

STATE OF UTAH
DIVISION OF WATER QUALITY
DEPARTMENT OF ENVIRONMENTAL QUALITY
UTAH WATER QUALITY BOARD
SALT LAKE CITY, UTAH 84114-4870

GROUND WATER QUALITY DISCHARGE PERMIT UGW370004

STATEMENT OF BASIS

White Mesa Uranium Mill, Cell 4B Construction

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April 6, 2010

PURPOSE

The purpose of this Statement of Basis (hereafter SOB) is to describe the technical and regulatory basis to proposed modifications to requirements found in Ground Water Quality Discharge Permit (GWDP) No. UGW370004 (hereafter Permit) for a new uranium tailings disposal embankment, Cell 4B at Denison Mines (USA) Corp. (hereafter DUSA) White Mesa Uranium Mill located near Blanding, San Juan County, Utah. The Mill is located on fee land and mill site claims, covering approximately 5,415 acres, encompassing all or part of Sections 21, 22, 27, 28, 29, 32, and 33 of Township 37 South, Range 22 East, and Sections 4, 5, 6, 8, 9, and 16 of Township 38 South, Range 22 East, Salt Lake Base and Meridian.

Some changes to the permit are considered major by the Executive Secretary, and as such require the opportunity for providing public comment. Major changes to the Permit are those that may have a potential impact on the protection of public health and the environment. Other changes are considered minor by the Executive Secretary, and as such need not be submitted for public comment. Minor changes to the Permit are those that are considered to: (1) have no impact on the protection of the environment, or (2) are more stringent or protective than those already authorized in the existing Permit. The proposed changes to the Permit are highlighted in redline-strikeout format in Attachment 1.

Both minor and major changes associated with this Permit modification include, but are not limited to, the following:

- Requires a 4-foot-wide buffer zone on the inside area of the Feedstock Storage Area be maintained free of bulk Feedstock materials
- Specifies that any failure to achieve or maintain the required Best Available Technologies (BAT) performance standards for Cell 4A constitutes a violation of the Permit
- Requires the Permittee to submit a revised Cell 4A BAT Monitoring, Operations and Maintenance Plan that includes procedures and reporting requirements for liner repairs
- Summarizes the approved Design Standards for Tailings Cell 4B and specifies that the BAT design standard for Tailings Cell 4B shall be defined by and the Cell 4B construction shall conform to the engineering plans, specifications, supporting analyses, and calculations
- Sets forth the BAT performance standards for Tailings Cell 4B
- Requires that at least three new groundwater compliance monitoring wells be installed following construction of Cell 4B hydraulically downgradient of Cell 4B
- Requires the Permittee to: (1) notify UDRC of any damage to, and proposed repairs of, installed liners that may occur in Cell 4A and 4B liner during operations in those cells; (2) complete all necessary repairs to the liner in accordance with repair methods specified in approved Cell 4A and Cell 4B Construction Quality Assurance/Quality Control Plans; and (3) submit a Liner Repair Report to UDRC documenting any such liner repairs
- Requires the Permittee to collect tailings wastewater samples for analysis from multiple locations at Cell 4B
- Requires the Permittee to implement and document the results of a monitoring program
- Requires the Permittee to conduct monthly recovery and fluid level measurements of the Tailings Cell 4B slimes drain recovery heads
- Specifies the content and requirements of the Cell 4B BAT Monitoring, Operations and Maintenance Plan
- Requires weekly tailings wastewater freeboard measurements in Cell 4B
- Requires the Permittee to submit a monitoring well As-Built report for the three new groundwater monitoring wells to be installed in conjunction with the construction of Cell 4B
- Requires the Permittee to provide all requested information, resolve all issues identified, and re-submit reports for Executive Secretary review and approval within a timeframe approved by the Executive Secretary
- Requires the Permittee to provide at least a 7-calendar-day written notice prior to any drilling and well installation activities

- Requires that additional monitoring wells, should the Executive Secretary determine that they are required, be installed and approved by the Executive Secretary before tailings management Cell 4B is placed into service
- Requires the Permittee to commence a quarterly groundwater sampling program in the three new monitoring wells to be installed in conjunction with the construction of Cell 4B within a specified time frame
- Requires the Permittee to prepare and submit a BAT Monitoring, Operations and Maintenance Plan for proposed new tailings management Cell 4B.
- Requires the Permittee to submit an engineering As-Built Report to document all Cell 4B construction activities
- Requires the Permittee to conduct an additional hydrogeologic and field investigation of seeps and Ruin Spring west and southwest of the tailings management cell area and further delineate the relationship of flow in the perched water system to these seeps and springs and to the geologic contact between two formations beneath the mill site and underlying the area to the west and southwest
- Require the Permittee to revise one engineering design drawing entitled “Sheet 6 of 8”, as listed in Table 6 of the Permit, and receive the Executive Secretary’s approval before constructing Cell 4B
- Numerous minor changes

BACKGROUND

The White Mesa uranium mill was constructed in 1979 - 1980 and licensed under federal regulations by the Nuclear Regulatory Commission (hereafter NRC), Source Material License SUA-1358. On August 16, 2004, the NRC delegated its uranium mill regulatory program to the State of Utah, by extending Agreement State status. As a result, the Utah Division of Radiation Control (hereafter UDRC) became the primary regulatory authority for the DUSA White Mesa mill for both radioactive materials and groundwater protection. Later, DUSA was issued a State Ground Water Quality Discharge Permit No. UGW370004 on March 8, 2005. Previous to the modification proposed herein today, the Permit was last modified on January 20, 2010.

DUSA has requested authority to construct a new tailings Cell 4B to be used in managing tailings generated by the milling process. Since operation of this new facility could create the potential for contaminant releases to the groundwater, it may be constructed and used only upon approval under a Ground Water Quality Discharge Permit [hereafter Permit, also see UAC R317-6-6.1(A)]. The Executive Secretary has determined to issue this authorization by modifying the existing Permit. All Permit modifications proposed at this time are identified, explained, and justified in this Statement of Basis.

Although Cell 4B is a new facility that might affect groundwater quality, UDRC has decided to modify the existing Permit rather than issue a new Permit. Thus, UDRC must ensure that the provisions of UAC R317-6-6 are or will be satisfied. The UDRC’s rationale for concluding that

the more substantive of those provisions are or will be satisfied is presented below. Other provisions are discussed on the Safety Evaluation Report (URS 2010).

- Issuance of a Discharge Permit [UAC R317-6-6.4(A)] - in the process of issuance of a Permit, the Executive Secretary is required to provide findings on the several issues, including:

“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;”

Finding - Cell 4B has been designed with two synthetic liners, a leak detection layer, and a geosynthetic clay liner system, using Best Available Technology ("BAT"). These features are designed to prevent or minimize migration of wastes out of Cell 4B to the adjacent subsurface soil, groundwater, or surface water at any time during the active life (including closure period) of the cell. Further, Cell 4B has been designed to be closed with the liner system left in place. As a result, the liner system will be constructed of materials that can prevent or minimize wastes from migrating into the liner during the active life of the facility.

It is the Executive Secretary's intent to approve the liner system proposed for Cell 4B, based on recommendations of URS Corporation (URS 2009) developed from a review of the Cell 4B Design Report and related documents. The design approach for the liner system to be incorporated into Cell 4B is identical to that used to design the liner system for Cell 4A, previously approved by UDRC (UDRC 2008b).

Final construction of Cell 4B will be documented by the Permittee in a report that will be submitted for Executive Secretary review and approval before Cell 4B is put into service (Permit, Part I.H.9). For additional information, refer to "10CFR40, Appendix A, Criterion 5A(1): Ground-Water Protection Standards" and "UAC R317-6-6.4: Issuance of Discharge Permit" in URS 2010.

“2. the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;”

Finding - construction and operation of Cell 4B will not create new issues of concern over and above those considered and accepted for existing licensed facilities at the mill. The physical, chemical and radiological make up of the tailings is not expected to be significantly different from that of existing tailings or from the assumptions in the previously issued GWDP. Cell 4B will have a double liner/leak detection/slimes drain system similar to that of Cell 4A which is designed not to release tailings solutions to the environment and that UDRC has already approved. Any releases at Cell 4B would be detected by the leak detection system

(LDS) and groundwater monitoring programs and remediated before there could be any impact on the public.

The Permittee also provided information in a Hydro Geo Chem letter dated February 12, 2010, discussing the inferred distribution of conglomeratic zones within the Dakota Formation, and their inferred vertical and aerial extent of the elevated portion of the contact surface of the Burro Canyon/Brushy Basin Formations on geologic cross sections that span the Cell 4B footprint area.

UDRC will incorporate a new Permit condition requiring that a minimum of three additional downgradient groundwater monitoring wells be installed in conjunction with the construction of Cell 4B (see in the proposed Permit new Part I.H.6). The condition will require that the well installation for two wells be approved by UDRC before Cell 4B is placed into service. The location of the third well will be approved by the Executive Secretary prior to placing Cell 4B into service, and the third well must be installed within calendar 30 days of its location being approved.

Another new condition will also be included in the forthcoming Permit to require the Permittee to conduct an additional hydrogeologic investigation in the area to the west of the Cell 4B footprint area, extending to and including existing seeps (Cottonwood Seep and Westwater Seep) and Ruin Spring located west and southwest of the tailings management cells. The investigation will be conducted to verify the relationship of the (geologic) contact between the Brushy Basin and the Burro Canyon formations to the seeps and springs. The Permittee must submit a report presenting the results of these additional investigations prior to placing Cell 4B into service (see new Part I.H.10).

“3. the applicant is using best available technology to minimize the discharge of any pollutant; and”

Finding - Cell 4B has been designed using Best Available Technology ("BAT") methodologies, as described under Issuance of a Discharge Permit [UAC R317-6-6.4(A)], Item 1 above.

“4. there is no impairment of present and future beneficial uses of the ground water.”

Finding - the Permittee has provided proposed engineering design and construction specifications for Cell 4B that use BAT, and has proposed to install three new groundwater compliance monitoring wells downgradient of Cell 4B, once the cell is constructed. These new wells will be incorporated into the ongoing sampling and analysis program for the mill site. The expanded sampling and analysis program, combined with the BAT-based Cell 4B design, and implementation of an Executive

Secretary approved Cell 4B BAT, Monitoring, Operations and Maintenance Plan that the Permit will require be submitted for Cell 4B (New Part I.H.8) are expected to satisfy the operational monitoring / maintenance, and groundwater monitoring requirements of UAC R317-6-6.4(A) 4. A new condition (Part I.H.10) has also been added to the Permit to require that the Permittee conduct an additional hydrogeologic investigation in the area to the west of the Cell 4B footprint area, to further delineate the relationship of flow in the perched groundwater zone and the seeps and Ruin Spring (see the discussion under “Groundwater Compliance and Performance Monitoring [UAC R317-6-6.9(A) and (B)] below). For additional information, refer to “UAC R317-6-6.4: Issuance of Discharge Permit” in URS 2010.

- Groundwater Compliance and Performance Monitoring [UAC R317-6-6.9(A) and (B)] - the Permittee provided updated site information on site hydrogeology (HGCI 2009 and HGCI 2010). The HGCI reports provide information indicating that the proposed groundwater monitoring system, including three new monitoring wells (MW-33, MW-34, and MW-35) proposed to be installed downgradient of Cell 4B, together with existing wells MW-14 and MW-15, and other downgradient monitoring wells, would be sufficient in number, are properly located, and are properly designed to provide reasonable assurance of providing timely, reliable, and representative data for detecting potential future releases from the tailings management cells, including Cell 4B. As stated above, a new condition (Part I.H.6) has been added to the Permit to require that wells MW-33 and MW-34 be installed and the location of well MW-35 be approved by the Executive Secretary before Cell 4B is placed into service.
- Background Ground Water Quality Determinations [UAC R317-6-6.10] - the Executive Secretary's determination regarding background groundwater quality for the site is set out in the 2009 Statement of Basis (UDRC 2009) and in the Permit issued on January 20, 2010, and is based on previous review of work submitted by the Permittee. Background groundwater quality reports were also considered in light of groundwater geochemical and isotopic sampling and analysis performed by the University of Utah Department of Geology and Geophysics (Hurst 2008). Those documents and other documents considered by the Executive Secretary in determining background groundwater quality at the site are listed in the References section of the September, 2009 Statement of Basis (UDRC 2009).

Background groundwater quality has yet to be determined by the Executive Secretary for the three new groundwater compliance monitoring wells required to be installed in conjunction with the construction of Cell 4B. A new condition (Part I.H.7) has been added to the Permit to require submittal of a background groundwater quality report after 8 quarters of sampling and analysis of these new wells. For additional information, refer to “UAC R317-6-6.10: Background Water Quality Determination” of URS 2010.

- Submission of Monitoring Data [UAC R317-6-6.12] - for additional information, refer to “UAC R317-6-6.12: Submission of Data” in URS 2010.)
- Reporting of Mechanical Problems or Discharge System Failures [UAC R317-6-6.13] - the Permit requires that notices be given in the event of failure to maintain discharge minimization technology ("DMT") or BAT standards required under the Permit (Part I.G.3) and if the facility is otherwise out of compliance (Part I.G.4 and Part II.1). For additional information, refer to “UAC R317-6-6.13: Reporting of Mechanical Problems or Discharge System Failures” in URS 2010.
- Correction of Adverse Effects Required [UAC R317-6-6.14] - Part I.G.4 of the Permit specifies the actions that must be taken by the Permittee in the event of a violation of a condition of the Permit. For additional information, refer to “UAC R317-6-6.14: Correction of Adverse Effects” in URS 2010.
- Out of Compliance Status [UAC R317-6-6.16] - the determination of when the mill is out of compliance and the procedures to be followed once the facility is so determined are set out in Part I.G of the Permit, which incorporates the requirements of UAC R317-6-6.16, and has since original issuance of the Permit in March 2005. For additional information, refer to “UAC R317-6-6.16: Out-of-Status Compliance” in URS 2010.
- Procedure When a Facility is Out of Compliance [UAC R317-6-6.17] - the determination of when the mill is out of compliance and the procedures to be followed once the facility is so determined are set out in Part I.G of the Permit, which incorporates the requirements of UAC R317-6-6.17. For additional information, refer to “UAC R317-6-6.17: Procedure When A Facility is Out-of-Compliance” in URS 2010.

MAJOR PERMIT CHANGES

The major Permit changes are given below in the same order that they appear in the Permit.

Revision to Part I.D.3(f): Existing Facility DMT Performance Standards - Feedstock Storage Area

The Permit has been revised to require that a 4-foot-wide buffer zone be maintained on the inside area of the Feedstock Storage Area that is to remain free of bulk Feedstock materials in order to assure that these materials do not extend beyond the designated, fenced Feedstock Storage Area.

Revision of Part I.D.6: BAT Performance Standards for Tailings Cell 4A

Part I.D.6 of the Permit has been revised to clarify that any failure to achieve or maintain the required BAT performance standards for Cell 4A will constitute a violation of the Permit and require the Permittee to report such a violation to the Executive Secretary in accordance with Part I.G.3 of the Permit.

New Part I.D.12: BAT Design Standards for Tailings Cell 4B, including Table 6

The Permit has been revised to include a provision that summarizes the approved Design Standards for Tailings Cell 4B, specifying that the BAT design standard and construction shall conform to the engineering plans, specifications, supporting analyses, and calculations listed in Table 6. Detailed UDRC evaluation of these Cell 4B related documents is found in a November 5, 2009 URS technical memorandum. It is the intent of the UDRC through this action to approve the DUSA Cell 4B engineering design and specifications. Pertinent details of the following major elements of the Cell 4B engineering design are identified and described in DUSA documents listed in proposed Table 6, including but not limited to:

- Dikes;
- Foundation;
- Tailings Capacity;
- Liner and leak Detection Systems, including the following components:
 - Primary Flexible Membrane Liner (FML)
 - Leak Detection System
 - Secondary FML
 - Geosynthetic Clay Liner;
- Slimes Drain Collection System, including the following components:
 - Horizontal Strip Drain Collection System
 - Horizontal Slimes Drain Collection Pipe System
 - Slimes Drain Access Pipe;
- North and East Dike Splash Pads; and
- Cell 4B Emergency Spillway

These added provisions formally invoke the applicable engineering design standards, specifications, and calculations approved for Cell 4B design, and codify the general and unique features and characteristics (including tailings capacity of Cell 4B, Cell 4B dike locations and dike widths, and number and locations of splash pads, etc) of the approved Cell 4B design. This information is summarized and presented in the Table 6 documents in a manner similar to that by which information for the approved Cell 4A Design Standards was previously formalized and presented in Table 5 of the March 17, 2008 Permit.

In general, the design basis for Cell 4B is similar to that already approved for Cell 4A. Many of the specific details regarding the Cell 4A engineering design and specifications were provided the public earlier in an October 24, 2007 UDRC Statement of Basis (SOB) and a March 14, 2008 Public Participation Summary (PPS). The reader is referred to these two documents for additional information. However, certain exceptions exist in the engineering design basis for Cell 4B, as follows:

- The floor and inside slopes of Cell 4B encompass about 44 acres, and the cell will have a water surface area of 40 acres while Cell 4A occupies an area of approximately 40 acres.
- Dikes for Cell 4B will range in base width from approximately 92 to 190 feet while dikes for Cell 4A will range in base width from approximately 89 to 211 feet
- Cell 4B has a tailings capacity of approximately 1.9 million cubic yards while Cell 4A has a tailings capacity of approximately 1.6 million cubic yards, both as measured below the required 3-foot freeboard.
- Cell 4B will include 9 splash pads, constructed on the north and east dikes while Cell 4A has 8 splash pads, 4 installed on the north dike and 4 installed on the east dike of the cell.
- The calculated amount of time required for the slimes drain system in Cell 4B to dewater the tailings is 5.45 years, or approximately 5.5 years. This drain down time is somewhat less than that drain down time calculated for Cell 4A. For more information, see the discussion under New Part I.D.13 below.
- The calculated maximum allowable daily leakage rate for the Leak Detection System (LDS) in Cell 4B is 26,145 gallons/day. This leakage rate is slightly greater than the calculated maximum allowable daily leakage rate for LDS in Cell 4A. For more information, see the discussion under New Part I.D.13 below.

New Part I.D.13: BAT Performance Standards for Tailings Cell 4B

This section of the Permit sets forth the BAT performance standards for Tailings Cell 4B. These Cell 4B performance standards are very similar to those already established in Part I.D.6 for existing Cell 4A. However, some exceptions exist for Cell 4B, as follows:

- Maximum Allowable Daily Head - has not yet been determined due to the fact that Cell 4B has not yet been constructed [Part I.D.13(a)]. It is the Executive Secretary's intent to establish that in the Permit, after approval of the Cell 4B As-Built Report, required in Part I.H.9 (see below).
- LDS Maximum Allowable Daily Leakage Rate - 26,145 gallons/day (see description under "New Part I.H.8 - Revised BAT Monitoring, Operations and Maintenance Plan for Cell 4A and BAT Monitoring, Operations and Maintenance Plan for Cell 4B")

below). This calculated maximum leakage rate is slightly higher than that calculated for Cell 4A; the difference in the calculated values is attributable to differences in the geometric configurations of Cells 4B and 4A.

- Slimes Drain Drain-Down Time - calculated amount of time required for the slimes drain system in Cell 4B to dewater the tailings is approximately 5.5 years (see description under “New Part I.H.8 - Revised BAT Monitoring, Operations and Maintenance Plan for Cell 4A and BAT Monitoring, Operations and Maintenance Plan for Cell 4B” below). The corresponding maximum drain-down time for Cell 4A is somewhat greater (6.4 years), due to deviations in construction of sand bags used as a filter media above the slimes drain strip drains and main drain line. To address these construction problems the DUSA consultant, Geosyntec Inc, provided a revised drain-down calculation (6.4 years) in a July 2, 2008 email submittal to the DRC (Geosyntec, 2008). DRC staff later accepted this revised calculation in a letter dated August 18, 2008 (UDRC 2008c). Recent efforts made in preparation and review of the Cell 4B design will hopefully avoid this type of pitfall seen at the Cell 4A Cell.
- Maximum Weekly Wastewater Level - the freeboard in Cell 4B must be no less than 3 feet, as measured from the top of the upper FML.

It is the Executive Secretary’s intent, after Cell 4B is constructed and the As-Built Report approved, that the Permittee identify a compliance fluid level (vertical height) above the elevation of the transducer (found at the bottom of the LDS collection sump) that corresponds to a 1-foot hydraulic head level in the LDS at the lowest point in the cell floor (outside of the collection sump). Once the Permittee has determined and the Executive Secretary has approved this height value, it will be added to the Permit under Parts I.D.13.(a) and Part I.E.12(a)(2), in a manner consistent with the analogous compliance height value specified for Cell 4A in Parts I.D.6 (a) and I.E.8(a)(2).

New Part I.E.1(b)(3): Ground Water Compliance and Technology Performance Monitoring - Future Cell 4B Downgradient Wells to be Installed

The Permit has been revised to require that at least three new groundwater compliance monitoring wells (to be designated wells MW-33, MW-34, and MW-35) be installed in conjunction with construction and use of Cell 4B. Wells MW-33 and MW-34 are to be installed first, and before Cell 4B is put into use. Then the location of Well MW-35 will be based on hydrogeologic information obtained from the development of Wells MW-33 and MW-34. These new wells will be installed to monitor groundwater conditions in the downgradient from the approved Cell 4B footprint. The wells are intended to serve as additional future compliance monitoring wells for detecting potential releases from Cell 4B to the perched groundwater zone that underlies the Cell 4B and the adjacent tailings management cells. The provision requires that well design and construction conform to existing requirements in the Permit (Part I.E.4), and that well As-Built reports be submitted for approval.

Revised Part I.E.7(f): DMT Performance Standards Monitoring - Inspections of Tailing Cell and Pond Liner Systems

The provision specifying inspections of tailing cell and pond liner systems [Part I.E.7(f)] has been revised to require the Permittee to report any liner defect or damage identified during inspections pursuant to Part I.G.3, and to repair such defects or damage by implementing the currently approved Liner Maintenance Provisions, and to report all such repairs.

The modification formalizes expected practice in the event that any defect or damage is identified during a liner system inspections at Tailings Cells 1, 2, 3, and the Roberts Pond.

New Part I.E.8(c): Cell 4A BAT Performance Standards Monitoring - Liner Maintenance and Repair

The Permit has been revised to require that the Permittee complete all necessary repairs to the liner to address damage that might occur to the liner during operations in Cell 4A in accordance with Section 9.4 of the approved Cell 4A Construction Quality Assurance Plan (QA/QC Plan). All repairs will be performed by qualified liner installation personnel, which shall be reported in a Liner Repair Report. The provision requires that any leak, hole, or other damage to the liner be reported verbally to the Executive Secretary in accordance with Part I.G.3 of the Permit. The Permittee shall also report all repairs made pursuant to Part I.F.2 of the Permit.

Finally, the new provision located at Part I.H.8(c) requires that a Liner Repair Report signed by a Utah Licensed Professional Engineer be submitted to the Executive Secretary for each liner repair completed.

Revised Part I.E.10: Tailings Cell 4B Wastewater Sampling

The Permit has been modified to require the Permittee to collect tailings wastewater samples for analysis from multiple locations at Cell 4B, in addition to those already listed in this part of the Permit.

New Part I.E.12(a): Cell 4B BAT Performance Standards Monitoring

The Permit has been revised to require that immediately following Executive Secretary approval of the Cell 4B Best Available Technologies (BAT), Monitoring, Operations and Maintenance Plan, required under Part I.H.8, the Permittee implement and document the results of a monitoring program that shall include the following (for details, see the revised Permit):

- Continuous operation of the LDS pumping and monitoring equipment, and a requirement that failures not repaired within 24-hours will be both a failure of BAT and a Permit violation;
- Monitoring to verify compliance with Maximum Allowable Head Criteria ⁽¹⁾; and a requirement that LDS head values above this criteria constitute a BAT failure and a Permit violation;
- Monitoring to verify compliance with Maximum Allowable Average Daily LDS Flow Rates and a requirement to maintain such flow rates below 26,145 gallons/day; and
- Conduct measurements to verify compliance with the 3-foot minimum vertical freeboard requirement for Cell 4B, as made to the nearest 0.1 foot.

New Part I.E.12(b): Cell 4B BAT Performance Standards Monitoring - Slimes Drain Recovery Head Monitoring

This Permit revision also requires that the Permittee conduct monthly recovery and fluid level measurements of the slimes drain recovery heads in Cell 4B, immediately after initiating pumping conditions in the slimes drain system. This provision is added to formalize requirements for verifying that the applicable design intent and predicted performance of the slimes drain system approved for Cell 4B design are achieved. Further, that monitoring and reporting thereof be done in a manner similar to that is required for Cells 2 and 3 in Part I.D.3) and I.E.7(b). At some future date, the Executive Secretary will need to revise the requirements at Part I.F.11 to include quarterly reporting of said slimes drain recovery monitoring for Cells 4A and 4B.

New Part I.E.12(c): Cell 4B BAT Performance Standards Monitoring - Liner Maintenance and Repairs

The Permit has been revised to require that the Permittee complete all necessary repairs to the liner to address damage that might occur to the liner during operations in Cell 4B in accordance with Section 10.4 of the approved Cell 4B Construction Quality Assurance Plan (QA/QC Plan) identified in Table 6 of the Permit, and that all such repairs be performed by qualified liner installation personnel, and that such repairs be reported in a Liner Repair Report certified by a Utah licensed Professional Engineer. The provision requires that any leak, hole, or other damage to the liner be reported verbally to the Executive Secretary in accordance with Part I.G.3 of the Permit. The Permittee shall also report all repairs made pursuant to Part I.F.3 of the Permit.

¹ For additional information on how the maximum allowable head will be determined after Cell 4B construction, see discussion under Part I.D.13, above.

The justification for adding this provision to the Permit for Cell 4B includes the same considerations described above for Cell 4A under “New Part I.E.8(c)”.

Revision to Part I.F.3: Reporting Requirements - Routine Cell 4A and 4B BAT Performance Standards Monitoring and Maintenance Reports

This part of the Permit has been changed as follows:

- a. Changed the title of Part I.F.3 to “Routine Cell 4A and 4B BAT Performance Standards Monitoring and Maintenance Reports”; and
- b. Require that when a liner repair is performed at tailings Cell 4A or 4B, a Repair Report is to be submitted as required by Parts I.E.8(c) and I.E.12(c) of the Permit, and that this Repair Report be included with the next quarterly BAT Monitoring and Maintenance Report.
- c. Require weekly tailings wastewater freeboard measurements in Cell 4B [Part I.F.3(b)].

New Part I.H.6: Installation of New Groundwater Monitoring Wells

The Permit has been revised to require that the Permittee install at least three hydraulically downgradient wells adjacent to tailings management Cell 4B. The Permit revision specifies that the locations of the first two new wells installed are to be the same as those for proposed monitoring wells MW-33 and MW-34 as shown on Figure 4 of the February 8, 2010 submittal by Hydro Geo Chem Inc., and that the exact location of the third new monitoring well be determined through consideration of hydrogeologic information acquired through development of wells MW-33 and MW-34 and other related field investigations. The Permit requires that two of these three new compliance monitoring wells (MW-33 and MW-34) be installed prior to placement of tailings and wastewater in Cell 4B. This Permit revision requires that these monitoring wells:

- a. Provide early detection of tailings cell contamination of shallow groundwater from Tailings Cell 4B.
- b. Provide discrete groundwater monitoring for Tailings Cell 4B.
- c. Comply with the design, construction, and development requirements found in Part I.E.4 of the Permit.

This Permit revision also requires that, within 45 calendar days of completing installation of wells MW-33 and MW-34, the Permittee submit a monitoring well As-Built report to document said well construction for Executive Secretary approval, and that the report complies with the existing requirements for well as-built reports found in Part I.F.6. Part I.H.6 also requires the following:

- a. If additional information is required during review of the well as-built report, that the Permittee provide all requested information within a time frame approved by the Executive Secretary;
- b. The Permittee provide at least a 7 calendar day written notice to allow the Executive Secretary to observe all drilling and well installation activities; and
- c. Should the Executive Secretary determine that additional monitoring wells are required under Part I.H.6(e), these new wells will be installed and approved within a time frame approved by the Executive Secretary.

The Permit has also been revised to require that before placing tailings or wastewater in Tailings Cell 4B, the Permittee must also submit to the Executive Secretary for approval, a proposed location for new compliance monitoring well MW-35. The Permittee must complete installation of Well MW-35 within 30 calendar days of the Executive Secretary's approval of the proposal for its installation.

The Permittee is also required to submit for Executive Secretary approval, a monitoring well As-Built report for well MW-35, within 45 calendar days of completing well installation, to document its construction. Similar to the requirements for the other two new wells, design and construction of well MW-35 must comply with the requirements of Part I.E.4. The As-Built report for the third new well must also comply with the requirements of Part I.F.6 of the Permit.

In the event the Executive Secretary requires additional information, the Permittee will provide all requested information within a time frame approved by the Executive Secretary. The addition of this new provision to the Permit requires that new compliance monitoring wells be installed downgradient of the footprint of Cell 4B and allows the Executive Secretary to review and approved the location and design of the third monitoring well. The location of well MW-35 will be based on additional hydrogeologic data that will be obtained from installation of the first two additional wells. Part I.H.6 also ensures that all three of the new wells will be installed in a timely manner with respect to the development of new Cell 4B.

New Part I.H.7: Background Groundwater Quality Report for New Monitoring Wells

The Permit has been revised to require that the Permittee, within 30 calendar days of receipt of written Executive Secretary approval for use of Tailings Cell 4B, commence a quarterly groundwater sampling program that will comply with the following Permit requirements:

- a. Routine groundwater compliance monitoring requirements of Part I.E.1 of the Permit.
- b. Well monitoring procedure requirements of Part I.E.5 of the Permit.

After completion of eight consecutive quarters of groundwater sampling and analysis of these new wells, the Permittee will also submit, for Executive Secretary approval, a Background Report that will include:

- 1) Data preparation and statistical analysis of groundwater quality data, including but

not limited to, evaluation of data characteristics and internal data consistency, treatment of non-detectable values, and statistical methods used. These statistics shall be calculated using the Decision Tree/Flowchart used for the previous Background Reports that was conditionally approved by the UDRC on August 24, 2007.

- 2) Shallow aquifer average linear groundwater velocity calculated for the new wells, based on well specific hydraulic conductivity, hydraulic gradient, and effective aquifer porosity.

After review of the report, if the Executive Secretary determines that additional information is required, the Permittee will provide all requested information, resolve all issues identified, and re-submit the report for Executive Secretary review and approval within a timeframe approved by the Executive Secretary. After approval of this report, the Executive Secretary will re-open this Permit and establish appropriate monitoring frequency and Groundwater Compliance Limits in Table 2 of the Permit for the each of the new wells at Cell 4B.

New Part I.H.8 - Revised BAT Monitoring, Operations and Maintenance Plan for Cell 4A and BAT Monitoring, Operations and Maintenance Plan for Cell 4B

The Permit has been revised to require that the Permittee submit, for Executive Secretary approval, a revised BAT, Monitoring, Operations and Maintenance Plan for Cell 4A and a BAT, Monitoring, Operations and Maintenance Plan for Cell 4B. The revised Cell 4A BAT, Monitoring, Operations, and Maintenance Plan shall include the elements described in Parts I.D.6 and I.E.8 of the Permit. The Cell 4B BAT, Monitoring, Operations, and Maintenance Plan shall include the elements described in I.D.13 and I.E.12 of the Permit. At the discretion of the Permittee, these plans may be combined into one. The Permit revision also requires that these plans be approved by the Executive Secretary prior to placing any tailings or wastewater in Cell 4B.

This new compliance schedule item was needed because:

- The existing Cell 4A BAT Monitoring, Operations, and Maintenance Plan needs to be revised to include procedures and reporting requirements for repairs to the liner in Cell 4A to address any damage that may occur to the liner during operations in Cell 4A
- This new item ensures that the Cell 4B BAT Monitoring, Operations, and Maintenance Plan will include monitoring procedures and reporting requirements for: BAT performance standards and requirements in new Parts I.D.13 and I.E.12(a) and (b), and any repairs to the liner in Cell4B to address any damage that may occur pursuant to Part I.E.12(c).
- The intent of Part I.H.8 is to provide a Cell 4B BAT, Operations and Maintenance Plan that is similar to that required for Cell 4A

New Part I.H.9: Cell 4B As-Built Report

The Permit has been revised to require that the Permittee submit for Executive Secretary approval, an engineering As-Built Report to document all construction activities, for Executive Secretary review and approval. The Permit revision requires that any deviations from the Executive Secretary approved engineering design and/or specifications be clearly disclosed and described and that the As-Built Report be certified by a Utah licensed Professional Engineer. The Permit revision also requires that, if after review of the As-Built report, and the Executive Secretary determines that additional information is required, the Permittee provide all requested information, and resolve all issues identified, before Cell 4B is put into service. This Permit revision is needed to allow the Executive Secretary to conduct a formal review of the final Cell 4B construction to ensure it can perform in accordance with the approved engineering design. Based on information provided in this process, certain Permit requirements may be amended at a future date, e.g., BAT performance standards in Part I.E.12.

New Part I.H.10: Additional Hydrogeologic Investigation and Report

The Permit has been revised to require that the Permittee conduct additional hydrogeologic and field investigation to: (1) Resolve uncertainties and apparent discrepancies in elevation survey data for springs and seeps at the margin of White Mesa, including, but not limited to, Cottonwood Seep and/or Westwater Seep and Ruin Spring, (2) Determine the elevation of the upper geologic contact of the Brushy Basin Shale Member at nearby seeps / springs, and compare the elevations of the same geologic contact in monitoring wells in the vicinity of the tailings management cells and other areas across the facility; and (3) Verify the hydrogeologic nature of nearby seeps and springs, including whether they are influenced or controlled by said geologic contact. In addition, the purposes of such studies also include, but are not limited to:

- Further delineate the physical relationship between the perched groundwater flow system that underlies the White Mesa facility and nearby vicinity atop the geologic contact between the Brushy Basin Shale and Burro Canyon Formations;
- Determine directions of groundwater flow to the closest point(s) of surface discharge of the perched groundwater zone downgradient of the facility; and
- Confirm the estimated groundwater travel time to said surface discharge point(s) from the tailings management cell area, including Cell 4B.

Such information will assist the Executive Secretary in an improved understanding of local hydrogeologic characteristics, and possible points of potential contaminant exposure to the public and environmental receptors. This information may also have important applications to the on-going site investigations related to the chloroform and nitrate groundwater contaminant plumes at the facility. This new requirement mandates that before use of Cell 4B for tailings disposal that DUSA have the report certified by a Utah Licensed Professional Geologist or Engineer, and submit the report for Executive Secretary approval. If the Executive Secretary

determines that additional information is needed, DUSA will provide the requested information and resolve all issues identified on a schedule approved by the Executive Secretary.

New Part I.H.11: Corrections to Cell 4B Engineering Drawing Entitled “Sheet 6 of 8: Lining System Details II, Rev. 1”

During construction of Cell 4A, UDRC staff observed certain difficulties in construction of the main slimes drain collection line that drained multiple strip drains (for related details, see discussion above at Part I.D.13, slimes drain drain-down time). This slimes drain pipe ran from the northeast to the southwest corners along the floor of Cell 4A. The problem focused mainly on the difficulty of achieving a 1H:1V slope on the gravel aggregate that surrounded the main drain collection pipe. To correct the problem, certain engineering design changes were made during construction of Cell 4A. The changes included deployment of additional sandbags in a continuous configuration at either side of the drain pipe, in combination with a geotextile fabric, to constrain and control the gravel media around the drain pipe. This method helped the gravel form a uniform geometry around the pipe, thus improving its performance as a drain.

In Cell 4B that same slimes drain function is to be performed by a similar drain pipe and gravel aggregate zone that will run from the northwest corner to the southeast corner along the floor of the disposal cell. To assist the Permittee to avoid repeating this previous construction pitfall (and required last-minute design change), Part I.H.11 has been added to the Permit to require revision of the respective engineering design drawing, and Executive Secretary approval, before construction of Cell 4B. To this end a footnote was also added to Table 6 of the Permit, directing the Permittee to the new requirement in Part I.H.11.

MINOR PERMIT CHANGES

The following minor changes are proposed to be made to the Permit:

- Modification of the header on each page to assist the reader to know what Permit subarea was addressed there, e.g. Part I.E.
- The word “Quality” was deleted from the title on the second page of Table 2 to make it consistent with the title of the first page of Table 2.
- With the addition of the new Table 6 (entitled “Approved Tailings Cell 4B Engineering Design and Specifications”) the previous Table 6 (entitled “Groundwater Monitoring Reporting Schedule”) was renumbered to Table 7. All associated references made to Table 6 in the text of the previous Permit have been changed to refer instead to Table 7;
- Revised descriptive labels provided in Parts I.D.5(f) and I.D.5(g) to identify items specifically associated with Cell 4A;

- The words “and Maintenance” were added to the title of Part I.E.8.
- The “LDS” was added to denote that the failure of pumping and monitoring equipment referred to is that of LDS pumping and monitoring equipment.
- Revised the opening paragraph of Part I.E.8 and Part I.E.8(b) to include reference to Part I.H.8 of the Permit;
- Revised Part I.E.10 to add Cell 4B to the Tailings Cell Wastewater Quality Monitoring program and revise formatting in Part I.E.10(d)(5);
- Revised Part I.F.3 to add Cell 4B as a cell required to be included in the Routine Cell 4B BAT Performance Standards Monitoring and Maintenance Reports; and
- Revised formatting of text in Part I.F.
- Correction of sundry typographical and formatting errors.

REFERENCES

- Geosyntec 2008 Email transmittal from Greg Corcoran to Dave Rupp, RE: DUSA Cell 4A Construction: Two Items noted, July 2, 2008, includes July 2, 2008 spreadsheet (1 p.)
- HGCI 2009 Hydro Geo Chem, Inc, *Site Hydrogeology and Estimation of Groundwater Travel Times in the Perched Zone, White Mesa Uranium Mill Site Near Blanding, Utah*, August 27, 2009; included as Appendix B to the *Reclamation Plan, Rev. 4.0 White Mesa Mill, Blanding, Utah*. Denison Mines (USA) Corporation (DUSA), November 2009.
- HGCI 2010 Hydro Geo Chem Inc, letter from Stewart J. Smith (HGCI) to David Frydenlund (DUSA), February 8, 2010; included as Attachment H to DUSA's *Re: White Mesa Uranium Mill - Second Round of Interrogatories from review of License Amendment Request and Environmental report for Cell 4B* also dated February 8, 2010.
- UDRC 2007 Utah Division of Radiation Control, *Statement of Basis for a Uranium Milling Facility South of Blanding, Utah*, October 24, 2007.
- UDRC 2008a Utah Division of Radiation Control, *Public Participation Summary Ground Water Discharge Permit (Permit) for the Denison Mines (USA) Corp. (DUSA) Uranium Milling Facility South of Blanding, Utah*, March 14, 2008.
- UDRC 2008b Utah Division of Radiation Control, *Ground Water Quality Discharge Permit UGW370004*, March 17, 2008.
- UDRC 2008c Utah Division of Radiation Control letter from Loren B. Morton to Harold R. Roberts (DUSA), "*July 29, 2008 DRC Letter Regarding White Mesa Uranium Mill Cell 4A Operation; July 331, 2008 DUSA Email Regarding 252 Photos on C.D. (received August 1, 2008), Showing Work Completed on Cell 4A Sand Bag Placement; August 7, 2008 DRC Email, Subject: Sandbag Adjustments (Partial Response to Submitted C.D. Photographs). Request for Information*", August 18, 2008 (includes July 2, 2008 Geosyntec email from Greg Corcoran to Dave Rupp).
- URS 2009 URS Corporation, *Final Summary of Review and Recommendation for Acceptance of Denison Mines (USA) Corp.'s Revised Cell 4B Design Report and Responses to Rounds 1, 2 & 3 Interrogatories (UDRC.0088000.166)*, Memorandum from Jon Luellen and Robert Baird (URS) to Loren Morton (Utah Division of Radiation Control), November 5, 2009.

URS 2010

URS Corporation, *Denison Mines (USA) Corp., License Amendment Request and Environmental Report for Cell 4B Safety Evaluation Report under UAC R313-24 and UAC R317-6, March 15, 2009 (Draft).*