 40, Appendix A, Criterion 13; *see also* 40 CFR 192, Appendix I.

[14] 10 CFR Part 40, Appendix A, Criterion 5. (emphasis added).

[15] If background levels are higher than an MCL for a particular constituent, then requiring compliance with an MCL would require a licensee to return groundwater to "better than natural" quality, which would be an unreasonable proposition.

environment as long as the ACL is not exceeded. Licensees may propose ACLs to the Commission and such proposals are evaluated on a site-specific, case-by-case basis.

Thus, to the extent that an MCL for a given constituent might be relevant through EPA's and NRC's regulations at a given mill site, it would only be relevant if the *natural background level* or an *ACL* is not determined to be the applicable limit.[16] Therefore, the inescapable conclusion is that the Tribe's allegations are deficient factually and legally and do not provide a basis for withdrawal of IUSA's license amendment.

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[16] Given that the lead content in the Molycorp material has been raised as a matter of public concern thus far in this proceeding, it is interesting to note that natural background lead concentrations in groundwater and surface water in the area of the site are above the proposed MCL for lead. As stated by Mr. Samuel J. Billin, a Registered Professional Engineer in the State of Utah, the measured natural background levels for lead in the Navajo/Sandstone aquifer and nearby streams are above Utah Division of Drinking Water action levels:

> "Background data presented in the Final Environmental Statement (U.S.NRC, May 1979) include regional surface water and groundwater quality analyses collected prior to the construction of the mill. These data include analyses reporting up to 20 ug/L total lead for a sample taken in the Navajo Sandstone on July 25, 1977. Water quality analyses from nearby streams indicate lead concentrations up to 150 ug/L. These samples indicate the potential for background concentrations of lead, prior to mill construction, to be greater than the Utah Division of Drinking Water action levels." Billin Affidavit at 3.

Thus, *natural background levels* at the site exceed either state action levels or the proposed EPA MCL.

## III. CONCLUSION

For the aforementioned reasons, IUSA respectfully requests that the Presiding Officer deny the Tribe's request for withdrawal of IUSA's license amendment.

Respectfully submitted,

Anthony J. Thompson, Esq.
1225 19th Street, NW
2nd Floor
Washington, DC 20036
(202) 496-0780
COUNSEL TO INTERNATIONAL
URANIUM (USA) CORPORATION

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Alan S. Rosenthal, Presiding Officer
Dr. Richard F. Cole, Special Assistant

| | | |
|---|---|---|
| IN THE MATTER OF: | ) | |
| | ) | Docket No: 40-8681-MLA-11 |
| INTERNATIONAL URANIUM (USA) CORPORATION | ) | |
| | ) | ASLBP No. ~~01-789-01-MLA~~ 02-795-02-MLA |
| (Source Material License Amendment) | ) | DATE: APRIL 9, 2002 |

## CERTIFICATE OF SERVICE

I hereby certify that true and complete copies of the foregoing Response of International Uranium (USA) Corporation to Ute Mountain Ute Tribe's Written Presentation in the above-captioned matter has been served upon the following by electronic mail and facsimile (as indicated by an asterisk (*)), and by first class mail, postage prepaid, on this 9th day of April, 2002.

Dr. Richard F. Cole (*)
Special Assistant
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
11545 Rockville Pike, Mail Stop #T3F-23
Washington, DC 20852

Administrative Judge Alan S. Rosenthal(*)
Presiding Officer
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Mr. Tom Rice, Director (*)
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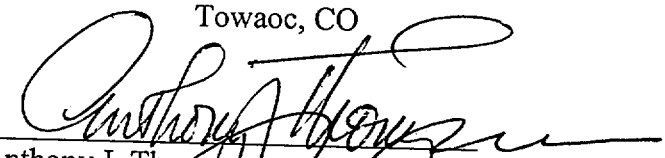

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(IUCMOLYCORPCERTIFICATEOFSERVICE.DOC)

# AFFIDAVIT OF SAMUEL J. BILLIN, P.E.

I, SAMUEL J. BILLIN, being duly sworn upon oath, depose and state as follows:

I am a Registered Professional Engineer in the State of Utah, license number 95-180588.

I received a bachelor of science degree in civil engineering from Brigham Young University in 1991 with an emphasis in water resources and hydraulics. I received a master of science degree from Utah State University in civil engineering in 1992 where I studied groundwater hydrology and chemical transport. I have more than seven years of experience assisting the mineral industry with permitting new facilities, permit amendments, and remediation of hazardous waste sites.

At the request of International Uranium (USA) Corporation (IUC), I have directed a multi-disciplinary team of scientists in evaluating the operation of tailings cells at the White Mesa Mill and review of pleadings filed in opposition to IUC's proposed license amendments. These team reviews have included geochemists, groundwater hydrologists, and mining geologists familiar with both the uranium mineral industry and permitting of mineral facilities with both state and federal agencies.

Our reviews have resulted in several observations that are significant in responding to pleadings concerning the amendment of IUC's Source Material License. These technical evaluations are as follows:

Reviewing the performance of the tailings cells in use by the mill (cells No. 1, 2, and 3) indicates that there is little potential for tailings solution to impact the perched water zone underlying the site or the deep Entrada/Navajo bedrock aquifer located some 1,300 feet below the site.

The existing tailings cells were lined with synthetic materials and contain leak detection systems. Quality control and assurance was provided by oversight and inspection by multiple parties including registered professional engineers and representatives of the United States Nuclear Regulatory Commission (USNRC). Since the cells were constructed in the early 1980's, there have been no indications that tailings cells in use were or are discharging tailings liquid to either the leak detection systems or the underlying formation.

The site is underlain by several geologic formations. The uppermost bedrock formation is the Burro Canyon/Dakota Sandstone. The Morrison Formation is a grouping of several similar rock types forming an aquitard (i.e., a barrier to vertical groundwater flow) from 110 feet to 1,300 feet below the site. A significant regional aquifer, the Entrada/Navajo Sandstone Formation, is located below the Morrison Formation.

We performed infiltration and groundwater flow modeling based on observations documented throughout the facility life (Letter report to Anthony Thompson dated November 23, 1998). These calculations indicated that very low quantities of liquid

could permeate the PVC liner system and potentially infiltrate the formation. These quantities would be considered "de minimis" and inherent for PVC liners according to guidance documents provided by the United States Environmental Protection Agency (USEPA).

Based on our modeling, potential discharges from the tailings facilities cannot reach the perched water zone for a minimum of 1,300 years. Even then, impacts to water quality are unlikely due to closure of the facility, regional changes in groundwater hydrology, and attenuating processes occurring in slow moving groundwater.

As impacts to the perched zone 110 feet below the site are highly unlikely, the likelihood of any impacts to the Entrada/Navajo aquifer, some 1,300 feet below the site, are even more remote.

The existence of a perched water zone beneath the facility significantly limits the potential for operation of the tailings cells to impact the Entrada/Navajo aquifer.

Monitoring of the perched zone has been performed since 1980, prior to construction of the tailings cells. This monitoring program has included up to 23 wells in the Burro Canyon/Dakota Formation. Potential for contamination of the Entrada/Navajo aquifer would certainly be preceded by detection in the perched water zone.

The conclusion that the Entrada/Navajo Formation is contaminated below the site is unwarranted based on the one sample result indicated in the filing of the Concerned Citizens of San Juan Co. Utah.

The filing cites a chemical analysis of a single sample collected December 14, 1994 from Energy Fuels Well #5 as an indication of contamination of the Entrada/Navajo aquifer in the vicinity of the White Mesa mill. The filing notes that the reported concentration of lead in this sample was greater than the action level for lead (15 (ug/L) established by the Utah Division of Drinking Water (Rule R309-103). The filing further implies that such indicated contamination has resulted from activities of the White Mesa Mill. Any claims of contamination in the Entrada/Navajo aquifer, based on the chemical analysis of this single sample are unwarranted by virtue of the following facts.

No records of sample collection are provided including well purging methods and quantities, methods of sample handling, methods of sample preservation and cleanliness of sample containers. These methods have been developed to assure that reported chemical analyses do, in fact, represent chemical conditions within the water body in question.

Regardless of what procedures were or were not followed, extensive scientific evidence has shown that no single purging schedule a priori produces accurate samples of groundwater. A series of samples collected during purging with subsequent analysis is required to determine a purging volume and schedule that will produce consistent results.

One sample of any geologic media, especially a mobile media such as groundwater, has an undefined reliability. Multiple samples are required to establish the natural amount of variability due to seasonal aquifer fluctuations and sampling methods.

Trace element (e.g., lead) concentrations in water are notorious for their sensitivity to collection and handling methods as well as their heterogeneous distributions in aquifers. In no way can one sample be considered an accurate indicator of groundwater concentrations.

Contamination of the Entrada/Navajo aquifer can only be defined in the context of background water quality in the regional aquifer. Constituent concentrations may naturally exceed such criteria. I am aware of no evidence to substantiate a claim that groundwater has been contaminated by the White Mesa Mill.

Background data presented in the Final Environmental Statement (U.S.NRC, May 1979) include regional surface water and groundwater quality analyses collected prior to the construction of the mill. These data include analyses reporting up to 20 ug/L total lead for a sample taken in the Navajo Sandstone on July 25, 1977. Water quality analyses from nearby streams indicate lead concentrations up to 150 ug/L. These samples indicate the potential for background concentrations of lead, prior to mill construction, to be greater than the Utah Division of Drinking Water action levels.

FURTHER AFFIANT SAYETH NOT.

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

DATED this 14th day of December 1998.

Samuel J. Billin, P.E.

Voluntarily signed and sworn to before me this 14th day of December 1998, by the signer, whose identity is personally known to me or was proven to me on satisfactory evidence.

NOTARY PUBLIC

Residing at: 1345 W 101st Ave - Denver CO 80221
My Commission expires: 10/20/01

MRR
Gf: Mill Utah/
Groundwater

# State of Utah

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
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February 20, 2002

Mr. Bill Love
2871 East Bench Road
Moab, UT 84532

Re: Request For Update and Status of State Groundwater Discharge Permit Application Process and Chloroform Investigation and Remediation Plan: International Uranium Corporation Uranium Mill Near Blanding, Utah.

Dear Mr. Love:

This letter is in response to your telephone inquiry regarding an update and status report of State progress towards: 1) issuance of a Groundwater Discharge Permit for the International Uranium Corporation (IUC) uranium mill near Blanding, Utah, and 2) completion of the on-going chloroform groundwater contamination investigation and remediation plan. A summary of the status of both projects is provided below.

1. State Groundwater Discharge Permit Application – we are working with IUC to complete this application. Several technical studies have been prepared and are in process of review by Utah Division of Radiation Control (DRC) staff. In general, these studies are needed to:

    1) Describe and characterize local groundwater conditions at White Mesa,
    2) Determine the number and location of monitoring wells needed for adequate groundwater monitoring of the facility,
    3) Determine best management practices to prevent groundwater contamination at the facility.

    Currently, we are awaiting IUC's resolution of several groundwater hydrology issues to move forward with this process. The need to investigate the chloroform contamination at the facility at the same time we are reviewing the GWD Permit application is impacting the GWD Permit schedule. It is important to coordinate these two efforts to ensure separate and distinct monitoring of the tailings facility from the chloroform plume. IUC also has several issues of their own that they would like resolved before permit issuance.

    In the meantime, the State has conducted independent split-sampling of the existing IUC monitoring wells on 3 different occasions to confirm past groundwater quality data and better understand the dynamics of the IUC monitoring system (May, 1999, November, 2000, and November, 2001). During this split-sampling the State expanded the list of groundwater monitoring parameters used previously by IUC for their NRC license.

Our goal is to obtain a GWD Permit that provides adequate groundwater monitoring for the facility, and prevents groundwater pollution, to the degree possible thru reasonable improvements to engineering containment and operational processes. Accomplishing this goal is time consuming, and requires negotiation with the mill operator.

At this time, a firm date cannot be provided regarding the issuance of the State GWD Permit. However, we can continue to provide you periodic updates of our progress. As always, the State permitting process requires notification of the public of when the comment period opens, and when a hearing will be scheduled.

2. Chloroform Investigation - as you might recall in August, 1999 we issued a Groundwater Corrective Action (GWCA) Order to IUC regarding chloroform contamination discovered in IUC monitoring well MW-4 during the May, 1999 split-sampling event. The GWCA Order required IUC to submit for approval both: 1) an investigation report to determine the extent and cause of the groundwater pollution, and 2) a subsequent groundwater remediation plan.

   Since issuance of the GWCA Order, IUC has provided several reports related to the groundwater contamination investigation. The latest of which was dated November 9, 2001 and is currently under review. To date, this investigation has been completed in stages and is currently on-going. With each stage of the investigation, we have found additional information that needs to be provided before the contaminant investigation phase can be considered complete. To date, we have twice asked for additional information regarding this investigation, see DRC letters of July 3, 2000 and June 7, 2001. Currently, the investigation is not yet complete, and no DRC approval has been issued to data for either the investigation report or any proposed groundwater remediation plan.

   During the investigation so far, IUC has installed 9 additional groundwater monitoring wells near existing well MW-4. From these new wells it appears that the southern-most boundary of the chloroform plume has been identified. However, additional work is needed to identify and quantify the groundwater pollution along the western, eastern, and northern boundaries of the contaminant plume. Because we have yet to establish the physical extent and concentrations of this groundwater plume, the cause(s) or source(s) of the plume are as of yet not substantiated.

   In December, 2001 IUC installed two (2) more monitoring wells Northwest of existing well MW-4 in an attempt to better define the extent of the contaminant plume. We are currently awaiting an IUC report to document the geologic logs, well completion details and diagrams, and contaminant concentrations for these two (2) new wells.

Currently, the groundwater contamination investigation required by the August, 1999 GWCA Order continues at the facility. To the casual observer, it may appear that an excessive amount of time has transpired to identify the source and extent of the groundwater pollution. However, several factors combine that allow us additional time to investigate and remediate the groundwater pollution at the IUC facility, including:

1. The isolated location of the IUC facility on White Mesa that provides long distances between the contaminant plume and the facility boundaries,

2. The lack of shallow aquifer water wells in a downgradient direction, both on and off the IUC facility, that could become possible points of exposure to the public, and

3. Local hydrogeologic conditions that hydraulically isolate and prevent the shallow aquifer contamination from adversely impacting the deep confined aquifer that provides drinking water to other groundwater users in the region.

As mentioned above, the chloroform groundwater investigation is a complicated, on-going, and evolving project. Consequently, it is difficult today to predict when the investigation will be complete and when any remediation plan will be ready for State approval. In the meantime, we would be happy to inform you of progress made by IUC on the groundwater investigation and remediation plan in question.

In addition, the Utah Ground Water Quality Rules require all groundwater remediation plans to be made available for public review and comment before they are approved by the State (see Utah Administrative Code [UAC], R317-6.15.E). These rules also mandate several factors and criteria that must be met as a part of any State approval. When the time for this approval arrives, we will provide formal notice of the public comment period and a formal statement of basis to explain the State's findings regarding both the IUC contaminant investigation and the final groundwater remediation plan. At this time, the public may request a hearing regarding the proposed action (UAC R317-6-.20.A).

If you have further questions, or would like a periodic update regarding either the State GWD Permit or Groundwater Contaminant Investigation or Remediation Plan in progress for the IUC facility, please contact Loren Morton of my staff at (801) 536-4262. Thank you for your interest in this matter.

Sincerely,

William J. Sinclair
Director

WJS/LBM:lm

cc: Harold Roberts, IUC

F:\...\SierraClubUpdate2.doc
File: IUC Groundwater Permit Application

# EVALUATION OF EIGHT OTHER PARAMETERS

## NOVEMBER 29, 1999

Submitted to:

U.S. Nuclear Regulatory Commission
Utah Department of Environmental Quality
U.S. Environmental Protection Agency

Prepared by:

Roman Z. Pyrih, Ph.D.
Geochem Ventures International
Golden, Colorado

Submitted by:

International Uranium (USA) Corporation
Denver, Colorado
Contact: Michelle Rehmann
303.389.4131

## 1.0 INTRODUCTION

In a transmittal letter that accompanied the Notice of Violation and Groundwater Corrective Action Order dated August 23, 1999, the Director of the Division of Radiation Control of the Utah Department of Environmental Quality (UDEQ) requested that International Uranium (IUSA) Corporation include certain parameters in its groundwater contaminant investigation which were not part of the Notice of Violation and Groundwater Corrective Action Order. The eight parameters included "four" potential contaminants that were found during the May 1999 split sampling of wells at the White Mesa Uranium Mill site to be at concentrations in excess of Utah's health based groundwater standards:

- Gross Alpha
- Total Uranium
- Nitrate + Nitrite
- Manganese
- Selenium

and, "three" other indicators of potential groundwater contamination that were found in wells at concentrations below Utah's health based groundwater standards:

- Ammonia
- Iron
- Tetrahydrofuran

Although the transmittal letter described groups of "four" and "three" parameters, IUSA understands that UDEQ requests IUSA to include a total of eight (not seven) parameters.

The Issue Paper that accompanied the Notice of Violation stated that of the eight parameters "...currently under review by UDEQ, some or all (which) may be due to background groundwater conditions at the site." The purpose of this report is to review and to evaluate the occurrence of these eight parameters in terms of site hydrology, monitoring history, and water quality information based on 19 years of data collections and on background measurements from off-site wells in the area. In our opinion, the levels of these constituents reported in the May 1999 split sampling are indeed due to background groundwater conditions at the Mill site.

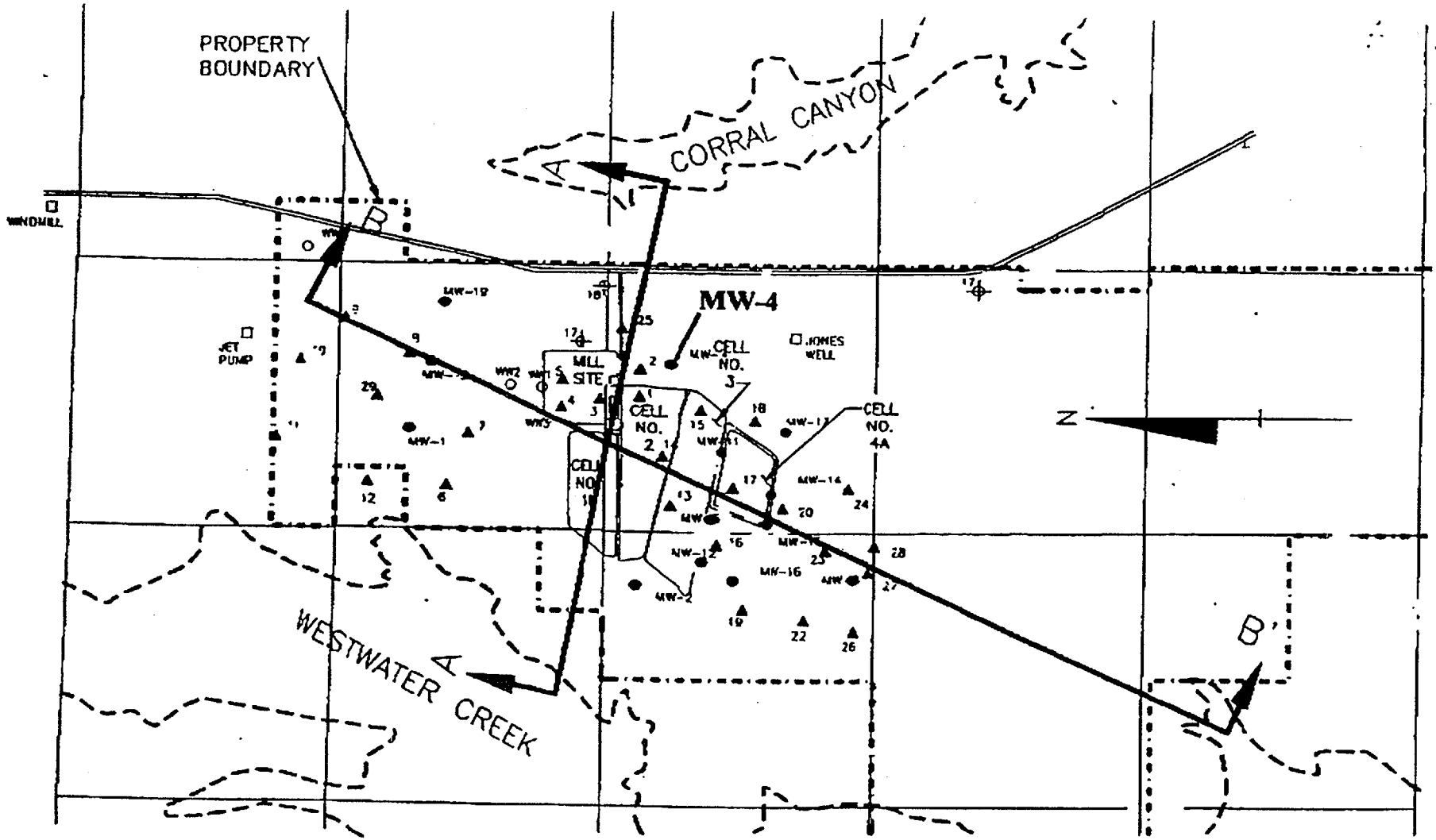
## 2.0 SITE HYDROLOGY

The White Mesa Mill is located 6.2 miles southwest of Blanding, Utah. The Mill is situated on White Mesa, surrounded on the east and west sides by Westwater Canyon and Corral Canyon. The site plan map is provided as Figure 1. Cross-sections cutting the mill site from east to west (A – A') and from north to south (B – B') are provided in Figures 2 and 3.

The perched groundwater zone within the first 70 – 150 feet of the surface is the first water horizon. As such, it is the earliest horizon for detection of possible tailings cell seepage and is used for groundwater monitoring. It is this groundwater that is the subject of ongoing investigations.

This perched groundwater is not a regional aquifer, but a perched zone of water. Downgradient regional users of groundwater are not affected by this zone. The preponderance of wells that are located in the perched zone are several miles upgradient, to the north of the White Mesa Mill where the saturated thickness is greater. There are some shallow wells immediately upgradient of the Mill that are used for irrigation purposes. Aside from the monitoring wells used by the Mill, there are no wells completed in the perched zone that are in use downgradient of the Mill site. Groundwater in this perched zone actually daylights in outcroppings in the canyons. Figure 3 illustrates what little water makes it to the canyons slowly seeps out and evaporates. At the Mill site, the hydraulic gradient in the perched zone is generally to the south / southwest (Figure 4).

Groundwater in the Entrada / Navajo sandstones is the first useable aquifer of significance documented in the area of the Mill. The Entrada / Navajo aquifer is an artesian aquifer that is used regionally for irrigation and domestic consumption. At the Mill site, the Entrada / Navajo aquifer is separated from the perched groundwater zone by more than 1,200 feet of unsaturated, low permeability rock formations. This combination of low permeability, thick unsaturated strata, and artesian pressures within the aquifer provides a natural barrier that protects the Entrada / Navajo aquifer from contamination.




▲ DAMES AND MOORE 1978 BORINGS

○ WATER SUPPLY WELLS D'APPOLONIA (1981)

● EXISTING MONITORING WELLS

EXISTING WATER SUPPLY WELLS

STOCK WELLS

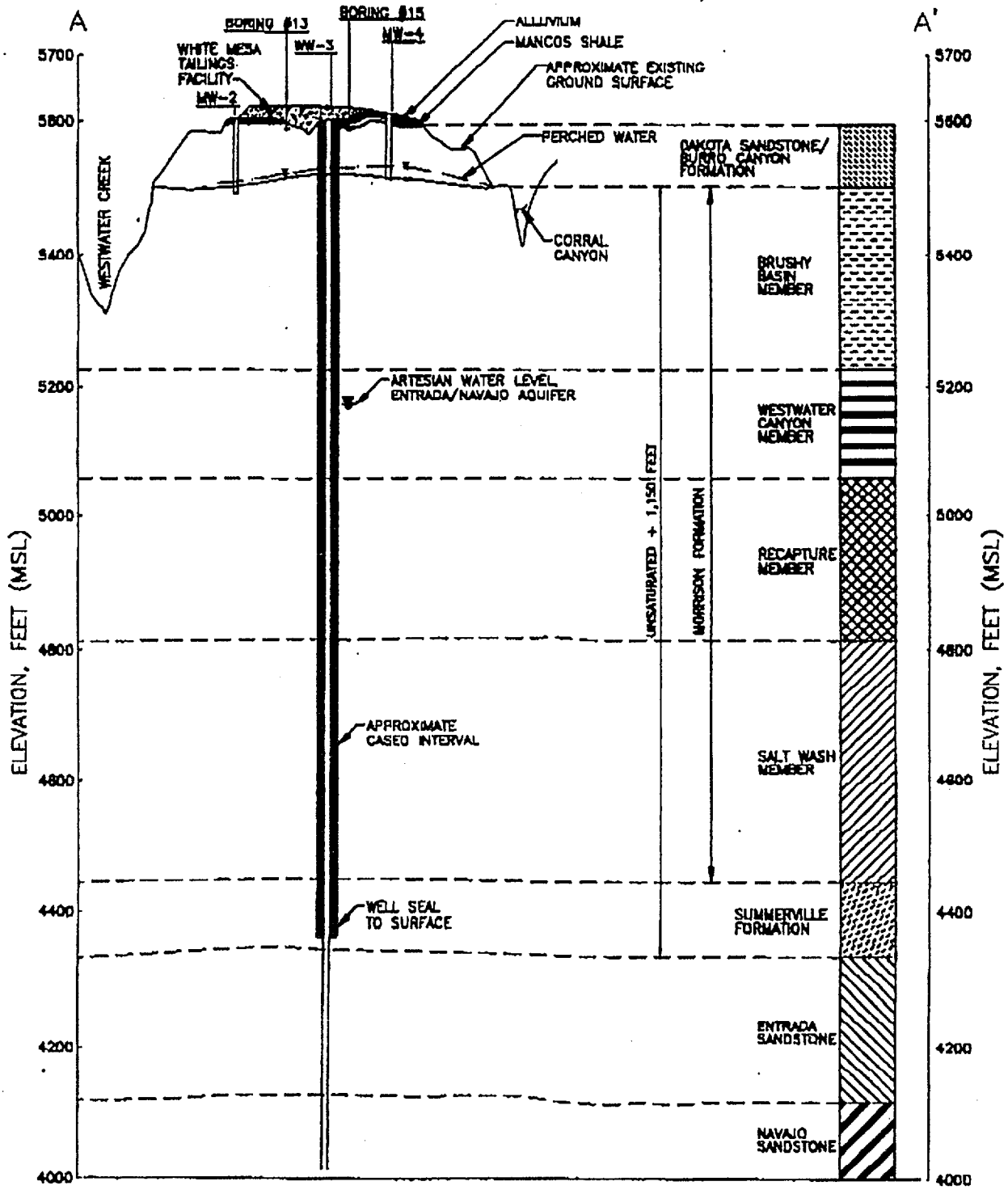
**International Uranium (USA) Corporation**
**White Mesa Mill**

Site Plan Map showing
Monitor Wells and Borings

SCALE

2000 0 2000 4000 feet

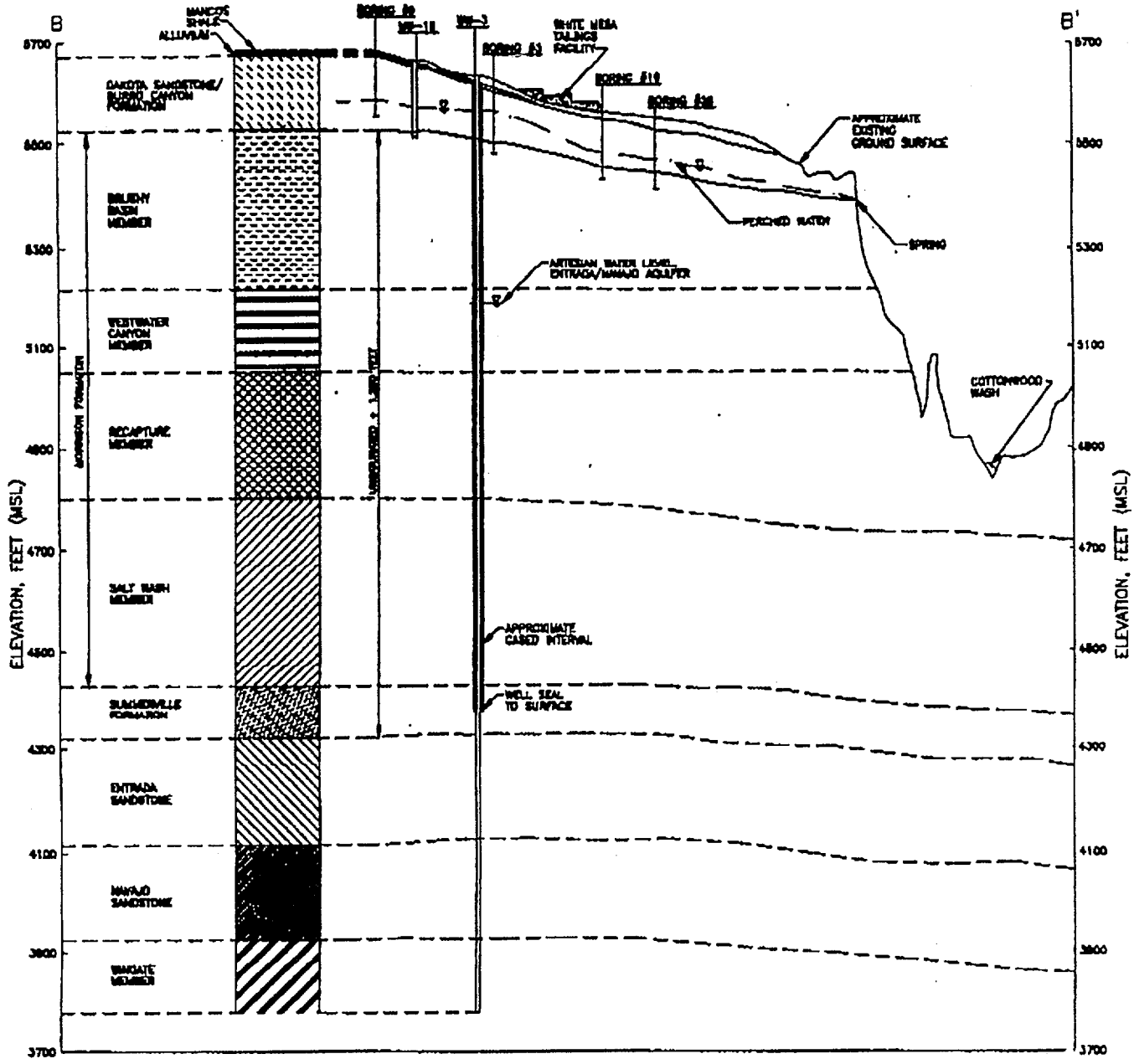
**Figure 1. Site Plan Map showing monitoring wells and borings.**




Section A–A'

International Uranium (USA) Corporation
White Mesa Mill

Figure 2. Cross-section cutting from west to east (A – A') through White Mesa.




Section B–B'

International Uranium (USA) Corporation
White Mesa Mill

Figure 3. Cross-section cutting from north to south (B – B') through White Mesa.

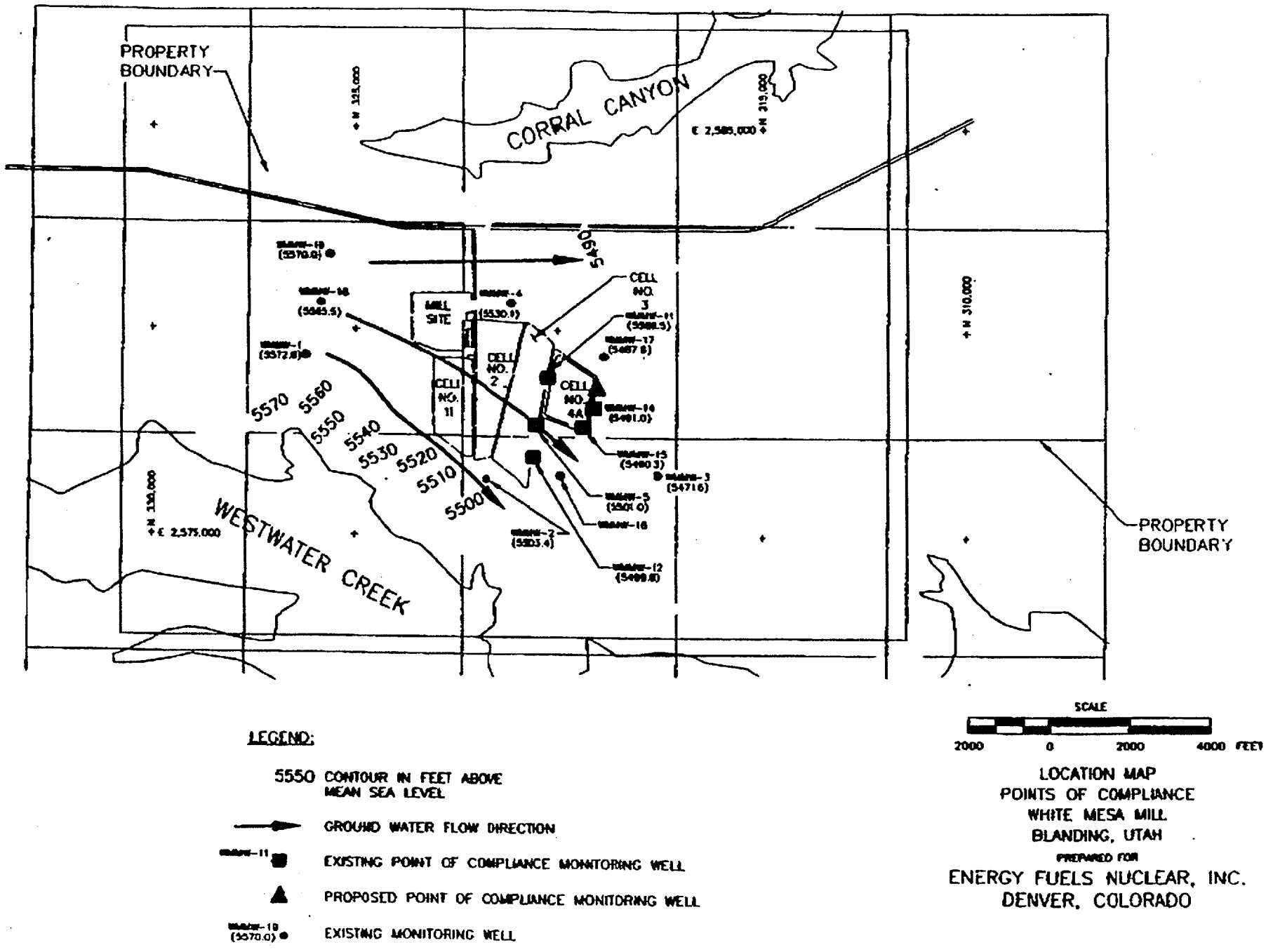



Figure 4. Direction of groundwater flow in the perched zone at Mill site.

## 3.0 MONITORING OF PERCHED ZONE

Water-quality data has been collected at the Mill site since 1979. Data includes pre-operational groundwater sampling and operational sampling of the perched zone. For some of the eight parameters, the data consists of quarterly monitoring results taken for up to 19 years. For other parameters, the data consists of a few analyses taken at upgradient or offsite locations, to characterize the levels of the parameters in the perched zone. No historical data exists for tetrahydrofuran; it was never used at the Mill.

### 3.1 Pre-Operational Background Sampling

Pre-operational background sampling began in July 1977. Analyses were performed by the Utah State Division of Environmental Health, Lab No. 77061. The results that were available at the time of publication of the 1978 Environmental Report (ER) were published in Table 2.6-6, "Water Quality of Ground Waters and Springs in Project Vicinity." Additional discussions of pre-operational water quality were published in the 1979 Final Environmental Statement (ES) for the White Mesa Uranium project. As described in the ES, groundwater water-quality data collected from January 1977 to May 1977 indicated the following:

- Surface water samples G1, G3, G4, and G5 were taken from springs within Cottonwood Creek, originating in the perched water zone. Sample G2 was collected from a well completed in the Navajo Sandstone that exceeded drinking water standards for iron and selenium.

- Abandoned stock wells (G6 and G7) on the project site that were completed in the Dakota Sandstone were of poor quality, frequently exceeded drinking water standards for arsenic, iron, selenium and sulfate. Total dissolved solids ranged from about 700 to 3,300 mg/L.

### 3.2 Early Operational Sampling

The earliest reports with groundwater data were issued around 1980, on analyses done by WAMCO labs. Subsequent analyses were performed by CORE Laboratories (1982 – 1983), UCC Metals Division Developmental Laboratory (1984), EDA Instruments (1985 – 1986), and Barringer Labs (1987 – 1994).

Several reports concluded that the perched water zone under the Mill site has always contained groundwater of poor quality, and that the groundwater was highly variable in water quality. Establishing background for the site on water quality at one well was inappropriate. For example, in Section 2.2.4 of the United States Nuclear Regulatory Commission's Environmental Assessment that was prepared in consideration of license renewal for the White Mesa Uranium Mill, the following illustrates the condition:

> "A staff review of the groundwater quality indicated that downgradient monitor wells Nos. 2, 3, 4. 5. 11, 12, and 13 show a higher concentration of dissolved constituents than does the background well (No.1). Because this has been observed since the time of the preoperational monitoring program, it probably represents normal variance in the ground water."

The Hydrogeologic Evaluation of White Mesa Uranium Mill prepared in 1994 by Titan Environmental Corporation reiterates that the groundwater in the perched zone is poor quality and highly variable. The perched water is of poor quality because it is dissolving minerals from the Brushy Basin Member. The water quality is highly variable because of several factors, including:

- Slow groundwater velocities that allow water to equilibrate with local mineralogy.
- Mineralogical variability of the host rock unit in which the perched zone is found.
- Partial penetration of some wells into the top of the underlying Brushy Basin Member.
- Decrease in saturated thickness of the perched zone south of the site.

The average total dissolved solids (TDS) for the site wells in the perched water zone range from about 1,200 to 5,000 mg/L, and the average sulfate concentrations range from about 600 to 3,000 mg/L. According to the Utah Administrative Code, R448-6, groundwater with TDS of 3,000 to 10,000 mg/L is classified as Class III-Limited Use. A number of upgradient wells (MW- 19), cross-gradient wells (MW- 4 and 17), and downgradient wells (MW-3, 4, 12, 14, and 15) would fall into this classification (Figures 5 and 6). Monitoring wells MW-2, 3, 4, 5, 11, 12, 14, 15, and 17 have consistently exceeded the Utah Class II and III standard of 1,000 mg/L for sulfate since the groundwater monitoring program was initiated. The results are tabulated in historical data included in Appendix B. The reported concentrations in Figure 6 are well within the typical historic range for each respective well.

Affidavit of Stewart J. Smith
Senior Hydrogeologist
Hydro Geo Chem, Inc.
51 West Wetmore
Tucson, Arizona 85705

I have been asked my opinion regarding whether or not chloroform detected in perched groundwater at the White Mesa Uranium Mill site (the site), located near Blanding, Utah, could spread onto White Mesa Ute Tribal lands located to the south-southeast of the site, or reach any springs that are recharged by the Brushy Basin perched groundwater zone. I am basing this opinion on a review of past consultants' reports describing the hydrogeology of the site (primarily on Titan, 1994[1]), and on my own involvement as a consultant to International Uranium (USA) Corporation with an ongoing investigation into the occurrence of chloroform in the perched water. The ongoing investigation is summarized, as of November 2001, in IUSA and HGC, 2001[2].

In my opinion, based on information that is available to me at the present time, it is highly unlikely that the chloroform detected in the perched water could spread onto the White Mesa Tribal lands or reach any springs that are recharged by the Brushy Basin perched groundwater zone at hazardous concentrations. I make the following points to support this opinion:

1. Perched groundwater flow directions based on past monitoring at the site range from southerly to southwesterly.

2. Chloroform most likely originated from the abandoned scale house leach field, which is located upgradient and cross-gradient of IUSA's tailings cells. The leach field origin is supported by: 1) the distribution of chloroform measured in existing monitoring wells in the perched groundwater zone, 2) the correlation between elevated nitrate and elevated chloroform concentrations in those monitoring wells that have been identified to have elevated chloroform concentrations, and 3) the location of the leach field upgradient of the detected chloroform.

3. I have seen no evidence that a continuing source of chloroform exists.

4. Only the perched water, which is of naturally poor quality, and of very limited usable quantity due to low yield to wells, is affected. The regional Navajo/Entrada aquifer is separated from the perched water by more than approximately 1,000 feet of very low permeability materials. The regional aquifer is under artesian pressure, so that any flow between the regional aquifer and these intervening materials would be upward in the vicinity of the site.

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[1] TITAN. 1994. Hydrogeological Evaluation of White Mesa Uranium Mill. Submitted to Energy Fuels Nuclear.

[2] IUSA and HGC. 2001. Update to Report "Investigation of Elevated Chloroform Concentrations in Perched Groundwater at the White Mesa Uranium Mill near Blanding, Utah", November 9, 2001.

5. The chloroform plume is moving slowly and has migrated approximately 1,800 feet south of the abandoned scale house leach field in more than 20 years, a rate of approximately 90 feet/year.

6. Tribal lands are located approximately 3 miles south-southeast of the plume. At this rate, even if the plume could reach Tribal lands, it would take approximately 175 years.

7. The direction of migration of the plume is to the south-southwest, toward the western "lobe" of White Mesa bounded on the west by Cottonwood Canyon. Cottonwood Canyon separates White Mesa from Black Mesa to the west. Tribal lands are located south-southeast of the plume, on a "lobe" of White Mesa that is situated to the east of the "lobe" toward which the plume is migrating. Therefore, the plume is migrating toward a portion of White Mesa that is isolated from the portion on which the Tribal lands are located.

8. A small spring located approximately 2 miles southwest of the chloroform plume may be recharged by the perched water zone. At a rate of approximately 90 feet/year, even if the plume could reach the spring, it would take approximately 117 years.

9. Natural attenuation processes, including hydrodynamic dispersion, diffusion, and chemical breakdown, will reduce chloroform concentrations substantially as it continues to migrate downgradient. It is highly unlikely that chloroform concentrations at hazardous or even detectable concentrations would ever migrate onto Tribal lands or to springs due to the large distance and travel times that would be required.

10. Furthermore, because of the relatively slow rate of travel and large distances to the site's downgradient property boundaries, there is ample time available for active mitigation of the chloroform plume using proven methodologies before there is any possibility of offsite impact.

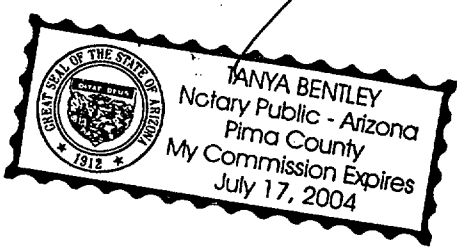
11. The isolation of the chloroform plume from the regional aquifer, and the long distances between the plume and the site boundaries are points that were also recently stated in a February 20, 2002 letter from Mr. William J. Sinclair, Director, State of Utah Department of Environmental Quality, Division of Radiation Control, to Mr. Bill Love, 2871 East Bench Road, Moab Utah.

Subscribed and Sworn to before me this 8th day of April, 2002.

Stewart J. Smith

My Commission
Expires: July 17, 2004

Notary Public



## RESUME OF STEWART J. SMITH

**EDUCATION:**

B.S. (Geosciences), University of Arizona, Tucson, Arizona, 1980.
M.S. (Hydrology), University of Arizona, Tucson, Arizona, 1989.

**EXPERIENCE:**

Hydro Geo Chem, Inc.

Mr. Smith joined Hydro Geo Chem in 1989 as a Hydrogeologist. His responsibilities include management of site characterization and remediation activities, design of soil and groundwater remediation systems, collection and interpretation of chemical and hydrogeologic data, use of numerical models for remedial design and as predictive and interpretive tools, and preparation of interpretive reports. Project management duties have included representation of clients to and negotiation with controlling regulatory agencies.

Project involvement includes:

- Management of a groundwater remediation project at an Albuquerque, NM landfill site. Project elements include estimation of landfill gas generation rates, design of a soil vapor extraction (SVE) system to remove VOC from soils underlying the landfill that act as a continuing source to groundwater, and design of a groundwater pump and treat system. Includes field measurement of soil and aquifer properties to support the design of the SVE and groundwater treatment system, and evaluation of other remedial alternatives.

- Numerical modeling of the decomposition of municipal solid waste under both aerobic and anaerobic conditions. Model results were used to support the design of an in-situ pilot aerobic treatment system for a closed City of Tucson landfill and to predict long term methane generation rates for untreated landfills.

- Numerical modeling of a baro-pneumatic landfill gas generation rate measurement technique to support a patent application. Patent is pending. Use of the technique to estimate landfill gas generation rates in landfills located in Tucson, AZ, Albuquerque, NM, and Livermore, CA.

- Design of deep soil vapor extraction (SVE) systems for protection of groundwater beneath three Tucson, AZ landfills. Systems were configured to maximize removal of deep vadose zone volatile organic compounds (VOC) that have acted as a source to groundwater while minimizing air intrusion into the overlying landfill. The design process included the use of three-dimensional numerical gas flow and transport models that utilized estimates of soil properties derived from field air permeability tests.

- Management of an investigation at a uranium mill site in Utah to support the award of a groundwater discharge permit. Elements of the project include measurement of soil and bedrock hydraulic properties, numerical modeling to select appropriate monitoring well densities, investigation of a localized groundwater VOC plume, and presentation of results to and negotiation with controlling regulatory agencies.

- Development of a three-dimensional numerical model of groundwater flow through a fanglomerate drinking water aquifer located in central Arizona. The modeling was part of an ongoing remedial effort at an Arizona mine site. The model was used to predict the hydraulic interaction between the fanglomerate and an overlying alluvial aquifer impacted by acid mine drainage under pre-remedial conditions and under conditions of future remedial pumping of the alluvial aquifer.

- Management of an SVE design study at a U.S. Environmental Protection Agency Superfund site located near Gary, Indiana. Work included performance of a pilot test, design of an SVE remedial system for the site using numerical models, and preparation of a design report. The effects of biodegradation resulting from SVE operation were included in the evaluation. The system is currently operating within design parameters.

- Numerical modeling of unsaturated flow and transport within mine tailings impoundments at a copper mine in Arizona and a Trona mine in Wyoming. Three-dimensional numerical models have been used to: 1) predict the impact of past and current wet tailings disposal on regional groundwater, 2) assess remedial options, 3) direct further data collection activities, and 4) provide data for slope-stability studies.

- Development of a three-dimensional numerical flow and transport model to predict the effectiveness of various remedial pumping strategies on acid mine drainage at a site in Arizona.

- Hydrogeologic assessment of a mountainous terrane for a Native American tribe in Nevada. Work included estimation of sustainable water supply and water quality, and recommendation of areas most favorable for water development.

- Analysis of multi-depth soil gas data collected at a municipal landfill in Tucson, Arizona. Work included supervision of field activities and development of numerical flow and transport models that incorporate groundwater and soil gas data as an aid to understanding past history and current and potential future impacts of VOCs on groundwater.

- Supervision of an SVE /air sparging pilot test at the site of a gasoline release in Phoenix, Arizona. Work included preparation of site-specific work plans, quality assurance project plans, health and safety plans, and analysis and interpretation of field data using numerical models.

- Management of a remedial investigation at a U.S. Environmental Protection Agency Non-Time Critical Emergency Response site located in Fort Wayne, Indiana. Work has included investigation of on- and off-site subsurface VOC contamination and preliminary design of a soil and groundwater remedial system.

- Supervision of the design of an SVE system to remediate a VOC-contaminated Superfund site located in Kalamazoo, Michigan. Work included preliminary system design using numerical models.

- Assessment of the long-term impact of vadose zone VOCs on groundwater at a site located within the North Indian Bend Wash Superfund site. Work included use of numerical models and preparation of an interpretive report.

- Supervision of the design and installation of an SVE/Enhanced Bioremediation System for clean-up of a fuel oil spill in Phoenix, Arizona. Work included predictive numerical modeling of vapor extraction and biodegradation efficiency for the purpose of pilot test design, performance of a pilot test, interpretation of pilot test results, and preparation of interpretive reports.

- Supervision of an investigation of subsurface contamination by organic compounds at a Superfund site in the Livermore Valley, California. Duties included planning and direction of soil gas, soils, and groundwater work.

- Supervision of the investigation and remediation of tetrachloroethylene soil contamination at a site located within the San Gabriel Basin Superfund site, southern California. Duties included planning and direction of field activities, design of remedial alternatives, and preparation of interpretive reports.

- Biostimulation soil venting pilot tests. Duties included preparation of site-specific work plans, supervision of field operations, performance of venting efficiency and tracer tests, interpretation of results using numerical models, and preparation of interpretive reports.

- SVE pre-design investigations. Duties included supervision of soil gas sampling and soil air permeability tests, and interpretation of results using numerical models.

- Environmental audits. Duties included research and investigation into all aspects of past and present property use which may have an impact on potential site contamination and owner liability, as well as investigation into the possibility of contamination from off-site sources. Preparation of interpretive reports based on the results of research and on-site investigations.

- Acid mine water contamination study. Duties included sampling and on-site analysis of groundwater to delineate the extent and type of contamination, supervision of monitor and production well installation, performance and interpretation of aquifer tests, and preparation of interpretive reports.

## Prior Experience

Geologist/Geologic Engineer for Newmont Exploration Ltd., Tucson, Arizona, 1984 to 1989. Major duties included:

- Analysis of the hydrogeology of the area surrounding a developing mine site in Nevada through interpretation of geologic maps. Recommendation of areas favorable for development of production wells to serve mining operations.

- Interpretation of geophysical data with respect to lithology and structure. Co-author of in-house report relating major gold districts to basin and range structure (as defined by regional gravity and aeromagnetic data). Development of a statistical model to quantify the spatial association of mineralization to aeromagnetic features.

- Geostatistical ore deposit modeling. Transformation of drill-hole data into engineering models used for mine design and planning, corporate financial planning, and published corporate ore reserve statements. Process required detailed analysis of the geologic environment, and analysis of the statistics and geostatistics of element distribution within an ore deposit, to ensure accurate estimation by kriging or inverse-distance techniques.

- Field acquisition, transcription, reduction, and presentation of data. Use of existing software to load, edit, grid, contour, and image process data on Burroughs mainframe, IBM PC, and COMPAC portables.

- Development of computer software to improve data processing procedures and design of routines to process new types of data sets.

- Research and field examination of areas with potential for bulk-minable gold mineralization. Using satellite imagery, located prospects with potential significant enough to warrant property acquisition.

Mineral Exploration Geologist for AMAX Exploration, Inc., and St. Joe American Corporation (now Bond Gold), 1980 to 1984. Responsibilities included research and field evaluation of properties with potential for bulk-minable gold, silver, tin, tungsten, and molybdenum mineralization; preparation of geologic reports and recommendations; supervision of drilling operations; and collection and analysis of geophysical data.

**PROFESSIONAL AFFILIATIONS:**

Member, National Groundwater Association

**AWARDS/HONORS:**

Member, Phi Kappa Phi (Honorary Society).

**SHORT COURSES:**

General Physics Corporation Short Course, "Bioremediation Engineering" November 1992.

Air and Waste Management Association Seminar, "Bioventing and Vapor Extraction: Uses and Application in Remediation Operations", April 1992.

OSHA 40-Hr Health and Safety Training for Hazardous Waste Site Activities, September 1989. 8-Hr Refreshers, Annually.

**PROFESSIONAL PUBLICATIONS:**

Bentley, H.W. and S.J. Smith. 1998. Soil Vapor Extraction of Chlorinated VOCs in the Vicinity of a Landfill Equipped with a Landfill Gas Control System. Presentation at the 1998 Arizona Hydrological Society Eleventh Annual Symposium. September 23 to 26, 1998. Abstract with Proceedings.

Bentley, H.W., J. Tang, S.J. Smith, D. Samorano, R.G. Arnold. 1998. Analysis of Remedial Options for Chlorinated VOCs at Harrison Landfill. In: Bioremediation and Phytoremediation, Chlorinated and Recalcitrant Compounds. The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, California, May 18 to 21, 1998. pp. 21-26

Ward, J.J. and S.J. Smith. 1998. Arid Zone Landfills: What Do Investigation and Modeling of Containment Migration Reveal About Transport Mechanisms? Presentation at the 1998 Arizona Hydrological Society Eleventh Annual Symposium. September 23 to 26, 1998. Abstract with Proceedings.

Smith, S.J., J. Pepe, and G.R. Walter. 1995. The Effect of Variable Injection Rates on Air Sparging Patterns in Heterogeneous, Porous Media. Presented at the First International Symposium on In-Situ Air Sparging for Site Remediation. Las Vegas, Nevada.

Smith, S. and G. Walter. 1993. Numerical Modeling of "Raining" Soil Vapor Extraction Wells for a Hypothetical Alluvial Aquifer. Presented at Rocky Mountain Ground Water Conference - Ground Water Technology and Tasks in the 90's, Albuquerque, New Mexico, 1993.

Walter, G.R., R.D. Philip, and S.J. Smith. 1993. Chicken/Egg Arguments in the Establishment of Soil Cleanup Standards. Presented at Hazmacon '93, San Jose, California.

# AFFIDAVIT

I, Roman Z. Pyrih, being duly sworn according to law, depose and state as follows:

1. I am presently employed as President and Consulting Geochemist of Roman Z. Pyrih & Associates, Inc. I am familiar with the references to chloroform and to "other pollutants" made by the Ute Mountain Ute Tribe in UTE MOUNTAIN UTE TRIBE INITIAL PRESENTATION IN INFORMAL HEARING AND REQUEST FOR WITHDRAWAL OF LICENSE AMENDMENT #20. The chloroform and "other pollutants" are parameters that were mentioned in a letter from State of Utah Department of Environmental Quality ("UDEQ") to Mr. David Frydenlund, International Uranium (USA) Corporation ("IUSA"), dated August 23, 1999, in connection with an investigation into certain chloroform contamination in the perched groundwater zone at IUSA's White Mesa Mill site (the "Groundwater Contaminant Investigation"). The "other pollutants" include: gross alpha, total uranium, ammonia, iron, manganese, selenium, and tetrahydrofuran. Based on results of groundwater monitoring conducted by UDEQ with IUSA during May, 1999, the UDEQ requested that IUSA include these parameters in the Groundwater Contaminant Investigation.

2. I investigated the possibility whether the tailings cells at the White Mesa Uranium Mill (the "Site) were leaking tailings solutions and whether a chloroform plume, first identified in monitoring well MW-4, was emanating from the cells. For my investigation, I used established diagnostic procedures used by geochemists to fingerprint water "types." The fingerprints are based on the chemical composition of the water as described by the major-ion chemistry of the water. Groundwater, for example, can be characterized by the relative concentrations of sodium, potassium, calcium, magnesium, sulfate, chloride, and bicarbonate ions that are dissolved in the water. The relative concentrations of these major ions can be plotted in diagnostic diagrams that fingerprint the water. Tailings solutions have a characteristic and unique major-ion fingerprint in which magnesium and sodium are the predominant cations, and sulfate and chloride are the predominant anions. None of the monitoring wells at the Site showed groundwater with the major-ion fingerprint diagnostic of tailings solutions. This observation led me to

conclude that the tailings cells at the Site were not leaking. Tailings solutions were not flowing into the monitoring wells.

3. If tailings solutions were not flowing into monitoring well MW-4 (which is located cross-gradient of the tailings cells), then tailings seepage could not be carrying chloroform into the monitoring well. Some other source area had to account for the presence of high concentrations of chloroform in the monitoring well. As part of my investigation, I looked at the possibility of off-site and on-site sources for the chloroform. I investigated the land-use history of the Site, potential off-site industrial and agricultural uses of chloroform, even mischievous tampering with the monitoring well. In the end, I concluded that the source of the chloroform reported in monitoring well MW-4 was not the tailings cells, but most likely an abandoned leach field that received laboratory effluents containing chloroform between 1979 and mid-1980, prior to operation of the White Mesa Mill. The abandoned leach field has been under extensive investigation by HYDRO GEO CHEM, INC., which confirms the leach field to be the most likely source of the chloroform reported in monitoring well MW-4.

4. I reviewed the results of the May, 1999, groundwater monitoring and compared the results on the "other pollutants" with groundwater data from pre-operational background sampling and early operational sampling of groundwater at the Site that were contained in various reports. My interpretation of the groundwater monitoring results and conclusions from the review of historical groundwater sampling at the Site were presented in a report, "Evaluation of Eight Other Parameters," that I prepared on November 29, 1999, for submittal to the US NRC, UDEQ, and US EPA.

5. My review and comparison of the groundwater data led me to conclude that the concentrations of these "other pollutants" are indicative of natural background levels in these wells. They are not indicators of any seepage of tailings solutions from the cells. In the report, I also concluded that the parameters referenced by UDEQ in the May, 1999, sampling were present at concentrations consistent with monitoring results from 19 years of data collection, or with background levels measured in wells at the Site. The inorganic parameters occurred in the perched groundwater zone at the Site at natural background levels.

6. My conclusion was consistent with previous investigations of the perched groundwater at the Site. Monitoring data that have been collected since 1979 (prior to milling operations) indicated that the groundwater in the perched zone was of poor and variable water-quality. Groundwater is perched above mudstones and claystones that are a natural source of the inorganic parameters. Slow groundwater velocities at the Site allow the perched water to equilibrate with the local mineralogy, dissolving inorganic parameters that elevate the total dissolved solids of the groundwater into the poor water-quality range.

7. UDEQ identified gross alpha as a pollutant reported in the May, 1999, sampling which appeared to be in excess of the State health based groundwater standards in wells at 2 upgradient, 2 cross-gradient, and 5 down-gradient locations. However, as

mentioned above, the levels of gross alpha that were detected are consistent with natural background levels for the Site. On further review of the analytical data from May, 1999, sampling, I noted that the gross alpha results that appeared to be in excess of State standards were for total gross alpha. Utah drinking water standards include a standard (15 pCi/L) for gross alpha that excludes radon and uranium and not for total gross alpha. The two analyses are not interchangeable and should not be confused. Examination of the May, 1999, sampling results indicated that the gross alpha (minus radon and uranium) never exceeded the Utah health based groundwater standard nor Federal MCLs.

8. The UDEQ identified total uranium as another pollutant reported in the May, 1999, sampling which appeared to be in excess of the State health based groundwater standards. UDEQ identified 7 monitoring wells that contained elevated levels of uranium. These locations included 2 upgradient wells, 2 cross-gradient wells, and 3 downgradient wells. I reviewed the results of pre-operational background sampling and early operational sampling of groundwater for total uranium from 1981 at the Site. In the historical data, there are instances where higher levels of total uranium were reported in monitoring wells upgradient of the Site than were detected downgradient. The results from the May, 1999, sampling were consistent with the monitoring results from nearly 18 years of data collection. My conclusion was that the levels of total uranium reported in the monitoring wells during the May, 1999, sampling are consistent with natural background groundwater conditions at the Site.

9. The UDEQ identified ammonia as a potential indicator of groundwater pollution, even though ammonia was detected at concentrations below State health based groundwater standards. The May, 1999, sampling indicated 8 monitoring wells with elevated ammonia levels. The concentration of ammonia in one upgradient well was similar to the concentrations reported in 2 downgradient wells. The ammonia concentration in the upgradient well was higher than the concentrations in 5 downgradient wells. My review of pre-operational and early operational monitoring data indicated that historical ammonia levels were consistent with the monitoring results from the May, 1999, sampling. The levels of ammonia reported in the May, 1999, sampling are consistent with natural background conditions at the Site.

10. The occurrence of the "other pollutants" listed by the Ute Mountain Ute Tribe, namely iron, manganese, selenium, and tetrahydrofuran were investigated and discussed in the report, "Evaluation of Eight Other Parameters." My review of the historical data for iron, manganese, and selenium, concluded that the concentrations reported in the May, 1999, sampling were also consistent with natural background conditions at the Site. Traces of tetrahydrofuran were reported in one upgradient well and one downgradient well at the Site during the May, 1999, sampling. IUSA has never used tetrahydrofuran at the Site.

Subscribed and Sworn to before me this 8th day of April, 2002.

Roman Z. Pyrih

My Commission
Expires: _____

My Commission Expires 07/19/2005

Notary Public

ELAINE K. ILGENFRITZ
NOTARY PUBLIC
STATE OF COLORADO

**Roman Z. Pyrih, Ph.D.**
**Principal Geochemist**
**Senior Project Manager**

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Roman Z. Pyrih & Associates, Inc
Geochem Ventures International
17326 West 57th Avenue
Golden, Colorado 80403

TEL: (303) 278-6403
FAX: (303) 278-2838
E-MAIL: rpyrih@attglobal.net

**Date of Birth:** January 25, 1946

**Citizenship:** United States of America

**Education:**

Ph.D. Geochemistry, Colorado School of Mines, Golden, Colorado, 1974
M.S. Chemistry, Colorado School of Mines, Golden, Colorado, 1970
B.S. Chemistry, Fordham University, New York, 1967

US Army Chemical Center and School, Fort McClellan, Alabama, 1973

**Professional Summary:**

Dr. Roman Z. Pyrih has more than 25 years of industry experience in managing mining and industrial waste, and in dealing with soils and groundwater contaminated by heavy metals and radionuclides. Dr. Pyrih is internationally recognized as an expert on the geochemical behavior of heavy metals and radionuclides in the environment. He has managed and consulted on numerous domestic and international projects, while integrating geochemical technology into resource recovery, and soil and groundwater cleanup strategies.

Dr. Pyrih has directed environmental services in geochemistry and geohydrology that included: definition of background, geochemical pathway and fate analysis, contaminant attenuation studies, and *in situ* remediation using microbial degradation, adjustments of Eh and pH, and geochemical fixation of contaminants. His specialty is *in situ* cleanup of soils and groundwater utilizing naturally occurring geochemical and microbial processes to immobilize or eliminate potential groundwater contaminants.

**Experience:**

1988 to Present

President and Consulting Geochemist
Roman Z. Pyrih & Associates, Inc.
Geochem Ventures International
Golden, Colorado

Dr. Pyrih has been pursuing "bankable" environmental projects, both domestically and internationally. These opportunities recover and recycle valuable resources such as spilled fuels, precious metals, or industrial chemicals and minerals, with revenues from the recovery being utilized to pay for cleanup operations.

Concurrently, Dr. Pyrih has been providing consulting services in geochemistry to the mining and metals industries by overseeing the preparation of site characterization reports, engineering evaluations and cost analyses, and risk assessments. He has managed soils and groundwater cleanup projects for major US clients and multinational lending institutions, and has implemented *in situ* remedies at sites contaminated with arsenic, boron, hexavalent chromium, copper, cyanide, lead, mercury, molybdenum, selenium, and uranium.

1996 to 1998

Principal Geochemist
Fluor Daniel GTI, Inc.
Golden, Colorado

Directed remediation of groundwater and soils at gas plant sites and CCA wood-treating facilities. Utilized chemical reduction technology to effect *in situ* conversion of hexavalent chromium to the trivalent state, followed by *in situ* precipitation and geochemical fixation of the chromium in the groundwater regime.

Directed laboratory studies that quantified natural attenuation of CCA chemicals, including arsenic, copper and hexavalent chromium, by soils and aquifer materials and confirmed natural attenuation of hexavalent chromium in field demonstrations.

Demonstrated *in situ* cleanup of arsenic in groundwater. Natural attenuation of arsenic was enhanced by introducing iron into groundwater and was effected by air sparging of the subsurface, so as to promote the precipitation and removal of insoluble iron-arsenate compounds.

Managed the remediation phase of the Lincoln Park superfund site at the Cañon City Uranium Mill in Colorado. Proposed and successfully negotiated an in-place remedy to treat soils and restore water quality in the former uranium tailings disposal area, contaminated with uranium and molybdenum. The remedy was a cost-effective alternative to excavating and removing soils from the footprint of the former unlined tailings ponds, and was implemented at the site in the fall of 1996, with the consent and approval of regulatory agencies including US EPA. An objective of the remedy was to minimize long-term groundwater pumping and treatment costs.

Pursued resource recovery opportunities to include: ozone treatment of sulfide ores; electrokinetic treatment of zinc-bearing waste; vacuum-enhanced recovery of spilled fuels; microbial degradation and chemical oxidation of organic contaminants.

1992 to 1995

Director of Ukrainian Operations and Principal Geochemist
GEOCHEM, a Division of TerraVac
Lakewood, Colorado

Evaluated opportunities to recover jet fuel and solvents spilled at fuel storage facilities at the Uzyn military base in Ukraine. The spilled hydrocarbons seeped into the ground, contaminated groundwater, and hindered the conversion of airport facilities for commercial, non-military use. The full-scale project could be self-funding, with revenues being generated by the recovery and recycling of valuable fuel products. Negotiated with potential partners on projects in Ukraine, with Ukrainian officials in the Ministry of Defense, the Ministry for Environmental Protection, and the Embassy of Ukraine in Washington, D.C. Initiated a faculty/student exchange program between the Colorado School of Mines and the Ivano-Frankivske University for Oil and Gas in Ukraine.

Responsible for identifying "bankable" environmental projects in Ukraine and Eastern Europe. Managed a feasibility study for one of the first environmental cleanup projects in Ukraine, at an oil refinery site in Drohobych, Lviv Region, and obtained funding for this feasibility study from the Overseas Private Investment Corporation.

1986 to 1992

President and Director of Geochemistry
GEOCHEM, Inc.
Lakewood, Colorado

Directed technology group that supported design of waste-disposal facilities at numerous customer sites. Integrated geochemical concepts into the design of waste-disposal facilities which incorporated additional environmental safeguards to protect groundwater from potential contamination.

Developed chemical reduction technology to convert hexavalent chromium in soils and groundwater to the less mobile, trivalent state. Incorporated chemical reduction into remediation strategies to affect *in situ* precipitation and geochemical fixation of chromium.

Introduced passive in-place treatment to abate the generation and effects of acidic rock drainage, as an alternative to conventional water treatment for heavy metals and arsenic. Demonstrated the ability of soils and earth materials to attenuate the movement of free cyanide and metal cyanide complexes in the subsurface for numerous customer sites. Implemented biogeochemical remedies to degrade cyanide in groundwater using indigenous microorganisms.

1979 to 1986

President and Consulting Geochemist
Roman Z. Pyrih & Associates, Inc.
Golden, Colorado

Conducted contaminant attenuation studies at numerous locations in support of permitting, closure, and land application activities. Studies included quantifying the ability of clay liners, soil, and bedrock material to attenuate the movement of various chemical and radiochemical constituents as potential groundwater contaminants.

1974 to 1979

Project Manager
Earth Sciences, Inc.
Golden, Colorado

Designed, engineered and operated a five-acre, heap-leaching pilot facility to recover gold using sodium cyanide and activated carbon. Developed and patented pyrometallurgical and hydrometallurgical processes to recover vanadium from metal-bearing shale, and uranium from commercial phosphate fertilizer.

**Membership in Professional Societies:**

Mining and Metallurgical Society of America
Society for Mining, Metallurgy, and Exploration
Ukrainian Academy of Sciences for Oil and Gas (Honorary)

**Language Proficiencies:**

English - Excellent (Speaking, Reading, Writing, Understanding)
Ukrainian - Excellent (Speaking, Reading, Writing, Understanding)
Russian and Polish - Fair (Reading, Understanding)
Italian, Spanish, and German - Fair (Speaking, Understanding)

**Publications:**

Dr. Roman Z. Pyrih has authored more than 30 technical publications dealing with the movement of contaminants such as cyanide, heavy metals, and radionuclides in the environment. His papers have also addressed *in situ* approaches to treating soils and restoring water quality in groundwater aquifers. He has been issued four US patents for hydrometallurgical processes to recover vanadium and uranium. A partial list is provided below.

Pyrih, R. 1998. "Recognizing Natural Attenuation of Metals." Fourth Annual Conference on Natural Attenuation '98, Pasadena, CA, December, 1998.

Pyrih, R. and R. Brown, 1998. "Enhancing the Natural Attenuation of Metals." Fourth Annual Conference on Natural Attenuation '98, Pasadena, CA, December, 1998.

Pyrih, R. 1998. "Overview of Metals Remediation Technologies Used in the Private Sector; Geochemical Fixation of Uranium and Molybdenum." Presented before Committee on Technologies for Cleanup of Subsurface Contaminants in the DOE Weapons Complex, National Research Council, Hanford Reservation, Richland, WA, May, 1998.

Pyrih, R. and R. Brown, et al. 1998. "In situ Remediation of Metals Comes of Age." Remediation / Summer 1998, p. 81 - 96.

Pyrih, R. and R. Hardison, et al. 1998. "In Situ Geochemical Fixation of Uranium and Molybdenum Using Calcium Polysulfide." Society for Mining, Metallurgy, and Exploration Annual Meeting, Orlando, FL, March, 1998, Preprint 98-138.

Pyrih, R. 1997. "Geochemical Fixation as a Remedy for Restoring Groundwater Quality." Presented before Hazardous Materials and Waste Management Division, Colorado Department of Health, Denver, Colorado.

Pyrih, R. 1996. "In-Place Cleanup of Soils and Groundwater Containing Cyanide and Metals." Presented at meeting of Alaska Miners Association, Anchorage, Alaska.

Pyrih, R. 1996. "In-Situ Metals Fixation for Groundwater Treatment." Innovative Technology Seminar, Michigan Department of Environmental Quality, Michigan State University, Lansing, Michigan.

Pyrih, R. 1996. "Laboratory Testwork and Field Demonstration of Flushing with Geochemical Fixation of Uranium and Molybdenum in the Old Ponds Area." Prepared for Cotter Corporation in support of remedy activities at the Cañon City Mill.

Pyrih, R. and J. Rouse. 1994. "In-Place Cleanup of Copper, Chromium, and Arsenic in Soil and Groundwater at Wood Preserving Sites." Second International Symposium and Exhibition on Environmental Contamination in Central and Eastern Europe, Budapest, Hungary.

Pyrih, R. 1993. "Remediation, Rehabilitation and Natural Resource Development in Eastern Europe - Environmental Opportunities and Needs." National Western Mining Conference & Exhibition, Denver, Colorado.

Pyrih, R. and J. Rouse. 1993. "Geochemistry." Geotechnical Practice for Waste Disposal. Edited by David E. Daniel; Chapman & Hall, London.

Pyrih, R. 1992. "Resource Recovery in Ukraine; Size and Scope of Environmental Projects." Environmental Group of ASCE Colorado Section.

Pyrih, R. 1992. "Opportunities and Needs in Natural Resources Development in Ukraine." Presented at TWG Leadership Conference, Developing a New Democracy - The Role of U.S. - Ukraine Relations, Washington, D.C.

Pyrih, R. 1992. "Environmental Regulation and Their Application to Mineral Development in the United States." Ukrainian State Committee on Geology and Utilization of Mineral Resources, in Kiev and Krivij Rih, Ukraine.

Pyrih, R. 1992. "Supplemental Trip Report, World Bank Environmental Mission to Ukraine, July 8 to 11, 1992." Prepared under Terms of Reference for The World Bank.

Pyrih, R. 1992. "Environmental Rules and Regulations in the United States - an Industry Perspective." Ministry for Environmental Protection of Ukraine, in Kiev, Ukraine.

Pyrih, R. 1992. "Final Report, World Bank Environmental Mission to Ukraine, April 9 to April 29, 1992." Prepared under Terms of Reference for The World Bank.

Pyrih, R. 1992. "Environmental Degradation and Environmental Health in Ukraine - Panel Discussion." Health and the Environment Conference held at the United Nations, New York City.

Pyrih, R. 1991. "Evolution of the Environmental Protection Agency in the United States." Ministry for Environmental Protection of Ukraine, in Kiev, Ukraine.

Pyrih, R. 1991. "Use of Lysimeters to Monitor the Effects of Tailings Dewatering on Pore-Water Chemistry." Proceedings, Randol Gold Forum, Cairns '91, Australia.

Pyrih, R. and D. Hall, Hall Southwest Water Consultants. 1991. "Naturally Occurring Radionuclides and Their Distribution in Texas." Prepared for Texas Utilities Mining Company in support of permitting.

Pyrih, R. and J. Rouse. 1991. "Geochemical Attenuation and Natural Biodegradation of Cyanide Compounds in the Subsurface." Environmental Management for the 1990's, Denver, Colorado.

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Pyrih, R. 1990. "Subsurface Behavior of Heavy Metals, Considerations Influencing Monitoring and In-Place Cleanup." Environmental Hazards Conference and Exposition, Seattle, Washington.

Pyrih, R. 1989. "Geochemical Characterization of Overburden Materials for Attenuation Properties." Prepared for Texas Utilities Mining Company in support of permitting.

Pyrih, R. and J. Rouse. 1989. "In-Place Cleanup of Heavy Metal Contamination of Soil and Groundwater at Wood Preservation Sites." Environmental Hazards Conference & Exposition, Houston, Texas.

Pyrih, R. and J. Rouse. 1989. "Attenuation Processes: A Viable Regulatory Alternative." Proceedings, Environmental Hazards Conference & Exposition, Bellevue (Seattle) Washington.

Pyrih, R. and V. Straskraba, et. al. 1988. "A Study of the Potential for Surface and Groundwater Contamination by Arsenic at the Sunbeam Gold Mine." Third International Mine Water Congress in Melbourne, Australia.

Pyrih, R. and J. Rouse. 1988. "Natural Geochemical Attenuation of Trace Elements in Migrating Precious-Metal Process Solutions." Proceedings, Randol International Gold Conference, Perth, Australia.

Pyrih, R. and R. Popielak, Canonie Environmental Services Corp. 1988. "Evolution of Groundwater Chemistry." Presented by United Nuclear Corp. to EPA for consideration in preparation of RI/FS for Church Rock uranium tailings; established background value for nitrate in groundwater.

Pyrih, R. and D. Brooman. 1987. "Mine Drainage Treatability Investigations, Manganese Removal from Pond Effluent." Presented by Colorado Yampa Coal Company at Colorado Water Quality Control Commission public hearing.

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Pyrih, R. 1985. "Relationship Between Geochemistry and Geotechnical Engineering as it Applies to the Management of Hazardous Waste Disposal." Presented at meeting of Geotechnical Group of ASCE Colorado Section.

Pyrih, R. and J. Rouse. 1985. "Natural Geochemical Attenuation of Contaminants Contained in Acidic Seepage." Proceedings, International Conference on New Frontiers of Hazardous Waste Management, EPA .

Pyrih, R. and J. Morse, et. al. 1983. "New Perspectives on Radiometric Exploration for Oil and Gas." Oil and Gas Journal, pp. 87-90.

Pyrih, R. 1983. "McLaughlin Project Geochemical Program." Prepared for Homestake Mining Co. in support of McLaughlin Project permitting.

Pyrih, R. 1983. "Swanson Uranium Project Geochemical Program." Presented by Marline Uranium Corp. at Virginia Uranium Advisory Group public hearing.

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Pyrih, R. and J. Rouse. 1983. "Summary Report on Geohydrological and Geochemical Conditions, with Recommended Ground-Water Monitoring Program, Uranium Area, CO." Presented by UMETCO Minerals Corp. at Colorado Department of Health public hearing.

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