State of Utah

Department of Environmental Quality

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July 20, 2006

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

Re: June 22 and 30, 2006 IUC Submittals Regarding June 14, 2006 DRC Round 2 Interrogatory for the Cell 4A Lining System Design Report: **DRC Review Findings and Request for Information - Round 4 Interrogatory.**

Dear Mr. Roberts,

We have reviewed your June 22 and June 30, 2006 submittals in response to the June 14, 2006 DRC Round 2 Interrogatory for the Cell 4A Lining System Design Report. We also acknowledge an on-site meeting held with DRC staff on July 11, 2006 wherein some of these issues were discussed. A Round 3 DRC Interrogatory was also provided to you under separate cover that focused on the cleanup of contaminated sub-grade soils beneath the former Cell 4A embankment.

The purpose of this Round 4 Interrogatory is to identify those issues and concerns related to cell design and re-lining that continue to be unresolved from the Round 2 Interrogatory. Similar to previous work, URS staff performed this review and prepared the Round 4 Interrogatory, which is attached for your consideration and resolution.

Five major issues continue unresolved from the Round 2 Interrogatory, including:

1. Cell 4A Soil Cleanup Report – which has yet to be submitted, and was the focus of the Round 3 Interrogatory.
2. GCL Freeze / Thaw Damage – including several engineering design options or measures that need to be taken to prevent or mitigate the impact of this damage on the long-term performance of the tailings embankment.
3. Revised Seismic Hazard Analysis – including more recent ground acceleration data and evaluation methods for Cell 4A.
4. Dike Stability Documentation – to demonstrate stability of the existing earthen dikes at Cell 4A.

5. Demonstration of Adequate Slimes Drain Performance and Leak Detection System Maximum Allowable Leakage Rate – including a quantitative evaluation of the ability of the slimes drain design to effectively remove fluids from the tailings cell in a timely and efficiently manner at closure. Also, additional information is required to justify the leak detection system maximum allowable leakage rate (ALR) and definition of pre-determined actions to control and mitigate a leak should the ALR be exceeded.

Certain other open issues have been identified which are new to the project, including:

6. GCL Field Hydration – including construction practices, procedures, methods, and Construction Quality Assurance/Quality Control (CQA/QC) testing to ensure that the GCL properly hydrates after emplacement.

7. Revised CQA/QC Plan – that includes pre-determined, clear, and discrete provisions to identify and rectify any design and construction deficiencies.

8. Backfill Compaction Requirements – including design and CQA/QC specifications for compacting soil and stone backfill materials that may be used.

9. Prevention of ATV Damage – including procedures and equipment needed to ensure that All Terrain Vehicles used to emplace the liner system will not damage it.

10. Clarification of Dike Stability – including resolution of certain inconsistencies in dike slopes.

11. Missing ALR Data and Calculations – including supporting data and calculations to justify ALR conclusions provided.

12. Adjustment or Justification of Certain Geonet Safety Factors – that account for certain phenomenon expected during and after construction

13. Calculation Corrections – regarding pipe strength and spillway designs.

After resolution of these open issues, it will be possible to move forward with issuance of a Construction Permit.

With regards to the agreed upon review schedule and budget, it is clear that a fourth round interrogatory was not contemplated during negotiation of our Memorandum of Agreement. Consequently, we suggest that a new schedule and budget be negotiated.

Also, it would appear that a conference call or meeting is in order to discuss the unresolved issues and chart a path forward. Please call me to arrange for such a meeting.

Sincerely,

Loren B. Morton

LBM:lm

cc: Britt Quinby, URS
Dave Frydenlund, IUC

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File: IUC Cell 4A Relining Project

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

INTERROGATORIES – FOURTH 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 Ratios
TDS	Total Dissolved Solids
TEDE	Total Effective Dose Equivalent
TMP	Tailings Management Plan
TRDP	Tailings Reclamation and Decommissioning Plan
URCR	Utah Radiation Control Rules

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Summary of Requested Items

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

The following items are ones that continue to be unresolved:

1. A Radiation Survey Report to demonstrate that the existing subgrade for Cell 4A has radiation and contamination levels that are acceptable.
2. 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. The response to Round 1 and 2 was incomplete. Included must be data on the potential impact of freeze/thaw on the GCL in the exposed portion of the liner system (i.e., the portion of the liner above the cell fluid level during operations with no confining pressure). Several options to address and resolve this issue are provided in the Interrogatory R313-24-4-03/04.
3. An up to date seismic hazardous analysis that includes recent data and evaluation methods.
4. Recent documentation that the cell dikes have maintained their integrity with time due to environmental factors such as erosion, subsidence, biointrusion, etc.
5. A Leachate Monitoring, Operations, Maintenance, and Reporting Plan that includes anticipated flow rates and maximum flow rates in the leachate collection layer (slimes collection layer). This is to include a demonstration that the tailings sands will settle out and function properly as a slimes drain layer without clogging and that the collection pipes are properly located and have the ability to remove the tailings solution in a reasonable time and manner. This plan shall also include the demonstration of the Action Leakage Rate and proposed response actions should the Action Leakage Rate be exceeded. Information provided to date is insufficient to adequately respond to this request.

The following items are ones where responses were provided by IUC that addressed the concern, but questions remain:

6. Included must be means and methods used prior to operation of Cell 4A that determine if the hydration of the GCL is adequate. The level must be comparable to the level of hydration of the GCL used in the acid resistance testing.
7. A revised Construction Quality Assurance Plan that includes a clear and concise description of the protocols for identifying and rectifying deficiencies in an upfront section.
8. Clarifications in either the CQAP, Technical Specifications, or on the Project Drawings regarding soil and stone backfill compaction requirements and the use of stone base for the concrete spillway.
9. Assurance and/or a demonstration that the use of the proposed ATVs will not adversely impact the integrity of the exposed liner.

10. Additional clarification on the evaluation of the stability of the cell dikes. There appears to be an inconsistency as to the steepness of the outside of the cell dike.
11. Data and calculations used to generate the plot of liquid levels that are anticipated in the cell during operation to the ALR.
12. Include an appropriate factor of safety, to account for uncertainties associated with the manner of installation of the geonet in the cell, or justification as to why it is not needed.
13. Correct minor inconsistencies identified in the pipe strength and spillway calculations.

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INTERROGATORY IUC R313-24-4-01/04: 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."

Refer to R317-6-6.3(Q); "Unless otherwise determined by the Executive Secretary, the application for a permit to discharge wastes or pollutants to ground water shall include the following complete information:... Q. Other information required by the Executive Secretary."

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:

Per Round 3 Interrogatory please provide a revised report/plan that includes:

1. *Site characterization data that defines the nature and extent of the U nat, Th-230, and Ra-226 contamination in Cell 4A. This is to include survey and sample results, their respective locations (marked on a drawing), the sample depths, and operational information that supports the identification of areas as potentially contaminated (or not impacted).*
2. *In place of the modeling effort to derive the clean up levels for uranium and thorium, the use of 30 pCi/g levels as the clean up criteria for natural uranium. This criteria would be combined with 5 pCi/g for Ra-226 averaged over in the upper 15 cm (6-inches) of soil, and 15 pCi/g averaged over a 15 cm thick layer of soils more than 15 cm below the surface. This is consistent with the approach recommended in the USNRC Branch Technical Position Paper "Guidelines for Residual Concentrations of Thorium and Uranium Waste in Soil" (USNRC 1981). In addition, the uranium can be used as an indicator for other metals that may have an impact on groundwater, which is consistent with item number 43 on page 48 of the Draft December 1, 2004 Statement of Basis for the Ground Water Quality Discharge Permit for the site.*

3. *Complete set of background data results, analytical methods used, sample locations shown on a map, sample depths, and an evaluation that justifies, demonstrates, and establishes the background levels to be used.*

4. *A revised methodology to identify elevated levels of contamination (above the clean up criteria) and confirm that it has been removed to the respective clean up levels. This includes means for justifying that sufficient samples have been collected at appropriate locations and they are representative of the area to be evaluated (i.e., released). This would include radiation measurement surveys of the soil surface and soil sampling at discrete depths and locations to define the vertical profile of the contamination (i.e., soil samples from 0 to 15 cm and from 15-cm and below) by location. These results would be used to support the basis for identifying areas as contaminated (impacted), or not impacted and in support of a sampling and survey strategy to be implemented during remediation and for the final confirmation survey and sampling to demonstrate that the contamination has been removed to levels consistent with the clean up criteria. Typically, the amount of sampling required for the areas not impacted is less than needed for the contaminated areas. Also, the sample analysis performed needs to be defined. For the characterization portion there is flexibility in the methods to be used. However, the laboratory used for the final status survey/sampling will be approved by the State of Utah for the respective analytical methods. In addition, the DRC must be notified at least 30 days in advance of performing the final status survey so as to allow for a representative to be onsite and collect split samples if so desired. The MARSSIM guide referenced in the "Basis for Interrogatory" provides one means for designing characterization, remedial, and final status survey/sampling.*

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 had previously submitted the results of a preliminary radiation survey, and on June 6, 2006, provided a (Draft) "Cell 4A Contaminate Removal Work Plan Schedule" for informal DRC review. This plan presented the proposed clean up criteria in soil for Ra-226, U-238, and Th-230, and the methodology to be used to confirm that the respective clean up criteria are met in the cell subgrade prior to the initiation of Cell 4A liner construction.

The DRC provided IUC with comments on the proposed clean up plan in Round 3 Interrogatories and requested a revised plan/report that includes the information and data discussed in the Interrogatory Statement above.

This request was followed by a teleconference on this topic on June 19, 2006 between the DRC, URS and IUC. Further, IUC's June 30, 2006 (Part 2) response to Round 2 Interrogatories stated that a justification for sampling frequency based on categories of low, medium and high possibilities for the presence of residual contamination in the Cell 4A area will be submitted under a separate cover. However, please note that the submittal provided is to be a complete clean up plan/report that addresses and includes all the information in items 1 through 4 of the Interrogatory Statement above. Other than the informal draft, nothing on this plan (or report) has been received.

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).

Letter from IUC to DRC dated June 22, 2006; Re: Cell 4A Lining System Design Report, Round 2 Interrogator Response.

Letter from IUC to DRC dated June 30, 2006; Re: Cell 4A Lining System Design Report, Response to DRC Request for Additional Information – Round 2 Interrogatory, Cell 4A Design.

INTERROGATORY IUC R313-24-4-02/04: 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 include in an upfront section of the QACP protocols for identifying and rectifying any deficiencies.

In review of the technical specifications and drawings for quality control requirements, the following concerns were identified that need to be included or addressed in either the CQAP, drawings, or the specifications:

1. *Section 1.04 of Specification section 03400 (Submittals) requires that the 28-day compressive strength test results be submitted 7 days prior to construction of the spillway. The 28-day compression tests should be derived from samples of the concrete actually provided, and collected from the source (e.g., the truck chute during placement). The frequency should be a minimum of one sample per 150 cubic yards of concrete used.*
2. *Part 2 (Products) of Specification Section 03400 includes requirements for mix design, concrete, and steel. However, no product requirements for the aggregate to be used are provided. Please provide aggregate product requirements.*

3. *Please include in Section 3.02 of Specification Section 03400 (Subgrade Preparation) subgrade compaction requirements. Also, please confirm and demonstrate that the subgrade materials be suitable as a base for the concrete? Concrete pavement and slabs are typically placed on a compacted stone base. Since the berm perimeter access road will traverse this spillway, it will need to function as road pavement and have a stable base/subase.*

4. *Correct the reference to Table 1A in the text of section 7.2.1. It is currently referenced as Table 1.*

5. *Please include in either the CQAP, Technical Specifications, or on the drawings compaction requirements for the soil and stone backfill materials to be placed. This includes the drainage aggregate, anchor trench backfill, and any subgrade material that are placed to make the proposed grade as needed. The compaction requirements must include the method of compaction per soil type, lift thickness, frequency of testing, and test methods.*

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). 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).

Construction Quality Assurance Plan (CQAP)

The initial review of the CQAP resulted in a request for clarification in Round 1 Interrogatories on specific issues relating to the lines of communication and protocols for identifying and rectifying deficiencies. Also, that the engineer of record be an independent party. IUC's response to this interrogatory provided clarification on certain responsibilities between the Construction Manager and the Geosynthetic Installer as they relate to acceptance of the geomembrane installation for the cell. However, no mention was made in the response of the respective lines of communication and protocols for other aspects of the liner system installation (i.e., GCL, earthwork, geonet, etc).

IUC included with their June 22, 2006 response to Round 2 Interrogatories (Part 1) a revised CQAP that includes Section 2.11 that addresses the project lines of communication. However protocols for identifying and rectifying deficiencies are not included in this new section.

The revised CQAP also includes the following corrections or clarifications requested in the Round 2 Interrogatories:

- *Correct section listing contained in Section 1.4.*
- *Section 2.8 is corrected to state that the CQA Officer is independent from the Owner.*
- *Section 14.1, Survey Control (previously Section 13.1), was corrected to state "by the Land Surveyor as needed", in place of "by the Construction Manager as needed."*

Project Technical Specifications

A section on the concrete spillway was also included in the revised plan (Section 13.0). However, this section refers back to the technical specifications and drawings for quality control requirements. In review of the technical specifications and drawings for quality control requirements, the following concerns were identified that need to be included or addressed in either the CQAP or the specifications:

1. *Section 1.04 of Specification section 03400 (Submittals) requires that the 28-day compressive strength test results be submitted 7 days prior to construction of the spillway. The 28-day compression tests must be derived from samples of the concrete actually provided, and collected from the source (e.g., the truck chute during placement). The frequency should be a minimum of one sample per 150 cubic yards of concrete used.*
2. *Part 2 (Products) of Specification section 03400 includes requirements for mix design, concrete, and steel. However, no product requirements for the aggregate to be used are provided.*
3. *Section 3.02 of Specification section 03400 (Subgrade Preparation) needs to include subgrade compaction requirements. Also, will the subgrade materials be suitable as a base for the concrete? Concrete pavement and slabs are typically placed on a compacted stone base. Since the berm perimeter access road will traverse this spillway, it will need to function as road pavement and have a stable base/subase.*

In addition, it was noted that Table 1A is referenced in the text of section 7.2.1 as Table 1. This inconsistency should be corrected. Also, in review of the revised drawings, CQAP, and Technical Specifications, it was noted that there are no compaction requirements for the soil and stone backfill materials to be placed. This includes the drainage aggregate, anchor trench backfill, and any subgrade material that are placed to make the proposed grade as needed. The compaction requirements must include the method of compaction per soil type; lift thickness, frequency of testing, and test methods.

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.

Letter from IUC to DRC dated June 22, 2006; Re: Cell 4A Lining System Design Report, Round 2 Interrogator Response.

Letter from IUC to DRC dated June 30, 2006; Re: Cell 4A Lining System Design Report, Response to DRC Request for Additional Information – Round 2 Interrogatory, Cell 4A Design.

INTERROGATORY IUC R313-24-4-03/04: 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:

As requested in Round 2 Interrogatories, please provide methods to be used to ensure that the GCL will hydrate to the desired level prior to the start of cell operations. This must include assurance through testing that the subgrade soils have sufficient moisture and will facilitate the migration of water from the soil to the GCL in a timely manner.

As stated in Round 2 Interrogatories, the levels of expected GCL hydration must be compared with the levels of hydration of the GCL specimens used by Ruhl and Daniel as well as GCL specimens that were tested by Kolstad et a.l 2004 for conventional non-prehydrated GCLs tested against acidic liquids (the latter reference source was previously cited in the Round 1 Interrogatories). Are the levels of expected GCL hydration comparable to the levels of GCL hydration of the samples used in the acid resistance testing? The results and conclusions must be presented in a framework that demonstrates that the reported test data (i.e., GCL degree of hydration) are applicable to the range of the expected GCL hydration based on site conditions.

*As previously requested in Round 1 and Round 2 Interrogatories, Please provide an evaluation of the GCL and its ability to perform under all anticipated conditions (**Particularly where it is exposed to freeze/thaw without cover or confining pressure**). All evaluations provided to date in support of the GCL's resistance to freeze/thaw have the GCL under a soil or liquid cover. Alternatives to providing this evaluation are presented in the Basis for Interrogatory below.*

Please provide assurance and/or a demonstration that the proposed use of All Terrain Vehicles (ATVs) on the liner system will not adversely impact the integrity of the liner. The respective limitation of equipment use on the liner system must be included as part of the project specifications (that are included with the current application).

BASIS FOR INTERROGATORY:

As stated in Round 1 Interrogatories, 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.

In IUC's May 8, 2006 response to the completeness review IUC provided supporting technical information on the compatibility of the liner system materials with the cell leachate (or tailing cell solution). In response to this submittal, the DRC included in Round 1 Interrogatories a request for current site-specific information, test data, and/or studies on the current and anticipated chemical and physical characteristics of the leachate. This was done so that a comparison could be performed of the constituents in (including the organic ones), and characteristics of, the cell solution to the respective technical data.

IUC responded to the Round 1 Interrogatory by providing inorganic test results of the tailing cell solution from September 4, 2003. Current results from 2005 and/or 2006 were not provided, nor were any results on organic constituents. Also, no discussion was included on the results being representative of anticipated chemical and physical characteristics of the tailings cell solution.

Round 2 Interrogatories expressed concern that organic compounds in the cell solution could have an adverse impact on the liner system (refer to Round 2 Interrogatories for the listing). To address this concern, the DRC requested in Round 2 Interrogatories that IUC provide either a quantitative evaluation that addresses the long-term resistance of all the liner system components to the tailings cell solution, or perform liner compatibility studies to demonstrate this long-term resistance. The primary liner components of concern are the HDPE flexible membrane liner and the GCL.

Compatibility of Flexible Membrane Liner with Tailings Solution

In IUC's June 30, 2006 response to this request, IUC provided a general explanation and references to support HDPE resistance to acidic solutions and organic solvents (similar to what had already been provided). Also included in this response was a general statement that only trace amounts of synthetic organic chemicals are found in the tailings solution at the White Mesa Mill. However, no supporting data on the organic chemical content and/or relative concentrations of the tailing solutions was provided. Chemical analysis of the tailings solution that includes the concentration of the organic chemicals referenced above could be used to compare against the respective material resistance information provided in the literature referenced, and therefore support a quantitative evaluation. However, historic data available on the concentrations of organic constituents in tailings solution indicate that when present, they are at concentrations much lower than would impact the HDPE. This combined with the consideration of the robust nature of HDPE as a liner material satisfies this concern.

Hydration of GCL

Due to the significance of hydration on the ability of the GCL to sustain a low hydraulic conductivity, Round 2 Interrogatories requested that IUC must provide data (e.g., a plot) indicating approximate predicted levels of hydration of the GCL expected to occur over time based on the GCL being in direct contact with the subgrade materials present at the site (based on their estimated moisture content and subgrade material type). IUC provided in their June 30, 2006 response a plot on the expected level of hydration that the GCL would likely achieve in the field prior to active usage of Cell 4A, IUC provided

additional data on the extent of rate of hydration of bentonite (in this case the granular bentonite component adhered to one side of a geomembrane) when placed in direct contact with sand having various moisture contents ranging from 1% to 17%. The data indicate that the bentonite moisture content would increase to about 140% after 15 days and would increase further to the range of 150% to 200% after about 45 days if the bentonite side of the GCL were placed in contact with sand at 10% or greater moisture content. On-site dike soil and compacted clay liner soil moisture contents are reported to be in the range of 13% to about 18.6 %.

Although data furnished for the bentonite component of a GCL are for a GCL (Gundseal®-type) that is not the same type of GCL that is specified for use in Cell 4A, analogous data (Daniel 1994) are available for the same general type of GCL (two Claymax® GCLs, having thin and thick geotextile backings) that would be used in Cell 4A. Those data indicate lower moisture contents for bentonite in the GCL (in the range of 50% to 80%) after 15 days of contact with sands in the same moisture content range as that addressed by the IUC data (about 10% to 15%), but moisture contents in same range to slightly higher than those reported above for the Gundseal-type GCL after about 42 days for contact with the same sand materials. This information suggests that if at least 42 to 45 days are allowed to transpire between GCL placement in the Cell 4A liner system and placement of the cell into active service, the GCL should hydrate to about 150 % to 200 % or more if the subgrade materials in contact with the GCL exhibit in-situ moisture contents of at about 10% or greater.

Based on the above information, IUC must be able to demonstrate the GCL will hydrate to the desired amount prior to operation. Since the hydration is dependent on the moisture content of the underlying subgrade soils, this includes assurance that there is sufficient moisture available in the soil prior to GCL placement, and that the soil type will facilitate the transfer of the moisture to the GCL (i.e., clay, silts, or silty-sands; not gravel) prior to the operation of the cell. Note that the operation of the cell will be dependent on establishing the integrity of the liner system, which includes the proper hydration of the GCL so it will be resistant to acidic solutions.

Round 2 Interrogatory also requested the following:

> *"...The(se) levels of expected [field] GCL hydration should be compared with the levels of hydration of the GCL specimens used by Ruhl and Daniel as well as compared to the levels of hydration (moistening) of the GCL specimens that were tested by Kolstad et al. 2004 for conventional non-prehydrated GCLs tested against acidic liquids (the latter reference source was previously cited in the Round 1 Interrogatories). The results and conclusions should then be presented in a framework that demonstrates that the reported test data are applicable to the range of the expected site conditions."*

This request is repeated here; IUC must specifically compare the ranges of expected GCL hydration levels (that are described above) to the level(s) of GCL (pre-) hydration that were established for those GCL specimens that were tested in laboratory to assess the effects of aggressive acidic leachates on GCL hydraulic conductivity (for which the GCLs were not significantly adversely affected), relative to laboratory tests that were