State of Utah

Department of Environmental Quality

Dianne R. Nielson, Ph.D.
Executive Director

DIVISION OF RADIATION CONTROL
Dane L. Finerfrock
Director

JON M. HUNTSMAN, JR.
Governor

GARY HERBERT
Lieutenant Governor

LM, your copy

May 17, 2006

Mr. Harold Roberts
Vice President – Corporate Development
International Uranium (USA) Corporation
1050 Seventeenth Street, Suite 950
Denver, CO 80265

Re: IUC Tailings Cell 4A Re-Lining System Design Report; May 8, 2006 IUC Response to April 28, 2006 DRC Completeness Review: **DRC Request for Additional Information – Round 1 Interrogatory.**

Dear Mr. Roberts,

We have reviewed your May 8, 2006 response to our April 28, 2006 Request for Additional Information, referenced above. Review of your May 8, 2006 response was conducted by the URS Corporation on behalf of the DRC.

From this review we have found a number of information items that need to be addressed and resolved. The purpose of this letter is to bring these issues to your attention, so that the review can continue forward.

The open issues can be summarized as follows:

1. Radiation Survey Report and Demonstration – needs to be submitted to demonstrate and justify that the uranium concentrations found in soils below the existing subgrade under Cell 4A are acceptable. Although the engineering design for re-lining may continue forward, please be advised that the Construction Permit will not be issued until this matter is fully resolved.
2. Revised Construction Quality Assurance/Quality Control (CQA/QC) Plan – the proposed CQA/QC Plan needs to be revised to clarify responsibilities and criteria for acceptance of work and procedures, required actions, and timelines to remediate material specification or construction errors when identifying and responding to non-conformances.

3. Tailings Wastewater Characterization Data – including additional characterization information on the current and anticipated tailings cell wastewater quality.
4. Additional GCL Test Data –for the bentonite layer found in the Geo Composite Liner (GCL) that demonstrates the thin bentonite layer is able to resist damage and degradation under long-term contact with the tailings cell wastewater.
5. Detailed FML Installation and Cell Operation Procedures – that will minimize stress on the Flexible Membrane Liner (FML) during both installation and tailings cell operation.
6. Settlement Evaluation – to evaluate anticipated settlement of the liner at the cell bottom and sideslopes under static conditions of the final cover system.
7. Dike Stability – including evaluation of the stability of 2H:1V sideslope, found on the western margin of Cell 4A, under the critical condition of partial or total liner system failure.
8. Basis for Assumed Ground Acceleration – including submittal of the basis for the 0.10 g seismic loading used in the current dike stability analysis for the 3H:1V sideslopes.
9. GCL Panel Overlap Demonstration – including additional demonstration to show that the proposed 1-foot GCL panel overlap is sufficient.
10. LCS and LDS Flow Rates – including anticipated and maximum flow rates in both the leachate collection system (LCS) and leak detection system (LDS) proposed for the new Cell 4A design.
11. LDS Action Leakage Rate – including a determination of the maximum design daily flow rate allowable in the LDS, under rapid reporting conditions, where the LDS fluid head is equal to or less than 1-foot.

Please revise your January 31, 2006 submittal to resolve the questions and issues outlined in the attached May 17, 2006 URS Round 1 Interrogatory.

From your May 8, 2006 response it appears that IUC will be unable to resolve the LDS Action Leakage Rate issue until after June 16, 2006. This issue was provided to you in both the April 28, 2006 DRC Completeness Review and the attached Round 1 Interrogatory. Your May 8, 2006 response was also non-committal as to when the Radiation Survey Report and Demonstration will be submitted to DRC for review.

As a result, it appears that renegotiation of the April 18, 2006 Memorandum of Agreement (MOA) schedule is in order. We would suggest the schedule be revised as follows (completed items are shown in italics, changes in redline format):

Table 1. IUC Cell 4A Phase 1 Milestones (Design Issues)

Responsible Party	Description	Current Deadline	Proposed Deadline
DRC	*Initial URS review and preparation of Round 1 Interrogatory*	*May 17, 2006*	*n/a*
IUC	Submittal of response to DRC Round 1 Interrogatory and revisions to engineering design and specifications	May 24, 2006	June 16, 2006 (1)

DRC	Review of IUC response to Round 1 Interrogatory and preparation of a Round 2 Interrogatory, if necessary	June 14, 2006	July 7, 2006
IUC	Submittal and complete resolution of all issues found in the DRC Round 2 Interrogatory	June 21, 2006	July 14, 2006
DRC	Review of IUC response to Round 2 Interrogatory and stipulation of required design elements and/or construction specifications	June 28, 2006	July 21. 2006
IUC	Submittal of final IUC design and specifications	July 7, 2006	July 30, 2006
DRC	Preparation and issuance of Construction Permit	July 12, 2006	August 4, 2006 (2)
IUC	Submittal of Cell 4A As-Built Report	December 12, 2006	January 4, 2007

Footnotes:
1) Delay in IUC response = 23 days
2) Issuance of Construction Permit will be delayed if Radiation Survey Report and Demonstration is not resolved to the satisfaction of the Executive Secretary.

Table 2. IUC Cell 4A Phase 2 Milestones (O&M Issues)

Responsible Party	Description	Deadline	Proposed Deadline
IUC / DRC	Meet to discuss Plan(s) Content and Form	June 13, 2006	July 6. 2006
IUC	Submit Cell 4A Operations and Maintenance Procedures and Plan	August 11, 2006	September 3. 2006
IUC	Submit Cell 4A BAT Monitoring Plan	August 25, 2006	September 17. 2006
IUC	Submit Revised Contingency Plan	August 25, 2006	September 17, 2006

After receipt of your response to this Round 1 Interrogatory, we will continue the review process.

If you have any questions or concerns regarding the attached Round 1 Interrogatory, please call me at 801-536-4262. We would also be happy to meet with you or your consultants to discuss these issues further.

Sincerely,

Loren B. Morton

LBM:lm

attachment

cc: Britt Quinby, URS

F:\...\TransmittalRnd1.doc
File: IUC Cell 4A Re-lining Project

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UTAH DIVISION OF RADIATION CONTROL
CELL 4A LINING SYSTEM
INTERNATIONAL URANIUM (USA) CORPORATION
WHITE MESA MILL
BLANDING, UTAH

INTERROGATORIES – FIRST ROUND

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Acronyms and Abbreviations

ALARA	As Low As Reasonably Achievable
BAT	Best Available Technology
CFR	Code of Federal Regulations
CQAP	Construction Quality Assurance Plan
DR	Design Report
DRC	Division of Radiation Control (Utah)
FML	Flexible Membrane Liner
GCL	Geosynthetic Clay Liner
HDPE	High Density Polyethylene
LCRS	Leachate Collection and Removal System
SDR	Standard Dimension Rations
TDS	Total Dissolved Solids
TEDE	Total Effective Dose Equivalent
TMP	Tailings Management Plan
TRDP	Tailings Reclamation and Decommissioning Plan
URCR	Utah Radiation Control Rules

Summary of Requested Items

Please refer to the interrogatories for the context of the item requests.

1. A Radiation Survey Report to demonstrate that the existing subgrade for Cell 4A has radiation and contamination levels that are acceptable.
2. A revised Construction Quality Assurance Plan that clarifies responsibilities and criteria for acceptance of work and required actions, timelines and procedures for identifying and responding to non-conformances.
3. A revised Construction Quality Assurance Plan that clearly states that the engineer of record (licensed in the State of Utah) is an independent party who will certify the CQA report by both direct field observations and document review.
4. Leachate chemical and physical characterization data.
5. Additional data and/or information that the GCL will be able to resist damage/degradation due to exposure to the leachate and freeze/thaw action.
6. A firm commitment that IUC will follow specific procedures that will minimize stress on the liner. The procedures will cover installation of the cell liner and operation of the cell, and will be submitted to the DRC for review and concurrence prior to issuance of the Construction Permit.
7. An evaluation of the anticipated settlement of the liner along the bottom and side slopes under the final closed cell condition.
8. Additional information and/or analysis of the stability of the cell dikes.
9. The basis for the 0.10g seismic loading used in the current dike stability analysis.
10. Additional demonstration that the planned overlap of the GCL panels is sufficient.
11. Anticipated flow rates and maximum flow rates in the leachate collection and leak detection layers.
12. The determination of the Action Leakage Rate for the cell leak detection layer, and the respective response action plan.
13. Clarifications on project drawings.

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INTERROGATORY IUC R313-24-4-01/01: RADIATION SURVEY AND RELATED DEMONSTRATIONS

PRELIMINARY FINDING:

Refer to R313-24-1(3), R313-24-4, R313-15-501, R313-15-406, and 10 CFR 40 Appendix A, Criterion 5A(1); DRC rules require that a radiation survey be performed to demonstrate that the requirements of R313-15 are met, including the magnitude and extent of radiation levels and concentrations or quantities of radioactive material (see R313-15-501). DRC rules also require IUC to describe "... how facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment,..." (see R313-15-406). R313-24-4 and 10 CFR 40 Appendix A, Criterion 5A(1) require that for uranium tailings impoundments where wastes have migrated into the liner during the active life of the facility, that closure of said impoundment must include "...removal or decontamination of all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate."

Also refer to R317-6-6.4(A). IUC must provide information that allows the Executive Secretary to determine:..."3. the applicant is using best available technology to minimize the discharge of any pollutant;...".

INTERROGATORY STATEMENT:

Please provide an evaluation that demonstrates that the existing soil subgrade has radiation and contamination levels that are acceptable. One possible scenario to minimize contamination and meet Best Available Technology (BAT) requirements is to base the design of the liner system for Cell 4A on a clean and stable subgrade. Another scenario is to demonstrate that the levels of any soil contamination left under the new liner design will have no adverse impact on local groundwater quality or the environment. In either case, it is IUC's burden to demonstrate and justify that any soil concentration level proposed as a cleanup standard has both technical and regulatory justification. Consequently, it is imperative that this evaluation be submitted to the DRC and is approved prior to issuance of the Construction Permit. Also, if the implementation of the plan results in modifications to the proposed subgrade and liner system, the respective modifications will need to be submitted to the DRC for review and concurrence prior to liner construction.

BASIS FOR INTERROGATORY:

It is clear that the former liner system in Cell 4A did not meet the requirements of 10 CFR 40 Appendix A, Criterion 5A(1), in that it did not "...prevent wastes from migrating into the liner during the active life of the facility." It is also clear that both waste residues in Cell 4A, the liner, contaminated subsoils, and structures and equipment contaminated with waste and leachate need to be removed (ibid.). Prior to the installation of the new liner system, IUC needs to demonstrate that the existing subgrade has radiation levels that are acceptable. IUC has submitted the results of a preliminary

radiation survey. However, the DRC raised questions in an October 18, 2005 letter and IUC has yet to provide a complete survey report. Please provide this report so that agreement can be reached as to the concentration and depth of contaminants in the cell subgrade that can be left under the new liner system.

IUC in their May 8, 2006 response to URS Completeness Review committed to provide the referenced plan under separate cover. However, the timing of the submittal was not provided. Since the design and placement of the liner system is dependent on having a clean and stable subgrade, agreement and implementation of this plan is needed.

REFERENCES:

Letter from IUC to UDRC dated May 8, 2006; Re: Cell 4A Lining System Design Report, Response to URS Completeness Review,

October 18, 2005 DRC letter to IUC (request for additional information).

INTERROGATORY IUC R313-24-4-02/01: DOUBLE LINER SYSTEM

PRELIMINARY FINDING:

Refer to R313-24-4, 10 CFR 40 Appendix A, Criterion 5A(1): Surface impoundments must have a liner that is designed, constructed, and installed to prevent any migration of wastes out of the impoundment to the adjacent subsurface soil, ground water, or surface water at any time during the active life (including the closure period) of the impoundment. The liner may be constructed of materials that may allow wastes to migrate into the liner (but not into the adjacent subsurface soil, ground water, or surface water) during the active life of the facility, provided that impoundment closure includes removal or decontamination of all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate. For impoundments that will be closed with the liner material left in place, the liner must be constructed of materials that can prevent wastes from migrating into the liner during the active life of the facility.

Refer to R317-3-1(1.7). 1.7. Construction Supervision. The applicant must demonstrate that adequate and competent inspection will be provided during construction. It is the responsibility of the applicant to provide frequent and comprehensive inspection of the project.

Refer to R317-3-10(4)(E). E. Construction Quality Control and Assurance. A construction quality control and assurance plan showing frequency and type of testing for materials used in construction shall be submitted with the design for review and approval. Results of such testing, gradation, compaction, field permeability, etc., shall be submitted to the executive secretary

INTERROGATORY STATEMENT:

Please revise the CQAP so it includes:

- *Sufficient detail to indicate who is responsible (between the Construction Manager, CQA Officer, and others) for, or when acceptance of the liner system construction work identified will occur.*
- *So it clearly identifies responsibility assignments or procedures for when there is non-conformance, how they are addressed and corrected, and the timely implementation and documentation of the corrective measure.*
- *So it clearly states that the engineer of record (licensed in the State of Utah) is an independent party who will certify the CQA report by both direct field observations and document review.*

BASIS FOR INTERROGATORY:

The applicant proposes to use a double liner with leak detection in order to prevent migration of wastes out of the impoundment (Cell 4A Lining System Design Report [DR]). The liners will be constructed of 60 mil High-Density Polyethylene (HDPE).

The applicant has provided a Design Report (Cell 4A Lining System) that contains an introduction (summary), design drawings, Construction Quality Assurance Plan, Technical Specifications, existing berm (dike) and clay liner construction documentation, and design calculations. The applicant indicates that the double liner with the leak detection system design is the Best Available Technology (BAT).

The review of the CQAP used to ensure that the liner is constructed properly revealed a few items that were not clear. There is insufficient detail to indicate who is responsible (between the Construction Manager, CQA Officer, and others) for construction quality assurance and quality control, or when or under what conditions acceptance of the work will occur. Also, the technical specifications contain information on conformance testing; however, the CQAP does not contain responsibility assignments or procedures, required actions, and timeframes to remediate material specification or construction errors when there is non-conformance.

REFERENCES:

"Cell 4A Lining System Design Report for the White Mesa Mill, Blanding, Utah," by GeoSyntec Consultants, January 2006. Prepared for International Uranium (USA) Corporation.

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INTERROGATORY IUC R313-24-4-03/01: LINER STRENGTH & COMPATIBILITY

PRELIMINARY FINDING:

Refer to R313-24-4, 10 CFR 40 Appendix A, Criterion 5A(2)(a): The liner must be constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrogeologic forces), physical contact with the waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;

INTERROGATORY STATEMENT:

Please provide current site-specific information, test data, and/or studies on the current and anticipated chemical and physical characteristics of the leachate, and additional data/information regarding the GCL and its ability to resist long-term damage/degradation due to exposure to leachate and residual process liquids and from freeze/thaw cycles. At a minimum, the ability of the GCL to resist long-term damage shall be demonstrated by its ability to retain a maximum field hydraulic conductivity of 10^{-7} cm/sec after being exposed to these potential degradation forces. This is needed for ensuring that the liner system components will be permanently resistant to possible damage or degradation due to the chemical properties of the leachate and freeze/thaw action.

Please provide detailed procedures that IUC will follow during installation of the cell liner system and operation of the cell during tailings placement that will limit the stress applied to the liner system to acceptable levels. For liner installation these procedures shall include provisions that no construction loads be placed on the side slope liner system, and during operation they are to include tailings placement procedures that will also limit stress to the side slope liner. The respective detailed procedures for liner installation shall be included as part of the project construction specifications. The respective detailed procedures covering the operation of the cell shall be included in the Cell 4A Operations and Maintenance Procedures and Plan, and Best Available Technology Monitoring Plan.

As an alternative to providing the detailed procedures requested above, a justification for the liner system design that accounts for typical construction loads and potential loads due to tailings placement on the side slopes can be provided.

BASIS FOR INTERROGATORY:

To meet the regulatory requirements referenced for the cell liner system the liner system materials (HDPE, GCL, clay, geonet, fabric, granular material, piping, extraction and monitoring equipment, etc.) need to be compatible with leachate so as not to compromise the integrity if the system.

The specifications for the HDPE FML are contained in the Technical Specifications Appendix C in the DR. Information on the compatibility of the liner materials with the leachate, or plans to test this compatibility and determine its potential impact on the liner components was not provided in the design report. Some vendor information on the compatibility of the FML, geonet, geotextile, drainage aggregate, drainpipe, and GCL was provided in IUC's May 8, 2006 response to URS's Completeness Review. However, insufficient information was provided regarding the current and anticipated chemical and physical characteristics of the leachate, and insufficient information was provided to demonstrate that the bentonite layer of the GCL lining system component would be able to withstand damage or degradation (e.g., increase in hydraulic conductivity) if it were to come into long-term contact with any leachate or residual process liquids that might be released from the cell. Acidic solutions can detrimentally affect the hydraulic conductivity of GCLs, especially if they are not prehydrated with water prior to exposure (e.g., Kolstad et al. 2004; Ruhl and Daniel 1997). Similarly, if the leachate or residual process liquids in the cell contain elevated concentrations of calcium, the GCL could be negatively impacted as a result of ion exchange reactions if it were to come into contact with these liquids (e.g. James et al. 1997). Information on the current and anticipated chemical and physical characteristics of the leachate, and additional data/information regarding the GCL and its ability to resist damage/degradation due to the composition of leachate and residual process liquids that will be present in Cell 4A are needed for ensuring that the liner system components will be resistant to possible damage or degradation due to the chemical properties of the leachate.

Other potential impacts to the GCL could result from exposure to multiple freeze/thaw cycles and from inadvertent and undetected damage during installation. Portions of the liner system will be exposed above the liquid/tailings level in the cell for an extended period of time. During this time the liner system will be not be covered (have very little to no confining pressure) and be exposed to multiple freeze/thaw cycles. As indicated in the literature cited above, GCLs subjected to freeze/thaw cycles under little to no confining pressures (no cover) could heave such that the hydraulic conductivity will increase. Assurance is needed that this action will not result in an unacceptable increase in the performance of the GCL (i.e., in a hydraulic conductivity greater than $1.0x\ 10^{-7}$ cm/sec). Inadvertent damage of a GCL during installation could result in a breach of this layer that is more detrimental to the performance of the liner system than inadvertent damage to a 12-inch thick layer of clay. Therefore, the evaluation of the GCL and its ability to perform under the all anticipated conditions an important aspect of ensuring liner system performance.

Although the applicant provided some calculations in the design report, they are incomplete and should include stresses from installation, operations (including tailings placement), interface stability, and varying environmental conditions. However, procedures to be used during liner installation and tailings placement were discussed in IUC's May 8, 2006 response to URS Completeness Review that addressed concerns over stress from installation and operations as well as from varying environmental conditions. If IUC follows the procedures as discussed in the May 8, 2006 response, limited or no

added stress on the liner system during installation and operations that could compromise it's integrity should result. The information provided also addressed concerns over varying environmental conditions.

REFERENCES:

"Cell 4A Lining System Design Report for the White Mesa Mill, Blanding, Utah," by GeoSyntec Consultants, January 2006. Prepared for International Uranium (USA) Corporation.

James, A.N., Fullerton, D., and Drake, R. 1997. "Field Performance of GLC Under Ion Exchange Conditions", Journal of Geotechnical and Geoenvironmental Engineering, Vol. 123, No. 10, pp. 897-901.Kolstad, D.C., Benson, C.H., and Jo, H.Y. 2004. "Hydraulic Conductivity of a Dense Prehydrated GCL Permeated with Aggressive Inorganic Solutions", Geosynthetics International, Vol. 11, No. 3, pp. 233-241.

Ruhl, J., and Daniel, D. 1997. "Geosynthetic Clay Liners Permeated with Chemical Solutions and Leachates", Journal of Geotechnical and Geoenvironmental Engineering, Vol. 123, No. 4, pp. 369-381.

INTERROGATORY IUC R313-24-4-04/01: LINER SETTLEMENT

PRELIMINARY FINDING:

Refer to R313-24-4, 10 CFR 40 Appendix A, Criterion 5 A(2)(b): The liner must be placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression, or uplift.

INTERROGATORY STATEMENT:

Please state and justify the extent of settlement, differential settlement, and distortion in the cover that are allowed, on the bottom and sideslopes under the liner system at the time of final closure. Demonstrate that allowable settlement, differential settlement, and distortion resulting from the anticipated loads during operation will not damage the final liner system. A justification of the design criteria used needs to be included.

BASIS FOR INTERROGATORY:

The license application has not provided for review an evaluation of potential settlement on the bottom or sideslopes of the liner due to anticipated loads during operations and after final closure.

REFERENCES:

"Cell 4A Lining System Design Report for the White Mesa Mill, Blanding, Utah," by GeoSyntec Consultants, January 2006. Prepared for International Uranium (USA) Corporation.

INTERROGATORY IUC R313-24-4-05/01: DIKE INTEGRITY

PRELIMINARY FINDING:

Refer to R313-24-4, 10 CFR 40 Appendix A, Criterion 5A(5): When dikes are used to form the surface impoundment, the dikes must be designed, constructed, and maintained with sufficient structural integrity to prevent massive failure of the dikes. In ensuring structural integrity, it must not be presumed that the liner system will function without leakage during the active life of the impoundment.

INTERROGATORY STATEMENT:

Please provide evidence that the current extent of erosion, subsidence, biointrusion or other forces have not altered the dike, originally constructed in 1989, so that long-term structural integrity maybe ensured. State the extent to which erosion, subsidence, biointrusion, or other forces have altered the dike since it was originally constructed. State maintenance and/or repairs conducted to date.

Please confirm that slope stability analysis represents the most critical slope conditions for the proposed Cell 4A dike, (i.e., under the assumption of partial or total liner failure, and when the cell is full of liquid to capacity). If not, please provide a revised analysis that does evaluate the most critical slope conditions. Also, please provide the basis for the 0.10g seismic loading.

BASIS FOR INTERROGATORY:

Appendix D of the design report presents documents from the original construction of the dike on the west and south sides of Cell 4A. However, this information is inadequate to conduct a detailed review of the license and to meet the regulatory requirements. Information is needed as to how the dike has been maintained or will be re-constructed to meet the requirements for structural integrity during the active life of the impoundment.

IUC's May 8, 2006 response to URS Completeness Review did provide an evaluation of the stability of the original Cell 4A dikes. This evaluation considered two slopes and used a seismic loading of 0.10g. The indication was that the slopes evaluated were 3H:1V, and they are the highest. However, the design report does indicate the presence of a 2H:1V slope on the west side of Cell 4A. Due to the presence of the 2H:1V slope, it is uncertain if the slopes evaluated are the most critical. Also, the basis for the 0.10g seismic loading was not included.

REFERENCES:

"Cell 4A Lining System Design Report for the White Mesa Mill, Blanding, Utah," by GeoSyntec Consultants, January 2006. Prepared for International Uranium (USA) Corporation.

INTERROGATORY IUC R313-24-4-06/01: BEST AVAILABLE TECHNOLOGY

PRELIMINARY FINDING:

*Refer to R313-24-4, R317-6-1.13: **Best Available Technology** means the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods taking into account energy, public health, environmental and economic impacts and other costs.*

*Refer to R313-24-4, R317-6-6.4(A)(3/112): The Executive Secretary may issue a ground water discharge permit for a new facility if the Executive Secretary determines, after reviewing the information provided under R317-6-6.3, that: 1.the applicant demonstrates that the applicable class TDS limits, ground water quality standards protection levels, and permit limits established under R317-6-6.4E will be met; 2. the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;3. the applicant is using **best available technology** to minimize the discharge of any pollutant; and 4. there is no impairment of present and future beneficial uses of the ground water.*

INTERROGATORY STATEMENT:

Please provide additional information to demonstrate, for the anticipated site conditions, that the proposed width of longitudinal GCL panel overlap (12 inches) is adequate to prevent the possibility of separation gaps occurring between individual GCL panels after field placement of the GCL panels.

Please provide a Leachate Monitoring, Operations, Maintenance, and Reporting Plan that includes an estimation of anticipated flow rates and maximum capacity in both the leachate collection and detection systems.

Please provide information to support the determination of an appropriate Action Leakage Rate for the Cell 4A lining system. This information should be included as part of the Leachate Monitoring, Operations, Maintenance, and Reporting Plan.

Please note that the Leachate Monitoring, Operations, Maintenance, and Reporting Plan shall include a requirement that the Cell 4A berm will not be overtopped.

Please provide the following clarifications on the project drawings that are included in Appendix A:

- *Sheet 4, detail 2 shows the layout of the slimes drain system. Why are the PVC collection pipes only in the southwestern corner and not along the entire base of the cell? Please provide the justification for this design as opposed to placing the collection pipes along the entire cell base.*
- *Please provide the justification for not including cleanouts for both the slimes drain and the leak detection piping (refer to Sheet 4). Include the methods proposed to maintain these pipes so they function as designed.*

- *Please review the drawing details and sections on Sheets 5 and 6 that show the slimes drain and leak detection piping surrounded by gravel, and correct and/or clarify inconsistencies so that the collection pipes are in contact or resting on the underlying FML.*
- *On Sheet 6 the connection of the strip drain to the slime drain just before its connection to the 18-inch collection pipe is unclear. Please provide details in this connection (i.e., material catalog sheets, specifications, etc.).*
- *For all drawings ensure that the following key components are included:*
  - *Liner system component layer surface elevations*
  - *Slimes drain piping and sump invert elevations and horizontal coordinates at terminations, changes in direction, and connection points (at fittings)*
  - *LCR drain piping and sump invert elevations and horizontal coordinates at terminations, changes in direction, and connection points (at fittings)*
  - *Elevations and horizontal coordinates at all liner system changes in grade such at key transition locations including but not limited to from the cell bottom to the side slopes and top of berms and in the sump area.*

BASIS FOR INTERROGATORY:

For waste cell liner systems as proposed for Cell 4A, the State of Utah considers BAT to be a double liner with leachate collection/detection systems. For Cell 4A, this means, at a minimum:

- *Leachate collection layer and removal system above a primary liner consisting of appropriately designed collection pipes, granular filter bed, and sump type extraction system. The leachate collection system shall have the ability to remove liquid from the cell in practical and timely manner.*
- *Primary HDPE Liner that is at least sixty (60)-mil thick.*
- *A rapid reporting leak detection layer and removal system between the primary and secondary liner consisting of appropriately designed collection pipes, geonet and/or granular filter bed, and sump type extraction system. The leachate detection system shall operate so as to maintain a minimal head on the secondary liner with a maximum allowable head of one (1) foot under anticipated impacts from siltation and clogging, rib layover and creep of synthetic components of the system, overburden pressures, etc.*
- *A composite secondary liner that consists of a HDPE liner that is at least sixty (60)-mil thick over at least twelve (12) inches of compacted clay with a maximum permeability of 1×10^{-7} centimeters per second.*
- *Bedding layer and/or appropriately prepared and clean subgrade.*
- *Maximum side slopes of 3-horizontal to 1-vertical*

- *Leachate Monitoring, Operations, Maintenance and Reporting Plan (that addressees both the leachate collection and detection system)*
- *Ground Water Monitoring system (per the facility Ground Water Quality Discharge Permit)*
- *Ground Water Monitoring Plan (per the facility Ground Water Quality Discharge Permit)*
- *Liner Maintenance and Inspection Plan*

The GCL installation specifications contained in Appendix C (02772) indicate that a 12-inch longitudinal overlap is required, with 2 feet at the widths (or the ends). Based on recent published information, a GCL panel overlap of 12 inches may not be sufficient to prevent possible separation of GCL panels that might occur following GCL panel placement (e.g. Thiel et al. 2005). An evaluation of anticipated site conditions and GCL panel placement procedures needs to be made and information provided to evaluate/demonstrate whether the proposed minimum overlap width is adequate to ensure that such possible separation would not occur.

Also, Per BAT for leachate collection and leak detection systems the Leachate Monitoring, Operations, Maintenance, and Reporting Plan needs to include an estimation of anticipated flow rates and maximum capacity in these layers to demonstrate compliance with the above listed respective requirements.

The Action Leakage Rate, which is defined as the maximum design flow rate that the leak detection system can rapidly remove without the fluid head on the liner exceeding one (1) foot, needs to be determined. The action leakage rate must include an adequate safety margin to allow for uncertainties in the design (e.g., slope, hydraulic conductivity, thickness of drainage material), construction, operation, and location of the system, waste and leachate characteristics, likelihood and amounts of other sources of liquids, considerations for rapid reporting when it is exceeded, and proposed response actions (e.g., the action leakage rate must consider decreases in the flow capacity of the system over time resulting from siltation and clogging, rib layover and creep of synthetic components of the system, overburden pressures, etc.). The development of the action leakage rate includes a reasonable and defendable estimation of an allowable leakage rate through the primary liner into the leak detection system. Guidance can be found in 40 CFR 264.302, the EPA document Action Leakage Rates For Leak Detection Systems; January 1992, and in Geosynthetics International, Special Issue on Liquid Migration Control Using Geosynthetic Liner Systems, 1997, Vol. 4 (that includes an article on page 215 by GeoSyntec Consultants on this topic).

IUC in their May 8, 2006 response to URS Completeness Review committed to provide an Action Leakage Rate Calculation Package by June 16, 2006 that is to include the anticipated flow rate information as well as the development of the action leakage rate for Cell 4A.

In review of the drawings contained in Appendix A, a few inconsistencies were identified (but are not limited too) where clarification is needed.

- *Sheet 4, detail 2 shows the layout of the slimes drain system. Why are there PVC collection pipes only in the southwestern corner and not along the entire base of the cell?*
- *Refer to Sheet 4; it is typical to include cleanouts for effective maintenance of these pipes. Why are there no cleanouts included for either the slimes drain or the leak detection system?*
- *There appears to be inconsistencies in the thickness of the gravel under the collection pipes for the slimes drain and the leak detection systems in Sheets 4 and 5. For example, section G shows the 4-inch slimes drain resting on a geotextile that is on top of the upper FML. However, section E shows the 4-inch pipe on top of a layer of gravel then on the geotextile and FML. Sections E and H are also not consistent as to the thickness of gravel above the 18-inch slimes drain collection pipe. All the related details need to be reviewed and presented in a consistent manner.*
- *The connection of the strip drain to the slime drain just before its connection to the 18-inch collection pipe is unclear (refer to Sheet 6). How will this connection be made?*

REFERENCES:

"Cell 4A Lining System Design Report for the White Mesa Mill, Blanding, Utah," by GeoSyntec Consultants, January 2006. Prepared for International Uranium (USA) Corporation.

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Lichwardt, M.A., and Comer, A.I., 1997. "Geosynthetics in Salinity-Gradient Solar Ponds", Geotechnical Fabrics Report, April 1997. St. Paul, MN.

40 CFR 264.301.