# EXHIBIT Q

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
William J. Sinclair
Director

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

# MEMORANDUM

**ENFORCEMENT SENSITIVE**
**ATTORNEY-CLIENT PRIVILEGE**

TO: Dianne Nielson, Executive Director
Utah Department of Environmental Quality

THROUGH: Bill Sinclair, Director BS
Division of Radiation Control

FROM: Rob Herbert, Hydrogeologist RFH
Division of Radiation Control

DATE: April 16, 1999

SUBJECT: Request for Acceptability Determination for CERCLA Off-Site Rule
International Uranium (USA) Corporation (IUSA) White Mesa Mill

This morning, I received a telephone call from Terry Brown, the CERCLA Regional Off-Site Coordinator for Region 8 of the U.S. Environmental Protection Agency (EPA). Mr. Brown called me to acknowledge receipt of the DRC letter dated April 7, 1999 from Bill Sinclair in reference to the subject request. A copy of this DRC letter is attached. During the telephone call, Mr. Brown inquired about the State of Utah's application request to IUSA for a ground water discharge permit. I explained to Mr. Brown that the State and IUSA have entered a voluntary informal permit application process that IUSA insisted upon being nonbinding. This informal process is a last-ditch effort by the State to demonstrate to IUSA what permit requirements they will be subject to before they formally submit to a legally binding permit. Mr. Brown inquired about any Notices of Violation (NOV) that the State has issued to IUSA related to the White Mesa Mill. According to Mr. Brown, unless IUSA has received any NOVs from the State of Utah, the information provided to him from the NRC leaves him no choice but to issue a letter to IUSA finding the White Mesa Mill acceptable for the CERCLA Off-Site Rule. I have attached a copy of the Mr. Brown's letter to the NRC requesting information about the White Mesa Mill.

From my discussion with Mr. Brown this morning, it appears that EPA will grant acceptability status to the White Mesa Mill for the CERCLA Off-Site Rule unless the State of Utah issues an NOV/Order to IUSA for a ground water discharge permit. This acceptability status may be detrimental to the State's current position regarding "sham disposal" of alternate feed materials. It is recommended that we discuss our options before EPA issues its determination.

c: Denise Chancellor and Fred Nelson, Utah Attorney General's Office

KH 4/8/99
Your copy

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

Michael O. Leavitt
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April 7, 1999

Terry Brown
CERCLA Regional Off-Site Coordinator
U.S. Environmental Protection Agency - Region 8
999 18th Street - Suite 500
Denver, Colorado 80202-2466

SUBJECT: March 29, 1999 Letter to Mr. N. King Stablein, Acting Chief
U.S. Nuclear Regulatory Commission Uranium Recovery Branch

Dear Mr. Brown:

The Utah Department of Environmental Quality, Division of Radiation Control (DRC) has received a copy of the subject letter in reference to International Uranium (USA) Corporation's (IUSA) request for an Acceptability Determination for the White Mesa Uranium Mill in accordance with the CERCLA Off-Site Rule (OSR). As Rob Herbert of my staff indicated to you via telephone, the State of Utah currently has an appeal before the Nuclear Regulatory Commission regarding the legitimacy of FUSRAP materials from Tonawanda, New York as alternate feed materials for the White Mesa Uranium Mill. The Commission has extended the appeal review to April 29, 1999 for making a ruling. In relation to the "sham disposal" issue currently under appeal with the Commission, the State of Utah has serious concerns regarding ground water protection from potential seepage from the tailings impoundments at the White Mesa Mill. These concerns include the:

(1) design, construction and performance of the tailings impoundment liner systems;
(2) design, construction and efficiency of the tailings impoundment liner leak detection systems;
(3) failure to include secondary permeability from joints and fractures in transport models; and
(4) inadequate leak detection ground water monitoring program.

To clarify these State concerns, I have enclosed the following items:

- Summary table of potential listed hazardous waste constituents identified in the last four alternate feed materials requested by IUSA;
- March 9, 1999 Memorandum to update Denise Chancellor of Utah Attorney General's Office regarding alternate feed materials at the White Mesa Mill;
- February 11, 1999 DRC letter to Dave Frydenlund of IUSA explaining the State's concerns related to groundwater protection from potential seepage from the tailings impoundments;
- January 21, 1999 DRC letter to Michelle Rehmann of IUSA questioning the validity of assumptions made in analytical modeling of tailings impoundment liner system
- February 12, 1999 Knight Piesold LLC letter to Michelle Rehmann of IUSA in response to the DRC's January 21, 1999 letter to Michelle Rehmann.

Because of the concerns described above, the State of Utah has requested that IUSA submit a permit application to the State for a ground water discharge permit. At this time, IUSA and the State have entered into a voluntary permit application process. Hopefully the end result will be a groundwater permit that satisfies both the needs of IUSA and the State of Utah. The State of Utah will be prepared to pursue further enforcement mechanisms if the voluntary process should fail.

We believe that OSR acceptability should be carefully evaluated. in regards to the White Mesa Mill in lieu of the State of Utah's concerns regarding adequate groundwater protection. If you have any questions, please call me or Rob Herbert at (801) 536-4250.

Sincerely,

William J. Sinclair, Director
Division of Radiation Control

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c: Fred Nelson and Denise Chancellor, Attorney General's Office

## Potential Listed Hazardous Waste Constituents Identified In Alternate Feed Materials
## International Uranium Corporation White Mesa Mill License Amendment Requests

| Organics | Cotter | Ashland 2 | Ashland 1 | St. Louis |
|---|---|---|---|---|
| Acetone | | x | | |
| Benzene | | x | | x |
| Carbon tetrachloride | x * | | | |
| Chloroform | | | x | x |
| Hexachlorobutadiene | | | | x |
| Tetrachloroethene | | | x | |
| Trichloroethene | | | | x |
| Trichlorofluoromethane | | | | x |
| 1,1,1 Trichloroethane | | | | x |
| Bromo fluoro benzene | | x | | |
| 2 Butanone (methyl ethyl ketone) | x * | x | | |
| Chlorobenzene | | x | | x |
| Dibromofluorobenzene | | x | | |
| 1,1 Dichloroethane | | | | x |
| 1,2 Dichloroethane | | x | | |
| Ethylbenzene | | x | x | x |
| Methylene chloride (dichloromethane) | | x | x | x |
| Toluene | | x | x | x |
| Trichlorofluoromethane | | x | | |
| Xylenes | | x | | x |
| Acenaphthene | | | x | x |
| Acenaphthylene | | | x | x |
| Anthracene | | x | x | x |
| Benzo (a) Anthracene | | x | x | x |
| Benzo (b) fluoranthene | | x | x | x |
| Benzo (k) fluoranthene | | x | x | x |
| Benzo (g,h,i) perylene | | x | x | x |
| Benzo (a) pyrene | | x | x | x |
| Bis (2-ethyl hexyl) phthalate | | x | x | x |
| Chrysene | | x | x | x |
| Dibenzo (a,b) anthracene | | x | | x |
| Dibenzofuran | | | x | x |
| Di-n-butyl phthalate | | x | x | |
| Di-n-octyl phthalate | | x | | |
| Fluoranthene | | x | x | x |
| Fluorene | | | x | x |
| Indeno (1,2,3 c,d) pyrene | | x | | x |
| 2 Methyl Naphthalene | | x | x | x |
| Naphthalene | | x | x | x |
| Phenanthrene | | x | x | |
| Pyrene | | x | x | x |
| 4 methyl phenol | | | | x |
| **Metals** | **Cotter** | **Ashland 2** | **Ashland 1** | **St. Louis** |
| Ag | | | | |
| Cd | | | | |
| Chromium | | x | x | x |
| Lead | | x | x | x |

* DOE/NV determined through process knowledge that carbon tetrachloride had been used during uranium processing. DOE/NV considers this a process waste which became containinated during processing and is not within the scope of spent solvent listings.

Source: IUC NRC license amendment requests and IUC 9/30/98 submittal to Don Verbica of UDEQ-DSHW.

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
William J. Sinclair
Director

# MEMORANDUM

TO: Denise Chancellor

THROUGH: Bill Sinclair BS

FROM: Rob Herbert

DATE: March 9, 1999

SUBJECT: Alternate Feed Materials

The purpose of this memorandum is to update you on the status of alternate feed materials associated with International Uranium Corporation's White Mesa Mill. Enclosed are the following:

(1) February 3, 1999 NRC approval letter and attached Technical Evaluation Report to allow IUC to receive and process FUSRAP materials from the Ashland 1 and Seaway Area D sites located at the Tonawanda, New York site.

(2) March 2, 1999 cover letter to IUC's Amendment Request to process alternate feed material from the St. Louis FUSRAP Site at the White Mesa Uranium Mill.

(3) Graph of IUC alternate feed volumes versus average U-238 weight percent.

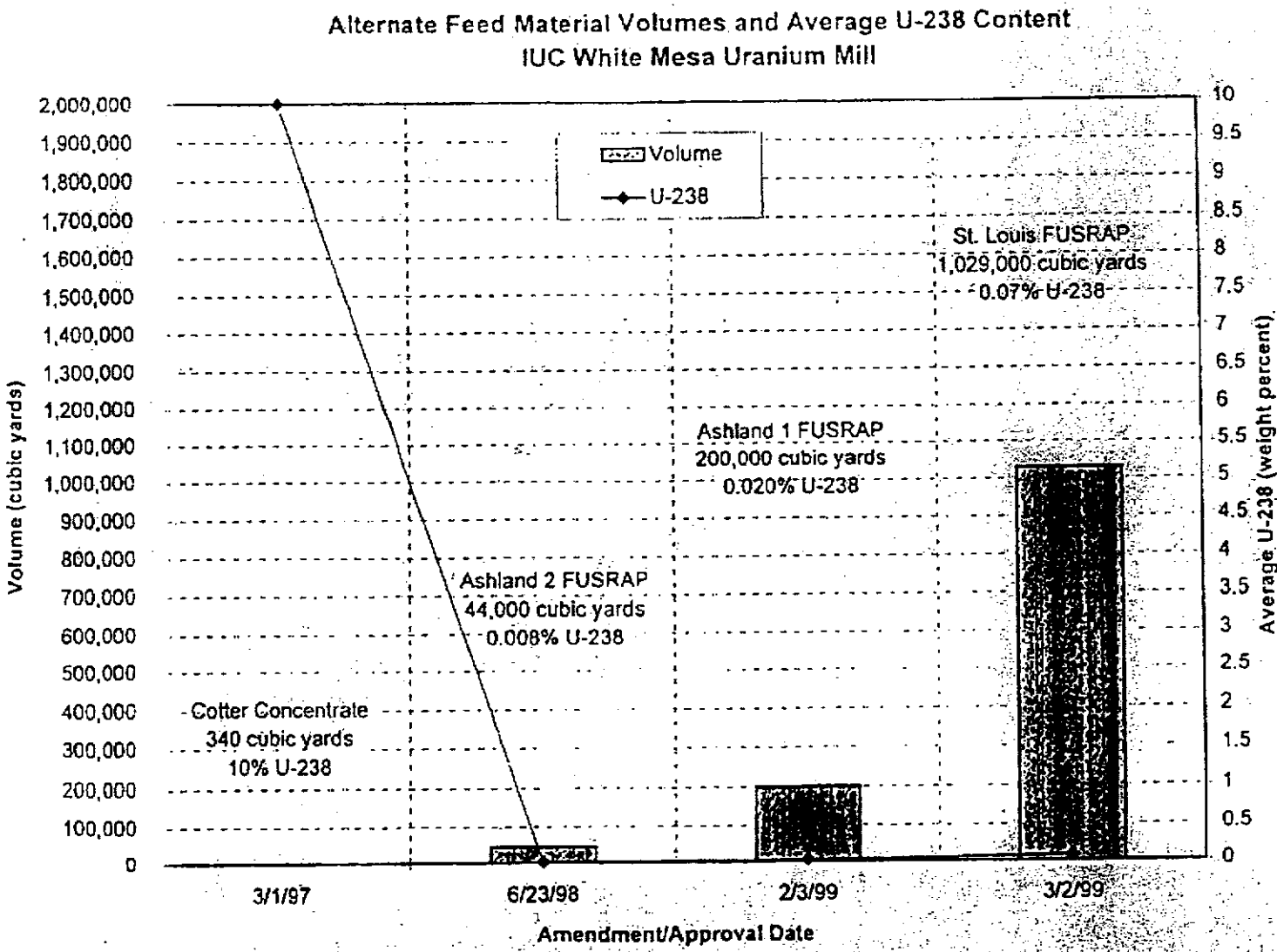
A cursory review of Attachment 4 of the St. Louis amendment request (Review of Constituents in St. Louis Site Uranium Materials to Determine Potential Presence of Listed Hazardous Wastes) indicates the presence of the same hazardous waste indicator constituents that were present in the Ashland 2 and Ashland 1/Seaway Area D materials. However, IUC is relying on the lack-of-evidence strategy to discount these constituents by stating that:

> ..."*if sufficient information is not available to determine conclusively that a contaminant or waste is derived from a RCRA-listed source, the waste is to be considered not a RCRA listed waste. Since the origins of contamination in the fill and site background have not been determined, these should not be considered RCRA listed sources at this time.*"

We may need to involve Don Verbica to review IUC's evaluation and conduct an independent review of the available data. Don informed us yesterday that he is not comfortable with IUC's draft protocol for listed hazardous wastes and therefore he is not willing to agree with it in its current form.

As shown by the enclosed graph, the volume of IUC's alternate feed requests has increased dramatically since the Cotter Concentrate. This same graph shows an inverse relationship between volume and uranium content when comparing the Cotter Concentrate, a legitimate alternate feed material, to the Tonawanda and St. Louis FUSRAP materials. In other words, the uranium content has decreased significantly with a dramatic increase in alternate feed volumes.

combo

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Michael O. Leavitt
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JAN 2 1 1999

January 21, 1999

Michelle R. Rehmann
Environmental Manager
International Uranium (USA) Corporation
Independence Plaza, Suite 950
1050 Seventeenth Street
Denver, CO 80265

SUBJECT: Methodology Assumptions used for Calculation of Flux Through The Cell 3 Liner White Mesa Uranium Mill

Dear Ms. Rehmann:

The Utah Department of Environmental Quality, Division of Radiation Control (DRC) has received the subject report prepared by Knight Piésold LLC and dated December 31, 1998. A review of this report by DRC staff indicates that a number of assumptions were made without appropriate supporting documentation. These assumptions have critical implications associated with the analytical model inputs and corresponding output liner leakage predictions. Without the supporting documentation, these assumptions and the model predictions cannot be confirmed. To enable the DRC to proceed with a review of the modeling effort and verify the predictions rendered, please provide the following information .

- The geomembrane defect frequencies and sizes used in the modeling effort assumed intensive quality assurance/quality control (QA/QC) monitoring during liner construction. To validate this assumption, extensive documentation of construction QA/QC is needed. Please provide the DRC with the construction QA/QC documentation to ensure the following:
  - Quality control was provided by the geomembrane installer following a rigorous construction quality control manual;
  - Quality assurance was provided continuously by an third party independent firm;
  - All geomembrane panel seams were tested after installation to find and repair all seam defects;
  - Description and documentation of steps were taken in preparation of the soil subgrade below the 30-mil synthetic PVC liner. In particular, please provide:

1) Maximum and average particle size allowed on the soil subgrade prior to installation of the 30-mil synthetic liner. Please provide gradation testing results to support said claims.

2) Description of equipment and methods used to remove over-sized materials (e.g. rock clasts, soil clods) from the soil subgrade prior to placement of the 30-mil synthetic liner.

- monitoring of moisture, ambient temperature, seaming temperature, seam contamination by dust or dirt, and remedial activities were conducted and documented; and

- all connections between geomembranes and appurtenances were tested to find and repair defective connections.

- As stated in the Summary of Model Assumptions on page 1 of the subject report, "*The soil layer underlying the geomembrane has a saturated hydraulic conductivity ranging from $1x10^{-3}$ (for sand) to $1x10^{-6}$ cm/s (for reworked bedrock materials).*" Because the soil layer beneath the geomembrane is the controlling soil layer, there needs to be some quantitative justification for using these values, particularly for the reworked bedrock materials of the Dakota Sandstone. Please provide the DRC with documentation for quantitative results of permeability and compaction tests to justify the hydraulic conductivity values used in the analytical modeling effort.

- As indicated above, the DRC questions the validity of the hydraulic conductivity used for the soil layers underlying the geomembrane. Consequently, the DRC questions whether the appropriate Geomembrane liner Design Case and corresponding equations of Schroeder and others (1994) was applied in the modeling effort. Please justify the Design Case that was used in the leakage analytical modeling effort.

- Accelerated travel times of tailings pond leakage via secondary permeability from joints and fractures was not addressed in either the November 23, 1998 or the December 31, 1998 Knight Piésold reports. However, site-specific well test data from a previous groundwater study of the White Mesa mill indicated the presence of joints and fractures. Please justify why the potential effects of joint and fracture flow were not incorporated in the seepage analytical modeling effort.

We appreciate the opportunity to review the Knight Piésold report and look forward to working with you in the future. If you have any questions about this letter, please call me or Rob Herbert at (801) 536-4250.

Sincerely,

William J. Sinclair, Director
Division of Radiation Control

WJS:RFH:rh

cc: Don Ostler, P.E., Director, DEQ-DWQ

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**Knight Piésold LLC**
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*Denver, Colorado 80265-0500*

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YOUR REFERENCE 1201C
OUR REFERENCE UDEQ2.wpd

February 12, 1999

Michelle Rehmann
International Uranium (USA) Corporation
1050 Seventeenth Street, Suite 950
Denver, CO 80265

Re: Response to UDEQ Comments on Methodology Assumptions

Dear Michelle:

At your request, we have reviewed the letter from the Utah Department of Environmental Quality (UDEQ) dated January 21, 1999. This letter contained four comments regarding the UDEQ's review of modeling we recently completed for the White Mesa Uranium Mill. The purpose of our modeling effort was to estimate the water flux that could reasonably be expected to pass through Cell 3, a PVC-lined impoundment at your facility. Previous cell modeling by others utilized hypothetical cases involving unrealistic assumptions of massive liner failure. Eighteen years of operation have indicated that these hypothetical assumptions are unwarranted. Our objective has been to review available data and approximate actual site conditions. We have used engineering judgement to quantify the hydraulic conductivity of the soils beneath the PVC liner. We infer that UDEQ generally agrees with the modeling but is questioning specific input values used in the model. Additionally, UDEQ seems to purport that unsaturated flow in the underlying Dakota Sandstone is fracture controlled. We have summarized the UDEQ comments and our responses as follows:

Comment 1: UDEQ questions the conclusion that the liner was installed under intensive quality assurance/quality control (QA/QC) and, therefore, our assumptions regarding liner defect frequencies are invalid.

Response 1: Our review and analysis of cell construction activities as reported in our letter to Anthony Thompson, dated November 23, 1998 concluded that the liner was, in fact, installed in accordance with intensive QA/QC procedures. This report cites numerous specifications, construction reports, Nuclear Regulatory Commission (NRC) inspections, and third party reviews used to arrive at this conclusion. Should UDEQ question our engineering review of the QA/QC documentation, these documents are part of the public record and can be reviewed by UDEQ as required. These reports contain the factory seam tests, quality control tests, field seam tests, bedding gradation tests, and liner repair reports requested by UDEQ.

Knight Piésold

2

February 12, 1999

Michelle Rehmann
International Uranium (USA) Corporation

As we stated in our letter report titled *Methodology for Calculation of Flux Through the Cell 3 Liner*, dated December 31, 1998:

> "Sensitivity analyses were conducted to determine the effect of defect assumptions. Increasing the frequency of pinholes and installation defects by an order of magnitude (*i.e., 10 times*) resulted in only a 30% increase in the estimates for average flux through the liner. These analyses indicate that pinhole and defect flux frequencies are a minor factor in the estimation of total volumetric flux through the liner."

Based on our review of construction documentation, we judge it improbable that there could be 10 times the installation defects we assumed. Thus, although UDEQ questions the QA/QC assumptions, these parameters do not significantly change our conclusions.

Comment 2: UDEQ questions the assumed hydraulic conductivity of the regraded materials beneath the liner.

Response 2: No documentation is available for the saturated hydraulic conductivities of dike or bottom materials underlying the geomembrane. In our efforts to approximate actual seepage we used engineering judgement to estimate the hydraulic properties of the liner bedding material. We assumed that the saturated hydraulic conductivity of the 12-in sand layer behind the liner on the south dike of Cell 3 was $1 \times 10^{-3}$ cm/s because this is a typical value for the clean sand that was used for the underdrain material. The value of $1 \times 10^{-6}$ cm/s was used for the compacted soils behind the other three sides (dikes) of Cell 3. This same value also was used for the compacted, reworked Dakota formation beneath the bottom of Cell 3. However, as shown by our response to Comment 3, these assumptions are not critical to the estimated flux values calculated.

Comment 3: UDEQ comments that a change in assumed hydraulic conductivity would require modeling the system under a different Design Case.

Response 3: The model we applied provides for six Design Cases as defined by Schroeder and others (1994). These Design Cases vary depending on the arrangement of the composite liner and the hydraulic conductivity of its constituents. Our model conservatively ignored the low conductivity tailings overlying the geomembrane. The appropriate Design Case for this arrangement is Design Case 3a. This case is formed

*Knight Piésold*



February 12, 1999

Michelle Rehmann
International Uranium (USA) Corporation

by a high conductivity material (pure water) overlying the geomembrane with a low conductivity layer (reworked Dakota bedrock) underlying the geomembrane. In this case, the liner bedding material acts as the controlling soil.

The UDEQ is correct that changing the assumed hydraulic conductivity for the liner bedding material would change the applicable Design Case. However, as the UDEQ points out, the appropriate design case is determined by the controlling soil. If the UDEQ feels that the hydraulic conductivity of the highly compacted liner bedding is greater than $10^{-6}$ cm/s, the low conductivity tailing overlying the liner would become the controlling soil.

Our engineering experience and the observed performance of the existing tailing underdrain indicate that this tailing is finely ground with resulting hydraulic conductivities most likely well below $10^{-6}$ cm/s. This case is most appropriately modeled by Design Case 4a. Design Case 4a is a mirror image of our modeled case with a low conductivity layer (tailing) overlying the geomembrane and a high conductivity layer (reworked Dakota bedrock) underlying the geomembrane. The flux equations for both Design Cases 3a and 4a are identical, as are the heads on the geomembrane used in the flux model. Therefore, the Design Case used for the flux model is correct no matter which assumptions are used for the saturated hydraulic conductivity of the tailing/bedrock/geomembrane layers.

Derivation of the flux model requires that one of the soils (i.e., upper or lower) be the controlling soil. In this case, the flux is controlled by either the tailing above or the bedding material beneath. Regardless of the assumption, the model indicates the same flux rate and travel time for both Design Cases. As such, protracted discussions with respect to proper hydraulic conductivity estimate do not change the conclusions of our study.

Comment 4. UDEQ asks for justification as to why fracture flow was not incorporated into the travel time modeling.

Response 4: Fracture flow was not incorporated into the flow modeling because our review of boring logs, pumping tests, and previous hydrogeologic reports gave no indication that any significant fractures exist. We are aware that questions regarding bedrock fractures have been raised in the past. Our review of available data concurs with the conclusion reached in Titan Environmental's 1994 report titled *Hydrogeologic Evaluation of White Mesa Uranium Mill*:

*Knight Piésold*

4

February 12, 1999

Michelle Rehmann
International Uranium (USA) Corporation

> "It could be postulated that a hypothetical fracture beneath the wet tailings cell would reduce the time of infiltration through the vadose zone. However, no significant fracture/joints have been documented in the subsurface in the approximately 45 wells and borings at the site. In addition, Disposal Cell No. 2 has been in operation for over 14 years with no evidence of constituents migrating through the vadose zone." (Titan, Page 40)

Our intent has been to model actual conditions and not elevate the hypothetical to reality. Fracture flow was not considered in our model because we found no basis to believe that it exists. The UDEQ comment refers to "site-specific well test data". If UDEQ is aware of well testing that indicates fracture flow, it would be beneficial for them to cite their reference.

It is important to realize that minor adjustments to model assumptions do not significantly change the estimated 1,300 years required before any flux through the liner could reach the perched water zone. Changing model results by even a few hundred years does not negate the conclusion that Cell 3 overlies several layers of extremely low conductivity bedrock that severely limit the potential for tailings solution to reach the perched water zone or impact the deep regional aquifer.

We are pleased to assist you in responding to UDEQ questions regarding our modeling efforts. As always, feel free to call if you should need further assistance.

Sincerely,

Samuel J. Billin, P.E.
Project Engineer

James R. Kunkel, P.E., Ph.D.
Senior Engineer