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June 5, 2014

Sent VIA OVERNIGHT DELIVERY

Mr. Rusty Lundberg
Division of Radiation Control
Utah Department of Environmental Quality
195 North 1950 West
P.O. Box 144850
Salt Lake City, UT 84114-4820

Re: Response to Utah Division of Radiation Control ("DRC") March 19, 2014 Request for Information ("RFI"), regarding the DRC review of the July 2012 Revised Renewal Application for the White Mesa Mill Groundwater Discharge Permit UGW370004

Dear Mr. Lundberg:

This letter responds to DRC's above-named letter dated March 19, 2014, which Energy Fuels Resources (USA) Inc. ("EFRI") received on March 20, 2014, regarding the DRC review of the July 2012 Revised Renewal Application for the White Mesa Mill Groundwater Discharge Permit UGW370004.

For ease of review, this letter provides each of DRC's comments verbatim, in italics, below, followed by EFRI's response.

The redline text of the GWDP Renewal Application and a complete, revised, clean copy of the entire Application are both attached to this letter for your convenience.

Request for Information

DRC Comment

SECTION: *1.1 and many subsequent sections*

INTERROGATORY STATEMENT(S): *Page 5 of the Renewal Application (RA) refers to the mill operator as Denison Mines (USA) Corp. Because the owner and operator of the mill has changed, please use the new name here and throughout the RA.*

BASIS FOR INTERROGATORY: *The names of the owner and operator of the mill need to be changed throughout the RA text to the new name of Energy Fuels Resources (USA) Inc.*

APPLICABLE RULE(S) OR REGULATION(S): *UAC R317-6-6.3.A*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The name of the owner/operator has been updated throughout the document, except when the organization name is part of the titles of previously submitted reports. The owner/operator names on documents provided as appendices which are still in effect (i.e. are the most recent DRC-approved versions) have also not been changed.

DRC Comment

SECTION: *1.2*

INTERROGATORY STATEMENT(S): *Page 5 of the Renewal Application (RA) states that*

> *In accordance with discussions between Denison management and State of Utah Division of Radiation Control ("DRC") staff on March 12, 2009, this Application includes the information required under R313-6-6.3.*

Similarly, Page 6 refers to R313-6-6.4C. However, the Utah Code designations applied in these cases are not correct. Please correct them.

BASIS FOR INTERROGATORY: *The code that provides language identical or nearly identical to that quoted in the RA is found in UAC R317-6-6.4C. No rules labeled as R313-6-6.3 or R313-6-6.4C exist in the UAC.*

APPLICABLE RULE(S) OR REGULATION(S): *UAC R317-6-6*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The references have been corrected.

DRC Comment

SECTION: *1.2 (cont'd)*

INTERROGATORY STATEMENT(S): *On Page 6, the following wording from R317-6-6.4C is quoted (but misattributed):*

> *The Director may issue (or renew) a ground water discharge permit for an existing facility, such as the Mill, provided:*

> *a) The applicant demonstrates that the applicable class total dissolved solids ("TDS") limits, ground water quality standards and protection levels will be met;*
> *b) The monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;*
> *c) The applicant utilizes treatment and discharge minimization technology commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology; and*
> *d) There is no current or anticipated impairment of present and future beneficial uses of the ground water.*

Please demonstrate within the renewal application (and summarize here) that all four conditions listed above are being met as is required for the Director to renew a groundwater discharge permit.

BASIS FOR INTERROGATORY: *Currently, there are two groundwater plumes identified at the White Mesa Mill property. Please explain how these plumes are being addressed and justify why a groundwater discharge permit should be renewed for the facility in light of these conditions.*

APPLICABLE RULE(S) OR REGULATION(S): *UAC R317-6-6*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

Section 1.2 has been revised to address the conditions in R317-6-6.4C.

DRC Comment

SECTION: *2.1*

INTERROGATORY STATEMENT(S): *Please update the Applicant and Owner name and address.*

BASIS FOR INTERROGATORY: *Since the company has recently changed ownership, please provide the following information required by UAC R317-6-6.3.A:*

> *The name and address of the applicant and the name and address of the owner of the facility if different than the applicant. A corporate application must be signed by an officer of the corporation. The name and address of the contact, if different than above, and telephone numbers for all listed names shall be included.*

APPLICABLE RULE(S) OR REGULATION(S): *UAC R317-6-6.3.A*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The owner/applicant name and contact information have been updated.

DRC Comment

SECTION: *2.3*

INTERROGATORY STATEMENT(S): *Page 14 says,*

> *The name of the facility is the White Mesa Uranium Mill. The facility is a uranium milling and tailings disposal facility, which operates under a Radioactive Materials License issued by the Director of the Utah Division of Radiation Control under UAC R313-24. In addition to uranium in the form of U_3O_8, the Mill also produces vanadium, in the form of vanadium pentoxide (V_2O_5), ammonia metavanadate (AMV) and vanadium pregnant liquor (VPL), from certain conventional ores and has produced other metals from certain alternate feed materials. Alternate feed materials are uranium bearing materials other than conventionally mined ores.*

Please describe what "other metals from certain alternate feed materials" have been produced.

BASIS FOR INTERROGATORY: *The license granted under UAC R313-24 limits production of minerals to certain specified types.*

APPLICABLE RULE(S) OR REGULATION(S): *UAC R313-24; License UT1900479*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

NRC License SUA-1358, Amendment 4, Part 10.9, authorized the receipt and processing of source material from Cabot Performance Materials ("CPM") facility in Boyertown, Pennsylvania. As noted in the Technical Evaluation Report, included as Appendix A, EFRI (formerly International Uranium (USA) Corporation) was authorized to receive and process the CPM for the recovery of uranium, tantalum and niobium. The text has been changed to reflect the additional metals allowed for receipt, processing and recovery from CPM alternate feed.

DRC Comment

SECTION: *2.7.1*

INTERROGATORY STATEMENT(S): *It is stated on Page 27 that "Immediately below the FML, each Cell has a nominal 6-inch thick layer of crushed sandstone that was prepared and rolled smooth as an FML sub-base layer." Please correct this statement to include the other two types of sub-base reported by EFR to exist in places beneath the tailings cells.*

BASIS FOR INTERROGATORY: *Materials underlying the FML of Cells 2 and 3 apparently consist of crushed sandstone in most locations. However, characterization of all sub-base or underlay materials beneath the cell liners in Cells 2 and 3 as crushed sandstone is not correct. In some locations, the underlay materials are said to consist of either concrete sand or bare rock.*

Page 23 of 58 in Denison Mines (2012) says of the underlay materials:

> *The material installed beneath the liners in Cells 2 and 3 consists of crushed Dakota sandstone that was compacted with a smooth drum roller, but in some locations, in which a smooth base grade was available, portions of the liner were placed over in-situ Dakota sandstone (H. Roberts, 2012) (emphasis added).*

This same document also states that

> *The Second Phase Tailings Management system Construction Report generally is consistent with this observation: Energy Fuels Nuclear Inc. (1983) noted that a gravel-sand mixture derived from crushing of loose [Dakota] sandstone, with some washed concrete sand in some areas, was used to construct the compacted bedding layer immediately beneath the liner in Cell 3; and that a similar process and materials were used for the liner bedding material in Cell 2" (emphasis added).*

Thus, it is seen that the thickness of crushed sandstone is appreciably less than six inches, being, in fact, zero, in some locations. In some locations, FML is laid directly upon the Dakota Sandstone. In other locations, washed concrete sand is substituted for or added to crushed sandstone. Acknowledgment of these variant types of materials used in the sub-base of the liner in the RA is important since each type of material potentially has different hydraulic properties and has a bearing on the modeling of whether or not "the discharge can be controlled and will not migrate into or adversely affect the quality of any other waters of the state."

APPLICABLE RULE(S) OR REGULATION(S): *UAC R317-6-6.3.G*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The sentence "Immediately below the FML, each Cell has a nominal 6-inch thick layer of crushed sandstone that was prepared and rolled smooth as an FML sub-base layer." has been replaced with the following text:

> The criterion for placement of the FML in Cells 1, 2 and 3 was a smooth sub base with no rocks protruding that could potentially damage the FML. The cells were excavated by ripping the in-place Dakota Sandstone with a large dozer. Where the rock could not be efficiently ripped, explosives were used to loosen the rock. The cell bottom was then graded to the final design contours and rolled with a smooth drum vibrating roller. The smooth drum roller effectively crushed the loose sandstone, filling in small holes, and

allowed for a smooth surface suitable for liner placement. Due to the excavation methods (ripping and blasting) there were some areas that required little or no fill to meet final grades, while other areas required placement of additional crushed sandstone to meet the final grade. The cell bottom was sometimes re-worked several times to accomplish the desired result. The majority of the cell bottom is covered with a layer (1 to 6 inches) of crushed sandstone while the liner in some areas is placed directly on a smooth rolled surface of Dakota Sandstone with only a thin veneer of re-compacted sandstone. In places where the surface was rough or contained small holes, washed concrete sand was used to fill or smooth the imperfections, and the area was then rolled one last time before FML placement. Areas of crushed sandstone filled sub base versus areas with little or no crushed sandstone base were not documented during construction. Areas filled or smoothed with washed concrete sand is likely less than 0.1% of the cell bottoms.

DRC Comment

SECTION: *2.7.2.4*

INTERROGATORY STATEMENT(S): *Page 29 indicates that "Denison submitted an Infiltration and Contaminant Transport Modeling ("ICTM") Report, White Mesa Mill Site, Blanding, Utah . . . to fulfill the requirements of Part I.H.11 of the Permit."*

Please revise the sentence above to show the correct part of the Permit.

BASIS FOR INTERROGATORY: *The requirements for the ICTM in the Permit are found in Part I.H.2 in the current version of the Permit.*

APPLICABLE RULE(S) OR REGULATION(S): *See Permit No. UGW370004*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The reference has been corrected.

DRC Comment

SECTION: *2.7.6*

INTERROGATORY STATEMENT(S): *Relative to Roberts Pond, Page 35 says that "an appropriate DMT operation standard", as referenced in Permit, includes "a stipulation that the Mill maintain a minimal wastewater head in this pond based on a 2-foot freeboard limit and a 1-foot additional operating limit." Please rewrite this statement to correct it and render it consistent with provisions in the Permit.*

BASIS FOR INTERROGATORY: *The statement quoted above uses the phrase "minimal wastewater head," but this is incorrect. In the existing context, that phrase neither makes sense nor corresponds to the Permit language.*

What would work in the statement would be language similar to either "minimum distance between the wastewater surface and the pond-bank crest" or "maximal wastewater head." The minimum distance between the wastewater surface and the pond-bank crest is equal to the minimum freeboard of two feet, as required by the Permit, plus an additional one foot of freeboard as determined by the Permittee, these together constituting the operating limit employed by the Permittee for safety purposes. The maximal wastewater head should not exceed the elevation of the pond-bank crest minus three feet, which is the sum of the two feet of freeboard and the one foot of additional operating distance.

The language of the Permit itself is as follows:

> *The Permittee shall operate this wastewater pond so as to provide a minimum 2-foot freeboard at all times. Under no circumstances shall the water level in the pond exceed an elevation of 5,624 feet amsl. In the event that the wastewater elevation exceeds this maximum level, the Permittee shall remove the excess wastewater and place it into containment in Tailings Cell 1 within 72-hours of discovery.*

It is important to make the distinctions above since a literal interpretation of the existing language would constrain the level in the pond to exceed the limits set by the Permittee and possibly exceed the limits stated in the Permit.

APPLICABLE RULE(S) OR REGULATION(S): *See Permit No. UGW370004*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The text has been changed to reflect the requirements from the GWDP.

DRC Comment

SECTION: *2.7.7.1*

INTERROGATORY STATEMENT(S): *On Page 35, it says*

> *The Permit requires the Mill to continue its existing practice of limiting open air storage of feedstock materials to the historical storage area found along the eastern margin of the Mill site (as defined by the survey coordinates found in Permit Table 4); and one of the following three practices: 1) Store feedstock materials in water-tight contains, or 2) Place feedstock containers in water-tight overpack containers, or 3) place feedstock containers on a hardened surface that conforms to the requirements spelled out in the permit part I.D.11d) 1 through 5.*

Please correct that part of the statement following the phrase "one of the following three practices" since that is at variance with the Permit.

BASIS FOR INTERROGATORY: *The Permit, portions of which are now quoted, actually requires two practices (see Part I.D.11), as follows: (1) "Feedstock materials will be stored at all times in water-tight containers,* ***and****" (2) compliance with one of the following options is required:*

> *(b) Aisle ways will be provided at all times to allow visual inspection of each and every feedstock container,* ***or***
>
> *(c) Each and every feedstock container will be placed inside a water-tight overpack prior to storage,* ***or***
>
> *(d) Feedstock containers shall be stored on a hardened surface to prevent spillage onto subsurface soils, and that conforms with the following minimum physical requirements . . . [emphasis added]*

which physical requirements are listed specifically in the Permit.

Thus, the Permit requires ***two*** *practices. This is a different requirement from (and twice the number of) "****one*** *of . . . three practices", which is incorrectly referenced in the RA. The first of the required two practices included in the Permit is that "feedstock materials will be stored at all times in water-tight containers." This first practice is thus mandatory regardless of which option is selected for a second practice.*

As indicated in the Permit, a second required practice is then selected from one of three available options. These three are the options labeled as (b), (c) and (d) shown above.

An additional significant point is that only two of the three options for the second practice stated in the Permit as being available are currently listed in the RA. The option about "(b) Aisle ways will be provided at all times to allow visual inspection of each and every feedstock container" is not listed in the RA. It needs to be, since that is one of the options provided in the referenced Permit.
Using a different, somewhat more symbolic approach, the RA perspective of (the first practice listed ***or*** *c* ***or*** *d) needs to be replaced by Permit perspective of (the first practice listed* ***and*** *(b* ***or*** *c* ***or*** *d)).*

APPLICABLE RULE(S) OR REGULATION(S): *See Permit No. UGW370004*

REGULATORY GUIDANCE REFERENCE(S): N/A

<u>EFRI Response:</u>

EFRI agrees that Part I.D.11 of the GWDP is poorly worded and should be clarified. However, EFRI disagrees with DRC's interpretation as set out in the foregoing Interrogatory, which is inconsistent with the intent of DRC as reflected in the September 2009 Statement of Basis that accompanied the applicable revisions to the GWDP. On page 28 of that Statement of Basis, DRC wrote:

> "On June 20, 2008, DUSA submitted a White Mesa Mill-Containerized Alternate Feedstock Material Storage Procedure. After reviewing the submittal, the DRC found that the procedure again failed to address all of the DRC concerns listed in the April 29, 2008 DRC Request for Additional Information Letter. In order to expedite resolution of these concerns, the DRC has modified Part I.D.11 with new performance requirements for storing feedstock material outside of the ore storage area, with an eye to the following goals: 1) containers are maintained in a water tight condition to prevent soil and groundwater pollution, and 2) aisleways are provided between containers to allow physical entry and visual inspection, early detection, and timely remediation of leakage. In the event that DUSA cannot meet goals 1 and 2, options are provided in Part I.D.11 for DUSA to seek out DRC approval and perform said storage over an engineered surface of concrete or asphalt with certain other performance criteria. Related BAT monitoring requirements were also added at Part I.E.7(d) and (e)."

Accordingly, the intention of Part I.D.11 is to provide the Mill with the following three options:

1. Store feedstock materials in water-tight containers, and aisle ways will be provided at all times to allow visual inspection of each and every feedstock container; or
2. Each and every feedstock container will be placed inside a water-tight overpack prior to storage; or
3. Feedstock containers shall be stored on a hardened surface to prevent spillage onto subsurface soils, and that conforms with the following minimum physical requirements . . .

As currently drafted, Part I.D.11. of the GWDP is confusing because the word "and" between subparagraphs a) and b) is intended to refer to those two subparagraph only, and the word "or" is used to distinguish the other two options. However, the wording is ambiguous because, without knowing the intent, other interpretations are possible.

The intention was clearly to avoid the contents from any damaged 55-gallon drums from making contact with the surface of the ground when stored outside the ore storage area. As stated earlier on page 28 of the Statement of Basis:

> "On May 9, 2007, DRC and NRC staff performed an inspection at the Mill site. During the inspection DRC staff found several hundred 55-gallon drums containing alternate feedstock material; many of which were bent, dented, and rusting at the perimeter of the drum pile. While none were found to be leaking, the DRC staff observed that the drums were triple stacked at least ten deep, with less than a 3-inch spacing between rows of drums, which made it impossible to physically enter and visually inspect the condition of each of the drums."

Each of the three options delineated above were considered satisfactory to address DRC's concerns relating to bent, dented and rusting drums. The aisle ways were intended to allow the Mill and DRC to determine by inspection that the 55-gallon drums are themselves watertight. Placing bent, dented and rusted drums in water-tight overpacks or on an impermeable surface was also considered satisfactory to address those concerns. There is no need to require water tight containers to also be placed in water-tight overpacks or on an impermeable surface. That would be redundant.

Accordingly, EFRI requests that Part I.D.11 of the renewed GWDP be revised to read as follows:

> "11. BAT Requirements for Feedstock Material Stored Outside the Feedstock Storage Area – the Permittee shall store and manage feedstock materials outside the ore storage pad in accordance with the following minimum performance requirements:
>
> a) Feedstock materials will be stored at all times in water-tight containers, and aisle ways will be provided at all times to allow visual inspection of each and every feedstock container, or
> b) Each and every feedstock container will be placed inside a water-tight overpack prior to storage, or
> c) Feedstock containers shall be stored on a hardened surface to prevent spillage onto subsurface soils, and that conforms with the following minimum physical requirements . . . [remainder of Section remains unchanged]"

DRC Comment

SECTION: *2.7.7.2*

INTERROGATORY STATEMENT(S): *On Page 35, the RA states "For new facilities constructed at the Mill, or reconstruction of existing facilities, Part I.D.3(e) requires the higher standard of secondary containment that would prevent contact of any potential spill with the ground surface." Please correct the reference made in this sentence to the Permit.*

BASIS FOR INTERROGATORY: *The correct reference should be Part I.D.3(g).*

APPLICABLE RULE(S) OR REGULATION(S): *See Permit No. UGW370004*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The reference has been corrected.

DRC Comment

SECTION: *2.9.1.3*

INTERROGATORY STATEMENT(S): *Page 39 of the RA says*

> *Part I.E.1(d) of the Permit requires that each point of compliance well must be sampled for the constituents listed in Table 2.9.1.3-1.*
>
> *Further, Part I.E.1.(d)l) of the Permit, requires that, in addition to pH, the following field parameters must also be monitored:*
>
> - *Depth to groundwater*
> - *Temperature*
> - *Specific conductance*

The Permittee needs to add to the list of parameters referenced with respect to Part I.E.1(d)(1) the following parameter: redox potential (Eh).

BASIS FOR INTERROGATORY: *Part 1.E.1(d) of the Permit states the following:*

> *d) Compliance Monitoring Parameters - all groundwater samples collected shall be analyzed for the following parameters:*
> *1) Field Parameters - depth to groundwater, pH, temperature, specific conductance, and redox potential (Eh).*

From this, it is seen that redox potential (Eh) is a field parameter currently left out of the description in the RA. It is important to include Eh as a field parameter in order to estimate redox conditions in the perched water zone.

APPLICABLE RULE(S) OR REGULATION(S): *See Permit No. UGW370004*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

Redox potential has been added to the list of required field parameters.

DRC Comment

SECTION: *2.12.1*

INTERROGATORY STATEMENT(S): *Reference is made to the Tailings and Slimes Drain Sampling Program, Revision 0, November 20, 2008 as Appendix H. Please change the appendix name to Appendix I.*

BASIS FOR INTERROGATORY: *Appendix H is not the correct appendix name for this document. The correct appendix name is Appendix I. The name needs to be changed to correspond with the actual paper and electronic copies of the RA.*

APPLICABLE RULE(S) OR REGULATION(S): *N/A*

REGULATORY GUIDANCE REFERENCE(S): ***N/A***

EFRI Response:

The Appendix reference has been changed. It is important to note that additional appendices have been added to the document and all subsequent appendix references have been changed accordingly.

DRC Comment

SECTION: *2.15.2.2*

INTERROGATORY STATEMENT(S): *As stated in the RA, "Part I.D.3(b)(1) of the Permit requires that Denison must at all times maintain the average wastewater head in the slimes drain access pipe to be as low as reasonable achievable (ALARA) in each tailings cell, in accordance with the approved DMT Plan." However, no data are provided in the RA in support of a demonstration of compliance to this objective.*

In addition, the RA states in Part I.D.3(b)(3) that

> *Compliance will be achieved when the average annual wastewater recovery elevation in the slimes drain access pipe, determined pursuant to the currently approved DMT Plan meets the conditions in Equation 1 specified in Part I.D.3(b)(3) of the Permit.*

Again, the RA provides no relevant information about the current approach to compliance. For each cell, accordingly please provide the following, where feasible:

(1) Historical records over the past four years (2009 to 2012, inclusive) chronicling measurements of "the average wastewater head in the slimes drain access pipe" for Cells 2 and 3, listed by date. Elevations can be obtained by subtracting quarterly measurements of depth to the wastewater, as required by Part I.E.7(b) of the Permit, from the reference elevation (e.g., top of pipe elevation).

(2) Data demonstrating how well, to date, "the average annual wastewater recovery elevation in the slimes drain access pipe, determined pursuant to the currently approved DMT Plan meets the conditions in Equation 1 specified in Part I.D.3(b)(3) of the Permit." This Equation basically tests each current year's 3-year average slime drain elevation against the previous year's to see if the current year's is less.

(3) Plans for decreasing "the average wastewater head in the slimes drain access pipe" for Cells 2 and 3 in the future, along with a planned schedule for reducing the head to the closure goal of no more than three feet above the FML within the next several years. These plans should include efforts to accelerate drawdown to meet ALARA criteria.

BASIS FOR INTERROGATORY:

Part I.E.7(b) of the Permit states

> *Quarterly Slimes Drain Water Level Monitoring: Cells 2 and 3 - the Permittee shall monitor and record quarterly the depth to wastewater in the slimes drain access pipes as described in Part I.D.3 of this Permit and the currently approved DMT Monitoring Plan at Tailings Cells 2 and 3 to determine the recovery head. For purposes of said monitoring, the Permittee shall at each tailings cell:*
>
> *1) Perform at least 1 separate slimes drain recovery test at each disposal cell in each quarterly period of each calendar year that meets the requirements of Part I.D.3,*
>
> *2) Designate, operate, maintain, and preserve one water level measuring point at the centerline of the slimes drain access pipe that has been surveyed and certified by a Utah licensed engineer or land surveyor,*
>
> *3) Make all slimes drain recovery head test (depth to fluid) measurements from the same designated water level measuring point, and*
>
> *4) Record and report all fluid depth measurements to the nearest 0.01 foot.*
>
> *5) For Cell 3 these requirements shall apply upon initiation of tailings de-watering operations.*

Part I.D.3(b)(3) states that

> *Annual Slimes Drain Compliance - shall be achieved when the average annual Wastewater recovery elevation in the slimes drain access pipe, as determined pursuant to the currently approved DMT Monitoring Plan, meets the conditions in Equation 1 below:*
>
> *Equation 1:*
>
> $$[\Sigma E_y + \Sigma E_{y-1} + \Sigma E_{y-2}] / [N_y + N_{y-1} + N_{y-2}] < [\Sigma E_{y-1} + \Sigma E_{y-2} + \Sigma E_{y-3}] / [N_{y-1} + N_{y-2} + N_{y-3}]$$
>
> *Where:*
>
> *ΣE_y = Sum of all monthly and quarterly slimes drain tailings fluid elevation measurements that meet the test performance standards found in the sub-paragraphs of Part I.D.3(b)(2), during the calendar year of interest. Hereafter, these water level measurements are referred to as slimes drain recovery elevations (SDRE). Pursuant to the applicable frequency and method of the approved DMT Monitoring Plan at the time of each SDRE test, these recovery tests are to be conducted and the SDRE values reported in units of feet above mean sea level (amsl). However, when monthly and quarteriy*

measurements are combined in the above equation, the quarterly values shall be multiplied by a coefficient of three (3).

ΣE_{y-1} = *Sum of all SDRE measurements made in the year previous to the calendar year of interest. However, when monthly and quarterly measurements are combined in the equation above, each quarterly value shall be multiplied by a coefficient of three (3).*

ΣE_{y-2} = *Sum of all SDRE measurements made in the second year previous to the calendar year of interest. However, when monthly and quarterly measurements are combined in the equation above, each quarterly value shall be multiplied by a coefficient of three (3).*

ΣE_{y-3} = *Sum of all SDRE measurements made in the third year previous to the calendar year of interest. However, when monthly and quarterly measurements are combined in the equation above, each quarterly value shall be multiplied by a coefficient of three (3).*

N_y = *Total number of SDRE tests that meet the test performance standards found in Part I.D.3(b)(2), conducted during the calendar year of interest. However, when monthly and quarterly measurements are used in the equation above, each quarterly test shall be counted as three (3) separate tests.*

N_{y-1} = *Total number of SDRE tests that meet the test performance standards found in Part I.D.3(b)(2), conducted in the year previous to the calendar year of interest. However, when monthly and quarterly measurements are used in the equation above, each quarterly test shall be counted as three (3) separate tests.*

N_{y-2} = *Total number of SDRE tests that meet the test performance standards found in Part I.D.3(b)(2), conducted in the second year previous to the calendar year of interest. However, when monthly and quarterly measurements are used in the equation above, each quarterly test shall be counted as three (3) separate tests.*

N_{y-3} = *Total number of SDRE tests that meet the test performance standards found in Part I.D.3(b)(2), conducted in the third year previous to the calendar year of interest. However, when monthly and quarterly measurements are used in the equation above, each quarterly test shall be counted as three (3) separate tests.*

Prior to January 1, 2013, the following values for E and N values in Equation 1 shall be based on SDRE data from the following calendar years.

Report for Calendar Year	*Source of Data by Calendar Year for Equation 1 Variables (right side)*					
	E_y	E_{y-1}	E_{y-2}	N_y	N_{y-1}	N_{y-2}
2010	*2009*	*2009*	*2009*	*2009*	*2009*	*2009*
2011	*2010*	*2009*	*2009*	*2010*	*2009*	*2009*
2012	*2011*	*2010*	*2009*	*2011*	*2010*	*2009*

Failure to satisfy conditions in Equation 1 shall constitute DMT failure and noncompliance with this Permit. For Cell 3, this requirement shall apply after initiation of de-watering operations [Emphasis added].

If recent performance on reducing the wastewater heads in the cells indicates that the current rate of drawdown may not be sufficient to attain dewatering performance objectives within the next several years, as has recently been indicated by the DRC during ICTM and REC Plan discussions, then plans *for remedial activities for the slimes drain will be needed. Equation 1 above will be used to address requirement (2) above.*

APPLICABLE RULE(S) OR REGULATION(S): *See Permit No. UGW370004*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

At this time, de-watering of Cell 3 has not commenced and no data are available at this time. A statement has been added to Section 2.15.2.2 noting that de-watering of Cell 3 has not started.

DRC Comment (1) above

Measurements of the Cell 2 slimes drain wastewater head are documented in each quarterly DMT report submitted to DRC pursuant to the requirements of Part I.F.1, Table 7 of the GWDP. The quarterly measurement forms and a graphical representation of the Cell 2 slimes data are included each quarter.

The requested data has been summarized and included in Appendix J of the GWDP Application.

DRC Comment (2) above

Annual compliance calculations pursuant to Part I.D.3(b)(3) of the GWDP are submitted to DRC on or before March 1 of the following year.

A summary of the annual compliance data, although presented elsewhere, have been added to Appendix J of the GWDP Application

DRC Comment (3) above

As noted in Appendix J of the GWDP Application, annual slimes drain compliance was not achieved for 2010, in accordance with Part I.D.3 of the Permit. As noted in correspondence with DRC, the monthly monitoring requirements specified in Part I.D.3(b)(2) of the February 2011 revision of the GWDP seriously interfered with EFRI's ability to comply with Parts I.D.3(b)(i) and I.D.3 (b)(3) of the GWDP. The monthly testing requirement resulted in the slimes drain pump being off (not pumping) an average of 6.42 days per month every month which is equivalent to 77 days (11 weeks) per year or 20 percent of the year for performance of the measurements.

The GWDP was amended in July 2011 to change the frequency of the slimes drain testing from monthly to quarterly. The average annual wastewater recovery elevation in the slimes drain pipe has been in compliance, that is, less than the previous year's running average since the monitoring frequency changed from monthly to quarterly in July 2011.

At the time Equation 1 was added to Part I.D.3(b)(3) of the GWDP, EFRI and DRC had extensive discussions as to what dewatering activities would satisfy the ALARA goal specified in Part I.D.3(b)(i). After reviewing the available options, taking into consideration the design of the cells and their slimes drain systems, DRC and EFRI agreed that operation of the slimes drain systems in a manner that complies with Equation 1 would satisfy the ALARA goal. As can be seen from the data in Appendix J to the GWDP Application, the slimes drain head levels have decreased in compliance with Equation 1, and at a faster rate since the change in monitoring frequency from monthly to quarterly. The Cell 2 de-watering results are in compliance with the GWDP requirements and with the ALARA goals and no changes are required to the program at this time.

DRC Comment

SECTIONS: *2.15.3.1, 2.15.3.2, 2.15.4*

INTERROGATORY STATEMENT(S): *Please fix the wording in these sections in reference to Part I.H.19.*

BASIS FOR INTERROGATORY: *I.H. sections only extend to Part I.H.7. There is no Part I.H.19 in the current Permit. Similar problems appear in other parts of Section 2.15.3.1 and in Sections 2.15.3.2 and 2.15.4. Please adjust the references so they are consistent with the current Permit.*

APPLICABLE RULE(S) OR REGULATION(S): *See Permit No. UGW370004*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The text has been modified to reference the DRC-approved BAT Operations and Maintenance Plan.

DRC Comment

SECTIONS: *2.19.2 and 2.19.3*

INTERROGATORY STATEMENT(S): *Page 78 of the RA states in Part 2.19.2 that: "The Mill's Reclamation Plan, Revision 4.0, was approved by the DRC under the Mill License in January 2011." This statement is incorrect. The currently approved reclamation plan is 3.2B, which was approved by the DRC on January 26, 2011.*

Section 2.19.2 and 2.19.3 also describe the Denison Mines submittal of Revision 5.0 of the Reclamation Plan in September 2011" and that "submission of responses to all first round interrogatory questions will be completed by August 14, 2013." Additional information about the Reclamation Plan is provided in Section 2.19.3 on Page 79. Please update this information to include concepts and data in a new version of the Reclamation Plan modified in response to information shared at recent meetings between the Permittee and the DRC.

BASIS FOR INTERROGATORY: *A meeting was held in Denver Colorado on April 29, 2013 concerning the version of the Reclamation Plan and the related version of the Infiltration and Contaminant Transport Model report then extant. Participating in the meeting were representatives of the Permittee, its consultant (MWH Americas), the DRC, and its consultant (URS Professional Solutions). A number of issues concerning the then-extant version of the Reclamation Plan were raised at this meeting, many were resolved verbally, and others were left as being yet to be resolved. Decisions were made at the meeting related to the Permittee undertaking additional work and responding to questions raised by the DRC. These issues, their resolutions and additional work to be done will help finalize a new version of the Reclamation Plan. The changes in the new version of the Reclamation Plan have need of being discussed in the RA to make it current.*

APPLICABLE RULE(S) OR REGULATION(S): *N/A*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The text of Section 2.19.2 of the Renewal Application has been updated to reference the current approved Reclamation Plan as Version 3.2B approved by DRC on January 26, 2011.

The text of Sections 2.19.2 and 2.19.3 of the Renewal Application have been revised to provide updated information on the status of Revision 5.0 of the Reclamation Plan.

DRC Comment

SECTION: *Appendix A*

INTERROGATORY STATEMENT(S): *A number of apparent discrepancies exist between well locations shown in San Juan County plats in Appendix A and well locations shown in Figure 10, White Mesa Site Plan Showing Locations of Perched Wells and Piezometers. Please reconcile these, or provide explanations, if information provided is believed to be correct as is.*

BASIS FOR INTERROGATORY: *There are several types of discrepancies noted when comparing well locations in San Juan County plats in Appendix A of the RA and well locations shown in Figure 10 of the RA, entitled White Mesa Site Plan Showing Locations of Perched Wells and Piezometers.*

- *A San Juan plat for Section 22, T37S, R22E is missing. This plat is important, and it needs to be included in the RA, because wells TWN-12, TWN-16 and TWN-19 are located in Section 22.*

- *The San Juan plats show what appear to be duplicate locations for each of the following pairs of wells, in which each well in each pair is placed in different sections.*

  TW4-19 (two locations: one in Section 28 and one in Section 33 of T27S, R22E.)
  TW4-22 (two locations: one in Section 28 and one in Section 33 of T27S, R22E.)

MW-21 (two locations: one in Section 32 of T37S, R22E and one in Section 5 of T38S, R22E.)

Please work with San Juan County to correct these apparent discrepancies, in case a mis-mapping could otherwise cause legal or other problems down the road, or even if it only might cause confusion. If the San Juan County plats are corrected, then please include the correct plats in the RA once this is accomplished.

- *The following abandoned wells are shown as wells in San Juan County plats but are not shown in Figure 10:*

  MW-16 (Section 32 of T37S, R22E)
  DR-2 (Section 32 of T37S, R22E)
  DR-16 (Section 5 of T38S, R22E)
  DR-18 (Section 5 of T38S, R22E)
  DR-25 (Section 5 of T38S, R22E)

  While it is not necessary from the perspective of the DRC for EFR to take any action on mapping of these wells, since they are abandoned, the DRC does point out the apparent discrepancy between the county plats and Figure 10 with respect to their apparent existence.

APPLICABLE RULE(S) OR REGULATION(S): *N/A*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

EFRI contacted San Juan County to address the discrepancies noted in this comment. San Juan County does not record well locations on plat maps.

Pursuant to a telephone conversation with DRC on April 30, 2014, EFRI has provided maps in Appendix B showing land ownership, well locations, surface water features, and structures to address the appropriate GWDP Renewal Application requirements.

DRC Comment

SECTION: *Appendix L*

INTERROGATORY STATEMENT(S): *The first listing of "Aluminum Powder" in Appendix L is out of order alphabetically, and the quantity shown for it, 0 g, is incorrect. Please remove this first listing, inasmuch as there is also a later listing that is ordered alphabetically, which has an entry for the correct quantity.*

BASIS FOR INTERROGATORY:): *In the alphabetical listing of laboratory chemicals on site, the item "Aluminum Powder", when first introduced, is listed between "Aluminum Metal, granular" and "Aluminum Nitrate, Nona hydrate." Furthermore, the quantity given, 0 g, appears to be incorrect, since a subsequent listing for "Aluminum Powder", the one that is listed between "Aluminum Potassium Sulfate 12 Hydrate Crystal" and "Aluminum Reagent 2," has an entry for quantity of 300 g.*

APPLICABLE RULE(S) OR REGULATION(S): *N/A*

REGULATORY GUIDANCE REFERENCE(S): N/A

EFRI Response:

The first listing of aluminum powder in the laboratory chemical inventory has been deleted.

DRC Comment

SECTION: *Appendix L*

INTERROGATORY STATEMENT(S): *Is the chemical inventory list provided in the RA (Appendix L) complete, listing every chemical either stored or used (either now or in the past) at the facility? If not, then please discuss each exception and indicate why it is not listed, or, alternatively, add it to the inventory list.*

BASIS FOR INTERROGATORY: *The text of the RA refers to Part I.H.1 of the Permit. The text states that Part I.H.1 "requires that Denison" (now EFR) "complete a historical review and conduct an inventory of all chemical compounds or reagents stored, used, or current in use at the facility, including the types of chemicals and the total volumes present, and historically used, as data is available." It says that, in application to renew the Permit, the Permittee "shall submit an updated inventory report."*

However, while the requirements are stated, the list currently submitted as Appendix L of the RA is entitled simply "Laboratory Chemical Inventory." This title by itself conveys the impression, whether rightly or wrongly, of possible insufficient compliance with Permit requirements. Part I.H.1 of the Permit refers not to a "laboratory chemical inventory" (which might exclude chemicals used in places at the facility other than in a laboratory) but refers to an "on-site chemicals inventory." The latter title suggests an inventory potentially more comprehensive than simply a laboratory chemical inventory. The Permit says of this on-site chemicals inventory that it must report the names of "all chemical compounds and reagents stored, used or currently in use at the facility". The text of the Permit later specifies that the Permittee "identify all chemicals used in the milling and milling related processes at White Mesa" (emphasis added). If there are chemicals that are currently being used, or that have been used in the past, at the facility, that are not that are not listed in the "Laboratory Chemical Inventory", then these need to be specified at this point by the Permittee in an updated inventory.

The current submittal does not discuss chemicals formerly used at the facility but not currently found in the laboratory nor does it mention their estimated volumes. This needs to be done.

Furthermore, as part of the new inventory to be submitted, the Permittee needs to include a statement attesting that, according to the best information to be had, the listing contained therein includes the names and quantities of every chemical either stored or used (either now or in the past) at the facility. Such a statement is needed to confirm that the requirements of the Permit that names and quantities of all chemicals are being reported.

EFRI Response:

The 2012 GWDP Renewal Application did include a current chemical inventory for other areas of the Mill and was not limited to only laboratory chemicals as implied by the comment. The 2012 GWDP Renewal Application included the following tables in Appendix L:

- L-1 Laboratory Chemical Inventory
- L-2 Current Mill Chemical Inventory
- L-3 Cleaners
- L-4 Chemicals Formerly Used/No Longer Used or Present on Site

Appendices L-1 through L-3 have been updated (moved to Appendix O) to include historic quantities of the chemicals that were used. Appendix L-4 (now O-4) as submitted with the 2012 GWDP Renewal Application, already included an estimation of the maximum quantity that was historically present/used, and therefore no changes were made to that Appendix. Additional chemicals have been added as necessary.

Please contact me if you have any questions or require any further information.

Yours very truly,

ENERGY FUELS RESOURCES (USA) INC.
Kathy Weinel
Quality Assurance Manager

cc: David C. Frydenlund
Harold R. Roberts
David E. Turk
Dan Hillsten

White Mesa Mill

Renewal Application

State of Utah Groundwater Discharge Permit No. UGW370004

Energy Fuels Resources (USA) Inc.

June 2014

1.0 INTRODUCTION

1.1 Background

Energy Fuels Resources (USA) Inc.[1] ("EFRI") operates the White Mesa Uranium Mill (the "Mill"), located approximately six miles south of Blanding, Utah, under State of Utah Ground Water Discharge Permit No. UGW 370004 (the "Permit" or "GWDP"). The Permit was originally issued by the Co-Executive Secretary of the Utah Water Quality Board on March 8, 2005, for 5 years, expiring on March 8, 2010, and was up for timely renewal in accordance with Utah Administrative Code ("UAC") R317-6-6.7. A renewal application was submitted September 1, 2009. At the request of the Director of the Utah Division of Radiation Control, EFRI submitted an updated version of the September 1, 2009 renewal application on July 13, 2012. At the request of the Director of the Utah Division of Radiation Control, EFRI is submitting this updated version of the July 2012 renewal application.

Prior to July 1, 2012, the Director of the Utah Division of Radiation Control ("Director") was referred to as the Executive Secretary of the Utah Radiation Control and Board Co-Executive Secretary of the Utah Water Quality Board. Documents referenced in this Application, published prior to that date, refer to the Director, by one or both of these previous titles.

In accordance with R317-6-6.7, this is an updated application (the "Application") to the Director for renewal of the Permit for another 5-years under R313-6-6.7.

The Mill is also subject to State of Utah Radioactive Materials License No. UT 1900479 (the "Mill License"), which was issued on March 31, 1997[2] for 10-years and is currently in the process of timely renewal under R313-22-36[3], and State of Utah Air Quality Approval Order DAQE-AN0112050018-11 (the "Air Approval Order") which was re-issued on March 2, 2011 and is not up for renewal at this time. While the Mill License is referred to in this Application from time to time in order to allow the Director to better understand Mill operations and compliance with applicable regulatory requirements, this is not an application for renewal of the Mill License or Air Approval Order.

1.2 Applicable Standards for Review and Approval of this Application

In accordance with discussions between EFRI and State of Utah Division of Radiation Control ("DRC") staff on April 1, 2014, this Application includes the information required under R317-6-6.3.

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[1] Prior to July 25, 2012, Energy Fuels Resources (USA) Inc. was named "Denison Mines (USA) Corp ("Denison")". Prior to December 16, 2006, Denison was named "International Uranium (USA) Corporation."

[2] The Mill License was originally issued by the United States Nuclear Regulatory Commission ("NRC") as a source material license under 10 CFR Part 40 on March 31, 1980. It was renewed by NRC in 1987 and again in 1997. After the State of Utah became an Agreement State for uranium mills in August 2004, the Mill License was re-issued by the Executive Secretary as a State of Utah Radioactive materials license on February 16, 2005, but the remaining term of the Mill License did not change.

[3] A Mill License renewal application was submitted to the Executive Secretary on February 28, 2007, pursuant to R313-22-36.

In accordance with R317-6-6.4C, the Director may issue (or renew) a ground water discharge permit for an existing facility, such as the Mill, provided:

a) The applicant demonstrates that the applicable class total dissolved solids ("TDS") limits, ground water quality standards and protection levels will be met;
b) The monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
c) The applicant utilizes treatment and discharge minimization technology commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology; and
d) There is no current or anticipated impairment of present and future beneficial uses of the ground water.

This Permit Application demonstrates how existing facilities continue to meet applicable regulatory criteria and the monitoring strategies employed to prevent impairment of present and future beneficial uses of the groundwater. EFRI conducts various kinds of environmental monitoring at the White Mesa Mill including but not limited to groundwater, surface water, soil, sediment, tailings waste water, air, and vegetation. Specific groundwater monitoring activities employed are summarized below.

Energy Fuels' ground water monitoring program is comprehensive in that it includes all of the 72 monitoring wells at the facility, as described above, although not every well is sampled every quarter. Samples are taken and analyzed for a large number of groundwater contaminants including heavy metals, nutrients, general chemistry analytes, radiologics, and volatile organic compounds ("VOCs"). Exceedences of standards found during this monitoring program have been addressed as described throughout this GWDP Application.

Under the License, the Permit, and the Corrective Action Plans, EFRI has completed and is monitoring the 72 groundwater monitoring wells described below.

- 27 monitoring wells placed to detect any leaks from the cells. Because the leak detection systems for Cells 1, 2, and 3 utilized older, less sophisticated technology, the DRC required eight new wells be installed adjacent to the tailings cells in 2005. These wells were to be used as a first line of defense to detect any tailings cell leakage. These supplemented the original seven required by NRC. An additional 12 wells have been constructed in association with the construction of Cells 4A and 4B.
- 34 monitoring wells associated with characterizing the chloroform groundwater contamination.
- 12 monitoring wells associated with characterizing the nitrate groundwater contamination.

The monitoring results for each well that is sampled are evaluated for compliance with standards for 38 different constituents and, regardless of whether standards are met, for trends in the data that may show a need for further action.

Four indicator parameters (chloride, uranium, fluoride, and sulfate) are used at the site to determine if there has been any cell leakage. These constituents were chosen because they are the most mobile and are expected to be seen first with any upward trend in consistent concentrations. If a cell were leaking, it is expected that all four parameters would show increasing trends within two years, based on Kd values and other transport characteristics for the contaminants and site.

During a DRC split sampling event in May, 1999, excess chloroform concentrations were discovered in monitoring well MW-4, which is located along the eastern margin of the site. Because these concentrations were above the Utah Ground Water Quality Standard of 70 μg/L, the DRC initiated enforcement action against EFRI on August 23, 1999 by issuing a Ground Water Corrective Action Order. The Order required completion of: 1) a contaminant investigation report to define and delineate boundaries for the contaminant plume, and 2) a groundwater corrective action plan to clean it up. Twenty new monitoring wells (since increased to 34 wells) were installed at the site as part of the investigation. Table 1.2-1 lists the 34 chloroform monitoring wells.

The Director and EFRI determined that the laboratory wastewater sent to sewage leach fields, and not potential leaking from tailings cells, was the most likely source of the chloroform plume.

As with every groundwater corrective action, the corrective action plan is developed based on assumptions about the source, and those assumptions are tested continuously with groundwater monitoring as corrective action proceeds.

With DRC concurrence, EFRI began to pump chloroform contaminated groundwater in April, 2003. Groundwater monitoring results show this initial remediation effort has been effective based on reduction of contaminant concentrations. Reductions of the contaminant concentrations indicates both that the pumping program is working and that there is no continuous source for the contaminants, as would be the case if the cells were leaking.

During a review of the EFRI April 30, 2008 New Wells Background Report and other EFRI reports, Nitrate + Nitrite (as N) (hereafter Nitrate) concentrations were observed above the Utah Ground Water Quality Standard (10 mg/L) in five monitoring wells in the mill site area.

After the Nitrate Plume was identified, the Executive Secretary and EFRI entered into a January 28, 2009 Stipulated Consent Agreement that required EFRI to complete a Contaminant Investigation Report to determine the potential sources of the Nitrate contamination. Nineteen additional wells were installed to determine the extent of the contamination; nine of these wells have since been abandoned. Table 1.2-2 lists the current and former nitrate wells installed as part of the nitrate corrective actions.

EFRI has submitted two reports to DRC regarding the elevated Nitrate concentrations. The reports identify the extent of the Nitrate plume but EFRI and DRC disagreed about what the reports indicated about the likely source of the plume. EFRI does not believe that the results adequately demonstrated an on-site source.

EFRI agreed to implement a corrective action plan to clean up the plume. EFRI completed and submitted the Nitrate Corrective Action Plan to the DRC on May 7, 2012. The Corrective Action Plan was approved following a public comment period, and was incorporated into a December 12, 2012 Stipulation and Consent Order, Docket Number UGW12-04. The approval is subject to conditions, stipulated penalties and timelines outlined in the Stipulation and Consent Order. The remediation plan requires EFRI to pump the groundwater and treat it by evaporation and/or use as process water. Pumping under the remediation plan began in January, 2013.

Groundwater monitoring results show this initial remediation effort has been effective based on reduction of the plume mass to date.

When the DRC began oversight of the Mill, it noted that ground water monitoring had showed elevated concentrations of metals, primarily uranium, in wells MW-3, MW-3A, MW-14, MW-15, MW-22 on the Mill site. The DRC was concerned about whether the observations meant that tailings cells were leaking. To address its concerns, the DRC commissioned the University of Utah to investigate the elevated concentrations in July 2007. The University completed its study and published a report in May 2008 (the "2008 University Report").

After review of the 2008 University Report, the DRC determined that downgradient wells with elevated total uranium concentrations (including well MW-22) were not being impacted by potentially leaking tailings cells. This conclusion was based on at least three lines of isotopic evidence:

1. Tritium Signature. Wells MW-3, MW-3A, MW-14, MW-15, MW-22 had tritium signatures in groundwater at or below the limit of detection of 0.3 Tritium Units (2008 University Report p. 26). These values are more than an order of magnitude below the corresponding surface water results found in either the tailings cells or the wildlife ponds. This means that the groundwater in these five downgradient wells is older than water in the tailings cells, and is of a different origin than the tailings wastewater.

2. Stable Isotopes of Deuterium and Oxygen-18 in Water. The Deuterium and Oxygen-18 content of the groundwater matrix and tailings wastewater matrix was tested in all of the water sources studied. The 2008 University Report results showed that wells MW-3, MW-3A, MW-14, MW-15, and MW-22, all downgradient wells with elevated uranium concentrations, had Deuterium and Oxygen-18 signatures that were almost twice as negative as any of the surface water results. (2008 University Report, p. 42.) This shows that groundwater in these downgradient wells had a different geochemical origin than the tailings cell wastewater.

3. Stable Isotopes on Dissolved Sulfate. The University Study evaluated two stable isotopes found in sulfate minerals dissolved in the water samples, Oxygen-18 and Sulfur-34. The evaluation showed that the sulfate solutes in groundwater from downgradient wells MW-3, MW-3A, MW-14, MW-15, and MW-22 had a different isotopic signature than the sulfate minerals dissolved in the tailings wastewater. In the case of Oxygen-18 in sulfate, the downgradient wells showed more negative values than the tailings cells wastewater. For Sulfur-34, the results were inversed, with groundwater showing more positive values than the

negative values seen in the tailings wastewater (2008 University Report p. 46.). This shows that the sulfate dissolved in the downgradient wells, with elevated uranium concentrations, has a different origin than the tailings wastewater.

In summary, the University Study concluded that wells with high concentrations of metals (MW-3, MW-14, MW-15, MW-18, and MW-22) bear very different isotopic fingerprints than those of the surface water sites (e.g. wildlife ponds, and tailings cells) (2008 University Report p. 58). Regarding uranium concentrations in well MW-22, the University Study stated that "...it does not appear that the elevated uranium values are the result of leakage from tailings cells...." (2008 University Report p. 45).

The 2008 University Report further theorized that the cause of the increasing contaminant concentrations on the site was artificial recharge from wildlife ponds constructed in 1995, described in Part 1.5.1. This recharge likely leached and mobilized natural uranium and other constituents as a result of new saturation of zones beneath the site that had previously been unsaturated. The Mill drained the wildlife ponds in 2012.
As a result, the Mill meets the requirements set out in R317-6-6.4(c).

This Application has been prepared under the direction, and bears the seal, of a professional engineer qualified to practice engineering before the public in the state of Utah and professionally registered as required under the Professional Engineers and Professional Land Surveyors Licensing Act rules (UAC 156-22).

1.3 Background Groundwater Reports and Re-opening of Permit

In the December 1, 2004 Statement of Basis (the "2004 Statement of Basis") prepared by DRC in connection with the original issuance of the Permit, three monitoring wells (MW-14, MW-15, and MW-17) located downgradient of the Mill's tailings cells were found to have long-term increasing concentration trends for total uranium. These three wells and downgradient well MW-3, had total uranium concentrations above the Utah Ground Water Quality Standard ("GWQS"), found in UAC R317-6-2 (see the 2004 Statement of Basis, pp. 6-7). These findings were of concern to the DRC because they appeared to indicate that the tailings cells had possibly discharged wastewater into the underlying shallow aquifer.

To resolve this concern, the Director required EFRI to evaluate groundwater quality data from the thirteen existing wells on site, and submit a Background Ground Water Quality Report for Director approval. The existing wells are those wells which were installed prior to the issuance of the original GWDP on March 8, 2005 and include: MW-1, MW-2, MW-3, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-26 (formerly called TW4-15 and installed as part of the chloroform corrective action order), and MW-32 (formerly called TW4-17 and installed as part of the chloroform corrective action order). It is important to note that MW-4 was installed prior to the issuance of the original permit; however, MW-4 is monitored under the chloroform program and was not included in the Existing Background Report. GWCLs have not been established for this well, and MW-4 is not a POC well under the GWDP. One of the purposes of the background report was to provide a critical evaluation of historic groundwater quality data from the facility, and determine representative background quality conditions and reliable groundwater compliance limits ("GWCLs") for the Permit.

As required, EFRI submitted the following reports:

- *Revised Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc. (the "Existing Well Background Report"); and

- *Revised Addendum: -- Evaluation of Available Pre-Operational and Regional Background Data, Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, November 16, 2007, prepared by INTERA, Inc. (the "Regional Background Report").

The Existing Well Background Report and the Regional Background Report included a detailed quality assurance evaluation of all existing groundwater quality data collected prior to the date of issuance for the thirteen existing wells, in accordance with criteria established by DRC and United States Environmental Protection Agency ("EPA") guidance. This resulted in a database suitable for statistical and other analyses. Based on an analysis of this updated database, the Existing Well Background Report and Regional Background Report concluded that there had been no impacts to groundwater from Mill activities, based on a number of factors, including the following:

- There were a number of exceedances of GWQSs in upgradient and far downgradient wells at the site, which cannot be considered to have been impacted by Mill operations to date. Exceedances of GWQSs in monitoring wells nearer to the site itself are therefore consistent with natural background in the area.

- There were numerous cases of both increasing and decreasing trends in constituents in upgradient, far downgradient, and Mill site wells, which provide evidence that there are natural forces at work that are impacting groundwater quality across the entire site.

- In almost all cases where there were increasing trends in constituents in wells at the site, there were increasing trends in those constituents in upgradient wells. Furthermore, in no case was there any evidence in the wells in question of increasing trends in chloride, which is very mobile and a good indicator of potential tailings cell leakage at the site.

See Section 2.11.2 below for a more detailed discussion of the Existing Well Background Report and Regional Background Report and their conclusions.

The Permit also required nine new monitoring wells to be installed around tailings Cells 1 and 2, followed by groundwater sampling and analysis, and later submittal of another Background Ground Water Quality Report to determine reliable background conditions and groundwater compliance limits for the new wells. The new wells are those wells which were installed after the issuance of the original GWDP on March 8, 2005 and include: MW-3A, MW-23, MW-24, MW-25, MW-27, MW-28, MW-29, MW-30, and MW-31. In response to this requirement, EFRI installed the nine new wells, and submitted to the Director a *Revised Addendum: -- Background Groundwater Quality Report: New Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah,* April 30, 2008, prepared by INTERA, Inc. (the "New Well

Background Report"), and together with the Existing Well Background Report and the Regional Background Report, are referred to as the "Background Reports").

The New Well Background Report concluded that the sampling results for the new wells confirm that the groundwater at the Mill site and in the region is highly variable naturally and has not been impacted by Mill operations and that varying concentrations of constituents at the site are consistent with natural background variation in the area. See Section 2.11.2 below for a more detailed discussion of the New Well Background Report and its conclusions.

During the course of discussions with EFRI staff, and further DRC review, DRC decided to supplement the analysis provided in the Background Reports by commissioning the University of Utah to perform a geochemical and isotopic groundwater study at White Mesa. This resulted in the University of Utah completing a study entitled *Summary of work completed, data results, interpretations and recommendations for the July 2007 Sampling Event at the Denison Mines, USA, White Mesa Uranium Mill Near Blanding Utah*, May 2008, prepared by T. Grant Hurst and D. Kip Solomon, Department of Geophysics, University of Utah (the "University of Utah Study"). The purpose of the University of Utah Study was to determine if the increasing and elevated trace metal concentrations (such as uranium) found in the monitoring wells at the Mill were due to potential leakage from the on-site tailings cells. To investigate this potential problem, the study examined groundwater flow, chemical composition, noble gas and isotopic composition, and age of the on-site groundwater. Similar evaluations were also made on samples of the tailings wastewater and nearby surface water stored in the northern wildlife ponds at the facility. Fieldwork for the University of Utah Study was conducted from July 17 - 26 of 2007. The conclusions in the University of Utah Study supported EFRI's conclusions in the Background Reports

As stated above, EFRI prepared Background Reports that evaluated all historic data for the thirteen existing wells and nine new wells for the purposes of establishing background groundwater quality at the site and developing GWCLs under the GWDP. Prior to review and acceptance of the conclusions in these Background Reports, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the thirteen existing wells and the nine new wells based primarily on the conclusions and analysis in the Background Reports. It should be noted, however, that, because the GWCLs have been set at the mean plus second standard deviation, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

In addition to the thirteen existing wells and the nine new wells there are an additional 7 monitoring wells at the site which are included in the routine groundwater monitoring program. Those 7 wells are: MW-20, MW-22, MW-33, MW-34, MW-35, MW-36, and MW-37.

The GWDP dated January 20, 2010 required the completion of eight consecutive quarters of groundwater sampling and analysis of MW-20 and MW-22, and later submittal of another

Background Report to determine if wells MW-20 and MW-22 should be added as point of compliance ("POC") monitoring wells. Data from MW-20 and MW-22 were analyzed in the pre-operational and regional background addendum (INTERA 2007a); however there was not a complete data set at the time. Although wells MW-20 and MW-22 were installed in 1994, they were not sampled regularly until the second quarter of 2008. The eighth full round of sampling was completed during the first quarter of 2010, and EFRI submitted to the Director the *Background Groundwater Quality Report for Wells MW-20 and MW-22 for Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah,* June 1, 2010, prepared by INTERA, Inc. (the "MW-20 and MW-22 Background Report"). DRC classified MW-20 and MW-22 as general monitoring wells, and GWCLs have not been established for these wells. MW-20 and MW-22 are sampled semiannually.

Part I.H.6 of the GWDP dated June 21, 2010 required the installation of three hydraulically downgradient wells adjacent to Tailings Cell 4B (MW-33, MW-34, and MW-35) prior to placement of tailings and/or wastewater in Cell 4B. The purpose of these monitoring wells was to provide early detection of tailings cell contamination of shallow groundwater from Tailings Cell 4B. EFRI installed MW-33, MW-34, and MW-35 as required. Of these three wells installed near tailings Cell 4B, only MW-35 was hydraulically acceptable, with five feet or more of saturated thickness. MW-35 was sampled quarterly since fourth quarter 2010 to collect eight statistically valid data points for the completion of the Background Report and calculation of GWCLs. MW-33 and MW-34 had insufficient water for sampling, with saturated thicknesses less than five feet. MW-33 is completely dry, and no samples or depth to water measurements are collected from this well. Quarterly depth to water is measured in MW-34, but no sampling or analysis is required.

Part I.H.4 of the February 15, 2011 GWDP required the installation of two wells hydraulically downgradient of Tailings Cell 4B as replacements for MW-33 and MW-34. EFRI installed MW-36 and MW-37 as required. MW-36 and MW-37 were sampled quarterly since third quarter 2011 to collect eight statistically valid data points for the completion of the Background Report and calculation of GWCLs.

The Background Report for wells MW-35, MW-36, and MW-37 was submitted to the Director on May 1, 2014. The findings of the Background Analysis for wells MW-35, MW-36, and MW-37 support previous conclusions that the groundwater at the Mill is not being affected by any potential tailings cell seepage. At the time of this application, EFRI was awaiting a response from the Director regarding the Background Report for wells MW-35, MW-36, and MW-37.

1.4 Documents Referenced in This Application

The following documents are referenced in this Application.

a) The following Permits, Licenses, Statement of Basis, Plans and Related Reports:

(i) State of Utah Ground Water Discharge Permit No. UGW370004 dated August 24, 2012, (the "Permit") and previous versions of the Permit dated January 10, 2010, June 21, 2010, February 15, 2011, and July 14, 2011.

(ii) State of Utah Radioactive Materials License No. UT 1900479 (the "Mill License");

(iii) *Statement of Basis For a Uranium Milling Facility at White Mesa, South of Blanding, Utah, Owned and Operated by International Uranium (USA) Corporation*, December 1, 2004, prepared by the State of Utah Division of Radiation Control (the "2004 Statement of Basis");

(iv) *Reclamation Plan White Mesa Mill Blanding, Utah, Source Material License No. SUA-1358 Docket No. 40-8681 Revision 3.2B*, January 14, 2011 (the "Reclamation Plan"); and

(v) *UMETCO Minerals Corporation: White Mesa Mill Drainage Report for Submittal to NRC*, January 1990;

b) The following Background Groundwater Quality Reports and Related Studies:

(i) *Revised Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc. (the "Existing Well Background Report");

(ii) *Revised Addendum: -- Evaluation of Available Pre-Operational and Regional Background Data, Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, November 16, 2007, prepared by INTERA, Inc. (the "Regional Background Report");

(iii) *Revised Addendum: -- Background Groundwater Quality Report: New Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, April 30, 2008, prepared by INTERA, Inc. (the "New Well Background Report" and together with the Existing Well Background Report and the Regional Background Report, the "Background Reports"); and

(iv) *Summary of work completed, data results, interpretations and recommendations for the July 2007 Sampling Event at the Denison Mines, USA, White Mesa Uranium Mill Near Blanding Utah*, May 2008, prepared by T. Grant Hurst and D. Kip Solomon, Department of Geophysics, University of Utah (the "University of Utah Study");

(v) *Background Groundwater Quality Report for Wells MW-20 and MW-22 for Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, June 1, 2010, prepared by INTERA, Inc. (the "MW-20 and MW-22 Background Report");

(vi) *Background Groundwater Quality Report for Monitoring Wells MW-35, MW-36 and MW-37 White Mesa Mill Blanding, Utah,* May 1, 2014, prepared by INTERA, Inc. (the "MW-35, MW-36, and MW-37 Background Report".

c) The following environmental reports and analyses:

(i) *Environmental Report, White Mesa Uranium Project San Juan County, Utah,* January 30, 1978, prepared by Dames & Moore (the "1978 ER"); and

(ii) *Final Environmental Statement related to operation of White Mesa Uranium Project Energy Fuels Nuclear, Inc.*, May 1979, Docket No. 40-8681, prepared by the United States Nuclear Regulatory Commission (the "FES");

d) The following engineering, geological and hydrogeological reports:

(i) *Umetco Groundwater Study, White Mesa Facilities, Blanding, Utah,* 1993, prepared by Umetco Minerals Corporation (the operator of the Mill at the time) and Peel Environmental Services;

(ii) *Hydrogeological Evaluation of White Mesa Uranium Mill*, July 1994, prepared by Titan Environmental Corporation (the "1994 Titan Report");

(iii) *Evaluation of Potential for Tailings Cell Discharge – White Mesa Mill*, November 23, 1998, prepared by Knight-Piesold LLC;

(iv) *Investigation of Elevated chloroform concentrations in Perched Groundwater at the White Mesa Uranium Mill Near Blanding, Utah*, 2001, prepared by Hydro Geo Chem, Inc.;

(v) Letter Report dated August 29, 2002, prepared by Hydro Geo Chem, Inc.;

(vi) *Hydrogeology White Mesa Uranium Mill Site Near Blanding, Utah*, June 6, 2012, prepared by Hydro Geo Chem, Inc.;

e) The following plans and specifications relating to construction and operation of the Mill's tailings cells:

(i) *Engineers Report: Tailings Management System, White Mesa Uranium Project Blanding, Utah*, June 1979, prepared by D'Appolonia Consulting Engineers, Inc.;

(ii) *Engineer's Report: Second Phase Design – Cell 3 Tailings Management System, White Mesa Uranium Project Blanding, Utah*, May 1981, prepared by D'Appolonia Consulting Engineers, Inc.;

(iii) *Construction Report: Initial Phase – Tailings Management System, White Mesa Uranium Project Blanding, Utah*, February 1982, prepared by D'Appolonia Consulting Engineers, Inc.;

(iv) *Construction Report: Second Phase Tailings Management System, White Mesa Uranium Project*, March 1983, prepared by Energy Fuels Nuclear, Inc. (the operator of the Mill at the time);

(v) *Cell 4 Design, White Mesa Project Blanding, Utah*, April 10, 1989, prepared by Umetco Minerals Corporation (the operator of the Mill at the time);

(vi) *Construction Report: Tailings Cell 4A, White Mesa Uranium Mill – Tailings Management System*, August 2000, prepared by International Uranium (USA) Corporation (the operator of the Mill at the time);

(vii) *Cell 4A Lining System Design Report For The White Mesa Mill Blanding, Utah*, January 2006, prepared by GeoSyntec Consultants;

(viii) *Cell 4A Construction Quality Assurance Report, White Mesa Mill Blanding, Utah*, July 2008, prepared by Geosyntec consultants;

(ix) *Cell 4B Design Report, White Mesa Mill, Blanding, Utah*, December 8, 2007, prepared by Geosyntec Consultants; and

(x) *Cell 4B Construction Quality Assurance Report, Volumes 1-3*, November 2010, prepared by Geosyntec Consultants.

f) The following documents relating to the chloroform investigation at the site:

Preliminary Corrective Action Plan, White Mesa Mill Near Blanding, Utah, August 20, 2007, prepared by Hydro Geo Chem, Inc.;

(i) *Contamination Investigation Report TW4-12 and TW4-27 Areas White Mesa Uranium Mill, Near Blanding Utah,* January 23, 2014 prepared by Hydro Geo Chem, Inc.;

g) The following documents relating to the pH and other Out of Compliance investigations at the site:

(i) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the First, Second, Third and Fourth Quarters of 2010 and First Quarter 2011*, June 13, 2011;

(ii) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for*

Constituents in the Second Quarter of 2011, September 7, 2011;

(iii) *Plan and Time Schedule for Assessment of pH Under Groundwater Discharge Permit UGW370004,* April 13, 2012 prepared by Hydro Geo Chem, Inc;

(iv) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Third Quarter of 2012*, December 13, 2012;

(v) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Fourth Quarter of 2012*, March 15, 2013;

(vi) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the First Quarter of 2013*, August 28, 2013;

(vii) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Second Quarter of 2013*, September 20, 2013;

(viii) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Third Quarter of 2013*, December 5, 2013;

(ix) *Source Assessment Report, White Mesa Uranium Mill, Blanding Utah,* October 10, 2012 prepared by INTERA, Inc;

(x) *pH Report White Mesa Uranium Mill, Blanding Utah,* November 9, 2012 prepared by INTERA, Inc;

(xi) *Investigation of Pyrite in the Perched Zone, White Mesa Uranium Mill, Blanding Utah,* December 7, 2012 prepared by Hydro Geo Chem, Inc;

(xii) *Source Assessment Report for TDS in MW-29, White Mesa Uranium Mill, Blanding Utah,* May 7, 2013 prepared by INTERA, Inc;

(xiii) *Source Assessment Report for Selenium in MW-31, White Mesa Uranium Mill, Blanding Utah,* August 30, 2013 prepared by INTERA, Inc;

(xiv) *Source Assessment Report for Tetrahydrofuran in MW-01, White Mesa Uranium Mill, Blanding Utah,* December 17, 2013; prepared by INTERA, Inc.

(xv) *Source Assessment Report for Gross Alpha in MW-32, White Mesa Uranium Mill, Blanding Utah,* January 13, 2014 prepared by INTERA, Inc;

(xvi) *Source Assessment Report for Sulfate in MW-01 and TDS in MW-03A, White Mesa Uranium Mill, Blanding Utah,* March 19, 2014 prepared by INTERA, Inc;

h) The following documents relating to the nitrate investigations at the site:

(i) *Stipulated Consent Agreement Docket No. UGW12-03 between Denison Mines (USA) Corp. and the Director of the Division of Radiation Control,* July 12, 2012.

(ii) *Revised Tolling Agreement, Revision 3, between DUSA and the Director,* Revision 2, dated August 21, 2011.

(iii) *Revised Phase 1 (A through C) Work Plan and Schedule for Phase 1 A – C Investigation,* May 11, 2011, prepared by INTERA, Inc;

(iv) *Revised Phase 2 through 5 Work Plan and Schedule,* June 3, 2011, prepared by INTERA, Inc;

(v) *Revised Phase 2 QAP and Work Plan, Revision 2.0,* July 12, 2011; and

(vi) *Nitrate Corrective Action Plan,* May 7, 2012, prepared by Hydro Geo Chem, Inc;.

(vii) *Nitrate Contamination Investigation Report, December 30, 2009, prepared by INTERA, Inc.*

2.0 INFORMATION PROVIDED IN SUPPORT OF THE APPLICATION

2.1 Name and Address of Applicant and Owner (R317-6-6.3.A)

The Applicant and Mill Operator is Energy Fuels Resources (USA) Inc. ("EFRI"). EFRI is the current holder of the Permit. The Mill is owned by EFRI's affiliate, EFR White Mesa LLC ("EFRWM").

The address for both EFRI and EFRWM is:

225 Union Boulevard, Suite 600
Lakewood, CO 80228
Telephone: 303-974-2140 Fax: 303-389-4125

Contacts at EFRI, all located at the aforementioned office:

Harold R. Roberts, Executive Vice President, and Chief Operating Officer.
Direct telephone: 303-389-4160
hroberts@energyfuels.com

Frank J. Filas
Vice President, Permitting and Environmental Affairs
Direct telephone: 303-974-2146
ffilas@energyfuels.com

Katherine A. Weinel
Quality Assurance Manager
Direct telephone: 303-389-4134
kweinel@energyfuels.com

2.2 Legal Location of the Facility (R317-6-6.3B)

The Mill is regionally located in central San Juan County, Utah, approximately 6 miles (9.5 km) south of the city of Blanding. The Mill can be reached by taking a private road for approximately 0.5 miles west of Utah State Highway 191. See Figure 1.

Within San Juan County, 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 T37S, R22E, and Sections 4, 5, 6, 8, 9, and 16 of T38S, R22E, Salt Lake Base and Meridian ("SLBM"). See Figure 2.

All operations authorized by the Mill License are conducted within the existing site boundary. The milling facility currently occupies approximately 50 acres, and the tailings disposal cells encompass another 250 acres. See Figure 2.

2.3 Name and Type of Facility (R317-6-6.3.C)

The name of the facility is the White Mesa Uranium Mill. The facility is a uranium milling and tailings disposal facility, which operates under a Radioactive Materials License issued by the Director of the Utah Division of Radiation Control under UAC R313-24. In addition to uranium in the form of U_3O_8, the Mill also produces vanadium, in the form of vanadium pentoxide ("V_2O_5"), ammonia metavanadate ("AMV") and vanadium pregnant liquor ("VPL"), from certain conventional ores and has produced other metals from certain alternate feed materials (specifically niobium and tantalum as authorized under NRC license amendment number 4, included as Appendix A). Alternate feed materials are uranium bearing materials other than conventionally mined ores.

Construction of the Mill was completed and first operations commenced in May 1980. The Mill does not have a set operating life, and can operate indefinitely, subject to available tailings capacity and license and permit renewals. The conceptual and permitted total capacity is for the quantity of Mill tailings produced from a 15-year operating period at a rate of 2,000 tons per day, operating 340 days per year. Since it commenced operations in 1980, the Mill has operated on a campaign basis, processing conventional ores and alternate feed materials as they become available and as economic conditions warrant.

2.4 A Plat Map Showing All Water Wells, Including The Status And Use Of Each Well, Drinking Water Source Protection Zones, Topography, Springs, Water Bodies, Drainages, And Man-Made Structures Within A One-Mile Radius Of The Discharge. (R317-6-6.3.D)

There are five deep wells within a one mile radius of the Mill, two of which supply the Mill facility. There are no Drinking Water Source Protection Zones or ordinances within this radius.

Routine groundwater monitoring wells have been established for monitoring under the Permit. These monitoring wells are depicted on Figure 10 and in Appendix B to this Application. The depth and purpose of each of these wells is as shown in Tables 1.2-1, 1.2-2, and 2.4-1.

See Section 2.9.1.3 below for a detailed description of the Mill's groundwater monitoring program.

The surface topography and man-made structures are shown on Figures presented in Appendix B. See Sections 2.5.4 and 2.5.7 below for a more detailed discussion on local topography and land use.

The Mill area has several dry drainages, and the only nearby natural water bodies within one mile are Westwater Creek, Corral Creek and Cottonwood Creek. In addition to these are Ruin Spring and several other springs and seeps located within a 1.5 mile radius of the Mill. See Sections 2.5.3 and 2.13 below for discussions relating to seeps and springs in the vicinity of the site and to surface water and drainages, respectively.

2.5 Geologic, Hydrologic, and Agricultural Description of the Geographic Area (R317-6-6.3.E)

2.5.1 Groundwater Characteristics

This Section is based on the Report entitled: *Hydrogeology of the White Mesa Uranium Mill, Blanding Utah* June 6, 2014, prepared by Hydro Geo Chem, Inc. ("HGC") (the "2014 HGC Report" referred to as HGC, 2014).

2.5.1.1 Geologic Setting

The Mill is located within the Blanding Basin of the Colorado Plateau physiographic province. Typical of large portions of the Colorado Plateau province, the rocks underlying the site are relatively undeformed. The average elevation of the site is approximately 5,600 ft (1,707 m) above mean sea level ("amsl").

The site is underlain by unconsolidated alluvium and indurated sedimentary rocks consisting primarily of sandstone and shale. The indurated rocks are relatively flat lying with dips generally less than 3°. The alluvial materials consist mostly of aeolian silts and fine-grained aeolian sands with a thickness varying from negligible to as much as 25 to 30 feet across the site. In some portions of the site the alluvium is underlain by a few feet to as much as 30 feet of Mancos Shale. In other areas, the Mancos Shale is absent. The alluvium and Mancos (where present) are underlain by the Dakota Sandstone and Burro Canyon Formation, which are sandstones having a combined total thickness ranging from approximately 55 to 140 feet (17 to 43 m). Beneath the Burro Canyon Formation lies the Morrison Formation, consisting, in descending order, of the Brushy Basin Member, the Westwater Canyon Member, the Recapture Member, and the Salt Wash Member. The Brushy Basin and Recapture Members of the Morrison Formation, classified as shales, are very fine-grained and have a very low permeability. The Brushy Basin Member is primarily composed of bentonitic mudstone, siltstone, and claystone. The Westwater Canyon and Salt Wash Members are primarily sandstones but are expected to have a low average vertical permeability due to the presence of interbedded shales. See Figure 3 for a generalized stratigraphic column for the region.

Beneath the Morrison Formation lies the Summerville Formation, an argillaceous sandstone with interbedded shales, and the Entrada Sandstone. Beneath the Entrada lies the Navajo Sandstone. The Navajo and Entrada Sandstones constitute the primary aquifer in the area of the site. The Entrada and Navajo Sandstones are separated from the Burro Canyon Formation by approximately 1,000 to 1,100 feet (305 to 355 m) of materials having a low average vertical permeability. Groundwater within this system is under artesian pressure in the vicinity of the site, is of generally good quality, and is used as a secondary source of water at the site.

2.5.1.2 Hydrogeologic Setting

The site is located within a region that has a dry to arid continental climate, with average annual precipitation of approximately 13.3 inches, and an average annual lake evaporation rate of approximately 47.6 inches. Recharge to the principal aquifers (such as the Navajo/Entrada) occurs primarily along the mountain fronts (for example, the Henry, Abajo, and La Sal Mountains), and along the flanks of folds such as Comb Ridge Monocline.

Although the water quality and productivity of the Navajo/Entrada aquifer are generally good, the depth of the aquifer (approximately 1,200 feet below land surface [ft bls]) makes access difficult. The Navajo/Entrada aquifer is capable of yielding significant quantities of water to wells (hundreds of gallons per minute [gpm]). Water in on-site wells completed within the Navajo/Entrada rises approximately 800 feet above the base of the overlying Summerville Formation.

The shallowest groundwater beneath the site consists of perched water hosted primarily by the Burro Canyon Formation. Perched water is used on a limited basis to the north (upgradient) of the site because it is much shallower and more easily accessible than the deep Navajo/Entrada aquifer.

2.5.1.3 Perched Zone Hydrogeology

Perched groundwater originates mainly from precipitation and local recharge sources such as unlined reservoirs (Kirby, 2008) and is supported within the Burro Canyon Formation by the underlying, fine-grained Brushy Basin Member. Perched groundwater at the site is generally of poor quality due to high total dissolved solids ("TDS") in the range of approximately 1,100 to 7,900 milligrams per liter ("mg/L"). Its relatively poor quality is one reason that perched water is used primarily for stock watering and irrigation in areas upgradient (north) of the site. Figure 4 is a contour map showing the approximate elevation of the contact of the Burro Canyon Formation with the Brushy Basin Member, which essentially forms the base of the perched water zone at the site. Based on Figure 4, the Burro Canyon Formation/Brushy Basin Member contact generally dips to the south/southwest beneath the site.

Figure 5 is a perched groundwater elevation contour map for the first quarter, 2014. Based on the contoured water levels, groundwater within the perched zone flows generally south to southwest beneath the site. Beneath the tailings cells, perched groundwater flow is generally to the southwest.

Perched groundwater discharges from outcrops of the Burro Canyon Formation in seeps and springs along Westwater Creek Canyon and Cottonwood Canyon (to the west-southwest of the mill site and tailings cells) and along Corral Canyon (to the east and northeast of the mill site and tailings cells). Known discharge points include the seeps and springs shown in Figure 5 except Cottonwood Seep. As discussed in (HGC, 2014), Cottonwood Seep is located more than 1,500 feet west of White Mesa in an area where the Dakota Sandstone and Burro Canyon Formation (which hosts the perched water system) are absent due to erosion, and at an elevation approximately 230 feet below the base of the perched zone defined by the contact between the Burro Canyon Formation and the underlying Brushy Basin Member. Cottonwood Seep occurs near the contact between the slope-forming Brushy Basin Member and the underlying Westwater Canyon (sandstone) Member.

Contact elevations shown in Figure 4 are based on perched monitoring well drilling and geophysical logs and surveyed land surface elevations, and the surveyed elevations of Westwater Seep and Ruin Spring. The elevations of Westwater Seep and Ruin Spring are included in the kriged contours because they occur at the contact between the Burro Canyon Formation and the underlying Brushy Basin Member.

Groundwater elevations shown in Figure 5 include the surveyed elevations of all seeps and springs except Cottonwood Seep. As discussed above, no evidence exists to connect Cottonwood Seep to the perched water system. Although Cottonwood Seep may potentially receive some contribution from perched water, its occurrence near the contact between the Brushy Basin Member and the underlying Westwater Canyon Member indicates that its elevation is not representative of the perched water system.

The permeabilities of the Dakota Sandstone and Burro Canyon Formation at the site are generally low. No significant joints or fractures within the Dakota Sandstone or Burro Canyon Formation have been documented in any wells or borings installed across the site (Knight Piésold, 1998). Any fractures observed in cores collected from site borings are typically cemented, showing no open space.

Porosities and water contents of the Dakota Sandstone have been measured in samples collected during installation of former well MW-16 and well MW-17 (Figure 5). MW-16 was located immediately downgradient of tailings Cell 3 and MW-17 is located south of tailings Cell 4A at a location primarily cross-gradient with respect to perched water flow. Porosities of the Dakota Sandstone range from 13.4% to 26%, averaging 20%, and water saturations range from 3.7% to 27.2%, averaging 13.5%. The average volumetric water content is approximately 3%. The hydraulic conductivity of the Dakota Sandstone based on packer tests in borings installed at the site prior to 1994 ranges from 2.71×10^{-6} centimeters per second ("cm/s") to 9.12×10^{-4} cm/s, with a geometric average of 3.89×10^{-5} cm/s (TITAN, 1994).

The average porosity of the Burro Canyon Formation is similar to that of the Dakota Sandstone. Based on samples collected from the Burro Canyon Formation at former well MW-16 porosity ranges from 2% to 29.1%, averaging 18.3%, and water saturations of unsaturated materials range from 0.6% to 77.2%, averaging 23.4% (TITAN, 1994). These porosities are similar to those reported by MWH (MWH, 2010) for archived samples from borings MW-23 and MW-30.

Extensive hydrogeologic characterization of the saturated Burro Canyon Formation has occurred through hydraulic testing of perched monitoring wells and borings at the site. Hydraulic testing of MW-series wells located upgradient, cross-gradient, downgradient, and within the millsite and tailings cell complex, TW4-series wells located cross-gradient to upgradient of the millsite and tailings cells, TWN-series wells located primarily upgradient of the millsite and tailings cells, and DR-series piezometers, located downgradient of the tailings cells, indicate that the hydraulic conductivity of the perched zone ranges from approximately 2 x 10^{-8} to 0.01 cm/s.

TITAN (1994), reported that the hydraulic conductivity of the Burro Canyon Formation ranges from 1.9 x 10^{-7} to 1.6 x 10^{-3} cm/s, with a geometric mean of 1.01 x 10^{-5} cm/s, based on the results of 12 pumping/recovery tests performed in monitoring wells and 30 packer tests performed in borings prior to 1994. The range reported by TITAN (1994) is within the hydraulic conductivity range of approximately 2 x 10^{-8} to 0.01 cm/s reported by HGC (HGC, 2014).

In general the highest permeabilities and well yields are in the area of the site immediately northeast and east (upgradient to cross gradient) of the tailings cells. A relatively continuous, higher permeability zone (associated with poorly indurated coarser-grained materials in the general area of the chloroform plume) has been inferred to exist in this portion of the site. Analysis of drawdown data collected from this zone during long-term pumping of MW-4, MW-26 (TW4-15), and TW4-19 (Figure 5) yielded estimates of hydraulic conductivity ranging from approximately 4 x 10^{-5} to 1 x 10^{-3} cm/s (HGC, 2014). The decrease in perched zone permeability south to southwest of this area (south of TW4-4), based on tests at TW4-6, TW4-26, TW4-27, TW4-29 through TW4-31, and TW4-33 and TW4-34, indicates that this higher permeability zone "pinches out".

Relatively high conductivities measured at MW-11, located on the southeastern margin of the downgradient edge of tailings Cell 3, and at MW-14, located on the downgradient edge of tailings Cell 4A, of 1.4 x 10^{-3} cm/s and 7.5 x 10^{-4} cm/s, respectively, may indicate that this higher permeability zone extends beneath the southeastern portion of the tailings cell complex. However, based on hydraulic tests south and southwest of these wells, this zone of higher permeability does not appear to exist within the saturated zone downgradient (south-southwest) of the tailings cells.

Slug tests performed at groups of wells and piezometers located northeast (upgradient) of, in the immediate vicinity of, and southwest (downgradient) of the tailings cells indicate generally lower permeabilities compared with the area of the chloroform plume. The following results are based on analysis of automatically logged slug test data using the KGS solution available in AQTESOLVE (HydroSOLVE, 2000).

Testing of TWN-series wells installed in the northeast portion of the site as part of nitrate investigation activities yielded a hydraulic conductivity range of approximately 3.6 x 10^{-7} to 0.01

cm/s, with a geometric average of approximately 6 x 10^{-5} cm/s. The value of 0.01 cm/s estimated for TWN-16 is the highest measured at the site, and the value of 3.6 x 10^{-7} cm/s estimated for TWN-7 is one of the lowest measured at the site. Testing of MW-series wells MW-23 through MW-32 installed between and at the margins of the tailings cells in 2005 (and using the higher estimate for MW-23) yielded a hydraulic conductivity range of approximately 2 x 10^{-7} to 1 x 10^{-4} cm/s with a geometric average of approximately 2 x 10^{-5} cm/s. Hydraulic tests conducted at DR-series piezometers installed as part of the southwest area investigation downgradient of the tailings cells yielded hydraulic conductivities ranging from approximately 2 x 10^{-8} to 4 x 10^{-4} cm/s with a geometric average of 9.6 x 10^{-6} cm/s. The low permeabilities and shallow hydraulic gradients downgradient of the tailings cells result in average perched groundwater pore velocity estimates that are among the lowest on site (approximately 0.26 feet per year (ft/yr) to 0.91 ft/yr).

The extensive hydraulic testing of perched zone wells at the site indicates that perched zone permeabilities are generally low with the exception of the apparently isolated zone of higher permeability associated with the chloroform plume east to northeast (cross-gradient to upgradient) of the tailings cells. The geometric average hydraulic conductivity (approximately 1 x 10^{-5} cm/s) of the DR-series piezometers which cover an area nearly half the size of the total monitored area at White Mesa (excluding MW-22), is nearly identical to the geometric average hydraulic conductivity of 1.01 x 10^{-5} cm/s reported by TITAN (1994), and is within the range of 5 to 10 feet per year (ft/yr) [approximately 5 x 10^{-6} cm/s to 1 x 10^{-5} cm/s] reported by Dames and Moore (1978) [the 1978 ER] for the (saturated) perched zone during the initial site investigation.

Because of the generally low permeability of the perched zone beneath the site, well yields are typically low (less than 0.5 gpm), although sustainable yields of as much as 4 gpm (for example, at TW4-19, shown in Figure 5) are possible in wells intercepting the relatively large saturated thicknesses within the higher permeability zone located east to northeast (cross-gradient to upgradient) of the tailings cells at the site. Sufficient productivity can generally be obtained only in areas where the saturated thickness is greater, which is one reason that 1) some perched zone wells completed near the northern wildlife ponds are relatively productive and 2) the perched zone has been used on a limited basis as a water supply to the north (upgradient) of the site.

2.5.1.4 Perched Groundwater Flow

Perched groundwater flow at the site has historically been to the south/southwest. Figure 5 groundwater elevations indicate that beneath and south of the tailings cells, in the west central portion of the site, perched water flow is south-southwest to southwest. Flow on the western margin of White Mesa is generally south, approximately parallel to the mesa rim (where the Burro Canyon Formation [and perched zone] is terminated by erosion). On the eastern side of the site, perched water flow is also generally southerly. Near the wildlife ponds, flow direction ranges locally from westerly (west of the ponds) to easterly (east of the ponds) resulting in a generally north-south perched water divide along a line connecting the ponds. Cones of depression result from pumping of chloroform wells MW-4, TW4-4, TW4-19, TW4-20, and MW-26 and nitrate wells TWN-02, TW4-22, TW4-24, and TW4-25. These wells are pumped to reduce chloroform and nitrate mass in the perched zone east and northeast of the tailings cells.

In general, perched groundwater elevations have not changed significantly at most of the site monitoring wells since installation, except in the vicinity of the wildlife ponds and the pumping wells. For example, relatively large increases in water levels occurred between 1994 and 2002 at MW-4 and MW-19, located in the east and northeast portions of the site. These water level increases in the northeastern and eastern portions of the site are the result of seepage from wildlife ponds located near piezometers PIEZ-1 through PIEZ-5 shown in Figure 5, which were installed in 2001 for the purpose of investigating these changes. The mounding associated with the wildlife ponds and the general increase in water levels in the northeastern portion of the site have resulted in a local steepening of groundwater gradients over portions of the site. Conversely, pumping of chloroform wells MW-4, TW4-4, TW4-19, TW4-20, and MW-26 and nitrate wells TWN-02, TW4-22, TW4-24, and TW4-25 has depressed the perched water table locally and reduced average hydraulic gradients to the south and southwest of these wells. At the request of DRC, water has not been delivered to the northern wildlife ponds since March, 2012. The perched water mound associated with recharge from these ponds is diminishing and is expected to continue to diminish, thereby reducing hydraulic gradients downgradient of the ponds, in particular to the south and southwest.

As discussed above, perched water discharges in springs and seeps along Westwater Creek Canyon and Cottonwood Canyon to the west-southwest of the site, and along Corral Canyon to the east of the site. The known discharge points located directly downgradient of the tailings cells are Westwater Seep and Ruin Spring. These features are located more than 2,000 feet west-southwest and more than 9,000 feet south-southwest of the tailings cells at the site as shown in Figure 5.

DR-8, located approximately 4,000 feet southwest of the tailings cells, is located near the mesa rim above Cottonwood Seep along a line between the tailings cells and Cottonwood Seep. There is no evidence to connect Cottonwood Seep to the perched water system as it is separated from the perched water by approximately 230 feet of low permeability shales and mudstones. However, under hypothetical conditions that Cottonwood Seep receives some contribution from perched water, perched water passing beneath the tailings cells would presumably pass by DR-8 before continuing on an unidentified potential pathway toward Cottonwood Seep.

Figure 5 shows perched water pathlines southwest of the tailings cells based on first quarter, 2014 perched water level data. Paths 1 and 3 represent the shortest pathlines to discharge points Westwater Seep and Ruin Spring, respectively. Path 2 is the shortest pathline to DR-8, located near the edge of the mesa above Cottonwood Seep. A potential pathline is drawn from DR-8 to Cottonwood Seep. Although there is no evidence to connect Cottonwood Seep to the perched water system, this potential pathline is represented to allow for the possibility of an as yet unidentified connection. Westwater Seep is downgradient of tailings Cell 1 and the western portions of Cells 2, 3, and 4B. DR-8 is downgradient of tailings Cells 2, 3 and 4B. Ruin Spring is downgradient of Cell 4A, and the eastern portions of Cells 2, 3, and 4B.

2.5.1.5 Perched Zone Hydrogeology Beneath And Downgradient Of The Tailings Cells

The perched zone hydrogeology southwest (downgradient) of the tailings cells is similar to other areas of the site except that the saturated thicknesses are generally smaller, portions of the perched zone are dry, and hydraulic gradients and hydraulic conductivities are relatively low.

The combination of shallow hydraulic gradients, relatively low permeabilities, and small saturated thicknesses, results in rates of perched water movement that are among the lowest on-site.

In the immediate vicinity of the tailings cells, perched water was encountered at depths of approximately 53 to 117 ft below the top of casing ("btoc") as of the first quarter of 2014 (Figure 7). Beneath tailings Cell 3, depths to water ranged from approximately 67 feet in the eastern portion of the cell, to approximately 117 ft btoc at the southwest margin of the cell. Assuming an average depth of the base of tailings Cell 3 of 25 feet below grade, this corresponds to perched water depths of approximately 42 to 92 feet below the base of the cell, and an average depth of approximately 65 feet beneath the base of the cell.

Beneath tailings Cell 4B, depths to water ranged from approximately 106 ft btoc in the northeastern portion of the cell (at MW-5), to approximately 112 ft btoc at the southwest margin of the cell (at MW-35). Assuming an average depth of the base of tailings Cell 4B of 25 feet below grade, this corresponds to perched water depths of approximately 81 to 87 feet below the base of the cell, and an average depth of approximately 84 feet beneath the base of the cell.

The saturated thickness of the perched zone in the immediate vicinity of the tailings cells as of the first quarter of 2014 ranges from approximately 80 feet to negligible (Figure 8). Beneath tailings Cell 3, the saturated thickness varies from approximately 60 feet in the eastern portion of the cell to approximately 7 feet in the western portion of the cell. Beneath tailings Cell 4B, the saturated thickness varies from approximately 21 feet in the southeastern portion of the cell to negligible in the southwestern portion of the cell, where a dry zone, defined by MW-33 and former (historically dry) well MW-16, is present.

Saturated thicknesses in the southwest area of the site are affected by the ridge-like high in the Burro Canyon Formation/Brushy Basin Member contact (see Figure 4). As shown in Figures 5 and 8, dry to low saturated thickness conditions are associated with this paleoridge.

South-southwest of the tailings cells, the saturated thickness ranges from negligible at MW-21 (historically dry) to approximately 25 feet at DR-9. Small saturated thicknesses (less than 3 feet) near DR-6, DR-7, and DR-9 (west and southwest of Cell 4B) result from the paleoridge. The average saturated thickness based on measurements at MW-37, DR-13, MW-3, MW-20, and DR-21, which lay close to a line between the southeast portion of tailings Cell 4B and Ruin Spring, is approximately 8 feet. The average saturated thickness based on measurements at MW-35, DR-7, and DR-6, which are the points closest to a line between the southeast portion of tailings Cell 3 and Westwater Seep, is approximately 5 feet.

Perched zone hydraulic gradients currently range from a maximum of approximately 0.075 feet per foot ("ft/ft") east of tailings cell 2 (near the eastern portion of the chloroform plume) to approximately 0.0022 ft/ft in the northeast corner of the site (between TWN-19 and TWN-16). Hydraulic gradients in the southwest portion of the site are typically close to 0.01 ft/ft, but the gradient is less than 0.005 ft/ft west/southwest of tailings Cell 4B, between Cell 4B and DR-8. The overall average site hydraulic gradient, between TWN-19 in the extreme northeast to Ruin Spring in the extreme southwest, is approximately 0.011 ft/ft. A hydraulic gradient between the west dike of tailings Cell 3 and Westwater Seep is approximately 0.0122 ft/ft, and between the south dike of tailings Cell 4B and Ruin Spring, approximately 0.0118 ft/ft

2.5.2 Groundwater Quality

2.5.2.1 Entrada/Navajo Aquifer

The Entrada and Navajo Sandstones are prolific aquifers beneath and in the vicinity of the site. Water supply wells at the site are screened in both of these units, and therefore, for the purposes of this discussion, they will be treated as a single aquifer. Water in the Entrada/Navajo Aquifer is under artesian pressure, rising 800 to 900 ft above the top of the Entrada's contact with the overlying Summervillle Formation; static water levels are 390 to 500 ft below ground surface.

Within the region, this aquifer is capable of yielding domestic quality water at rates of 150 to 225 gpm, and for that reason, it serves as a secondary source of water for the Mill. Additionally, two domestic water supply wells drawing from the Entrada/Navajo Aquifer are located 4.5 miles southeast of the Mill site on the Ute Mountain Ute Reservation. Although the water quality and productivity of the Navajo/Entrada aquifer are generally good, the depth of the aquifer (>1,000 ft bls) makes access difficult.

Table 2.5.2.1-1 is a tabulation of groundwater quality of the Navajo Sandstone aquifer as reported in the FES and subsequent sampling. TDS ranges from 244 to 1,110 mg/liter in three samples taken over a period from January 27, 1977, to May 4, 1977. High iron (0.057 mg/liter) concentrations are found in the Navajo Sandstone. Because the Navajo Sandstone aquifer is isolated from the perched groundwater zone by approximately 1,000 to 1,100 ft of materials having a low average vertical permeability, sampling of the Navajo Sandstone is not required under the Mill's previous NRC Point of Compliance monitoring program or under the Permit. However, samples were taken at two other deep aquifer wells (#2 and #5) on site (See Figure 9 for the locations of these wells), on June 1, 1999 and June 8, 1999, respectively, and the results are included in Table 2.5.2.1-1.

2.5.2.2 Perched Groundwater Zone

Perched groundwater in the Dakota/Burro Canyon Formation is used on a limited basis to the north (upgradient) of the site because it is more easily accessible. The quality of the Burro Canyon perched water beneath and downgradient from the site is poor and extremely variable. The concentrations of TDS measured in water sampled from upgradient and downgradient wells range between approximately 600 and 5,300 mg/1. Sulfate concentrations measured in three upgradient wells varied between 670 and 1,740 mg/l (Titan, 1994). The perched groundwater therefore is used primarily for stock watering and irrigation. The saturated thickness of the perched water zone generally increases to the north of the site. See Section 2.11.2 below for a more detailed discussion of background ground water quality in the perched aquifer.

2.5.3 Springs and Seeps

As discussed in Section 2.5.1.4, perched groundwater at the Mill site discharges in springs and seeps along Westwater Creek Canyon and Cottonwood Canyon to the west-southwest of the site, and along Corral Canyon to the east of the site, where the Burro Canyon Formation outcrops.

Water samples have been collected and analyzed from springs and seeps in the Mill vicinity as part of the baseline field investigations reported in the 1978 ER (See Table 2.6-6 in the 1978 ER).

During the period 2003-2004, EFRI implemented a sampling program for seeps and springs in the vicinity of the Mill which had been sampled in 1978, prior to the Mill's construction. Four locations were designated for sampling, as shown on Figure 9. These are Ruin Spring (G3R), Cottonwood Seep (G4R), west of Westwater Creek (G5R) and Corral Canyon (G1R). During the 2-year study period only two of the four locations could be sampled, Ruin Spring and Cottonwood Canyon. The other two locations, Corral Creek and the location west of Westwater Creek were not flowing (seeping), and samples could not be collected. With regard to the Cottonwood seep, while water was present, the volume was not sufficient to complete all determinations, and only organic analyses were conducted. Analysis of the Cottonwood Seep water samples did not detect any organics.

Samples at Ruin Spring were analyzed for major ions, physical properties, metals, radionuclides, volatile and semi-volatile organic compounds, herbicides and pesticides, and synthetic organic compounds. With the exception of one chloromethane detection, all organic determinations were at less than detectable concentrations. The detection of chloromethane is not uncommon in groundwater and can be due to natural sources. In fact, chloromethane has been observed by EFRI at detectable concentrations in field blank samples during routine groundwater sampling events. The results of sampling for the other parameters tested are shown in Table 2.5.3-1. The results of the 2003/2004 sampling did not indicate the presence of mill derived groundwater constituents and are representative of background conditions.

As required by Part I.E.6 of the Permit, the Mill has implemented a *Sampling Plan for Seeps and Springs*. Per Part I.E.6 of the Permit, sampling of seeps and springs in required annually. A copy of the approved Sampling Plan for Seeps and Springs Revision 1, dated June 10, 2011, is included as Appendix C to this Application. EFRI submitted Revision 1.0 on June 10, 2011. Revision 1.0 is currently undergoing review by the Director. See Section 2.12.2 below for a more detailed description of the Plan. The first sampling under the Plan was completed in August, 2009. A summary of sampling results from the 2009through 2013 sampling events, performed under the approved *Sampling Plan for Seeps and Springs*, is provided in Table 2.5.3-2 through Table 2.5.3-5.

2.5.4 Topography

The Mill site is located on a gently sloping mesa that, from the air, appears similar to a peninsula, as it is surrounded by steep canyons and washes and is connected to the Abajo Mountains to the north by a narrow neck of land. On the mesa, the topography is relatively flat, sloping at less than one (1) percent to the south and nearly horizontal from east to west. See also Figure 6.

2.5.5 Soils

The majority (99%) of the soil at the Mill site consists of the Blanding soil series (1978 ER, Section 2.10.1.1). The remaining 1% of the site is in the Mellenthin soil series. Because the

Mellenthin soil occurs only on the eastern-central edge of the site (1978 ER, Plate 2.10-1), the FES (Section 2.8) concluded that it should not be affected by Mill construction and operation.

The Mill and associated tailings cells are located on Blanding silt loam, a deep soil formed from wind-blown deposits of fine sands and silts. Although soil textures are predominantly silt loam, silty-clay-loam textures are found at some point in most profiles (See Appendix D to this Application – *Results of Soil Analysis at Mill Site*). This soil generally has a 4 to 5 inch reddish-brown, silt-loam A horizon and a reddish-brown, silt-loam to silty-clay-loam B horizon. The B horizon extends downward about 12 to 16 inches where the soil then becomes calcareous silt-loam or silty-clay-loam, signifying the C horizon. The C horizon and the underlying parent material are also reddish-brown in color.

The A and B horizon both are non-calcareous with an average pH of about 8.0, whereas the C horizon is calcareous with an average pH of about 8.5. Subsoil sodium levels range up to 12% in some areas, which is close to the upper limit of acceptability for use in reclamation work (1978 ER, Sect. 2.10.1.1). Other elements, such as boron and selenium, are well below potentially hazardous levels. Potassium and phosphorus values are high in this soil (1978 ER, Table 2.10-2) and are generally adequate for plant growth. Nitrogen, however, is low (1978 ER, Sect. 2.10.1.1) and may have to be provided for successful revegetation during final reclamation.

With well-drained soils, relatively flat topography (see Section 2.5.4), and limited annual precipitation (see Section 2.5.1.2), the site generally has a low potential for water erosion. However, the flows resulting from thunderstorm activity are nearly instantaneous and, without the Mill's design controls, could result in substantial erosion. When these soils are barren, they are considered to have a high potential for wind erosion. Although the soil is suitable for crops, the low percentage of available moisture (6 to 9%) is a limiting factor for plant growth; therefore, light irrigation may be required to establish native vegetation during reclamation.

2.5.6 Bedrock

Subsurface conditions at the Mill site area were investigated as part of the 1978 ER by drilling, sampling, and logging a total of 28 borings which ranged in depth from 6.5 to 132.4 ft. Of these borings, 23 were augured to bedrock to enable soil sampling and estimation of the thickness of the soil cover. The remaining 5 borings were drilled through bedrock to below the perched water table, with continuous in situ permeability testing where possible and selective coring in bedrock. The soils encountered in the borings were classified, and a complete log for each boring was maintained. See Appendix A of Appendix H of the 1978 ER.

Borings in the footprint of the existing tailings cells reported calcareous, red-brown sands and silts from the surface to a depth of 15 ft, averaging over 7 ft. Borings in the general area of the Mill site and the tailings cells reported calcareous, red-brown sands and silts from the surface to a depth of 14 ft, averaging over 9 ft. Downgradient of the tailings cells, calcareous sands and silts extend to a depth of 17 ft of the surface. The calcareous silts and sands of the near-surface soils grade to weathered claystones or weathered sandstones, inter-layered with weathered claystone and iron staining. At depth, the weathered claystone or weathered clayey sandstone grade into sandstone with inter-layered bands of claystone, gravel, and conglomerate. Some conglomerates are cemented with a calcareous matrix.

2.5.7 Agricultural and Land Use Description of the Area

Approximately 65.8% of San Juan County is federally owned land administered by the U.S. Bureau of Land Management, the National Park Service, and the U.S. Forest Service. Primary land uses include livestock grazing, wildlife range, recreation, and exploration for minerals, oil, and gas. Approximately 22% of the county is Native American land owned either by the Navajo Nation or the Ute Mountain Ute Tribe. The area within 5 miles of the Mill site is predominantly range land owned by residents of Blanding. The Mill site itself, including tailings cells, encompasses approximately 300 acres.

A more detailed discussion of land use at the Mill site, in surrounding areas, and in southeastern Utah, is presented in the FES (Section 2.5). Results of archeological studies conducted at the site and in the surrounding areas as part of the 1978 ER are also documented in the FES (Section 2.5.2.3).

2.5.8 Well Logs

Well/boring logs for wells MW-1, MW-2, MW-3, MW-4 (not a compliance well under the Permit), MW-5, MW-11, MW-12, MW-14, MW-15, MW-16 (not a compliance well under the Permit and abandoned during the construction of Tailings Cell 4B), MW-17, MW-18, and MW-19, are included as Appendix A to the 1994 Titan Report. A copy of the 1994 Titan Report was previously submitted under separate cover.

Lithologic and core logs for wells MW-3A, MW-23, MW-24, MW-25, MW-27, MW-28, MW-29, MW-30 and MW-31 are included as Appendix A to the Report: *Perched Monitoring Well Installation and Testing at the White Mesa Uranium Mill April Through June 2005*, August 3, 2005, prepared by Hydro Geo Chem, Inc. A copy of that Report was previously submitted under separate cover.

Lithologic and core logs for well MW-26 (previously named TW4-15) and well MW-32 (previously named TW4-17) are included as Appendix A to the *Letter Report dated August 29, 2002, prepared by Hydro Geo Chem, Inc.* and addressed to Harold Roberts.

Lithologic and core logs for well MW-33, MW-34 and well MW-35 are included as Appendix A to the *Installation and Hydraulic Testing of Perched Monitoring Wells MW-33, MW-34, and MW-35 at the White Mesa Uranium Mill Near Blanding Utah, prepared by Hydro Geo Chem, Inc. October 11, 2010.* A copy of that Report was previously submitted under separate cover.

Lithologic and core logs for well MW-36 and well MW-37 are included as Appendix A to the *Installation and Hydraulic Testing of Perched Monitoring Wells MW-36 and MW-37 at the White Mesa Uranium Mill Near Blanding Utah, prepared by Hydro Geo Chem, Inc. June 28, 2011.* A copy of that Report was previously submitted under separate cover.

Installation logs for wells installed after 2011 are included in the As-Built Reports for each well.

2.6 The Type, Source, and Chemical, Physical, Radiological, and Toxic Characteristics of the Effluent or Leachate to be Discharged (R317-6-6.3.F)

The Mill is designed not to discharge to groundwater or surface waters. Instead, the Mill utilizes tailings and evaporation Cells for disposal or evaporation of Mill effluents as indicated below:

- Cell 1: dedicated to evaporation of Mill waste solutions;
- Cell 2: contains Mill tailings, has an interim cover and is closed to future tailings disposal;
- Cell 3: contains Mill tailings and is in the final stages of filling;
- Cell 4A: receives Mill tailings and is used for evaporation of Mill solutions; and
- Cell 4B: authorized to receive Mill tailings but currently is used only for evaporation of Mill solutions.

See Sections 2.7.2 through 2.7.4 below for a more detailed discussion of the Mill's tailings cells.

The projected chemical and radiological characteristics of tailings solutions were assessed by Energy Fuels Nuclear, Inc., a predecessor operator of the Mill, and NRC in 1979 and 1980, respectively. In addition, early samples were assessed by D'Appolonia Engineering as the Mill started operations to further evaluate and project the character of the solutions. Samples of tailings after the Mill was fully operational were collected by NRC (1987), EFRI/UDEQ (2003), and EFRI (2007 - 2013),. Samples collected in 2003 were obtained under the oversight of DRC personnel. The Samples collected in 2007 and 2008 were obtained by EFRI on a voluntary basis as the then proposed *Tailings and Slimes Drain Sampling Plan* (the "Tailings Sampling Plan") had not been approved by the Director at that time. The 2009 samples were collected on August 6, 2009 under the Tailings Sampling Plan that was approved at that time. Subsequent annual sampling has been performed in August 2010, 2011, 2012 and 2013 under an approved Tailings Sampling Plan. A copy of the currently approved Tailings Sampling Plan is included as Appendix L.

The chemical and radiological characteristics of the solutions held in the tailings cells, based on the sample results described above, are provided in the tables included in Appendix E, which list the concentration of parameters measured in accordance with the Permit.

There is no active discharge from the tailings Cells; therefore, an estimation of the flow rate ("gpd") is not applicable in this instance. However, when operating at full capacity, the Mill discharges approximately 2000 tons per day of dry tailings and approximately 600 gpm of tailings solutions to the Mill's tailings cells.

2.7 Information Which Shows that the Discharge can be Controlled and Will Not Migrate Into or Adversely Affect the Quality of any Other Waters of the State (R317-6-6.3.G)

2.7.1 General

The Mill has been designed as a facility that does not discharge to groundwater or surface water. All tailings and other Mill wastes are disposed of permanently into the Mill's tailings system. Excess waters are disposed of in the tailings or evaporation cells, where they are subject to evaporation, or re-processed through the Mill circuit. See Section 2.6.

The Mill was also designed and constructed to prevent runon or runoff of storm water by a) diverting runoff from precipitation on the Mill site to the tailings cells; and b) diverting runoff from surrounding areas away from the Mill site.

The Permit therefore does not authorize any discharges to groundwater or surface water, but is intended to protect against potential inadvertent or unintentional discharges, such as through potential failure of the Mill's tailings system.

The Mill's tailings system is currently comprised of four tailings cells (Cells 2, 3 4A, and 4B) and one evaporation pond (Cell 1). Diagrams showing the Mill facility layout, including the existing tailings cells are included as Figures 10 and 11 to this Application. In addition, the Mill has a lined catchment basin, used for temporary storage of Mill process upset fluids, known as "Roberts Pond". Roberts Pond is about 0.7 acres in size, and located approximately 180 feet west of the Mill building and about 200 feet east of the northeast corner of Cell 1.

The following sections describe the primary Discharge Minimization Technology ("DMT") and Best Available Technology ("BAT") features of the Mill, which demonstrate that the wastes and tailings at the Mill can be controlled so that they do not migrate into or adversely affect the quality of any waters of the State, including groundwater and surface water.

2.7.2 Cells 1, 2 and 3

2.7.2.1 Design and Construction of Cells 1, 2 and 3

Tailings Cells 1, 2 and 3 were each constructed more than 25 years ago. Construction of Cell 2 was completed on May 3, 1980, construction of Cell 1 was completed on June 29, 1981, and construction of Cell 3 was completed on September 15, 1982.

Each of Cells 1, 2 and 3 are constructed below grade. Each has a single 30 ml PVC flexible membrane liner ("FML") constructed of solvent welded seams on a prepared sub base. A protective soil cover layer was constructed immediately over the FML with a thickness of 12-inches on the cell floor and 18-inches on the interior sideslope. The criterion for placement of the FML in Cells 1, 2 and 3 was a smooth sub base with no rocks protruding that could potentially damage the FML. The cells were excavated by ripping the in-place Dakota Sandstone with a large dozer. Where the rock could not be efficiently ripped, explosives were used to loosen the rock. The cell bottom was then graded to the final design contours and rolled with a smooth drum vibrating roller. The smooth drum roller effectively crushed the loose sandstone, filling in small holes, and allowed for a smooth surface suitable for liner placement. Due to the excavation methods (ripping and blasting) there were some areas that required little or no fill to meet final grades, while other areas required placement of additional crushed sandstone to meet the final grade. The cell bottom was sometimes re-worked several times to accomplish the desired result. The majority of the cell bottom is covered with a layer (1 to 6 inches) of crushed sandstone while the liner in some areas is placed directly on a smooth rolled surface of Dakota Sandstone with only a thin veneer of re-compacted sandstone. In places where the surface was rough or contained small holes, washed concrete sand was used to fill or smooth the imperfections, and the area was then rolled one last time before FML placement. Areas of crushed sandstone filled sub base versus areas with little or no crushed sandstone base were not documented during construction. Areas filled or smoothed with washed concrete sand is likely less than 0.1% of the cell bottoms. Beneath this underlay, native sandstone and other foundation materials were graded to drain to a single low point near the upstream toe of the south cross-valley dike. Inside this layer, is an east-west oriented pipe to gather fluids at the upstream toe of the cross-valley dike. The crushed sandstone layer draining to the pipe at the upstream toe of the dike of the cell was intended to be a leak detection system for each cell. However, because the design of these leak detection systems does not meet current BAT standards, they are not recognized as leak detection systems in the Permit.

Each of Cells 2 and 3 also has a slimes drain collection system immediately above the FML, comprised of a nominal 12-inch thick protective blanket layer of soil or comparable material, on top of which is a network of PVC perforated pipe laterals on a grid spacing interval of about 50-feet. These pipe laterals gravity drain to a perforated PVC collector pipe which also drains toward the south dike and is accessed from the ground surface via a non-perforated access pipe. At cell closure, leachate head inside the pipe network will be removed via a submersible pump installed inside the access pipe

See Part I.D.1 of the Permit for a more detailed description of the design of Cells 1, 2 and 3.

After review of the existing design and construction and consultation with the State of Utah Division of Water Quality, the Director determined, in connection with the issuance of the Permit in 2005, that the DMT required under the groundwater quality protection rules (UAC R317-6-6.4(c)(3)) for Cells 1, 2 and 3 that pre-dated those rules will be defined by the current or existing disposal cell construction, with modifications that were included in the Permit (see page 25 of the 2004 Statement of Basis). These modifications focus on changes in monitoring requirements, and on improvements to facility closure. The goal of these improvements is to ensure that potential wastewater losses are minimized and local groundwater quality is protected. The modifications are described in Sections 2.7.2.2, 2.7.2.3 and 2.7.2.4 below.

2.7.2.2 Improved Groundwater Monitoring

Improvements were made to the Mill's groundwater monitoring network at the time of issuance of the Permit, to meet the following goals:

a) Early Detection

Three monitoring wells (MW-24, MW-27 and MW-28) were added immediately adjacent to Cell 1, in order to detect a potential release as early as practicable.

b) Discrete Monitoring

In order to individually monitor each tailings cell and to be able to pinpoint the source of any potential groundwater contamination that may be detected, the Permit required the addition of three monitoring wells (MW-29, MW-30 and MW-31) between Cells 2 and 3, in addition to the addition of wells MW-24, MW-27 and MW-28 immediately adjacent to Cell 1.

The addition of monitoring wells MW-24, MW-27, MW-28, MW-29, MW-30 and MW-31, together with the existing monitoring wells at the site provides a comprehensive monitoring network to determine any potential leakage from Cells 1, 2 and 3. See Figure 4 and Figure 10 for a map showing the locations of the existing compliance monitoring wells for the site.

2.7.2.3 Operational Changes and Improved Operations Monitoring

The Permit also required changes to disposal cell operation in order to increase efforts to minimize potential seepage losses, and thereby improve protection of local groundwater quality. Examples of these changes are:

c) Maximum Waste and Wastewater Pool Elevation

Part I.D.3 of the Permit requires that EFRI continue to ensure that impounded wastes and wastewaters for all of the Mill's tailings Cells and Roberts Pond are held within an FML.

d) Slimes Drain Maximum Allowable Head

Part I.D.3(b) of the Permit requires that the Mill provide constant pumping efforts to minimize the accumulation of leachates over the FML in Cell 2, and upon commencement of dewatering activities, in Cell 3, and thereby minimize potential FML leakage to the foundation and groundwater. See the discussion in Section 2.15.2.2 below.

2.7.2.4 Evaluation of Tailings Cell Cover System Design

EFRI submitted an *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah*, November 2007, prepared by MWH Americas, Inc., in November, 2007. EFRI submitted a revised *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah*, March 2010 ("revised ICTM Report") in response to DRC comments. The March 2010 report is currently being reviewed in conjunction with the Reclamation Plan, Revision 5.0. DRC provided interrogatories for the revised ICTM Report in March 2012. EFRI provided responses to these interrogatories in May and September 2012. DRC provided review comments on EFRI's May and September 2012 responses in February 2013.

On April 30, 2013, a meeting was held in Denver, Colorado to discuss specific issues identified in DRC's February 2013 review comments for Revision 5.0 of the Reclamation Plan and the revised ICTM Report. As noted in Section 2.19.2, included in the discussions at this meeting was DRC's request for site-specific tailings data. EFRI proposed a tailings investigation to address DRC's concerns. The tailings investigation was completed in October 2013 and subsequent laboratory testing of samples collected was completed in April 2014. A Tailings Data Analysis Report summarizing the results of the investigation is currently being prepared for submittal to DRC in June 2014. Submission of responses to DRC's February 2013 review comments on the revised ICTM Report are planned to be completed in 2014 after DRC's review of the Tailings Data Analysis Report. The results provided in the Tailings Data Analysis Report will be used to update technical analyses to address DRC's February 2013 review comments on the revised ICTM report. The responses will also incorporate decisions made at the April 30, 2013 meeting on key issues related to the revised ICTM Report.

See Section 2.19 below for a more detailed discussion of post-closure requirements for the Mill.

2.7.3 Cell 4A

Construction of Cell 4A was completed on or about November 1989. Cell 4A was used for a short period of time after its construction for the disposal of raffinates from the Mill's vanadium circuit. No tailings waste or wastewater had been disposed of in Cell 4A since the early 1990s. This lack of waste disposal, and exposure of the FML to the elements, caused Cell 4A to fall into disrepair over the years.

Although the original design of Cell 4A was an improvement over the design of Cells 1, 2 and 3 (it had a one-foot thick clay liner under a 40 ml high density polyethylene ("HDPE") FML, with a more elaborate leak detection system), it was constructed in 1989 and did not meet today's BAT standards.

Cell 4A was re-lined in 2007-2008 and was re-authorized for use in November 2008. With the reconstruction of Cell 4A, BAT was required, as mandated by Part I.D.4 of the Permit and as stipulated by the Utah Ground Water Quality Regulations at UAC R317-6-6.4(A). With BAT for Cell 4A, there are also new performance standards that require daily leak detection system monitoring, weekly wastewater level monitoring, and slimes drain recovery head monitoring. The BAT monitoring results are required to be reported and summarized in the Routine DMT and BAT Performance Standard Monitoring Reports. See Section 2.15.3 below for a more detailed discussion relating to the BAT performance standards and monitoring requirements for Cell 4A.

Tailings Cell 4A Design and Construction was approved by the Director as meeting BAT requirements. The major design elements are set out in Part I.D.5 of the Permit and consist of the following:

e) Dikes – consisting of existing earthen embankments of compacted soil, constructed by a previous Mill operator between 1989-1990, and composed of four dikes, each including a 15-foot wide road at the top (minimum). On the north, east, and south margins these dikes have slopes of 3H to 1V. The west dike has a slope of 2H to 1V. Width of these dikes varies. Each has a minimum crest width of at least 15 feet to support an access road. Base width also varies from 89-feet on the east dike (with no exterior embankment), to 211-feet at the west dike.

f) Foundation – including existing subgrade soils over bedrock materials. Foundation preparation included excavation and removal of contaminated soils, compaction of imported soils to a maximum dry density of 90%. The floor of Cell 4A has an average slope of 1% that grades from the northeast to the southwest corners.

g) Tailings Capacity – the floor and inside slopes of Cell 4A encompass about 40 acres and have a maximum capacity of about 1.6 million cubic yards of tailings material storage (as measured below the required 3-foot freeboard).

h) Liner and Leak Detection Systems – including the following layers, in descending order:

- (i) Primary FML – consisting of an impermeable 60 mil HDPE membrane that extends across both the entire cell floor and the inside side-slopes, and is anchored in a trench at the top of the dikes on all four sides. The primary FML is in direct physical contact with the tailings material over most of the Cell 4A floor area. In other locations, the primary FML is in contact with the slimes drain collection system (discussed below).
- (ii) Leak Detection System – includes a permeable HDPE geonet fabric that extends across the entire area under the primary FML in Cell 4A, and drains to a leak detection sump in the southwest corner. Access to the leak detection sump is via an 18-inch inside diameter (ID) HDPE pipe placed down the inside slope, located between the primary and secondary FML liners. At its base this pipe is surrounded with a gravel filter set in the leak detection sump, having dimensions of 10 feet by 10 feet by 2 feet deep. In turn, the gravel filter layer is enclosed in an envelope of geotextile fabric. The purpose of both the gravel and geotextile fabric is to serve as a filter.
- (iii) Secondary FML – consisting of an impermeable 60-mil HDPE membrane found immediately below the leak detection geonet. This FML also extends across the entire Cell 4A floor, up the inside side-slopes and is also anchored in a trench at the top of all four dikes.
- (iv) Geosynthetic Clay Liner – consisting of a manufactured geosynthetic clay liner ("GCL") composed of 0.2-inch of low permeability bentonite clay centered and stitched between two layers of geotextile.

i) Slimes Drain Collection System – including a two-part system of strip drains and perforated collection pipes both installed immediately above the primary FML, as follows:

- (i) Horizontal Strip Drain System – is installed in a herringbone pattern across the floor of Cell 4A that drains to a "backbone" of perforated collection pipes. These strip drains are made of a prefabricated, two-part geo-composite drain material (solid polymer drainage strip) core surrounded by an envelope of non-woven geotextile filter fabric. The strip drains are placed immediately over the primary FML on 50-foot centers, where they conduct fluids downgradient in a southwesterly direction to a physical and hydraulic connection to the perforated slimes drain collection pipe. A series of continuous sand bags, filled with filter sand cover the strip drains. The sand bags are composed of a woven polyester fabric filled with well graded filter sand to protect the drainage system from plugging.
- (ii) Horizontal Slimes Drain Collection Pipe System – includes a "backbone" piping system of 4-inch ID Schedule 40 perforated PVC slimes drain collection ("SDC") pipe found at the downgradient end of the strip drain lines. This pipe is in turn overlain by a berm of gravel that runs the entire diagonal length of the cell, surrounded by a geotextile fabric cushion in immediate contact with the primary FML. In turn, the gravel is overlain by a layer of non-woven geotextile to serve as an additional filter material. This perforated collection pipe serves as the "backbone" to the slimes drain system and runs from the far northeast corner downhill to the far southwest corner of Cell 4A where it joins the slimes drain access pipe.

(iii) Slimes Drain Access Pipe – consisting of an 18-inch ID Schedule 40 PVC pipe placed down the inside slope of Cell 4A at the southwest corner, above the primary FML. Said pipe then merges with another horizontal pipe of equivalent diameter and material, where it is enveloped by gravel and woven geotextile that serves as a cushion to protect the primary FML. A reducer connects the horizontal 18-inch pipe with the 4-inch SDC pipe. At some future time, a pump will be set in this 18-inch pipe and used to remove tailings wastewaters for purposes of de-watering the tailings cell.

j) North Dike Splash Pads – three 20-foot wide splash pads have been constructed on the north dike to protect the primary FML from abrasion and scouring by tailings slurry. These pads consist of an extra layer of 60 mil HDPE membrane that has been installed in the anchor trench and placed down the inside slope of Cell 4A, from the top of the dike, under the inlet pipe, and down the inside slope to a point 5-feet beyond the toe of the slope.

k) Emergency Spillway – a concrete lined spillway has been constructed near the southwestern corner of the west dike to allow emergency runoff from Cell 4A to Cell 4B. At this time, all stormwater runoff and tailings wastewaters not retained in Cells 2, 3, and 4A will be managed and contained in Cell 4B, including the Probable Maximum Precipitation and flood event.

l) BAT Performance Standards for Tailings Cell 4A – EFRI shall operate and maintain Tailings Cell 4A so as to prevent release of wastewater to groundwater and the environment in accordance with an Operations and Maintenance Plan, as currently approved by the Director, pursuant to Part I.H.19. At a minimum these performance standards shall include:
   (i) Maximum Allowable Daily Head – on the secondary FML,
   (ii) Maximum Allowable Daily Leak Detection System Flow Rate
   (iii) Slimes Drain Monthly and Annual Average Recovery Head Criteria – to be applied after the Mill initiates pumping conditions in the slimes drain layer.

See Part I.D.5 of the Permit for a more detailed discussion of the design of Cell 4A. A copy of the Mill's *Cell 4A and 4B BAT Monitoring, Operations and Maintenance Plan* is attached as Appendix F to this Application.

2.7.4 Cell 4B

Construction of Cell 4B was completed in November 2010.

Tailings Cell 4B Design and Construction was approved by the Director as meeting BAT requirements. The major design elements are set out in Part I.D.12 of the Permit and consist of the following:

a) Dikes – consisting of newly constructed dikes on the south and west side of the cell, each including a 20-foot wide road at the top (minimum). The exterior slopes of the southern and western dikes have slopes of 3H to 1V. The interior dikes have slopes of 2H to 1V. Limited portions of the Cell 4B interior sidelopes in the northwest corner and southeast corner of the cell (where the slimes drain and leak detection sump are located) have a slope of 3H to 1V. Width of these dikes varies. The base width of the southern dike varies from approximately 92 feet at the western end to approximately 190 feet at the eastern end of the dike, with no exterior embankment present on any other side of the cell.

b) Foundation – including existing subgrade soils over bedrock materials. Foundation preparation included excavation and removal of contaminated soils, compaction of imported soils to a maximum dry density of 90%. The floor of Cell 4B has an average slope of 1% that grades from the northwest to the southeast corner.

c) Tailings Capacity – the floor and inside slopes of Cell 4B encompass about 40 acres and the cell has a maximum capacity 1.9 million cubic yards of tailings material storage (as measured below the required 3-foot freeboard).

d) Liner and Leak Detection Systems – including the following layers, in descending order:

   (i) Primary FML – consisting of an impermeable 60 mil HDPE membrane that extends across both the entire cell floor and the inside side-slopes, and is anchored in a trench at the top of the dikes on all four sides. The primary FML is in direct physical contact with the tailings material over most of the Cell 4B floor area. In other locations, the primary FML is in contact with the slimes drain collection system (discussed below).

   (ii) Leak Detection System – includes a permeable HDPE geonet fabric that extends across the entire area under the primary FML in Cell 4B, and drains to a leak detection sump in the southeast corner. Access to the leak detection sump is via an 18-inch inside diameter ("ID") HDPE pipe placed down the inside slope, located between the primary and secondary FML liners. At its base this pipe is surrounded with a gravel filter set in the leak detection sump, having dimensions of 15 feet by 10 feet by 2 feet deep. In turn, the gravel filter layer is enclosed in an envelope of geotextile fabric. The purpose of both the gravel and geotextile fabric is to serve as a filter.

   (iii) Secondary FML – consisting of an impermeable 60-mil HDPE membrane found immediately below the leak detection geonet. This FML also extends across the entire Cell 4B floor, up the inside side-slopes and is also anchored in a trench at the top of all four dikes.

   (iv) Geosynthetic Clay Liner – consisting of a manufactured geosynthetic clay liner ("GCL") composed of 0.2-inch of low permeability bentonite clay centered and stitched between two layers of geotextile.

e) Slimes Drain Collection System – including a two-part system of strip drains and perforated collection pipes both installed immediately above the primary FML, as follows:

   (i) Horizontal Strip Drain System – is installed in a herringbone pattern across the floor of Cell 4B that drains to a "backbone" of perforated collection pipes. These strip drains are made of a prefabricated two-part geo-composite drain material (solid polymer drainage strip) core surrounded by an envelope of non-woven geotextile filter fabric. The strip drains are placed immediately over the primary FML on 50-foot centers, where they conduct fluids downgradient in a southeasterly direction to a physical and hydraulic connection to the perforated slimes drain collection pipe. A series of continuous sand bags, filled with filter sand cover the strip drains. The sand bags are composed of a woven polyester fabric filled with well graded filter sand to protect the drainage system from plugging.

(ii) Horizontal Slimes Drain Collection Pipe System – includes a "backbone" piping system of 4-inch ID Schedule 40 perforated PVC slimes drain collection (SDC) pipe found at the downgradient end of the strip drain lines. This pipe is in turn overlain by a berm of gravel that runs the entire diagonal length of the cell, surrounded by a geotextile fabric cushion in immediate contact with the primary FML. In turn, the gravel is overlain by a layer of non-woven geotextile to serve as an additional filter material. This perforated collection pipe serves as the "backbone" to the slimes drain system and runs from the far northeast corner downhill to the far southeast corner of Cell 4A where it joins the slimes drain access pipe.

(iii) Slimes Drain Access Pipe – consisting of an 18-inch ID Schedule 40 PVC pipe placed down the inside slope of Cell 4B at the southeast corner, above the primary FML. Said pipe then merges with another horizontal pipe of equivalent diameter and material, where it is enveloped by gravel and woven geotextile that serves as a cushion to protect the primary FML. A reducer connects the horizontal 18-inch pipe with the 4-inch SDC pipe. At some future time, a pump will be set in this 18-inch pipe and used to remove tailings wastewaters for purposes of de-watering the tailings cell.

f) North and East Dike Splash Pads – nine 20-foot wide splash pads have been constructed on the north and east dikes to protect the primary FML from abrasion and scouring by tailings slurry. These pads consist of an extra layer of 60 mil HDPE membrane that has been installed in the anchor trench and placed down the inside slope of Cell 4B, from the top of the dike, under the inlet pipe, and down the inside slope to a point 5-feet beyond the toe of the slope.

g) Emergency Spillway – a concrete lined spillway has been constructed near the southeastern corner of the east dike to allow emergency runoff from Cell 4A into Cell 4B. This spillway is limited to a 6-inch reinforced concrete slab, with a welded wire fabric installed within its midsection, set directly atop a cushion geotextile placed directly over the primary FML in a 4-foot deep trapezoidal channel. A 100-foot wide, 60-mil HDPE membrane splash pad is installed beneath the emergency spillway. No other spillway or overflow structure will be constructed at Cell 4B unless and until the construction of Cells 5A and 5B. At this time, all stormwater runoff and tailings wastewaters not retained in Cells 2, 3, and 4A will be managed and contained in Cell 4B, including the Probable Maximum Precipitation and flood event.

h) BAT Performance Standards for Tailings Cell 4B – EFRI shall operate and maintain Tailings Cell 4B so as to prevent release of wastewater to groundwater and the environment in accordance with the currently-approved Cell 4B BAT, Monitoring, Operations and Maintenance Plan. At a minimum these performance standards shall include:

(i) Maximum Allowable Daily Head – on the secondary FML,

(ii) Maximum Allowable Daily Leak Detection System Flow Rate

(iii) Slimes Drain Monthly and Annual Average Recovery Head Criteria – to be applied after the Mill initiates pumping conditions in the slimes drain layer,

(iv) Maximum Daily Wastewater Level – to ensure compliance with the minimum freeboard requirements for Cell 4B, and prevent discharge of wastewaters via overtopping.

See Part I.D.12 of the Permit for a more detailed discussion of the design of Cell 4B. A copy of the Mill's *Cell 4A and 4B BAT Monitoring, Operations and Maintenance Plan* is attached as Appendix F to this Application.

2.7.5 Future Additional Tailings Cells

Future additional tailings cells at the Mill will require Director approval prior to construction and operation. Future tailings cells at the Mill will be required to satisfy BAT standards at the time of construction.

2.7.6 Roberts Pond

Roberts Pond receives periodic floor drainage and other wastewaters from Mill process upsets, is frequently empty, and was re-lined with a new FML in May, 2002.

In order to minimize any potential seepage release from Roberts Pond, the Director required the following in Part I.D.3(e) of the Permit:

(i) EFRI "shall operate this wastewater pond [Roberts Pond] so as to provide a minimum 2-foot freeboard at all times. Under no circumstances shall the water level in the pond exceed an elevation of 5,624 feet amsl. In the event that the wastewater elevation exceeds this maximum level, the Permittee [EFRI] shall remove the excess wastewater and place it into containment in Tailings Cell 1 within 72-hours of discovery."

(ii) At the time of Mill site closure, EFRI will excavate and remove the liner, berms, and all contaminated subsoils in compliance with an approved final reclamation plan under the Mill License.

2.7.7 Other Facilities and Protections

2.7.7.1 Feedstock Storage

In order to constrain and minimize potential generation of contaminated stormwater or leachates, Part I.D.11 of the Permit requires the Mill to continue its existing practice of limiting open air storage of feedstock materials to the historical storage area found along the eastern margin of the Mill site (as defined by the survey coordinates found in Permit Table 4). The intent of Section I. D.11, (based on the SOB for the 2009 GWDP), is to require that feedstock storage outside of the area specified in Table 4 shall meet the following requirements:
a) Feedstock materials will be stored at all times in water-tight containers, and aisle ways will be provided at all times to allow visual inspection of each and every
feedstock container, or

b) Each and every feedstock container will be placed inside a water-tight overpack prior to storage, or

c) Feedstock containers shall be stored on a hardened surface to prevent spillage onto subsurface soils, and that conforms with the following minimum physical requirements:

1) A storage area composed of a hardened engineered surface of asphalt or concrete, and

2) A storage area designed, constructed, and operated in accordance with engineering plans and specifications approved in advance by the Director. All such engineering plans or specifications submitted shall demonstrate compliance with Part I.D.4,

3) A storage area that provides containment berms to control stormwater run-on and run-off, and

4) Stormwater drainage works approved in advance by the Director, or

5) Other storage facilities and means approved in advance by the Director.

The language Section D.11 is currently ambiguous. Accordingly, EFRI requests that Part I.D.11 of the renewed GWDP be revised as set out above.

2.7.7.2 Mill Site Reagent Storage

, Part I.D.3(g) of the Permit requires the Mill to demonstrate that it has adequate provisions for spill response, cleanup, and reporting for reagent storage facilities. These provisions are detailed in the Stormwater Best Management Practices Plan, which is designed to prevent potential reagent tank spills or leaks that could release contaminants to site soils or groundwater, and to provide proper spill prevention and control. Contents of this plan are stipulated in Part I.D.8 of the Permit, and submittal and approval of the plan is required under Part I.H.17 of the Permit. For existing facilities at the Mill, secondary containment is required, although such containment may be earthen lined. For new facilities constructed at the Mill, or reconstruction of existing facilities, Part I.D.3(g) requires a higher standard of secondary containment that would prevent contact of any potential spill with the ground surface.

A copy of the Mill's *Stormwater Best Management Practices Plan*, Revision 1.5: September 2012 is attached as Appendix G to this Application.

2.7.7.3 New Construction

Part I.D.4 of the Permit requires submittal of engineering plans and specifications and Director approval prior to the construction, modification, or operation of waste or wastewater disposal, treatment, or storage facilities. In these plans and specifications, the Mill is required to demonstrate how BAT requirements of the Groundwater Quality Protection Rules have been met. After Director Approval, a construction permit may be issued, and the Permit modified.

2.7.7.4 Other

The *White Mesa Mill Discharge Minimization Technology (DMT) Monitoring Plan,* 7/12 Revision: Denison-12.1 (the "DMT Plan"), and the *White Mesa Mill Tailings Management System*, 7/2012 Revision 12.1 (the "Tailings Management Plan"), are attached as Appendix H and Appendix I to this Application, respectively. These plans provide a systematic program for constant surveillance and documentation of the integrity of the tailings system, including monitoring the leak detection systems. The DMT Plan requires daily, weekly, quarterly, monthly and annual inspections and evaluations and monthly reporting to Mill management. See Section 2.15.2 below for a more detailed discussion of the requirements of the DMT Plan.

2.7.8 Surface Waters

The Mill has been designed as a facility that does not discharge to surface waters. Tailings and other Mill wastes are disposed of permanently into the Mill's tailings system. Further, as mentioned above, the Mill was designed and constructed to prevent runon or runoff of storm water by a) diverting runoff from precipitation on the Mill site to the tailings cells; and b) diverting runoff from surrounding areas away from the Mill site. As a result, there is no pathway for liquid effluents from Mill operations to impact surface waters.

Under the Mill License, the Mill is required to periodically sample local surface waters to determine if Mill activities may have impacted those waters. The primary pathway would be from air particulates generated during Mill operations that may have landed on or near surface waters, or that may have accumulated in drainage areas that could feed into surface waters. Sampling results since inception of Mill operations show no trends or other impacts of Mill operations on local surface waters. See the Mill's *Semi-Annual Effluent Report for the period July 1 to December 31, 2013*, a copy of which has previously been provided to the Director.

2.7.9 Alternate Concentration Limits

The Mill does not discharge to groundwater or surface water, nor is it designed to do so. Therefore, no alternate concentration limits are currently applicable to the site.

2.8 For Areas Where the Groundwater Has Not Been Classified by the Board, Information of the Quality of the Receiving Ground Water (R317-6-6.3.H)

Groundwater classification was assigned by the Director in the Permit on a well-by-well basis after review of groundwater quality characteristics for the perched aquifer at the Mill site. A well-by-well approach was selected by the Director in order to acknowledge the spatial variability of groundwater quality at the Mill, and afford the most protection to those portions of the perched aquifer that exhibited the highest quality groundwater. These groundwater classifications are set out in Part I.A and Table 1 of the Permit.

The primary element used by the Director in determining the groundwater classification of each monitoring well at the site, is the TDS content of the groundwater, as outlined in UAC 317-6-3. Groundwater quality data collected by the Mill show the shallow aquifer at the Mill has a highly variable TDS content, with TDS averages ranging from about 1100 to over 7900 mg/L. Another key element in determination of groundwater class is the presence of naturally occurring contaminants in concentrations that exceed their respective GWQS. In such cases, the Director has cause to downgrade aquifer classification from Class II to Class III (see UAC R317-6-3.6). Using all available TDS data and background data, for 24 of the POC and general monitoring wells the Director determined that 4 of those wells exhibit Class II drinking water quality groundwater. The remaining 20 wells exhibited Class III or limited use groundwater at the site. The Director determined that MW-35 will be classified as having Class II drinking water quality groundwater until sufficient background data have been collected and the applicable Background Report is submitted. Wells MW-36 and MW-37 have not been classified at this time.

2.8.1 Existing Wells at the Time of Original Permit Issuance

The Director required EFRI to evaluate groundwater quality data from the thirteen existing wells on site, and submit a Background Ground Water Quality Report for Director approval. One of the purposes of that report was to provide a critical evaluation of historic groundwater quality data from the facility, and determine representative background quality conditions and reliable GWCLs for the Permit.

EFRI (then Denison) prepared the Existing Well Background Report that evaluated all historic data for the thirteen existing wells for the purposes of establishing background groundwater quality at the site and developing GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the Existing Well Background Report, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the thirteen existing wells, based primarily on the analysis performed in the Existing Wellls Background Report. It should be noted, however, that, because the GWCLs have been set at the mean plus two standard deviations, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

2.8.2 New Wells Installed After the Date of Original Issuance of the Permit

Because the Permit called for installation of nine new monitoring wells around the tailings cells, background groundwater quality had to be determined for those monitoring points. To this end, the Permit required the Mill to collect at least eight quarters of groundwater quality data, and submit the New Well Background Report for Director approval to establish background groundwater quality for those wells.

EFRI (then Denison) prepared the New Well Background Report that evaluated all historic data for the nine new wells for the purposes of establishing background groundwater quality at the site and developing GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the New Well Background Report, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the nine new wells based primarily on the analysis performed in the New Well Background Report. It should be noted, however, that, because the GWCLs have been set at the mean plus second standard deviation, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

2.9 Sampling and Analysis Monitoring Plan (R317-6-6.3.I)

The groundwater monitoring plan is set out in the Permit. All groundwater monitoring at the site is in the perched aquifer. The following sections summarize the key components of the Mill's sampling and analysis plan.

2.9.1 Groundwater Monitoring to Determine Groundwater Flow Direction and Gradient, Background Quality at the Site, and the Quality of Groundwater at the Compliance Monitoring Point

2.9.1.1 Groundwater Monitoring at the Mill Prior to Issuance of the Permit

At the time of renewal of the Mill license by NRC in March, 1997 and up until issuance of the Permit in March 2005, the Mill implemented a groundwater detection monitoring program , in accordance with 10 CFR Part 40, Appendix A and the provisions of the Mill License condition 11.3A. The detection monitoring program was implemented in accordance with the report entitled, *Points of Compliance, White Mesa Uranium Mill,* prepared by Titan Environmental Corporation, submitted by letter to the NRC dated October 5, 1994. Under that program, the Mill sampled monitoring wells MW-5, MW-11, MW-12, MW-14, MW-15 and MW-17, on a quarterly basis. Samples were analyzed for chloride, potassium, nickel and uranium, and the results of such sampling were included in the Mill's Semi-Annual Effluent Monitoring Reports that were filed with the NRC up until August 2004 and with the DRC subsequent thereto.

Between 1979 and 1997, the Mill monitored up to 20 constituents in up to 13 wells. That program was changed to the Points of Compliance Program in 1997 because NRC had concluded that:

- The Mill and tailings system had produced no impacts to the perched zone or deep aquifer; and

- The most dependable indicators of water quality and potential cell failure were considered to be chloride, nickel, potassium and natural uranium.

2.9.1.2 Issuance of the Permit

On March 8, 2005, the Director issued the Permit, which includes a groundwater monitoring program that superseded and replaced the groundwater monitoring requirements set out in Mill License Condition 11.3A. Condition 11.3A has since been removed from the Mill License. Groundwater monitoring under the Permit commenced in March 2005, the results of which are included in the Mill's Quarterly Groundwater Monitoring Reports that are filed with the Director.

On September 1, 2009, EFRI filed a Groundwater Discharge Permit Renewal Application. At the request of the Director of the Utah Division of Radiation Control, EFRI submitted an updated version of the September 1, 2009 renewal application on July 13, 2012. At the request of the Director of the Utah Division of Radiation Control, EFRI is submitting this updated version of the July 2012 renewal application. The Permit remains in timely renewal status awaiting completion of review of the Renewal Application by the Director.

2.9.1.3 Current Ground Water Monitoring Program at the Mill Under the Permit

The current groundwater monitoring program at the Mill under is used to determine ground water flow direction, gradient, and quality at the compliance monitoring points. This program consists of monitoring at 25 point of compliance monitoring wells: MW-1, MW-2, MW-3, MW-3A, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, MW-31, MW-32, MW-35, MW-36, and MW-37. The locations of these wells are indicated on Figure 10. Depth to water is measured quarterly in MW-34, but due to limited water is not sampled for POC compliance. MW-33 is completely dry and is not sampled for POC compliance.

Part I.E.1.(d) of the Permit requires that each point of compliance well must be sampled for the constituents listed in Table 2.9.1.3-1.

Further, Part I.E.1.(d)1) of the Permit, requires that, in addition to pH, the following field parameters must also be monitored:

- Depth to groundwater
- Temperature
- Specific conductance
- Redox potential ("Eh")

and that, in addition to chloride and sulfate, the following general organics must also be monitored:

- Carbonate, bicarbonate, sodium, potassium, magnesium, calcium, and total anions and cations.

Sample frequency depends on the speed of groundwater flow in the vicinity of each well. Parts I.E.1 (b) and (c) provide that quarterly monitoring is required for all wells where local groundwater average linear velocity has been found by the Director to be equal to or greater than 10 feet/year, and semi-annual monitoring is required where the local groundwater average linear velocity has been found by the Director to be less than 10 feet/year.

Based on these criteria, quarterly monitoring is required at MW-11, MW-14, MW-25, MW-26 and MW-30, and MW-31, and semi-annual monitoring is required at MW-1, MW-2, MW-3, MW-3A, MW-5, MW-12, MW-15, MW-17, MW-18, MW-19, MW-23, MW-24, MW-27, MW-28, MW-29 and MW-32.

Geochemical and indicator parameter analysis during the initial SAR in October of 2012 concluded that upgradient monitoring wells MW-1, MW-18, and MW-19 have not been impacted by Mill activities. At that time, EFRI proposed that these upgradient monitoring wells be sampled routinely but not subject to GWCLs. In a letter dated April 25, 2013, DRC approved this proposed change to take place at the time of the Permit renewal.

Wells MW-35, MW-36 and MW-37 were being sampled quarterly, to collect eight consecutive quarters of background data. The Background Report for wells MW-35, MW-36, and MW-37 was submitted to the Director on May 1, 2014. After review by DRC, the Director will establish groundwater compliance levels for those wells and determine their frequency of sampling.

Prior to the February 15, 2011 revision of the GWDP, EFRI collected quarterly groundwater samples from MW-20 and MW-22 for development of background values and potential GWCLs. Part I.E.1.c).3) in the currently approved August 24, 2012 revision of the GWDP now requires that MW-20 and MW-22 be monitored on a semi-annual basis as "General Monitoring Wells," but they are not subject to GWCLs.

2.9.1.4 Groundwater Flow Direction and Gradient

Part I.E.3 of the Permit requires that, on a quarterly basis and at the same frequency as groundwater monitoring required by Part I.E.1 and described in Section 2.9.1.3 above, the Mill shall measure depth to groundwater in the following wells and/or piezometers:

i) The point of compliance wells identified in Table 2 of the Permit, as described in Section 2.9.1.3 above;
j) Piezometers P-1, P-2, P-3, P-4 and P-5;
k) Existing monitoring wells MW-20, MW-22, and MW-34;
l) Contaminant investigation wells - any well required by the Director as a part of a contaminant investigation or groundwater corrective action (at this time this includes the chloroform and nitrate investigation wells); and
m) Any other wells or piezometers required by the Director.

While it is not a requirement of the GWDP, EFRI also measures depth to water in the DR piezometers which were installed during the Southwest Hydrogeologic Investigation. The Mill uses these measurements to prepare groundwater isocontour maps each quarter that show the groundwater flow direction and gradient. The isocontour map for the first quarter of 2014 is attached as Figure 5.

2.9.1.5 Background Quality at the Site

A significant amount of historic groundwater quality data had been collected by EFRI and previous operators of the Mill for some wells at the facility. In some cases these data extend back more than 30 years to September 1979. A brief summary of the various studies that had been performed prior to the original issuance of the Permit is set out in Section 2.0 of the Regional Background Report.

However, at the time of original issuance of the Permit, the Director had not yet completed an evaluation of the historic data, particularly with regard to data quality, and quality assurance issues. Such an examination needed to include such things as justification of any zero concentration values reported, adequacy of minimum detection limits provided (particularly with respect to the corresponding GWQS), adequacy of laboratory and analytical methods used, consistency of laboratory units or reporting, internal consistency between specific and composite types of analysis (e.g., major ions and TDS), identification and justification of concentration outliers, and implications of concentration trends (both temporal and spatial).

As discussed in Section 2.11.2 below, the Director also noted several groundwater quality issues that needed to be resolved prior to a determination of background groundwater quality at the site. These were: 1) a number of constituents exceeded their respective GWQS (including nitrate in one well and manganese, selenium and uranium in several wells); 2) long term trends in uranium in downgradient wells MW-14, MW-15 and MW-17; and 3) a spatial high of uranium in those three downgradient wells. See pages 5-8 of the 2004 Statement of Basis for a more detailed discussion of these points.

As a result of the foregoing, the Director required that the Background Reports be prepared to address and resolve these issues.

Further, because background groundwater quality at the Mill site had not yet been approved at the time of original Permit issuance, the Director was not able to determine if any contaminant is naturally occurring and therefore detectable or undetectable for purpose of selecting GWCLs in each well. Consequently, the Director initially assigned GWCLs as if they were "undetectable" (i.e., assuming that all natural background concentrations were less than a fraction of the respective GWQS).

As discussed in Section 1.3 above and 2.11.2 below, EFRI submitted the Background Reports to the Director. Both the Existing Well Background Report and the New Well Background Report provided GWCLs for all of the constituents in the existing wells and new wells, respectively, based on a statistical intra-well approach. The Director has approved the Background Reports.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the thirteen existing wells and the nine new wells based primarily on the analysis performed in the Background Reports. It should be noted, however, that, because the GWCLs have been set at the mean plus second standard deviation, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

2.9.1.6 Quality of Ground Water at the Compliance Monitoring Point

There are over 30 years of data for some constituents in some wells at the site, but not for all constituents. However, with the exception of tin, which was added as a monitoring constituent in 2007, all currently required monitoring constituents have been sampled in the wells that were in existence on the date of the original issuance of the Permit commencing with the first quarter of 2005. Further, all constituents in the new compliance monitoring wells have been sampled upon installation of those wells, commencing either in the second or third quarters of 2005.

The analytical results from this sampling are reported quarterly in Groundwater Monitoring Reports, which are filed with the Director pursuant to Part I.F.1 of the Permit.

2.9.2 Installation, Use and Maintenance of Monitoring Devices

Compliance monitoring at the Mill site is accomplished in three ways: the compliance well monitoring program; the leak detection monitoring system in Cells 4A and 4B; and various DMT monitoring requirements. Each of these are discussed below.

2.9.2.1 Compliance Well Monitoring

Compliance for tailings Cells 1, 2 and 3 and the remainder of the Mill site, other than Cells 4A and 4B, is accomplished by quarterly or semi-annual sampling of the network of compliance monitoring wells at the site. See Figure 10 for a map that shows the compliance monitoring well locations, and Section 2.9.1.3 for a description of the monitoring program.

2.9.2.2 Leak Detection System in Cell 4A and Cell 4B

BAT was required, as mandated in Part I.D.4 of the Permit and as stipulated by UAC R317-6-6.4(a) for the reconstruction of Cell 4A and the construction of Cell 4B. Because tailings Cells 1, 2 and 3 were constructed more than 25 years ago, and after review of the existing design and construction, the Director determined that DMT rather than BAT is required for Cells 1, 2 and 3 (see the discussion in Section 2.7.2 above).

BAT for Cell 4A and Cell 4B included the construction of a modern leak detection system. See Sections 2.7.3 and 2.7.4 above for a description of the key design elements of Cell 4A and Cell 4B respectively, including their leak detection systems. With BAT for Cell 4A and Cell 4B, there are new performance standards in the Permit that require daily leak detection system monitoring, weekly wastewater level monitoring, and slimes drain recovery head monitoring. The BAT monitoring results are required to be reported and summarized in the Routine DMT and BAT Performance Standard Monitoring Reports. See Sections 2.15.3 and 2.15.4 below for a more detailed discussion of the BAT monitoring requirements for Cell 4A and Cell 4B respectively.

Because Cell 4A and Cell 4B have modern leak detection systems, that meets BAT standards and are monitored daily, the leak detection systems in Cell 4A and Cell 4B can be considered to be a point of compliance monitoring devices.

2.9.2.3 Other DMT Monitoring Requirements

In addition to the foregoing, the additional DMT performance standard monitoring discussed in detail in Section 2.15 below is required to be performed under the Permit

2.9.3 Description of the Compliance Monitoring Area Defined by the Compliance Monitoring Points

The compliance monitoring area at the site is the area covered by the groundwater compliance monitoring wells. Figure 10 shows the current locations of the compliance groundwater monitoring wells at the site.

At the time of original Permit issuance, the Director reviewed the then recent water table contour maps of the perched aquifer. Those maps identified a significant western component to groundwater flow at the Mill site, which the Director concluded appeared to be the result of wildlife pond seepage and groundwater mounding (see page 23 of the 2004 Statement of Basis). As a consequence, new groundwater monitoring wells were required, particularly along the western margin of the tailings cells, in addition to the monitoring wells already in existence at that time. The Director also concluded that new wells were also needed for DMT purposes and to provide discrete monitoring of each tailings cell. This resulted in the addition of the following compliance monitoring wells to the then existing monitoring well network: MW-23, MW-24, MW-25, MW-26 (which was then existing chloroform investigation well TW4-15), MW-27, MW-28, MW-29, MW-30, MW-31 MW-32 (which was then existing chloroform investigation well TW4-17), MW-35, MW-36, and MW-37. As previously stated MW-33 and MW-34 were installed but are not currently sampled due to limited water and saturated thickness. MW-20 and MW-22 are not POC wells but are general monitoring wells and are sampled semiannually for information purposes only.

Based on groundwater flow direction and velocity, the compliance monitoring network, with the foregoing additional new wells, was considered to be adequate for compliance monitoring in the perched aquifer at the site.

Further, as mentioned in Section 2.9.2.2 and 2.9.2.3 above, the leak detection systems in Cell 4A and 4B can also be considered to be compliance monitoring areas for these cells.

2.9.4 Monitoring of the Vadose Zone

Monitoring is not performed in the vadose zone at the site.

2.9.5 Measures to Prevent Ground Water Contamination After the Cessation of Operation, Including Post-Operational Monitoring

2.9.5.1 Measures to Prevent Ground Water Contamination After the Cessation of Operation

Please see Section 2.19 below for a detailed discussion of the measures to prevent groundwater contamination after the cessation of operations.

2.9.5.2 Post-Operational Monitoring

Groundwater monitoring will continue during the post-operational phase through final closure until the Permit is terminated. EFRI understands that the final closure will take place and the Permit will be terminated upon termination of the Mill License and transfer of the reclaimed tailings cells to the United States Department of Energy pursuant to U.S.C. 2113. See Section 2.19.1.1 below.

2.9.6 Monitoring Well Construction and Ground Water Sampling Which Conform Where Applicable to Specified Guidance

2.9.6.1 Monitoring Well Construction

a) New Wells

All new compliance monitoring wells installed after the original issuance of the Permit were installed in accordance with the requirements of Part I.E.4 of the Permit. Part I.E.4 requires that new groundwater monitoring wells installed at the facility comply with the following design and construction criteria:

a) Located as close as practical to the contamination source, tailings cell, or other potential origin of groundwater pollution;
b) Screened and completed in the shallow aquifer;
c) Designed and constructed in compliance with UAC R317-6-6.3(I)(6), including the EPA RCRA Ground Water Monitoring Technical Enforcement Guidance Document, 1986, OSWER-9950.1 (the "EPA RCRA TEGD"); and
d) Aquifer tested to determine local hydraulic properties, including but not limited to hydraulic conductivity.

As-built reports for all new groundwater monitoring wells were submitted to the Director for his approval, in accordance with Part I.F.6 of the Permit. Part I.F.6 requires those reports to include the following information:

a) Geologic logs that detail all soil and rock lithologies and physical properties of all subsurface materials encountered during drilling. Said logs were prepared by a Professional Geologist licensed by the State of Utah or otherwise approved beforehand by the Director ;
b) A well completion diagram that details all physical attributes of the well construction, including:
    1) Total depth and diameters of boring;
    2) Depth, type, diameter, and physical properties of well casing and screen, including well screen slot size;
    3) Depth intervals, type and physical properties of annular filterpack and seal materials used;
    4) Design, type, diameter, and construction of protective surface casing; and
    5) Survey coordinates prepared by a State of Utah licensed engineer or land surveyor, including horizontal coordinates and elevation of water level measuring point, as measured to the nearest 0.01 foot; and
c) Aquifer permeability data, including field data, data analysis, and interpretation of slug test, aquifer pump test or other hydraulic analysis to determine local aquifer hydraulic conductivity in each well.

Between April and June 2005, EFRI installed wells MW-23, MW-24, MW-25, MW-27, MW-28, MW-29, MW-30, and MW-31. On August 23, 2005, EFRI submitted a *Perched Monitoring Well Installation and Testing at the White Mesa Uranium Mill April through June 2005* Report, prepared by Hydro Geo Chem, Inc., that documented how these wells had been installed in accordance with requirements of the Permit. A copy of that Report was previously submitted under separate cover.

Between August 30 and September 2, 2010, EFRI installed wells MW-33, MW-34, and MW-35. On October 11, 2010, EFRI submitted *Installation and Hydraulic Testing of Perched Monitoring*

Wells MW-33, MW-34, and MW-35 at the White Mesa Uranium Mill Near Blanding Utah, prepared by Hydro Geo Chem, Inc. that documented how these wells had been installed in accordance with requirements of the Permit. A copy of that Report was previously submitted under separate cover. During the week of April 25, 2011, EFRI installed wells MW-36, and MW-37. On June 28, 2011, EFRI submitted *Installation and Hydraulic Testing of Perched Monitoring Wells MW-36, and MW-37 at the White Mesa Uranium Mill Near Blanding Utah, prepared by Hydro Geo Chem, Inc.* that documented how these wells had been installed in accordance with requirements of the Permit. A copy of that Report was previously submitted under separate cover.

b) Existing Wells

The Existing Wells, MW-1, MW-2, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-26 and MW-32 as well as wells MW-16, MW-20 and MW-22, which are not compliance monitoring wells, and piezometers P-1, P-2, P-3, P-4 and P-5, were all constructed and installed prior to original issuance of the Permit. Some of those wells date back to 1979.

During several site visits and four split groundwater sampling events between May 1999 and the date of original issuance of the Permit, and a review of available as built information, DRC staff noted the need for remedial construction, maintenance, or repair at several of these wells, including:

(i) 16 of the existing monitoring wells failed to produce clear groundwater in conformance with the EPA RCRA TEGD, apparently due to incomplete well development. Consequently, the Permit required that MW-5, MW-11, MW-18, MW-19, MW-26, TW4-16, and MW-32 be developed to ensure that groundwater clarity conforms to the EPA RCRA TEGD to the extent reasonably achievable;

(ii) The Permit required the Mill to install protective steel surface casings to protect the exposed PVC well and piezometer casings for piezometers P-1, P-2, P-3, P-4, and P-5 and wells MW-26 and MW-32; and

(iii) Several problems were observed with the construction of MW-3, including:

A. A review of the MW-3 well as-built diagram showed that no geologic log was provided at the time of well installation. Consequently, the Director was not able to ascertain if the screened interval was adequately located across the base of the shallow aquifer;

B. MW-3 was constructed without any filter media or sand pack across the screened interval;

C. An excessively long casing sump (a 9 or 10 foot long non-perforated section of well casing), was constructed at the bottom of the well; and

D. The well screen appeared to be poorly positioned, based on the low productivity of the well, (there is no geologic log to verify proper positioning).

The Mill developed the wells as required and installed the protective casings required. The Director concluded that EFRI had fulfilled the requirements and sent EFRI a Closeout Letter on August 5, 2008.

With respect to the concerns raised about MW-3, the Mill installed MW-3A approximately 10 feet southeast of MW-3, in order to verify the depth to the upper contact of the Brushy Basin Member of the Morrison Formation (the "UCBM"). After installation, the Director reviewed the geologic log for MW-3 and the as-built reports for both MW-3 and MW-3A and concluded that the well screen for MW-3A is 2.5 feet below the UCBM and the well screen for MW-3 is 4.5 feet above the UCBM. Therefore MW-3 is a partially penetrating well; whereas MW-3A is fully penetrating. The Director concluded that semiannual sampling must continue in both wells until sufficient data is available and the DRC can make a conclusion regarding the effects of partial well penetration and screen length. As a result, the GWDP was modified to require that MW-3A be completed with a permanent surface well completion according to EPA RCRA TEGD. EFRI completed MW-3A as required, and on August 5, 2008 the DRC sent EFRI a Closeout Letter. Both MW-3 and MW-3A are currently sampled semiannually.

Subsequent to original Permit issuance, on January 6, 2006, DRC staff performed an inspection of the compliance groundwater monitoring wells at the Mill. During the inspection, well MW-5 was found to have a broken PVC surface casing. The repair of MW-5 was added to the Permit compliance schedule to require the Mill to repair the broken PVC casing to meet the requirements of the Permit.

The Permit required EFRI to submit an As-Built report for the repairs of monitoring well MW-5 on or before May 1, 2008. EFRI submitted the required report, and on August 5, 2008 the DRC sent EFRI a Closeout Letter.

The groundwater monitoring program at the Mill has historically had numerous wells with elevated turbidity, turbidity levels which could not stabilize to within 10% Relative Percent Difference (10% RPD) or both. Identification of equipment problems and improvements to field sampling practices did not result in improvements to measured turbidities. Ongoing turbidity issues were the result of monitoring requirements which were most likely ill-suited to the site geology. It is suspected that many wells at the Mill might not be capable of attaining a turbidity of 5 NTU due to the natural conditions in the formation hosting the perched monitoring wells (the Burro Canyon Formation and Dakota Sandstone). Clay interbeds occur in both the Burro Canyon Formation and Dakota Sandstone, and friable materials occur within the Burro Canyon Formation. Saturated clays and friable materials will likely continue to be mobilized using standard purging techniques currently in use for the sampling program at the Mill. Mobilized kaolinite (a cementing material within the formation) is expected to be an additional continuing source of turbidity in perched wells. EFRI discussed the turbidity issues with DRC and agreed to complete a redevelopment program for the selected wells at the Mill in a "good-faith" effort to reduce the turbidity level. Surging, bailing, and overpumping were determined to be the preferred well development techniques. The rationale for using surging and bailing followed by overpumping is consistent with U.S. Environmental Protection Agency ("EPA") guidance and guidance provided in other technical papers and publications.

Select, nonpumping, chloroform, nitrate and groundwater POC, wells were redeveloped during the period from fall 2010 to spring 2011 by surging and bailing followed by overpumping. The results of the redevelopment are provided in the Report entitled*: Redevelopment of Existing Perched Monitoring Wells White Mesa Uranium Mill, Near Blanding Utah, prepared by Hydro Geo Chem, Inc. September 30, 2011* (the "Redevelopment Report"). The Redevelopment Report provides a qualitative description of turbidity behavior before and after redevelopment and provides a number of conclusions and recommendations. A copy of the Redevelopment Report was previously submitted under separate cover. The Redevelopment Report was closed out by the Director in a letter dated November 15, 2012. The closeout denied EFRI recommendations. However, due to other modifications to the sampling strategies, turbidity of the wells is no longer considered an issue.

As described above, the existing wells have been reviewed by the Director, and repairs, modifications, retrofits, etc. have been made as required to conform those wells to the requirements of Part I.E.4 of the Permit, to the extent reasonably practicable.

2.9.6.2 Ground Water Sampling

Ground water sampling is performed in accordance with the requirements of Part I.E.5 of the Permit, which requires that all monitoring shall be conducted in conformance with the following procedures:

a) Grab samples shall be taken of the groundwater, only after adequate removal or purging of standing water within the well casing has been performed;
b) All sampling shall be conducted to ensure collection of representative samples, and reliability and validity of groundwater monitoring data. All groundwater sampling shall be conducted in accordance with the currently approved Groundwater Monitoring Quality Assurance Plan;
c) All analyses shall be performed by a laboratory certified by the State of Utah to perform the tests required;
d) If any monitor well is damaged or is otherwise rendered inadequate for its intended purpose, EFRI shall notify the Director in writing within five days of the discovery; and
e) Immediately prior to each monitoring event, EFRI shall calibrate all field monitoring equipment in accordance with the respective manufacturer's procedures and guidelines. EFRI shall make and preserve on-site written records of such equipment calibration in accordance with Part II.G and H of the Permit. Said records shall identify the manufacturer's and model number of each piece of field equipment used and calibration.

In accordance with the requirements of Part I.E.1(a) of the Permit, groundwater sampling at the Mill is performed in accordance with the *White Mesa Uranium Mill Ground Water Monitoring Quality Assurance Plan (QAP)* (the "QAP"), which has been approved by the Director. The QAP complies with UAC R317-6-6.3(I) and (L) and by reference incorporates the relevant requirements of the *Handbook of Suggested Practices for Design and Installation of Ground-Water Monitoring Wells* (EPA/600/4-89/034, March 1991), *ASTM Standards on Ground Water and Vadose Investigations* (1996), *Practical Guide for Ground Water Sampling* EPA/600/2-

85/104, (November 1985) and *RCRA Ground Water Monitoring Technical Enforcement Guidance Document* (1986), unless otherwise specified or approved by the Director. A copy of the current version of the QAP, Date: 6-06-12 Revision 7.2, is included as Appendix K.

2.9.7 Description and Justification of Parameters to be Monitored

The groundwater parameters to be monitored are described in Table 2.9.1.3-1. The process of selecting the groundwater quality monitoring parameters for the original Permit included examination of several technical factors. These factors are listed below and discussed in detail in Section 4 on pages 9-19 of the 2004 Statement of Basis. :

a) The number and types of contaminants that might occur in feedstock materials processed at the Mill;
b) Mill process reagents as a source of contaminants;
c) Source term abundance in the Mill's tailings cell solutions, based on historic wastewater quality sampling and analysis that had been done at the Mill's tailings cells; and
d) A consideration of contaminant mobility in a groundwater environment, based on site specific K_d information where available and lowest K_d values in the literature where site specific K_d information is not available.

One additional parameter, tin, was added to the list of groundwater monitoring constituents in 2007. Tin was not originally a required groundwater monitoring parameter in the Permit, and was omitted from the original Permit due to non-detectable concentrations reported by EFRI in three tailings leachate samples (2004 Statement of Basis, Table 5). With the addition of the alternate feed material from Fansteel Inc., tin was estimated to increase from 9 to 248 tons in the tailings inventory. The Director concluded that, with an estimated K_d of 2.5 to 5, tin is not as mobile in the groundwater environment as other metals; however, with the acidic conditions in the tailings wastewater, tin could stay in solution and not partition on aquifer materials. As a result, tin was added as a monitoring constituent to Table 2 of the Permit.

2.9.8 Quality Assurance and Control Provisions for Monitoring Data

Part I.E.1(d) of the Permit sets out some special conditions for groundwater monitoring. Under those conditions, the Mill must ensure that all groundwater monitoring conducted and reported complies with the following:

a) Depth to groundwater measurements shall always be made to the nearest 0.01 foot;
b) All groundwater quality analyses reported shall have a minimum detection limit or reporting limit that is less than its respective GWCL concentration defined in Table 2 of the Permit; and
c) All gross alpha analysis reported with an activity equal to or greater than the GWCL shall have a counting variance that is equal to or less than 20% of the reported activity concentration. An error term may be greater than 20% of the reported activity concentration when the sum of the activity concentration and error term is less than or equal to the GWCL.

As mentioned in Section 2.9.6.2 above, Part I.E.1(a) of the Permit requires that all groundwater sampling shall be conducted in accordance with the currently approved QAP. The detailed quality assurance and control provisions for monitoring data are set out in the QAP, a copy of which is attached as Appendix K to this Application.

2.10 Plans and Specifications Relating to Construction, Modification, and Operation of Discharge Systems (R317-6-6.3.J)

As discussed in Section 2.7.1 above, the Mill has been designed as a facility that does not discharge to groundwater or surface water. Tailings and other wastes associated with Mill operations are designed to be permanently disposed of in the Mill's tailings cells. The Mill's tailings cells can therefore be considered the Mill's discharge system in that they permanently contain discharges from the Mill's process circuits and all other Mill tailings and wastes.

The following plans and specifications and as built reports relating to tailings Cells 1, 2, 3, 4A and 4B are referenced in this Application and were previously submitted on the dates noted below under separate cover:

a. *Engineers Report: Tailings Management System, White Mesa Uranium Project Blanding, Utah*, June 1979, prepared by D'Appolonia Consulting Engineers, Inc.;
b. *Engineer's Report: Second Phase Design – Cell 3 Tailings Management System, White Mesa Uranium Project Blanding, Utah*, May 1981, prepared by D'Appolonia Consulting Engineers, Inc.;
c. *Construction Report: Initial Phase – Tailings Management System, White Mesa Uranium Project Blanding, Utah*, February 1982, prepared by D'Appolonia Consulting Engineers, Inc.;
d. *Construction Report: Second Phase Tailings Management System, White Mesa Uranium Project*, March 1983, prepared by Energy Fuels Nuclear, Inc.;
e. *Cell 4 Design, White Mesa Project Blanding, Utah*, April 10, 1989, prepared by Umetco Minerals Corporation;
f. *Construction Report: Tailings Cell 4A, White Mesa Uranium Mill – Tailings Management System*, August 2000, prepared by EFRI (then named International Uranium (USA) Corporation);
g. *Cell 4A Lining System Design Report For The White Mesa Mill Blanding, Utah*, January 2006, prepared by GeoSyntec Consultants; and
h. *Cell 4A Construction Quality Assurance Report, White Mesa Mill Blanding, Utah*, July 2008 prepared by Geosyntec consultants.
i. *Cell 4B Design Report, White Mesa Mill, Blanding, Utah*, December 8, 2007, prepared by Geosyntec Consultants
j. *Cell 4B Construction Quality Assurance Report, Volumes 1-3*, November 2010, prepared by Geosyntec Consultants

2.11 Description of the Ground Water Most Likely to be Affected by the Discharge (R317-6-6.3.K)

2.11.1 General

The ground water most likely to be affected by a potential discharge from Mill activities is the perched aquifer.

The deep confined aquifer under White Mesa is found in the Entrada and underlying Navajo Sandstones, is hydraulically isolated from the perched aquifer, and is therefore extremely unlikely to be affected by any such potential discharges. The top of the Entrada Sandstone at the site is found at a depth of approximately 1,200 feet below land surface (see the discussion in Sections 2.5.1.1 and 2.5.1.2 above). This deep aquifer is hydraulically isolated from the shallow perched aquifer by at least two shale members of the Morrison Formation, including the Brushy Basin (approximately 295 feet thick) and the Recapture (approximately 120 feet thick) Members. Other geologic units are also found between the perched and deep confined aquifers that include many layers of thin shale interbeds that contribute to hydraulic isolation of these two groundwater systems, including: the Morrison Formation Westwater Canyon (approximately 60 feet thick), and Salt Wash (approximately 105 feet thick) Members, and the Summerville Formation (approximately 100 feet thick). Artesion groundwater conditions found in the deep Entrada/Navajo Sandstone aquifer also reinforce this concept of hydraulic isolation from the shallow perched system. See the discussion on page 2 of the 2004 Statement of Basis.

2.11.2 Background Ground Water Quality in the Perched Aquifer

This Section describes the groundwater quality in the perched aquifer. See Sections 2.5.1.3, 2.5.1.4 and 2.5.1.5 above for a more detailed description of the perched aquifer itself, the depth to ground water, the saturated thickness, flow direction, porosity, hydraulic conductivity and flow system characteristics of the perched aquifer.

As mentioned in Section 2.9.1.5 above, a significant amount of historic groundwater quality data had been collected by EFRI and previous operators of the Mill for many wells at the facility.

However, at the time of original issuance of the Permit, the Director had not yet completed an evaluation of the historic data, particularly with regard to data quality, and quality assurance issues. The Director also noted several groundwater quality issues that needed to be resolved prior to a determination of background groundwater quality at the site, such as a number of constituents that exceeded their respective GWQS and long term trends in uranium in downgradient wells MW-14, MW-15 and MW-17, and a spatial high of uranium in those three downgradient wells.

As a result of the foregoing, the Director required that the Existing Well Background Report be prepared to address and resolve these issues. DUSA prepared the Existing Well Background Report that evaluated all historic data for the thirteen existing wells for the purposes of establishing background groundwater quality at the site and developing groundwater compliance limits GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the Existing Well Background Report, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the thirteen existing wells based primarily on the analysis performed in the Existing Well background Report. It should be noted, however, that, because the GWCLs have been set at the mean plus second standard deviation, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

As required by the Permit, the Existing Well Background Report addressed all available historic data, which includes pre-operational and operational data, for the compliance monitoring wells under the Permit that were in existence at the date of issuance of the Permit. The Regional Background Report focuses on the pre-operational site data and the available regional data to develop the best available set of background data that could not have been influenced by Mill operations. The New Well Background Report, which was required by the Permit, analyzed the data collected from the new wells, which were installed in 2005, to determine background concentrations for constituents listed in the Permit for each new well.

The Existing Well Background Report and the New Well Background Report were prepared to satisfy several objectives. First, in the case of the Existing Well Background Report, to perform a quality assurance evaluation and data validation of the existing and historical on-site groundwater quality data in accordance with the requirements of the Permit, and to develop a database consisting of historical groundwater monitoring data for "existing" wells and constituents.

Second, in the case of the New Well Background Report, to compile a database consisting of monitoring results for new wells, which were collected subsequent to issuance of the Permit, in accordance with the Mill's QAP data quality objectives.

Third, to perform a statistical, temporal and spatial evaluation of the existing well and new well data bases to determine if there have been any impacts to groundwater from Mill activities. Since the Mill is an existing facility that has been in operation since 1980, such an analysis of historic groundwater monitoring data was required in order to verify that the monitoring results to be used to determine background groundwater quality at the site and GWCLs have not been impacted by Mill activities.

Finally, since the analysis demonstrated that groundwater has not been impacted by Mill activities, to develop a GWCL for each constituent in each well.

The Regional Background Report was prepared as a supplement to the Existing Well Background Report to provide further support to the conclusion that Mill activities have not impacted groundwater.

In evaluating the historic data for the existing wells, INTERA used the following approach:

- If historic data for a constituent in a well do not demonstrate a statistically significant upward trend, then the proposed GWCL for that constituent is accepted as representative of background, regardless of whether or not the proposed GWCL exceeds the GWQS for that constituent. This is because the monitoring results for the constituent can be considered to have been consistently representative since commencement of Mill activities or installation of the well; and

- If historic data for a constituent in a monitoring well represent a statistically significant upward trend or downward trend in the case of pH, then the data is further evaluated to determine whether the trend is the result of natural causes or Mill activities. If it is concluded that the trend results from natural causes, then the GWCL proposed in the Existing Well Background Report will be appropriate.

After applying the foregoing approach, INTERA concluded that, other than some detected chloroform and related organic contamination at the Mill site, which is the subject of a separate investigation and remedial action, and that is the result of pre-Mill activities, and some elevated nitrate concentrations in certain wells which were considered to be associated with the chloroform plume, there have been no impacts to groundwater from Mill activities (See Section 2.16.1 below relating to the chloroform contamination and Section 2.16.2 relating to the nitrate contamination).

In reaching this conclusion, INTERA noted that, even though there are a number of increasing trends in various constituents at the site, none of the trends are caused by Mill activities, for the following reasons:

- There are no noteworthy correlations between chloride and uranium in wells with increasing trends in uranium, other than in upgradient wells MW-19 and MW-18, which INTERA concluded are not related to any potential tailings seepage. INTERA noted that it is inconceivable to have an increasing trend in any other parameter caused by seepage from the Mill tailings without a corresponding increase in chloride;
- There are significant increasing trends upgradient in MW-1, MW-18 or MW-19 in uranium, sulfate, TDS iron, selenium, thallium, ammonia and fluoride and far downgradient in MW-3 in uranium and selenium, sulfate, TDS and pH (decreasing trend). INTERA concluded that this provides very strong evidence that natural forces at the site are causing increasing trends in these constituents (decreasing in pH) in other wells and supports the conclusion that natural forces are also causing increasing trends in other constituents as well; and
- On a review of the spatial distribution of constituents, it is quite apparent that the constituents of concern are dispersed across the site and not located in any systematic manner that would suggest a tailings plume.

INTERA concluded that, after extensive analysis of the data, and given the conclusion that there have been no impacts to groundwater from Mill activities, the GWCLs set out in Table 16 of the Existing Well Background Report are appropriate, and are indicative of background ground water quality. INTERA did advise, however, that proposed GWCLs for all the trending constituents should be re-evaluated upon Permit renewal to determine if they are still appropriate at the time of renewal. See Table 16 of the Existing Well Background Report for INTERA's calculation of background ground water quality as represented by the proposed GWCLs. See Section 6.0 of the Existing Well Background Report for a discussion of the statistical manner used to calculate each proposed GWCL.

Upon approval of the Existing Wells Background Report, the Director required that the New Well Background Report be prepared to address and resolve similar issues in the newer wells.

EFRI prepared the New Well Background Report that evaluated all historic data for the nine new wells for the purposes of establishing background groundwater quality at the site and developing GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the New Well Background Report, the GWCLs for the new wells were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

In evaluating the new well data, INTERA used the same approach in the New Well Background Report that was used in the Existing Well Background Report for existing well data. In addition, INTERA compared the groundwater monitoring results for the new wells to the results for the existing wells analyzed in the Existing Well Background Report and to the pre-operational and regional results analyzed in the Regional Background Report. This was particularly important for the new wells because there is no historic data for any constituents in those wells dating back to commencement of Mill operations. A long-term trend in a constituent may not be evident from the available data for the new wells. By comparing the mean concentrations of the constituents in the new wells to the results for the existing wells and regional background data, INTERA was able to determine if the constituent concentrations in the new wells were consistent with background at the site.

INTERA concluded that after applying the foregoing approach, there have been no impacts to groundwater in the new monitoring wells from Mill activities. INTERA concluded that the groundwater monitoring results for the new wells are consistent with the results for the existing wells analyzed in the Existing Well Background Report and for the pre-operational and regional wells, seeps and springs analyzed in the Regional Background Report. INTERA noted that there were some detections of chloroform and related organic contamination and degradation products and nitrate and nitrite in the new wells, which are now the subject of two separate investigations (see Sections 2.16.1 and 2.16.2), but that such contamination was the result of pre-Mill activities.

As a result, given the conclusion that there have been no impacts to groundwater from Mill activities, INTERA concluded that the calculated GWCLs for new wells set out in Table 10 of the New Well Background Report are appropriate, and are indicative of background ground water quality. Again, INTERA noted that GWCLs for trending constituents should be re-evaluated upon Permit renewal to determine if they are still appropriate at the time of renewal. Additionally, the Flow Sheet states to "Consider an Alternate Approach" for determination of GWCLs in trending constituents. In its report, INTERA recommended, as an alternative, that GWCLs be set at the highest of a) the Flow Sheet approach, b) the highest historical value or c) the fractional approach; provided that in no event would the GWCL be less than mean plus 20% . This approach was rejected by the DRC in favor of the mean plus two standard deviation or equivalent. See Table 10 of the New Well Background Report for INTERA's calculation of background ground water quality as represented by the proposed GWCLs. See Section 2.2 of the New Well Background Report for a discussion of the statistical manner used to calculate each proposed GWCL.

The University of Utah Study confirmed INTERA's conclusions in the Background Reports that groundwater at the site has not been impacted by Mill operations (see the discussion in Section 1.3 above).

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the nine new wells based primarily on the analysis performed during the New Well Background Report. It should be noted, however, that, because the GWCLs were set at the mean plus two standard deviations, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

Part I.G.2 of the Permit provides that out-of-compliance status exists when the concentration of a pollutant in two consecutive samples from a compliance monitoring point exceeds a GWCL in Table 2 of the Permit. Per the requirements of Part I.G.4(c) of the Permit, EFRI is required to prepare and submit written plans and time schedules, for Director approval, to fully comply with the requirements of Part I.G.4(c) of the Permit relating to any such out-of-compliance situation, including, but not limited to:

(i) submittal of a written assessment of the source(s);

(ii) submittal of a written evaluation of the extent and potential dispersion of said groundwater contamination; and

(iii) submittal of a written evaluation of any and all potential remedial actions to restore and maintain ground water quality at the facility, for the point of compliance wells and contaminants in question, to ensure that: 1) shallow groundwater quality at the facility will be restored and 2) the contaminant concentrations in said point of compliance wells will be returned to and maintained in compliance with their respective GWCLs.

Seven Plans and Time Schedules and six Source Assessment Reports ("SARs") have been submitted to address consecutive exceedances other than pH which have been noted in wells since the establishment of the GWCLs in the January 20, 2010 GWDP. The Plans and Time Schedules and the SARs are included in Table 2.11.2-1. These Plans and Time Schedules and SARs were previously submitted under separate cover.

On July 12, 2012, EFRI and the Director entered into a Stipulated Consent Agreement relating to the implementation of the June 13, 2011 Plan and Time Schedule and the September 7, 2011 Plan and Time Schedules. The Stipulated Consent Agreement required the completion of a SAR to meet the requirements of the June 13, 2011 Plan and Time Schedule and the September 7, 2011 Plan and Time Schedules.

Subsequent Plan and Time Schedules submitted to the Director have been approved by the Director in letters to EFRI. The submission dates and the associated DRC approval dates of the Plans and Time Schedules and the associated SARs are listed on Table 2.11.2-1.

Given the varied background groundwater quality at the site, previously identified rising trends in some wells and other factors, it cannot be assumed that consecutive exceedances of a constituent in a monitoring well means that contamination has been introduced to groundwater in that well. The exceedances may very well be the result of background influences. The approach in these Plans therefore is to first determine if the recent exceedances are the result of background influences. If they are determined to be the result of background influences, then no remedial actions are required. If, however, they are determined to not be the result of natural background influences, then further analyses will be required.

Based on the information available at this time, EFRI believes that the GWCL exceedances observed are the result of natural influences and reflect the need to adjust some of the GWCLs for the site.

2.11.3 GWCL Determination for Field pH

During the completion of the 4th Quarter 2010 Quarterly Groundwater Monitoring Report, EFRI noted eleven perched groundwater monitoring wells with pH measurements below the GWCLs. These wells are located upgradient, cross-gradient, and downgradient of the Mill and tailings cells. Investigation into the eleven pH GWCLs in question indicated that the GWCLs for groundwater pH in all wells established in the January 20, 2010 GWDP were erroneously based on historic laboratory results instead of field measurements as contemplated by Table 2 of the GWDP. EFRI notified DRC that the existing GWCLs for groundwater pH were incorrectly based on laboratory results rather than field measurements and proposed to submit revised descriptive statistics for field pH to be used as revised pH GWCLs by the end of the second quarter 2011.

EFRI received approval from DRC to proceed with the revision of the pH GWCLs based on field measurements. The data processing and statistical assessments necessary to revise the GWCLs based on historic field pH data were completed. The data processing and statistical assessments completed were based on the DRC-approved methods in the logic flow diagram included as Figure 17 of the New Well Background Report. Following the statistical evaluation of pH data, EFRI compared the Mill's groundwater pH data from the 2nd Quarter of 2011, including accelerated sampling results through June 2011, and noted that all of the June 2011 groundwater results, and many of the other results from the 2nd Quarter, were already outside the revised GWCLs to be proposed based on the logic flow diagram.

It was noted that the historical trend of decreasing pH, which was addressed in the Background Study Reports, appeared to be present in nearly all wells throughout the Mill site area, including upgradient, downgradient, and cross-gradient wells in the groundwater monitoring program. As of June 2011, all groundwater monitoring wells demonstrated a downward trend in the field pH data over time.

EFRI notified DRC that the 2nd Quarter 2011 data exceeded the recalculated GWCLs. EFRI advised DRC that, as a result of these findings, EFRI did not believe it was appropriate to continue with its efforts to reset the GWCLs for pH based on field pH data, as originally planned, but instead it appeared that it would be more appropriate to undertake a study to determine whether the decreasing trends in pH are due to natural influences and, if so, to determine a more appropriate way to determine GWCLs.

EFRI and DRC agreed on further investigations to be completed, as well as the steps and milestone dates to be incorporated into a pH Report. The procedures for investigating the decreasing site-wide pH trends is documented in the *Plan to Investigate pH Exceedances in*

Perched Groundwater Monitoring Wells White Mesa Uranium Mill Blanding, Utah, Prepared by Hydro Geo Chem, Inc, April 13, 2012 (the "pH Plan and Time Schedule"). The pH Plan and Time Schedule described the pH investigation, which was incorporated into the July 12, 2012 Stipulated Consent Agreement referred to above. The pH Plan and Time Schedule was previously submitted under separate cover.

The Stipulated Consent Agreement of July 12, 2012 specified that a pH Report be completed as well as a separate investigation into the natural phenomenon that was causing the site-wide trend. As a result, two reports investigating and describing the causes of the pH trend were completed. These reports are the *pH Report*, dated November 9, 2012 (INTERA, 2012b) and the *Investigation of Pyrite in the Perched Zone, White Mesa Uranium Mill* ("Pyrite Report"), dated December 7, 2012 (HGC, 2012b).

The pH Report consists of a statistical and geochemical evaluation of the decline in pH in groundwater wells at the Mill. The primary conclusion from the pH Report was that the historical trend of decreasing pH, which was addressed in the Background Study Reports, appears to be present in nearly all wells throughout the Mill site area, including upgradient, downgradient, and crossgradient wells in the groundwater monitoring program, and there seems to be no abatement of the trend. The wide-spread nature of the decrease in pH in upgradient, downgradient, and crossgradient wells suggests that the pH decreases result from a natural phenomenon unrelated to Mill operations, which is also confirmed by the indicator parameter analysis conducted as part of the pH Report. As discussed in The Pyrite Report, the most likely cause of declining pH across the site appears at this time to be the oxidation of pyrite, possibly due to increasing water levels at the site attributed primarily to recharge of wildlife ponds and/or the introduction of oxygen into the perched water zone as a result of increased groundwater sampling frequency. Based on the conclusion that the pH trend was caused by natural phenomenon, the pH Report recalculated the Groundwater Compliance Limits ("GWCLs") for all compliance monitoring wells at the site.

The Pyrite Report evaluated and quantified the presence of pyrite throughout the Mill site, and identified and quantified the mechanism by which it contributes to the sitewide decline in pH. The results of the investigation support pyrite oxidation as the most likely mechanism to explain decreases in pH and increases in sulfate concentrations in site wells and indicates that pyrite must be considered in assessing perched water chemistry in the future. The complex interaction of the various naturally occurring factors identified at the site, including the presence of pyrite at varying concentrations, variable oxygen transport, and variable carbonate species concentrations, is expected to result in relatively large background variations in pH, sulfate (and therefore TDS) concentrations, as well as variations in background concentrations of pH sensitive analytes such as metals. The expected impact of these various factors on pH and analyte concentrations, all of which are unrelated to Mill operations, is generally consistent with site analytical results, suggesting that pyrite oxidation plays a significant role in perched water chemistry at the site.

The primary conclusion from the activities conducted to date and described above is that the pH trends are not due to potential tailings leakage or Mill activities, but to a natural phenomenon unrelated to Mill operations.

In an effort to diminish any trends that may have resulted in whole or in part, from increasing water levels attributed to the Wildlife ponds at the Mill, EFRI discontinued recharging the two most northern of these ponds, commencing in March 2012.

2.11.4 Quality of Ground Water at the Compliance Monitoring Point

The analytical results from groundwater sampling are reported quarterly in Groundwater Monitoring Reports, which are filed with the Director pursuant to Part I.F.1 of the Permit.

2.12 Compliance Sampling Plan (R317-6-6.3.L)

The Mill's plan for sampling groundwater compliance monitoring points is discussed in detail in Section 2.9.1.3 above, and the plan for sampling the leak detection systems in Cells 4A and 4B is discussed in Section 2.15.3 below. This section addresses other sampling required under the Permit. As the Mill is designed not to discharge to groundwater, there are no flow monitoring requirements in the Permit.

2.12.1 Tailings Cell Wastewater Quality Sampling Plan

Part I.E.10 of the Permit requires that, on an annual basis, EFRI collect wastewater quality samples from each wastewater source at each tailings cell at the facility, including wastewaters in surface impoundments, and slimes drains. The sampling is conducted in August of each calendar year in compliance with an approved plan. The Tailings SAP (dated July 30, 2012) was approved by the Director on August 2, 2012. A copy of the approved *Tailings and Slimes Drain Sampling Program*, Revision 2.1, July 30, 2012 is attached as Appendix L to this Application.

The purpose of the Tailings SAP is to characterize the source term quality of all tailings cell wastewaters, including impounded wastewaters or process waters in the tailings cells, and wastewater or leachates collected by internal slimes drains. The Revision 2.1, Tailings SAP requires:

- Collection of samples from the pond area of each active cell and the slimes drain of each cell that has commenced de-watering activities;
- Samples of tailings and slimes drain material will be analyzed at an offsite contract laboratory and subjected to the analytical parameters included in Table 2 of the Permit and general inorganics listed in Part I.E.1(d)(2)(ii) of the Permit, as well as semi-volatile organic compounds;
- A detailed description of all sampling methods and sample preservation techniques to be employed;
- The procedures utilized to conduct these analyses will be standard analytical methods utilized for groundwater sampling and as shown in Section 8.2 of the QAP;
- The contracted laboratory will be certified by the State of Utah in accordance with UAC R317-6-6.12A; and
- 30-day advance notice of each annual sampling event must be given, to allow the Director to collect split samples of all tailings cell wastewater sources.

The tailings and slimes drain sampling events are subject to the currently approved QAP, unless otherwise specifically modified by the Tailings SAP to meet the specific needs of this type of sampling. The QAP has been approved by the Director and satisfies the most applicable requirements of the following references, unless otherwise specified by the Director through his approval of the Tailings SAP:

- *Standard Methods for the Examination of Water and Wastewater, twentieth edition*, 1998; Library of Congress catalogue number: ISBN: 0-87553-235-7;
- *E.P.A. Methods for Chemical Analysis of Water and Wastes*, 1983; Stock Number EPA-600/4-79-020;
- *Techniques of Water Resource Investigations of the U.S. Geological Survey*, (1998); Book 9;
- Monitoring requirements in 40 CFR parts 141 and 142, 2000 ed., Primary Drinking Water Regulations and 40 CFR parts 264 and 270, 2000 ed.; and
- *National Handbook of Recommended Methods for Water-Data Acquisition*, GSA-GS edition; Book 85 AD-2777, U.S. Government Printing Office Stock Number 024-001-03489-1.

2.12.2 White Mesa Seeps and Springs Sampling Plan

The initial Permit required EFRI to submit a plan for groundwater sampling and analysis of all seeps and springs found downgradient or cross gradient from the tailings cells for Director review and approval. The Director approved the plan on March 17, 2009. A copy of the *Sampling Plan for Seeps and Springs in the Vicinity of the White Mesa Uranium Mill*, Revision: 1, June 10, 2011, is attached as Appendix C to this Application. As of this writing, Revision 1.0 of this SAP is undergoing review by the Director.

Under the Seeps and Springs SAP, sampling is conducted on an annual basis between May 1 and July 15 of each year, to the extent sufficient water is available for sampling, at six identified seeps and springs near the Mill. The sampling locations were selected to correspond with those seeps and springs sampled for the initial Mill site characterization performed in the 1978 ER, plus additional sites located by EFRI, the United States Bureau of Land Management and Ute Mountain Ute Indian Tribe representatives.

Samples are analyzed for all groundwater monitoring parameters found in Table 2 of the Permit. The laboratory procedures utilized to conduct the analyses of parameters listed in Table 2 are the same as utilized for groundwater sampling and as shown in Section 8.2 of the QAP. In addition to these laboratory parameters, the pH, temperature and conductivity of each sample will be measured and recorded in the field. Laboratories selected by EFRI to perform analyses of seeps and springs samples are required to be certified by the State of Utah in accordance with UAC R317-6-6.12.A.

The seeps and springs sampling events are subject to the currently approved QAP, unless otherwise specifically modified by the Seeps and Springs SAP to meet the specific needs of this type of sampling. The QAP has been approved by the Director and satisfies the applicable requirements of the references listed in Section 2.12.1 above, unless otherwise specified by the Director through his approval of the Seeps and Springs SAP.

2.12.3 Monitoring of Deep Wells

Due to the fact that the deep confined aquifer at the site is hydraulically isolated from the shallow perched aquifer (see the discussion in Section 2.11.1 above) monitoring of the deep aquifer is not required under the Permit.

2.13 Description of the Flooding Potential of the Discharge Site (R317-6-6.3.M)

2.13.1 Surface Water Characteristics

The Mill site is located on White Mesa, a gently sloping (1% SSW) plateau that is physically defined by the adjacent drainages which have cut deeply into regional sandstone formations. There is a small drainage area of approximately 62 acres (25 ha) above the site that could yield surface runoff to the site. Runoff from the mesa is conveyed by the general surface topography to either Westwater Creek, Corral Creek, or to the south into an unnamed branch of Cottonwood Wash. Local porous soil conditions, topography and low average annual rainfall of 13.3 inches (reported as 11.8 by Dames and Moore in historic reports) cause these streams to be intermittently active, responding to spring snowmelt and local rainstorms (particularly thunderstorms). Surface runoff from approximately 624 acres of the Mill drains westward and is collected by Westwater Creek, and runoff from another 384 acres drains east into Corral Creek. The remaining 4,500 acres of the southern and southwestern portions of the site drain indirectly into Cottonwood Wash (1978 ER, p. 2-143). The site and vicinity drainages carry water only on an intermittent basis. The major drainages in the vicinity of the Mill are depicted in Figure 12 and their drainage areas are tabulated in Table 2.13.1-1. Total runoff from the mesa (total yield per watershed area) is estimated to be less than 0.5 inch annually (1978 ER, p. 2-143).

There are no perennial surface waters on or in the vicinity of the Mill site. This is due to the gentle slope of the mesa on which the site is located, the low average annual rainfall of 13.3 inches per year at Blanding, local soil characteristics and the porous nature of local stream channels. Prior to Mill construction, three small ephemeral catch basins were present to the northwest and northeast of the Mill site.

Corral Creek is an intermittent tributary to Recapture Creek. The drainage area of that portion of Corral Creek above and including drainage from the eastern portion of the site is about 5 square miles. Westwater Creek is also an intermittent tributary of Cottonwood Wash. The Westwater Creek drainage basin covers nearly 27 square miles at its confluence with Cottonwood Wash 1.5 miles west of the Mill site. Both Recapture Creek and Cottonwood Wash are similarly intermittently active, although they carry water more often and for longer periods of time due to their larger watershed areas. They both drain to the south and are tributaries of the San Juan River. The confluences of Recapture Creek and Cottonwood Wash with the San Juan River are approximately 18 miles south of the Mill site. The San Juan River, a major tributary for the upper Colorado River, has a drainage of 23,000 square miles measured at the USGS gauge to the west of Bluff, Utah (1978 ER, p. 2-130).

Storm runoff in these streams is characterized by a rapid rise in flow rates, followed by rapid recession primarily due to the small storage capacity of the surface soils in the area. For example, on August 1, 1968, a flow of 20,500 cubic feet per second was recorded in Cottonwood Wash near Blanding. The average flow for that day, however, was only 4,340 cfs. By August 4, the flow had returned to 16 cfs (1978 ER, p. 2-135). Monthly streamflow summaries as updated from Figure 2.4 of the FES are presented in Figure 13 for Cottonwood Wash, Recapture Creek and Spring Creek. Flow data are not available for the two smaller water courses closest to the Mill site, Corral Creek and Westwater Creek, because these streams carry water infrequently and only in response to local heavy rainfall and snowmelt, which occurs primarily in the months of April, August, and October. Flow typically ceases in Corral Creek and Westwater Creek within 6 to 48 hours after precipitation or snowmelt ends.

2.13.2 Flood Protection Measures

The Mill was designed and constructed to prevent runon or runoff of storm water by a) diverting runoff from precipitation on the Mill site to the tailings cells; and b) diverting runoff from surrounding areas away from the Mill site via three drainage ditches that have been constructed north (upslope) of the Mill facility.

, A detailed description of the flooding potential of the site, including the 6-hour probable maximum precipitation (which is more conservative than the 100-year flood plain), and applicable flood protection measures is provided in the *UMETCO Minerals Corporation: White Mesa Mill Drainage Report for Submittal to NRC*, January 1990.

In addition to the foregoing designed control features, the facility has developed a *Stormwater Best Management Practices Control Plan* which includes a description of the site drainage features and the best management practices employed to ensure appropriate control and routing of stormwater. A copy of the Mill's *Stormwater Best Management Practices Plan* is included as Appendix G to this Application.

2.14 Contingency Plan (R317-6-6.3.N)

As required by Part I.H.15 of the Permit, the Mill has a *Contingency Plan* for regaining and maintaining compliance with the Permit limits and for re-establishing best available technology as defined in the Permit. A copy of the most current approved version of the Mill's *Contingency Plan* is included as Appendix M to this Application.

2.15 Methods and Procedures for Inspections of the Facility Operations and for Detecting Failure of the System (R317-6-6.3.O)

Part I.D. of the Permit sets out a number of DMT and BAT standards that must be followed. Part I.E. of the Permit sets out the Ground Water Compliance and Technology Performance Monitoring requirements, to ensure that the DMT and BAT standards are met. These provisions of the Permit, along with the DMT Plan, *Cell 4A and Cell 4B BAT Monitoring Operations and Maintenance Plan* and other plans and programs developed pursuant to these Parts, set out the methods and procedures for inspections of the facility operations and for detecting failure of the system.

In addition to the programs discussed above, the following additional DMT and BAT performance standards and associated monitoring are required under Parts I.D and I.E. of the Permit

2.15.1 Existing Tailings Cell Operation

Part I.D.2 of the Permit provides that authorized operation and maximum disposal capacity in each of the existing tailings Cells, 1, 2 and 3 shall not exceed the levels authorized by the Mill License and that under no circumstances shall the freeboard be less than three feet, as measured from the top of the FML. Part I.E.7(a) of the Permit requires that the wastewater pool elevations in Cells 1 and 3 must be monitored weekly to ensure compliance with the maximum wastewater elevation criteria mandated by Condition 10.3 of the Mill License. However, a letter from the Director dated January 27, 2011, which approved the use of Cell 4B, and a subsequent letter dated March 14, 2011, stated that authorization of the use of Cell 4B and approval of the DMT and Cell 4A Operations and Maintenance ("O&M") Plans effectively eliminated the former freeboard elevation requirements for tailings Cell 3.

Part I.D.2 further provides that any modifications by EFRI to any approved engineering design parameter at these existing tailings cells requires prior Director approval, modification of the Permit and issuance of a construction permit.

2.15.2 Existing Facility DMT Performance Standards

Part I.D.3 of the Permit requires EFRI to operate and maintain certain Mill site facilities and the existing tailings disposal cells to minimize the potential for wastewater release to groundwater and the environment, including, but not limited to the following additional DMT measures:

2.15.2.1 DMT Monitoring Wells at Cells 1, 2 and 3

Parts I.D.3 (a) and (d) require that at all times EFRI operate and maintain Cells 1, 2 and 3 to prevent groundwater quality conditions in any nearby monitoring wells from exceeding the GWCLs in Table 2 of the Permit. The groundwater compliance monitoring program described in detail in Section 2.9.1.3, is designed to provide early detection of a system failure in these tailings cells.

2.15.2.2 Slimes Drain Monitoring

Part I.D.3(b)(1) of the Permit requires that EFRI at all times maintain the average wastewater head in the slimes drain access pipe to be as low as reasonably achievable (ALARA) in each tailings disposal cell, in accordance with the approved DMT Plan. Compliance is achieved when the average annual wastewater recovery elevation in the slimes drain access pipe, determined pursuant to the currently approved DMT Plan, meets the conditions in Equation 1of Part I.D.3(b)(3) of the Permit.

Part I.E.7(b) of the Permit requires that EFRI monitor and record quarterly the depth to wastewater in the slimes drain access pipes as described in the currently approved DMT Plan at Cell 2, and upon commencement of de-watering activities, at Cell 3, in order to ensure compliance with Part I.D.3(b)(3) of the Permit. At this time, de-watering of Cell 3 has not commenced.

Quarterly measurements of the wastewater head in Cell 2 are reported in the quarterly DMT reports submitted to DRC pursuant to the requirements of Part I.F.1, Table 7 of the GWDP. The historic measurements for 2009 through 2013 are included in Appendix J. Annual compliance calculations pursuant to Part I.D.3(b)(3) of the GWDP are submitted to DRC on or before March 1 of the following year. The annual compliance calculations submitted to date for Cell 2 are summarized in Appendix J.

As noted in Appendix J, annual slimes drain compliance was not achieved for 2010, in accordance with Part I.D.3 of the Permit. As noted in correspondence with DRC, the monthly monitoring requirements specified in Part I.D.3(b)(2) of the February 2011 revision of the GWDP seriously interfered with EFRI's ability to comply with Parts I.D.3(b)(i) and I.D.3 (b)(3) of the GWDP. The monthly testing requirement resulted in the slimes drain pump being off (not pumping) an average of 6.42 days per month every month which is equivalent to 77 days (11 weeks) per year or 20 percent of the year for performance of the measurements.

The GWDP was amended in July 2011 to change the frequency of the slimes drain testing from monthly to quarterly. The average annual wastewater recovery elevation in the slimes drain pipe has been in compliance (that is, less than the previous year's running average) since the monitoring frequency changed from monthly to quarterly in July 2011.

2.15.2.3 Maximum Tailings Waste Solids Elevation

Part I.D.3(c) of the Permit requires that upon closure of any tailings cell, EFRI must ensure that the maximum elevation of the tailings waste solids does not exceed the top of the FML liner.

2.15.2.4 Wastewater Elevation in Roberts Pond

Part I.D.3(e) of the Permit requires that Roberts Pond be operated so as to provide a minimum 2-foot freeboard at all times, and that under no circumstances will the water level in the pond exceed an elevation of 5,624 feet above mean sea level. Part I.D.3(e) also provides that in the event the wastewater elevation exceeds this maximum level, EFRI must remove the excess wastewater and place it into containment in Cell 1 within 72 hours of discovery.

Part I.E.7(c) of the Permit requires that the wastewater level in Roberts Pond must be monitored and recorded weekly, in accordance with the currently approved DMT Plan, to determine compliance with the DMT operations standard in Part I.D.3(e) of the Permit;

2.15.2.5 Inspection of Feedstock Storage Area

Part I.D.3(f) of the Permit requires that open-air or bulk storage of all feedstock materials at the Mill facility awaiting Mill processing must be limited to the eastern portion of the Mill site (the "ore pad") described by the coordinates set out in that Part of the Permit, and that storage of feedstock materials at the facility outside of this defined area, must meet the requirements of Part I.D.11 of the Permit. Part I.D.11 requires EFRI to store and manage feedstock materials outside the defined ore storage pad in accordance with an approved Feedstock Management Plan. On

June 20, 2008, EFRI submitted a *White Mesa Mill Containerized Alternate Feedstock Material Storage Procedure* for Director review and approval. A copy of that procedure is included as Appendix N to this Application. The Director is currently reviewing that procedure.

Part I.E.7(d) of the Permit requires that EFRI inspect the feedstock storage areas weekly to:

a) Confirm that the bulk feedstock materials are maintained within approved feedstock storage defined by Table 4 of the Permit; and
b) Verify that all alternate feedstock materials located outside the feedstock storage area defined in Table 4 are stored in accordance with the requirements found in Part I.D.11.

Part I.E.7(d) further provides that EFRI must implement the Feedstock Material Storage Procedure immediately upon Director approval.

The Mill's procedure under the Mill License for inspection of the Mill's ore pad is contained in Section 3.3 of the DMT Plan, a copy of which is attached as Appendix H to this Application.

2.15.2.6 Monitor and Maintain Inventory of Chemicals

Part I.D.3(g) of the Permit requires , EFRI to provide secondary containment to capture and contain all volumes of reagent(s) that might be released at any individual storage area. This requirement applies to all chemical reagents stored at existing storage facilities and held for use in the milling process. Response to spills, cleanup thereof, and required reporting must comply with the provisions of an approved Emergency Response Plan as found in the approved Stormwater Best Management Practices Plan, stipulated by Parts I.D.10 and I.D.3(g) of the Permit. Part I.D.3(g) further provides that for any new construction of reagent storage facilities, such secondary containment and control must prevent any contact of the spilled or otherwise released reagent or product with the ground surface.

Part I.E.9 of the Permit requires that EFRI monitor and maintain a current inventory of all chemicals used at the facility at rates equal to or greater than 100 kg/yr. This inventory is to be maintained on-site, and must include:

(i) Identification of chemicals used in the milling process and the on-site laboratory; and
(ii) Determination of volume and mass of each raw chemical currently held in storage at the facility.

A copy of the Mill's chemical Inventory is attached as Appendix O to this Application. A copy of the Mill's *Stormwater Best Management Practices Plan*, Revision 1.5; September 2012 is attached as Appendix G to this Application.

2.15.3 BAT Performance Standards for Cell 4A

2.15.3.1 BAT Operations and Maintenance Plan

Part I.D.6 of the GWDP requires EFRI to operate and maintain Cell 4A so as to prevent release of wastewater to groundwater and the environment in accordance with a BAT Operations and Maintenance Plan. At a minimum such plan must include the following performance standards:

a) The fluid head in the leak detection system shall not exceed 1 foot above the lowest point in the lower membrane liner;
b) The leak detection system maximum allowable daily leak rate shall not exceed 24,160 gallons/day;
c) After EFRI initiates pumping conditions in the slimes drain layer in Cell 4A, EFRI will provide continuous declining fluid heads in the slimes drain layer, in a manner equivalent to the requirements found in Part I.D.3(b) for Cells 2 and 3; and
d) Under no circumstances shall the freeboard be less than 3-feet in Cell 4A, as measured from the top of the FML.

The BAT Operations and Maintenance Plan required under Part I.D.6 was approved by the Director on December 21, 2011. A copy of the most currently-approved *BAT Operations and Maintenance Plan* is included as Appendix F to this Application.

2.15.3.2 Implementation of Monitoring Requirements Under the BAT Operations and Maintenance Plan

Part I.E.8 of the Permit provides that, after Director approval of the Tailings Cell 4A BAT Operations and Maintenance Plan, EFRI must immediately implement all monitoring and recordkeeping requirements contained in the plan. At a minimum, such BAT monitoring shall include:

a) Weekly Leak Detection System (LDS) Monitoring - including:

   (i) continuous operation of the leak detection system pumping and monitoring equipment, including, but not limited to, the submersible pump, pump controller, head monitoring, and flow meter equipment approved by the Director. Failure of any pumping or monitoring equipment not repaired and made fully operational within 24-hours of discovery shall constitute failure of BAT and a violation of the Permit;

   (ii) measurement of the fluid head above the lowest point on the secondary FML by the use of procedures and equipment approved by the Director. Under no circumstance shall fluid head in the leak detection system sump exceed a 1-foot level above the lowest point in the lower FML on the cell floor. For purposes of compliance monitoring this 1-foot distance shall equate to 2.28 feet above the leak detection system transducer;

(iii) measurement of the volume of all fluids pumped from the leak detection system. Under no circumstances shall the average daily leak detection system flow volume exceed 24,160 gallons/day; and

(iv) operation and maintenance of wastewater levels to provide a 3-foot Minimum of vertical freeboard in tailings Cell 4A. Such measurements must be made to the nearest 0.1 foot.

b) Slimes Drain Recovery Head Monitoring

Immediately after the Mill initiates pumping conditions in the Cell 4A slimes drain system, monthly recovery head tests and fluid level measurements are to be made in accordance with the requirements of Parts I.D.3 and I.E.7(b) of the Permit and any plan approved by the Director.

2.15.4 BAT Performance Standards for Cell 4B

2.15.4.1 BAT Operations and Maintenance Plan

Part I.D.13 requires EFRI to operate and maintain Cell 4B so as to prevent release of wastewater to groundwater and the environment in accordance with a BAT Operations and Maintenance Plan, and that at a minimum such plan must include the following performance standards:

e) The fluid head in the leak detection system shall not exceed 1 foot above the lowest point in the lower membrane liner;
f) The leak detection system maximum allowable daily leak rate shall not exceed 26,145 gallons/day;
g) After EFRI initiates pumping conditions in the slimes drain layer in Cell 4B, EFRI will provide continuous declining fluid heads in the slimes drain layer, in a manner equivalent to the requirements found in Part I.D.3(b) for Cells 2, 3 and 4A; and
h) Under no circumstances shall the freeboard be less than 3-feet in Cell 4B, as measured from the top of the FML.

As mentioned above, the BAT Operations and Maintenance Plan was approved by the Director on December 21, 2011. A copy of the most currently-approved *BAT Operations and Maintenance Plan,* is included as Appendix F to this Application.

2.15.4.2 Implementation of Monitoring Requirements Under the BAT Operations and Maintenance Plan

Part I.E.12 of the Permit provides that EFRI must implement all monitoring and recordkeeping requirements contained in the Tailings Cell 4B BAT Operations and Maintenance Plan. At a minimum, such BAT monitoring includes:

c) Weekly Leak Detection System (LDS) Monitoring - including:

(i) continuous operation of the leak detection system pumping and monitoring equipment, including, but not limited to, the submersible pump, pump controller, head monitoring, and flow meter equipment approved by the Director. Failure of any pumping or monitoring equipment not repaired and made fully operational within 24-hours of discovery shall constitute failure of BAT and a violation of the Permit;

(ii) measurement of the fluid head above the lowest point on the secondary FML by the use of procedures and equipment approved by the Director. Under no circumstance shall fluid head in the leak detection system sump exceed a 1-foot level above the lowest point in the lower FML on the cell floor. For purposes of compliance monitoring this 1-foot distance shall equate to 2.25 feet above the leak detection system transducer;

(iii) measurement of the volume of all fluids pumped from the leak detection system. Under no circumstances shall the average daily leak detection system flow volume exceed 26,145 gallons/day; and

(iv) operation and maintenance of wastewater levels to provide a 3-foot Minimum of vertical freeboard in tailings Cell 4B. Such measurements must be made to the nearest 0.1 foot.

d) Slimes Drain Recovery Head Monitoring

Immediately after the Mill initiates pumping conditions in the Cell 4B slimes drain system, monthly recovery head tests and fluid level measurements are to be made in accordance with the requirements of Parts I.D.3 and I.E.7(b) of the Permit and any plan approved by the Director.

2.15.5 Stormwater Management and Spill Control Requirements

Part I.D.10 of the Permit requires EFRI to manage all contact and non-contact stormwater and control contaminant spills at the facility in accordance with an approved stormwater best management practices plan. Such plan must include the following minimum provisions:

a) Protect groundwater quality or other waters of the state by design, construction, and/or active operational measures that meet the requirements of the Ground Water Quality Protection Regulations found in UAC R317-6-6.3(G) and R317-6-6.4(C);
b) Prevent, control and contain spills of stored reagents or other chemicals at the Mill site;
c) Cleanup spills of stored reagents or other chemicals at the Mill site immediately upon discovery; and
d) Report reagent spills or other releases at the Mill site to the Director in accordance with UAC 19-5-114.

The Mill's *Stormwater Best Management Practices Plan* dated June 12, 2008, was approved by the Director on July 1, 2008. A copy of the most recently approved Mill's *Stormwater Best Management Practices Plan* Revision dated 1.5 September 2012, is included as Appendix G to this Application.

2.15.6 Tailings and Slimes Drain Sampling

Part I.E.10 of the Permit requires EFRI to annually collect wastewater quality samples from each wastewater source at each tailings cell at the facility, including surface impounded wastewaters, the leak detection systems (if present) and slimes drain wastewaters. All such sampling must be conducted in August of each calendar year in compliance with the approved Tailings Sampling Plan. See Section 2.12.1 above for a more detailed description of this program.

The Mill's *Tailings and Slimes Drain Sampling Program* was approved by the Director. The most recently approved version is included as Appendix L to this Application.

2.15.7 Additional Monitoring and Inspections Required Under the Mill License

Under the Mill License daily, weekly, and monthly inspection reporting and monitoring are required in accordance with NRC Regulatory Guide 8.31, *Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Recovery Facilities will be As Low As is Reasonable Achievable*, Revision 1, May 2002 ("Reg Guide 8.31"), by Section 2.3 of the Mill's ALARA Program and by the Mill's *Environmental Protection Manual ("EPM").* These requirements are over and above the inspections described above that are required under the Permit.

Additional daily, weekly, monthly, quarterly, and annual inspection and reporting requirements are specified in the EFRI DMT Plan and Tailings Management System Procedure (Section 3.1 of the EPM). The DMT Plan and Tailings Management System are included as Appendix H and Appendix I to this Application, respectively.

2.15.7.1 Daily Inspections

Three types of daily inspections are performed at the Mill under the Mill License:

a) Radiation Staff Inspections

Paragraph 2.3.1 of Reg. Guide 8.31 provides that the Mill's Radiation Safety Officer ("RSO") or designated health physics technician should conduct a daily walk-through (visual) inspection of all work and storage areas of the Mill to ensure proper implementation of good radiation safety procedures, including good housekeeping that would minimize unnecessary contamination. These inspections are required by Section 2.3.1 of the Mill's ALARA Program, and are documented and on file in the Mill's Radiation Protection Office.

b) Operating Foreman Inspections

30 CFR Section 56.18002 of the Mine Safety and Health Administration regulations requires that a competent person designated by the operator must examine each working place at least once each shift for conditions which may adversely affect safety or health. These daily inspections are documented and on file in the Mill's Radiation Protection Office.

c) Daily Tailings Inspection

Section 3.1 of the Mill's EPM requires that during Mill operation, the Shift Foreman, or other person with the training specified in paragraph 2.4 of the Tailings Management Procedure, designated by the RSO, will perform an inspection of the tailings line and tailings area at least once per shift, paying close attention for potential leaks and to the discharges from the pipelines. Observations by the Inspector are recorded on the appropriate line on the Mill's Daily Inspection Data form.

2.15.7.2 Weekly Inspections

Three types of weekly inspections are performed at the Mill under the Mill License:

a) Weekly Inspection of the Mill Forms

Paragraph 2.3.1 of Reg. Guide 8.31 provides that the RSO and the Mill foreman should, and Section 2.3.2 of the Mill's ALARA Program provides that the RSO and Mill foreman or their respective designees shall, conduct a weekly inspection of all Mill areas to observe general radiation control practices and review required changes in procedures and equipment. Particular attention is to be focused on areas where potential exposures to personnel might exist and in areas of operation or locations where contamination is evident.

b) Weekly Ore Storage Pad Inspection Forms

Paragraph 3.3 of the DMT Plan and Part I.E.7.(d of the Permit requires that weekly feedstock storage area inspections be performed by the Radiation Safety Department to confirm that the bulk feedstock materials are stored and maintained within the defined area of the ore pad and that all alternate feed materials located outside the defined ore pad area are maintained in accordance with the requirements of the Permit. The results of these inspections are recorded on the Mill's Ore Storage/Sample Plant Weekly Inspection Report.

c) Weekly Tailings and DMT Inspection

Section 3.1 of the EPM requires that weekly inspections of the tailings area and DMT requirements be performed by the radiation safety department.

2.15.7.3 Monthly Reports

Two types of monthly reports are prepared by Mill staff:

a) Monthly Radiation Safety Reports

The RSO reviews the results of daily and weekly inspections, including a review of all monitoring and exposure data for the month, and provides to the Mill Manager a monthly report containing a written summary of the month's significant worker protection activities (Section 2.3.4 of the ALARA Program).

b) *Monthly Tailings Inspection Reports*

Section 3.1 of the EPM, requires that a Monthly Inspection Data form be completed for the monthly tailings inspection. This inspection is typically performed in the fourth week of each month and is in lieu of the weekly tailings inspection for that week.

Mill staff also prepares a monthly summary of all daily, weekly, monthly and quarterly tailings inspections.

2.15.7.4 Quarterly Tailings Inspections

Section 3.1 of the EPM requires that the RSO or his designee perform a quarterly tailings inspection.

2.15.7.5 Annual Evaluations

The following annual evaluations are performed under the Mill License, as set out in Section 3.1 of the EPM.

a) Annual Technical Evaluation

An annual technical evaluation of the tailings management system must be performed by a registered professional engineer (PE), who has experience and training in the area of geotechnical aspects of retention structures. The technical evaluation includes an on-site inspection of the tailings management system and a thorough review of all tailings records for the past year. The Technical Evaluation also includes a review and summary of the annual movement monitor survey (see Section (b) below).

All tailings cells and corresponding dikes are inspected for signs of erosion, subsidence, shrinkage, and seepage. The drainage ditches are inspected to evaluate surface water control structures.

In the event tailings capacity evaluations were performed for the receipt of alternate feed material during the year, the capacity evaluation forms and associated calculation sheets will be reviewed to ensure that the maximum tailings capacity estimate is accurate. The amount of tailings added to the system since the last evaluation will also be calculated to determine the estimated capacity at the time of the evaluation.

As discussed above, tailings inspection records consist of daily, weekly, monthly, and quarterly tailings inspections. These inspection records are evaluated to determine if any freeboard limits are being approached and to identify any areas of potential concern. The evaluation also involves discussion with the Environmental and/or Radiation Technician and the RSO regarding activities around the tailings area for the past year. During the annual inspection, photographs of the tailings area are taken. The training of individuals is also reviewed as a part of the Annual Technical Evaluation.

The registered engineer obtains copies of selected tailings inspections, along with the monthly and quarterly summaries of observations of concern and the corrective actions taken. These copies are then included in the *Annual Technical Evaluation Report.*

The *Annual Technical Evaluation Report* must be submitted by September 1st of every year to the Directing Dam Safety Engineer, State of Utah, Natural Resources.

b) Annual Movement Monitor Survey

A movement monitor survey is conducted by a licensed surveyor annually during the second quarter of each year. The movement monitor survey consists of surveying monitors along dikes 3-S, 4A-W, and 4A-S to detect any possible settlement or movement of the dikes. The data generated from this survey is reviewed and incorporated into the *Annual Technical Evaluation Report* of the tailings management system.

c) Annual Leak Detection Fluid Samples

Annually, the leak detection system fluids in Cells 1, 2, 3, 4A and 4B are sampled when present as described in the Tailings Sampling Plan in Section 2.12.1.

2.16 Corrective Action Plan or Identification of Other Response Measures to be Taken to Remedy any Violation of Applicable Ground Water Quality Standards (R317-6-6.3.P)

There are two circumstances where applicable groundwater standards have been exceeded at the site that are not associated with natural background: chloroform contamination, and nitrate contamination. As discussed below, none of these circumstances appear to be related to discharges from milling activities. See Section 2.11.2 for a discussion of the current investigation into exceedances of GWCLs for certain constituents and decreasing pH trends at the site, which EFRI believes are associated with natural background.

2.16.1 Chloroform Investigation

In May, 1999, excess chloroform concentrations were discovered in monitoring well MW-4, which is screened in the shallow perched aquifer along the eastern margin of the Mill site. Because these concentrations were above the GWQS for chloroform, the Executive Secretary of the Utah Water Quality Board initiated enforcement action against the Mill on August 23, 1999 through the issuance of a Groundwater Corrective Action Order (UDEQ Docket No. UGO-20-01), which required completion of: 1) a contaminant investigation report to define and bound the contaminant plume, and 2) a groundwater corrective action plan to clean it up. Repeated groundwater sampling by both the Mill and DRC have confirmed the presence of chloroform in concentrations that exceed the GWQS along the eastern margin of the site in wells that are upgradient or cross gradient from the tailings cells. Other VOC contaminants and nitrate and nitrite have also been detected in these samples. After installation of 27 new monitoring wells at the site, groundwater studies appear to have defined the boundaries of the chloroform plume.

Based on the location of the plume and characterization studies completed to date, the contamination appears to have resulted from the operation of temporary laboratory facilities that were located at the site prior to and during construction of the Mill facility, and septic drainfields that were used for laboratory and sanitary wastes prior to construction of the Mill's tailings cells. Interim measures have been instituted in order to contain the contamination and to pump contaminated groundwater into the Mill's tailings cells. To that end, the Mill has equipped five of the wells (MW-4, TW4-4, MW-26 (previously named TW4-15), TW4-19 and TW4-20) with pumps to recover water impacted by chloroform and to dispose of such water in the Mill's tailings cells.

In the 2004 Statement of Basis, DRC noted on page 3 that, while the contaminant investigation and groundwater remediation plan are not yet complete, the DRC believes that additional time is available to resolve these requirements based on the following factors: 1) hydraulic isolation found between the shallow perched aquifer in which the contamination has been detected and the deep confined aquifers which are a source of drinking water in the area, 2) the large horizontal distance and the long groundwater travel times between the existing groundwater contamination on site and the seeps and springs where the shallow aquifer discharges at the edge of White Mesa, and 3) lack of human exposure for these shallow aquifer contaminants along this travel path.

EFRI submitted a *Preliminary Corrective Action Plan, White Mesa Mill Near Blanding, Utah*, August 20, 2007, prepared by Hydro Geo Chem, Inc., on August 21, 2007, and a *Preliminary Contamination Investigation Report, White Mesa Mill Near Blanding, Utah*, November 20, 2007, prepared by Hydro Geo Chem, Inc., on December 21, 2007. DRC has requested changes to the proposed plans. When a Corrective Action Plan is approved by the Director, it will be subject to public comments.

As part of the active strategy in the first phase of the Corrective Action Plan, EFRI has operated a chloroform capture system, referred to as the "Long-term Pump Test" continuously since January 31, 2010. The purpose of the test is to serve as an interim action that will remove a significant amount of chloroform-contaminated water while gathering additional data on hydraulic properties in the area of investigation. Chloroform-contaminated water is captured by pumping six wells located within the identified chloroform plume, and transferred via an above-ground piping network to Tailings Cell 1 for disposal.

Effectiveness of the first phase of the Corrective Action is evaluated and documented in quarterly reports to the Director. EFRI estimates that, as of the first quarter of 2014, 699 lbs. of chloroform have been extracted through the capture system.

2.16.2 Nitrate Investigation

During review of the New Well Background Report and other reports, a Nitrate contaminant plume was identified by DRC staff in five monitoring wells in the Mill site area, including wells: MW-30, MW-31, TW4-22, TW4-24, and TW4-25. TW4-25 is located upgradient of the Mill's tailings cells. Elevated concentrations of chloride also appear to be associated with the nitrate plume.

On September 30, 2008, the Director issued a request for a voluntary plan and schedule for EFRI to investigate and remediate this Nitrate contamination. On November 19, 2008 EFRI submitted a plan and schedule prepared by INTERA, Inc., which identified a number of potential sources for the contamination, including several potential historic and offsite sources. On January 27, 2009, the Director and EFRI signed a Stipulated Consent Agreement ("SCA") by which EFRI agreed to conduct an investigation of the Nitrate contamination, determine the sources of pollution, and submit a report by January 4, 2010.

EFRI submitted a Contaminant Investigation Report ("CIR") on December 30, 2009. On October 5, 2010 the Director issued a Notice of Additional Required Action ("NARA") letter that notified EFRI of the Director's determination that the 2009 CIR was incomplete.

On December 20, 2010 EFRI and the Director entered into Revision 0 of a Tolling Agreement, allowing a tolling period until April 30, 2011 in order to provide time for EFRI to prepare a Plan and Schedule for Director review addressing additional investigations to resolve open issues identified in the October 5, 2010 NARA, and to execute a revised SCA.

EFRI submitted a Plan and Schedule on February 14, 2011 and a revised Plan and Schedule on February 18, 2011. The Director provided comments on the revised Plan and Schedule on March 21, 2011. In an April 20, 2011 meeting, EFRI and the Director agreed that the Plan and Schedule to conduct additional nitrate investigations would be composed of four to five phases of study, including geoprobe drilling and soil sampling/analysis to investigate natural nitrate salt reservoir sources in the vadose zone beyond the Mill site, potential Mill sources, and other potential sources; groundwater sampling and analysis of existing monitoring wells for non-isotopic analytes; deep bedrock core sampling/analysis of possible natural nitrate reservoir and potential nitrate source locations; stable isotopic sampling/analysis of groundwater in existing monitoring wells; and stable isotopic sampling/analysis of soil/core samples, if needed.

On April 28, 2011, EFRI and the Director entered into Revision 1 of the Tolling Agreement to extend the Tolling Period through June 30, 2011 and adopt the agreements made on April 20, 2011. Under the Tolling Agreement Revision 1, EFRI agreed to submit a Revised Phase 1 (A through C) Work Plan on or before May 6, 2011 and a Revised Phase 2 through 5 Work Plan and Schedule on or before June 3, 2011.

EFRI submitted a May 6, 2011 Revised Phase 1 Work Plan and Schedule for the Phase 1 A - C investigation for Director review. EFRI conducted field and laboratory work for the Phase l A-C study in May and June, 2011.

EFRI submitted a Revised Phase 2 through 5 Work Plan and Schedule for Director review on June 3, 2011. The Director provided comments on this document on June 23, 2011 and advised EFRI that in order to revise the 2009 SCA to incorporate needed deliverables and timelines, the Phase 2 through 5 Work Plan would need to be expanded to the same level of detail as was provided for Phase 1 in Attachment 1 of the Revision 1 Tolling Agreement.

On June 30, 2011, EFRI and the Director entered into Revision 2 of the Tolling Agreement extending the Tolling Period to August 31, 2011, to facilitate the revision of the Phase 2 through 5 Work Plan to provide the required level of detail to construct a replacement SCA. EFRI submitted a separate July 1, 2011 detailed Revision 0 of the Work Plan and Quality Assurance Plan ("QAP") for the Phase 2 investigation. The Director provided comments on this document on July 7, 2011. EFRI provided a July 12, 2011 Revision 1.0 to the Phase 2 QAP and Work Plan, which DRC conditionally approved in a letter dated July 18, 2011. On August 1 and 2, 2011 EFRI submitted by email preliminary laboratory results for the Phase 1 A-C study to the Director.

On August 4, 2011, EFRI provided a Revision 1.0 to the Phase 2 - 5 Work Plan for Director review. The Director provided comments on the Phase 2-5 Work Plan, Revision 1.0 and the August 1, 2011 preliminary laboratory results on August 11, 2011. EFRI submitted Revision 2.0 of the Phase 2-5 Work Plan for Director review on August 11, 2011.

On August 25, 2011, the Director determined that based on review of the Revision 2.0 Phase 2-5 Work Plan, a finalized Plan and Schedule that meets the satisfaction of the Director, and which would allow the preparation of a replacement SCA, was not possible at that time; and that the development of a replacement SCA for continued contaminant investigation activities was not supported.

At a meeting on August 29, 2011, EFRI and DRC agreed that:

1. After more than two years of investigation it has been determined that there are site conditions that make it difficult to determine the source(s) of the contamination at the White Mesa site;
2. As a result, resources will be better spent in developing a CAP in accordance with UAC R317-6-6.15(D), rather than continuing with further investigations as to the source(s) of the contamination.

In discussions during October 2011, EFRI and the Director acknowledged that it has not been possible to date to determine the source(s), cause(s), attribution, magnitudes of contribution, and proportion(s) of the local nitrate and chloride in groundwater, and thereby cannot eliminate Mill activities as a potential cause, either in full or in part, of the contamination. As a result, EFRI and the Director agreed that resources will be better spent in developing a Corrective Action Plan in accordance with UAC R317-6-6.15(D), rather than continuing with further investigations.

On October 3, 2011 EFRI and the Director entered into a revised Stipulated Consent Agreement which required EFRI to submit a Corrective Action Plan for Director review that included plans to:

Phase I –determine the physical extent of soil contamination observed at the Ammonium Sulfate Crystal Tanks, and provide a control measure consisting of either removal of the areal extent of contamination down to bedrock, or a Plan and Schedule for covering the areal extent of contamination with at least 6 inches of concrete, followed by removal action during or before site closure.

Phase II – implement near term active remediation of the nitrate contamination by pumping contaminated water into the Mill's tailings cells for disposal. This phase is to include development, implementation, operation, and monitoring of a pumping well network to contain and hydraulically control the nitrate plume; monitoring of chloride concentrations; and any required increases to the Mill's surety for activities in this Phase.

Phase III – develop, if necessary, a comprehensive long-term solution for the nitrate contamination at the Mill Site. This Phase is to be determined after public participation and Director approval, and may include continuation of Phase I and II activities alone or in combination with any of the following: monitored natural attenuation, additional remediation and monitoring, determination of additional hydrogeologic characterization, contaminant travel times, points of exposure to public or wildlife, risk analysis, cost/benefit analysis, and possible development and petition of the Board for alternate corrective action concentration limits.

EFRI submitted a Draft Corrective Action Plan on November 30, 2011. The Director provided comments on the Draft Corrective Action Plan on January 19, 2012. EFRI provided Revision 1.0 of the Corrective Action Plan on February 27, 2012, and received comments from the Director on March 19, 2012. Pursuant to the revised SCA, EFRI provided Revision 2.0 to the Director on May 7, 2012.

On December 12, 2012, DRC signed the Stipulation and Consent Order ("SCO"), Docket Number UGW12-04, which approved the EFRI CAP, dated May 7, 2012. The SCO ordered EFRI to fully implement all elements of the May 7, 2012 CAP.

Based on the schedule included in the CAP and as delineated and approved by the SCO, the activities associated with the implementation of the CAP began in January 2013. The reporting requirements specified in the CAP and SCO are included in the quarterly nitrate reports.

2.17 Other Information Required by the Director (R317-6-6.3.Q)

As discussed below, a chemical inventory report and a Hydrogeologic investigation report for the southwest portion of the Mill site have been completed at the request of the Director. No other information has been specifically required by the Director to be included in this Application at this time. EFRI will provide additional information as requested by the Director.

2.17.1 Chemical Inventory Report

Part I.H.1 of the Permit requires that EFRI complete a historical review and conduct an inventory of all chemical compounds or reagents stored, used, or currently in use at the facility. including the types of chemicals and the total volumes present, and historically used, as data is available. EFRI submitted a chemical inventory report on June 7, 2005, and submitted additional related information on November 17, 2006.

Part I.H.1 requires that at the time of Permit renewal, the Permittee shall submit an updated inventory report. Part I.E.9 requires that the inventory address chemicals used in the milling process and the on-site laboratory. The updated inventory report is provided in Appendix O of this Application.

2.17.2 Southwest Hydrogeologic Investigation

Part I.H.6 of the Permit required that EFRI perform a detailed Southwest Hydrogeologic Investigation to define, demonstrate and characterize: 1) the hydraulic connection and local groundwater flow directions between the area near Tailings Cell 4B, and the western margin of

White Mesa, and 2) the full physical extent of the unsaturated area between former well MW-16, MW-33 and the western margin of White Mesa.

During 2011, EFRI installed 18 piezometers to define the geologic and physical extent of the apparent unsaturated structural high between Tailings Cell 4B and the western margin of White Mesa and the location and direction of groundwater flow paths between Tailings Cell 4B and Westwater and Cottonwood Seeps and Ruin Spring. Consistent with Part I.H.6.c) of the Permit, EFRI submitted an investigation report, the *Hydrogeology of the Perched Groundwater Zone in the Area Southwest of the Tailings Cells, White Mesa Uranium Mill Site* (the "Southwest Hydrogeology Report"), prepared by Hydro Geo Chem, on January 12, 2012. The Director provided comments in a conference call during May 2012, and in a letter dated May 30, 2012. EFRI submitted a revised version of the Report on August 3, 2012 and agreed to repeat slug testing of piezometer DR-08. DRC's September 20, 2012 review Summary and RFI, specifically requested that EFRI:

- repeat slug testing of piezometer DR-08,
- recalculate hydraulic properties, and
- recalculate travel times if necessary based on new data.

The Second Revision to the Report, addressing the data and re-calculations resulting from retesting of piezometer DR-08, was submitted on November 7, 2012.

2.18 This Application Performed Under the Direction of a Professional Engineer (R317-6-6.3.R)

This Application has been performed under the direction, and bears the seal, of Harold R. Roberts, Executive Vice President and Chief Operating Officer EFRI. Mr. Roberts is a Registered Professional Engineer in the State of Utah, No. 165838.

2.19 Closure and Post Closure Management Plan Demonstrating Measures to Prevent Ground Water Contamination During the Closure and Post Closure Phases of Operation (R17-6-6.3.S)

2.19.1 Regulatory Requirements for Uranium Mills

2.19.1.1 Long Term Custodian

One unique feature of the regulatory scheme for uranium mill tailings is that Section 83 of the Atomic Energy Act of 1954, as amended by the Uranium Mill Tailings Radiation Control Act of 1978 ("UMTRCA") (the Atomic Energy Act of 1954 as so amended is referred to herein as the "AEA")[4] requires that, prior to license termination, title to uranium mill tailings (11e.(2) byproduct material) must be transferred to the United States Department of Energy ("DOE") or the State in which the activity occurred, if the State so elects, for custody and long term care. 10 CFR 40.28 provides a general license to DOE or the State for that purpose.

2.19.1.2 Responsibility For And Manner Of Clean Up

UMTRCA amended the AEA to require that all Title II facilities (i.e., active mills) comply with

[4] *See* 42 U.S.C. 2113.

the decontamination, decommissioning, and reclamation standards prescribed by the Commission[5] and to require that such facilities post reclamation bonds or surety[6].

Responsibility for reclamation of Title II facilities rests with the licensee. 10 CFR Part 40 Appendix A Criterion 6A requires the adoption of a Director-approved reclamation plan for the site, Criterion 9 requires that financial surety must be established to fund the cost of reclamation in accordance with such plan, and Criterion 10 requires that each licensee include in its financial surety an amount equivalent to $250,000 (1978 dollars) to cover the costs of long-term surveillance by the long-term government custodian (DOE). Criteria 6, 9 and 10 have been incorporated by reference into the Utah rules by UAC R313-24-4.

2.19.1.3 Surface

The reclamation plan adopted by the Mill at the outset, as required by 10 CFR Part 40, Appendix A, Criterion 9, addresses the decontamination and decommissioning of the Mill and Mill site and reclamation of tailings and other waste disposal areas.

As is the case for most uranium mills, the Mill's reclamation plan requires that, upon closure, all mill buildings, unsalvageable equipment, contaminated soils (impacted by Mill operations within the Mill site itself as well as surrounding areas that may be impacted by windblown radioactive dusts from milling operations) etc. be deposited in the tailings cells and the tailings cells capped in place.

Appendix A, Criterion 6(6) sets the standard for determining when all impacted areas, other than the tailings impoundments have been adequately cleaned up. Criterion 6(6) provides that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the benchmark standard of 5pCi/g concentration of radium in the upper 15 cm (6 in) of surface soils and 15 pCi/g concentration of radium in the subsurface soils, and must be at levels which are ALARA. If more than one residual radionuclide is present, the sum of the ratios for each radionuclide present will not exceed "1" (unity). Further details on the NRC's approach to evaluating reclamation plans and release criteria for uranium mill sites, including the manner of modeling the release standard set out in Criterion 6(6), are contained in NUREG-1620, Rev 1, *Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act of 1978*, Final Report, June 2003 ("NUREG-1620").

2.19.1.4 Groundwater

Each uranium mill is required to have a groundwater monitoring program. In the case of the Mill, the Permit implements the applicable requirements of UAC R317-6. If there is groundwater contamination after cessation of operations, the requirements of UAC R317-6.15 must be satisfied.

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[5] *See* 42 U.S.C. 2113.
[6] *See* 42 U.S.C. 2201.

2.19.1.5 License Termination

Section 83.7 of the AEA[7] provides that material and land transferred to the long term custodian must be transferred without cost to the long-term custodian other than administrative and legal costs incurred in carrying out such transfer.

In order to cover the costs of long-term surveillance, Criterion 10 requires that a minimum charge of $250,000 (1978 dollars) must be paid by each mill operator to the general treasury of the United States or to an appropriate State agency prior to the termination of a uranium mill license.

In most cases if there is a groundwater contamination problem, the problem must be remediated prior to license termination, or an alternate corrective action concentration limit under R317-6-6.15.G must be achieved that is protective of public health and the environment. In some circumstances DOE may agree to take some additional actions after it takes title to the site, such as additional monitoring, if not onerous and provided adequate funding is provided.

Upon the Director and the NRC being satisfied that all regulatory requirements have been met and the site is reclaimed in a manner that satisfies all applicable standards, the Mill's license will be terminated upon transfer of the tailings to DOE. 10 CFR 40.28 provides a general license in favor of the long-term custodian for custody of and long-term care of the tailings impoundments and any surrounding lands transferred to it. [8] The surrounding areas not transferred to DOE would generally be free-released.

2.19.2 Current Reclamation Plan

The Mill's *Reclamation Plan*, Revision 3.2B, was approved by DRC under the Mill License on January 26, 2011. The *Reclamation Plan* sets out the requirements to be met by EFRI for the final reclamation and closure of the Mill facility, including the tailings cells and all impacted surrounding areas, in accordance with the requirements of 10 CFR Part 40, Appendix A (which have since been incorporated by reference into UAC R313-24). A copy of the Mill's *Reclamation Plan*, Revision 4.0 was previously submitted to the Director in November 2009 and is on file at the DRC.

EFRI submitted Revision 5.0 of the Reclamation Plan in September 2011. DRC provided one round of interrogatories for this document in March 2012. EFRI provided responses to these interrogatories in May and August 2012. DRC provided review comments on EFRI's May and August 2012 responses in February 2013.

On April 30, 2013, a meeting was held in Denver, Colorado to discuss specific issues identified in DRC's February 2013 review comments, including, but not limited to, DRC's request for site-specific tailings data and a probabilistic seismic hazard analysis (PSHA) for the Mill site. Representatives of DRC, DRC's consultant (URS Professional Solutions, LLC), EFRI, and

[7] *See* 42 U.S.C. 2113.

[8] In circumstances where the facility has a groundwater contamination plume, additional lands may be acquired by the licensee in order to bound the plume. In these circumstances these additional lands would be transferred along with the capped tailings impoundments, to DOE.

EFRI's technical consultant (MWH Americas, Inc.) attended the meeting. During the meeting, EFRI proposed a tailings investigation to address the request for site-specific tailings data. A work plan for this investigation was provided to DRC on June 24, 2013, and DRC provided approval of the work plan verbally to EFRI on September 12, 2013. The tailings investigation was completed in October 2013, and subsequent laboratory testing of collected samples was completed in April 2014. A Tailings Data Analysis Report summarizing the results of the investigation is currently being prepared for submittal to DRC in June 2014. A PSHA for the Mill site is being prepared for submittal to DRC in June 2014 as well. Submission of responses to DRC's February 2013 review comments on Revision 5.0 of the Reclamation Plan are planned to be completed in 2014 after DRC's review of the Tailings Data Analysis Report and PSHA for the Mill site. The results provided in the Tailings Data Analysis Report and PSHA for the Mill site will be used to update technical analyses to address DRC's February 2013 review comments on Revision 5.0 of the Reclamation Plan. The responses will also incorporate decisions made at the April 30, 2013 meeting on key issues related to Revision 5.0 of the Reclamation Plan.

2.19.3 Provisions Included in the Permit Relating to the Mill's Reclamation Plan

The Mill License is currently in timely renewal. As part of the Mill License Renewal, DRC is re-examining the Mill's *Reclamation Plan* for content and adequacy. At the time of original issuance of the Permit, the Director had not completed his review of the Mill's *Reclamation Plan*. As a result, new requirements were added to the Permit to ensure that the final reclamation design approved by the Director on his re-examination of the *Reclamation Plan* will provide adequate performance criteria to protect local groundwater quality.

To this end, three requirements were included in Part I.D.8 of the Permit to ensure that the cover system for each tailings cell will be designed and constructed to:

a) Minimize the infiltration of water into the radon barrier and underlying tailings waste;
b) Prevent the accumulation of leachates within the tailings that might create a bathtub effect and thereby spill over the maximum elevation of the FML inside any disposal cell; thereby causing a release of contaminants to the environment; and
c) Protect groundwater quality at the compliance monitoring wells by ensuring that contaminant concentrations there do not exceed their respective GWQS or GWCL defined in Part I.C.1 and Table 2 of the Permit.

To provide consistency with the performance criteria stipulated by the Director at other 11e.(2) disposal operations, a 200-year minimum performance period was required for all three of these criteria.

In addition, Part I.D.9 was included in the Permit, which provides that upon commencement of decommissioning, EFRI will reclaim the Mill site and all related facilities, stabilize the tailings cells, and construct a cover system over the tailings cells in compliance with all engineering design and specifications of the approved reclamation plan. Part I.D.7 also provides that the Director reserves the right to require modifications to the Mill's *Reclamation Plan* for purposes of compliance with the Utah Ground Water Quality Protection Regulations, including but not limited to containment and control of contaminants, or discharges, or potential discharges to waters of the State.

Finally, Part I.D.9 was added to the Permit to provide the Director an opportunity to ensure that:

a) The post-closure performance requirements for the tailings cell cover system in Part I.D.8 is fully and adequately integrated into the Mill's *Reclamation Plan.* Part I.H.2 was also added to the Permit to require EFRI to complete an infiltration and contaminant transport model of the final tailings cell cover system to demonstrate the long-term ability of the cover to protect nearby groundwater quality. As a part of this cover system performance modeling required by Part I.H.2, the Director will determine if changes to the cover system are needed to ensure compliance with the Part I.D.8 performance criteria;
b) All other facility demolition and decommissioning activities outlined in the *Reclamation Plan* will be done in a manner adequate to protect local groundwater quality. Issues or concerns to be considered and resolved include:
   (i) Identification, isolation, and authorized disposal of any un-used chemical reagents held in storage at the Mill site at the time of closure;
   (ii) Demolition, excavation, removal, and authorized disposal of all contaminated man-made structures, including, but not limited to: buildings, pipes, power lines, tanks, access roads, drain fields, leach fields, fly-ash disposal ponds, feedstock storage areas, Mill site wastewater storage ponds, solid waste disposal landfills, and all related appurtenances; and
   (iii) Excavation, removal, and authorized disposal of all contaminated soils found anywhere outside of the tailings cells at the facility.

Through this process, the Director will be able to ensure that DMT has been adequately established for both the final tailings cell cover system and reclamation of the facility.

EFRI submitted an *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah,* November 2007, prepared by MWH Americas, Inc., in November, 2007. EFRI submitted a revised *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah,* March 2010 ("revised ICTM Report") in response to DRC comments. The March 2010 report is currently being reviewed in conjunction with the Reclamation Plan, Revision 5.0. DRC provided interrogatories for the revised ICTM Report in March 2012. EFRI provided responses to these interrogatories in May and September 2012. DRC provided review comments on EFRI's May and September 2012 responses in February 2013.

On April 30, 2013, a meeting was held in Denver, Colorado to discuss specific issues identified in DRC's February 2013 review comments for Revision 5.0 of the Reclamation Plan and the revised ICTM Report. As noted in Section 2.19.2, included in the discussions at this meeting was DRC's request for site-specific tailings data. EFRI proposed a tailings investigation to address DRC's concerns. The tailings investigation was completed in October 2013 and subsequent laboratory testing of samples collected was completed in April 2014. A Tailings Data Analysis Report summarizing the results of the investigation is currently being prepared for submittal to DRC in June 2014. Submission of responses to DRC's February 2013 review comments on the revised ICTM Report are planned to be completed in 2014 after DRC's review of the Tailings Data Analysis Report. The results provided in the Tailings Data Analysis Report will be used to update technical analyses to address DRC's February 2013 review comments on the revised ICTM report. The responses will also incorporate decisions made at the April 30, 2013 meeting on key issues related to the revised ICTM Report.

2.19.4 Post-Operational Monitoring

Monitoring will continue under the Permit after cessation of operations, during reclamation and after reclamation has been completed until such time as the Mill License and Permit are terminated and the reclaimed tailings impoundments are transferred to the Department of Energy for perpetual care and maintenance.

3.0 CONCLUSIONS

This Application describes the key monitoring and DMT performance standard requirements and other protections contained in the Permit.

EFRI believes that with this Application, the accompanying Background Reports and other documentation, the Director has been provided sufficient information to determine that:

a) EFRI has demonstrated that the applicable class TDS limits, ground water quality standards and protection levels will be met;
b) The monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
c) EFRI utilizes treatment and discharge minimization technology at the Mill commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology; and
d) There is no current or anticipated impairment of present and future beneficial uses of the ground water.

4.0 SIGNATURE AND CERTIFICATIONS

This Application is dated June 5, 2014 and is being submitted by Energy Fuels Resources (USA) Inc.

Energy Fuels Resources (USA) Inc.

By: ______________________________

Frank J. Filas
Vice President, Permitting and Environmental Affairs

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

____
Frank J. Filas
Vice President, Permitting and Environmental Affairs

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER

I hereby certify that the foregoing Application has been prepared under my direction, that I have reviewed this Application, that I am familiar with the Mill facilities, and attest that this Application has been prepared in accordance with good engineering practices.

____
Harold R. Roberts
Registered Professional Engineer
State of Utah No. 165838

(seal)

REGISTERED PROFESSIONAL ENGINEER
No. 165838
HAROLD R. ROBERTS
STATE OF UTAH

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INDEX OF TABLES

Table 1.2-1

Chloroform Monitoring Wells (Depth and Purpose)

Well Location	Total Depth	Purpose
TW4-1	111.04	Chloroform Monitoring Well
TW4-2	121.125	Chloroform Monitoring Well
TW4-3	141.00	Chloroform Monitoring Well
TW4-4	114.50	Chloroform Pumping Well
TW4-5	121.75	Chloroform Monitoring Well
TW4-6	98.55	Chloroform Monitoring Well
TW4-7	119.80	Chloroform Monitoring Well
TW4-8	126.00	Chloroform Monitoring Well
TW4-9	121.33	Chloroform Monitoring Well
TW4-10	111.00	Chloroform Monitoring Well
TW4-11	100.00	Chloroform Monitoring Well
TW4-12	101.50	Chloroform Monitoring Well
TW4-13	102.50	Chloroform Monitoring Well
TW4-14	93.00	Chloroform Monitoring Well
MW-26	121.33	Chloroform Pumping Well/Groundwater Monitoring Well
TW4-16	142.00	Chloroform Monitoring Well
MW-32	130.60	Chloroform Pumping Well/Groundwater Monitoring Well
TW4-18	137.50	Chloroform Monitoring Well
TW4-19	121.33	Chloroform Pumping Well
TW4-20	106.00	Chloroform Pumping Well
TW4-21	120.92	Chloroform Monitoring Well
TW4-22	113.50	Chloroform Monitoring Well/Nitrate Pumping Well

Well Location	Total Depth	Purpose
TW4-23	113.50	Chloroform Monitoring Well
TW4-24	113.50	Chloroform Monitoring Well/Nitrate Pumping Well
TW4-25	134.80	Chloroform Monitoring Well/Nitrate Pumping Well
TW4-26	86.00	Chloroform Monitoring Well
TW4-27	96.00	Chloroform Monitoring Well
TW4-28	105.00	Chloroform Monitoring Well
TW4-29	91.00	Chloroform Monitoring Well
TW4-30	90.00	Chloroform Monitoring Well
TW4-31	104.00	Chloroform Monitoring Well
TW4-32	113.00	Chloroform Monitoring Well
TW4-33	84.70	Chloroform Monitoring Well
TW4-34	94.00	Chloroform Monitoring Well
TW4-35	Installation in Progress	Chloroform Monitoring Well
TW4-36	Installation in Progress	Chloroform Monitoring Well

Table 1.2-2

Nitrate Monitoring Wells (Depth and Purpose)

Well Location	Total Depth	Purpose
TWN-1	112.50	Nitrate Monitoring Well
TWN-2	95.00	Nitrate Pumping Well
TWN-3	110.00	Nitrate Monitoring Well
TWN-4	136.00	Nitrate Monitoring Well
TWN-5	155.00	Abandoned
TWN-6	135.00	Water Level Monitoring Well
TWN-7	120.00	Nitrate Monitoring Well
TWN-8	160.00	Abandoned
TWN-9	102.50	Abandoned
TWN-10	107.50	Abandoned
TWN-11	147.50	Abandoned
TWN-12	115.00	Abandoned
TWN-13	120.00	Abandoned
TWN-14	135.00	Water Level Monitoring Well
TWN-15	155.00	Abandoned
TWN-16	100.00	Water Level Monitoring Well
TWN-17	100.00	Abandoned
TWN-18	100.00	Nitrate Monitoring Well
TWN-19	110.00	Water Level Monitoring Well

Table 2.4-1

Permit Monitoring Wells (Depth and Purpose)

Well Location	Total Depth	Purpose
MW-1	115.00	Semi-Annual Groundwater Compliance
MW-2	125.00	Semi-Annual Groundwater Compliance
MW-3	96.00	Semi-Annual Groundwater Compliance
MW-3A	95.00	Semi-Annual Groundwater Compliance
MW-4	122.00	No Longer Included In Groundwater Program
MW-5	138.50	Semi-Annual Groundwater Compliance
MW-11	135.00	Quarterly Groundwater Compliance
MW-12	129.00	Semi-Annual Groundwater Compliance
MW-14	127.00	Quarterly Groundwater Compliance
MW-15	134.00	Semi-Annual Groundwater Compliance
MW-17	110.00	Semi-Annual Groundwater Compliance
MW-18	148.50	Semi-Annual Groundwater Compliance
MW-19	149.00	Semi-Annual Groundwater Compliance
MW-20	114.50	Semi-Annual Groundwater Monitoring
MW-22	140.00	Semi-Annual Groundwater Monitoring
MW-23	129.00	Semi-Annual Groundwater Compliance
MW-24	119.90	Semi-Annual Groundwater Compliance
MW-25	115.10	Quarterly Groundwater Compliance
MW-26	121.33	Quarterly Groundwater Compliance
MW-27	91.00	Semi-Annual Groundwater Compliance
MW-28	106.00	Semi-Annual Groundwater Compliance
MW-29	125.00	Semi-Annual Groundwater Compliance

MW-30	107.00	Quarterly Groundwater Compliance
MW-31	129.00	Quarterly Groundwater Compliance
MW-32	133.70	Semi-Annual Groundwater Compliance
MW-33	103.50	Dry, Not sampled
MW-34	109.00	Water Level Monitoring only
MW-35[1]	123.60	Quarterly Groundwater for Background
MW-36[1]	119.90	Quarterly Groundwater for Background
MW-37[1]	120.20	Quarterly Groundwater for Background

Notes:

1 – The Background Report for MW-35, MW-36, and MW-37 was submitted on May 1, 2014. These wells will continued to be sampled quarterly until such a time that the Background Report is approved.

Table 2.5.2.1-1
Water Quality of Entrana/Navajo Aquifer in the Mill Vicinity

Parameter	FES, Test Well (G2R) (1/27/77 - 3/23/78[1])	Well #2 6/01/99[1]	Well #5 6/08/99[1]
Field Specific Conductivity (umhos/cm)	310 to 400		
Field pH	6.9 to 7.6		
Temperature (°C)	11 to 22		
Estimated Flow m/hr (gpm)	109(20)		
pH	7.9 to 8.16		
Determination, mg/liter			
TDS (@180°C)	216 to 1110		
Redox Potential	211 to 220		
Alkalinity (as $CaCOS_3$)	180 to 224		
Hardness, total (as $CaCO_3$)	177 to 208		
Bicarbonate		226	214
Carbonate (as CO_3)	0.0	<1.0	<1.0
Aluminum		0.003	0.058
Aluminum, dissolved	<0.1		
Ammonia (as N)	0.0 to 0.16	<0.05	<0.05
Antimony		<0.001	<0.001
Arsenic, total	.007 to 0.014	0.018	<0.001
Barium, total	0.0 to 0.15	0.119	0.005
Beryllium		<0.001	<0.001
Boron, total	<0.1 to 0.11		
Cadmium, total	<0.005 to 0.0	<0.001	0.018
Calcium		50.6	39.8
Calcium, dissolved	51 to 112		
Chloride	0.0 to 50	<1.0	2.3
Sodium		7.3	9.8
Sodium, dissolved	5.3 to 23		
Silver		<0.001	<0.001
Silver, dissolved	<0.002 to 0.0		
Sulfate		28.8	23.6
Sulfate, dissolved (as SO_4)	17 to 83		
Vanadium		0.003	0.003
Vanadium, dissolved	<.002 to 0.16		
Manganese		0.011	0.032
Manganese, dissolved	0.03 to 0.020		
Chromium, total	0.02 to 0.0	0.005	0.005
Copper, total	0.005 to 0.0	0.002	0.086
Fluoride		0.18	0.18
Fluoride, dissolved	0.1 to 0.22		
Iron, total	0.35 to 2.1	0.43	0.20
Iron, dissolved	0.30 to 2.3		
Lead, total	0.02 - 0.0	<0.001	0.018
Magnesium		20.4	21.3
Magnesium, dissolved	15 to 21		

[1] Zero values (0.0) are below detection limits.

Parameter	FES, Test Well (G2R) (1/27/77 - 3/23/78[1])	Well #2 6/01/99[1]	Well #5 6/08/99[1]
Molybdenum, dissolved	0.004 to 0.010		
Nickel		<0.001	0.004
Nitrate + Nitrate as N		<0.10	<0.10
Nitrate (as N)	<.05 to 0.12		
Phosphorus, total (as P)	<0.01 to 0.03		
Potassium		3.1	3.3
Potassium, dissolved	2.4 to 3.2		
Selenium		<0.001	<0.001
Selenium, dissolved	<.005 to 0.0		
Silica, dissolved (as SiO_2)	5.8 to 12		
Strontium, total	0.5 to 0.67		
Thallium		<0.001	<0.001
Uranium, total (as U)	<.002 to 0.16	0.0007	0.0042
Uranium, dissolved (as U)	<.002 to 0.031		
Zinc		0.010	0.126
Zinc, dissolved	0.007 to 0.39		
Total Organic Carbon	1.1 to 16		
Chemical Oxygen Demand	<1 to 66		
Oil and Grease	1		
Total Suspended Solids	6 to 1940	<1.0	10.4
Turbidity		5.56	19.1
Determination (pCi/liter)			
Gross Alpha			<1.0
Gross Alpha ± precision	1.6±1.3 to 10.2±2.6		
Gross Beta			<2.0
Gross Beta ± precision	8±8 to 73±19		
Radium 226 ± precision			0.3±0.2
Radium 228			<1.0
Ra–226 ± precision	0.1±.3 to 0.6±0.4		
Th–230 ± precision	0.1±0.4 to 0.7±2.7		
Pb–210 ± precision	0.0±4.0 to 1.0±2.0		
Po–210 ± precision	0.0±0.3 to 0.0±0.8		

Source: Adapted from FES Table 2.25 with additional Mill sampling data

Table 2.5.3-1
Results of Quarterly Sampling
Ruin Spring (2003-2004)

Parameter	Ruin Spring							
	Q1-03	Q2-03	Q3-03	Q4-3	Q1-04	Q2-04	Q3-04	Q4-04
Major Ions (mg/L)								
Alkalinity	-	-	196	198	193	191	195	183
Carbon Dioxide	-	-	ND	ND	ND	ND	12	ND
Carbonate	-	-	ND	ND	ND	ND	ND	ND
Bicarbonate	-	-	239	241	235	232	238	223
Hydroxide	-		ND	ND	ND	ND	ND	ND
Calcium	153	156	149	158	158	162	176	186
Chloride	28.1	21.5	27.4	28.0	29.3	28.5	26	25
Fluoride	-	-	ND	0.5	0.5	0.6	0.6	0.6
Magnesium	34.8	34.2	31.7	34.2	35.8	35.1	37.1	38.6
Nitrogen, Ammonia As N	ND	ND	ND	ND	ND	0.06	ND	0.06
Nitrogen, Nitrate+Nitrite as N	1.6	1.5	1.4	1.4	1.73	1.85	1.34	1.7
Phosphorous	0.10	ND	-	ND	ND	ND	ND	ND
Potassium	2.6	3.3	3.3	3.9	3.4	3.6	4.0	3.7
Sodium	110	105	103	113	104	110	113	116
Sulfate	503	501	495	506	539	468	544	613
Physical Properties								
Conductivity (umhos/cm)	-	-	1440	1410	1390	1440	1320	1570
pH	-	-	7.91	7.98	-	-		-
TDS (mg/L)	-	-	1040	1000	1050	1110	1050	1070
TSS (mg/L)	-	-	13.5	ND	ND	ND	ND	ND
Turbidity (NTU)	-	-	0.16	0.13	ND	0.12	-	-
Metals-Dissolved (mg/L)								
Aluminum	ND	ND	0.40	ND	ND	ND	ND	ND
Antimony	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	0.001	ND	ND	0.001	ND	ND	ND	ND
Barium	ND	ND	ND	ND	ND	ND	ND	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	ND	ND	ND	ND	ND	ND	ND	ND
Copper	ND	ND	0.082	ND	ND	ND	ND	ND
Iron	ND	ND	ND	ND	ND	ND	ND	ND
Lead	ND	ND	ND	ND	ND	ND	ND	ND
Manganese	ND	ND	ND	ND	ND	ND	ND	ND
Mercury	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	0.013	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Silver	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ND	ND	ND	ND	ND	ND	ND	ND
Uranium	0.009	0.011	0.010	0.010	0.011	0.011	0.009	0.010
Vanadium	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	0.014	ND	ND	ND	ND	ND	ND	ND
Radionuclides (pCi/L)								
Gross Alpha Minus Rn & U	-	-	-	-	ND	ND	1.4	ND
Lead 210	42	ND	ND	ND	ND	ND	ND	ND
Radium 226	0.3	ND	0.3	ND	ND	ND	1.3	ND
Thorium 230	0.3	0.2	0.5	ND	ND	ND	0.4	ND
Thorium 232	-	-	ND	ND	ND	ND	ND	-
Thorium 228	-	-	ND	ND	ND	ND	-	-

Table 2.5.3-2
Results of Annual Sampling
Ruin Spring (2009-2013)

Ruin Spring								
Constituent	2009	2010	2011 - May	2011 - July	2012	2013	Range of Average Historic Values for Monitoring Wells [1]*	Ave 2003-2004[2]
Major Ions (mg/l)								
Carbonate	<1	<1	<1	1	<1	<1	--	--
Bicarbonate	233	254	241	239	237	208	--	--
Calcium	151	136	145	148	147	149	--	--
Chloride	28	23	25	44	28	26.3	ND - 213	27
Fluoride	0.5	0.53	0.45	0.5	0.52	0.538	ND - 1.3	0.6
Magnesium	32.3	29.7	30.6	31.1	31.9	32.1	--	--
Nitrogen-Ammonia	0.09	<0.05	ND	<0.05	<0.05	<0.05	--	--
Nitrogen-Nitrate	1.4	1.7	1.7	1.6	1.6	1.56	--	--
Potassium	3.3	3.07	3.2	3.3	3.5	3.46	--	--
Sodium	104	93.4	110	111	115	118	--	--
Sulfate	528	447	486	484	464	553	ND - 3455	521
TDS	1010	903	942	905	1000	952	1019 - 5548	1053
Metals (ug/l)								
Arsenic	<5	<5	<5	<5	<5	<5	--	--
Beryllium	< 0.5	< 0.5	< 0.5	< 0.5	<0.5	<0.5	--	--
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND - 4.78	0.01
Chromium	<25	<25	<25	<25	<25	<25	--	--
Cobalt	<10	<10	<10	<10	<10	<10	--	--
Copper	<10	<10	<10	<10	<10	<10	--	--
Iron	<30	<30	<30	<30	<30	<30	ND - 7942	25
Lead	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Manganese	<10	<10	<10	<10	<10	<10	ND - 34,550	5
Mercury	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	--
Molybdenum	17	17	16	17	16	16.1	--	--
Nickel	<20	<20	<20	<20	<20	<20	ND - 61	0.05
Selenium	12.2	10	11.8	10.2	10.8	10.2	ND - 106.5	12.1
Silver	<10	<10	<10	<10	<10	<10	--	--
Thallium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	--
Tin	<100	<100	<100	<100	<100	<100	--	--
Uranium	9.11	8.47	9.35	8.63	8.68	9.12	ND - 59.8	10
Vanadium	<15	<15	<15	<15	<15	<15	--	--
Zinc	<10	<10	<10	<10	<10	<10	--	--

Radiologics (pCi/l)								
Gross Alpha	<0.2	<0.2	<-0.3	<-0.05	<-0.09	<1.0	ND - 36	0.28
VOCS (ug/L)								
Acetone	<20	<20	<20	<20	<20	<20	--	--
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Carbon tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Chloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
MEK	<20	<20	<20	<20	<20	<20	--	--
Methylene Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Naphthalene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Tetrahydrofuran	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Xylenes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--

[1] From Figure 3, Table 10 and Appendix B of the *Revised Addendum, Background Groundwater Quality Report: New Wells for Denison Mines (USA) Corp's White Mesa Mill Site, San Juan County, Utah*, April 30, 2008, prepared by INTERA, Inc. and Table 16 and Appendix D of the *Revised Background Groundwater Quality Report: Existing Wells for Denison Mines (USA) Corp.'s White Mesa Uranium Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc.

[2] From Figure 9 of the *Revised Addendum, Evaluation of Available Pre-Operational and Regional Background Data, Background Groundwater Quality Report: Existing Wells for Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan Couinty, Utah*, November 16, 2007, prepared by INTERA, Inc.

*Range of average historic values for On-Site Monitoring Wells as reported on April 30, 2008 (MW-1, MW-2, MW-3, MW-3A, MW-4, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-20, MW-22, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, MW-31 and MW-32)[2]

Table 2.5.3-3
Results of Annual Sampling
Cottonwood Seep (2009-2013)

Cottonwood Seep								
Constituent	2009	2010	2011 - May	2011 - July	2012	2013	Range of Average Historic Values for Monitoring Wells[1]*	Ave 1977 - 1982 [1]
Major Ions (mg/l)								
Carbonate	<1	<1	<1	6	<1	<1	--	--
Bicarbonate	316	340	330	316	326	280	--	--
Calcium	90.3	92.2	95.4	94.2	101	87.9	--	--
Chloride	124	112	113	134	149	118	ND - 213	31
Fluoride	0.4	0.38	0.34	0.38	0.38	0.417	ND - 1.3	0.8
Magnesium	25	24.8	25.2	25.2	27.7	23.6	--	--
Nitrogen-Ammonia	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
Nitrogen-Nitrate	0.1	<0.1	0.1	<0.1	<0.1	<0.1	--	--
Potassium	5.7	5.77	6	5.9	6.2	5.53	--	--
Sodium	205	214	229	227	247	217	--	--
Sulfate	383	389	394	389	256	403	ND - 3455	230
TDS	1010	900	1030	978	1040	996	1019 - 5548	811
Metals (ug/l)								
Arsenic	<5	<5	<5	<5	<5	<5	--	--
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	--
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND - 4.78	--
Chromium	<25	<25	<25	<25	<25	<25	--	--
Cobalt	<10	<10	<10	<10	<10	<10	--	--
Copper	<10	<10	<10	<10	<10	<10	--	--
Iron	<30	<30	53	<30	<30	<30	ND - 7942	150
Lead	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Manganese	<10	<10	<10	<10	<10	<10	ND - 34,550	580
Mercury	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	--
Molybdenum	<10	<10	<10	<10	<10	<10	--	--
Nickel	<20	<20	<20	<20	<20	<20	ND - 61	--
Selenium	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	ND - 106.5	--
Silver	<10	<10	<10	<10	<10	<10	--	--
Thallium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	--
Tin	<100	<100	<100	<100	<100	<100	--	--
Uranium	8.42	8.24	7.87	8.68	8.17	8.95	ND - 59.8	--
Vanadium	<15	<15	<15	<15	<15	<15	--	--
Zinc	<10	<10	<10	<10	<10	<10	--	--

Radiologics (pCi/l)								
Gross Alpha	<0.2	<0.2	<0.1	<-0.1	<-0.2	<1.0	ND - 36	7.2
VOCS (ug/L)								
Acetone	<20	<20	<20	<20	<20	<20	--	--
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Carbon tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Chloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
MEK	<20	<20	<20	<20	<20	<20	--	--
Methylene Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Naphthalene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Tetrahydrofuran	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--
Xylenes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--

[1] From Figure 3, Table 10 and Appendix B of the *Revised Addendum, Background Groundwater Quality Report: New Wells for Denison Mines (USA) Corp's White Mesa Mill Site, San Juan County, Utah*, April 30, 2008, prepared by INTERA, Inc. and Table 16 and Appendix D of the *Revised Background Groundwater Quality Report: Existing Wells for Denison Mines (USA) Corp.'s White Mesa Uranium Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc.

*Range of average historic values for On-Site Monitoring Wells as reported on April 30, 2008 (MW-1, MW-2, MW-3, MW-3A, MW-4, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-20, MW-22, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, MW-31 and MW-32)

Table 2.5.3-4
Results of Annual Sampling
Westwater Seep (2009-2013)

Westwater Seep							
Constituent	**2009**	**2010**	**2011 - May**	**2011 - July**	**2012**	**2013**	**Range of Average Historic Values for Monitoring Wells[1] ***
Major Ions (mg/l)							
Carbonate	<1	<1	<1	Not Sampled - Dry	Not Sampled - Dry	Not Sampled - Dry	--
Bicarbonate	465	450	371				--
Calcium	191	179	247				--
Chloride	41	40	21				ND - 213
Fluoride	0.7	0.6	0.54				ND - 1.3
Magnesium	45.9	44.7	34.7				--
Nitrogen-Ammonia	<0.05	0.5	0.06				--
Nitrogen-Nitrate	0.8	<0.1	<0.1				--
Potassium	1.19	6.57	3.9				--
Sodium	196	160	112				--
Sulfate	646	607	354				ND - 3455
pH (s.u.)	8.01	7.38	7.2				6.7 - 8.9
TDS	1370	1270	853				1019 - 5548
Metals (ug/l)							
Arsenic	<5	<5	12.3	Not Sampled - Dry	Not Sampled - Dry	Not Sampled - Dry	--
Beryllium	<0.5	<0.5	0.91				--
Cadmium	<0.5	<0.5	0.9				ND - 4.78
Chromium	<25	<25	<25				--
Cobalt	<10	<10	<10				--
Copper	<10	<10	16				--
Iron	89	56	4540				ND - 7942
Lead	<1.0	<1.0	41.4				--
Manganese	37	87	268				ND - 34,550
Mercury	<0.5	<0.5	<0.5				--
Molybdenum	29	29	<10				--
Nickel	<20	<20	29				ND - 61
Selenium	<5.0	<5.0	<5.0				ND - 106.5
Silver	<10	<10	<10				--
Thallium	<0.5	<0.5	<0.5				--
Tin	<100	<100	<100				--
Uranium	15.1	46.6	6.64				ND - 59.8
Vanadium	<15	<15	34				--
Zinc	<10	<10	28				--

Radiologics (pCi/l)							
Gross Alpha	< -0.1	<0.3	0.5	Not Sampled - Dry	Not Sampled - Dry	Not Sampled - Dry	ND - 36
VOCS (ug/L)							
Acetone	<20	<20	ND	Not Sampled - Dry	Not Sampled - Dry	Not Sampled - Dry	--
Benzene	<1.0	<1.0	ND				--
Carbon tetrachloride	<1.0	<1.0	ND				--
Chloroform	<1.0	<1.0	ND				--
Chloromethane	<1.0	<1.0	ND				--
MEK	<20	<20	ND				--
Methylene Chloride	<1.0	<1.0	ND				--
Naphthalene	<1.0	<1.0	ND				--
Tetrahydrofuran	<1.0	<1.0	ND				--
Toluene	<1.0	<1.0	ND				--
Xylenes	<1.0	<1.0	ND				--

[1] From Figure 3, Table 10 and Appendix B of the *Revised Addendum, Background Groundwater Quality Report: New Wells for Denison Mines (USA) Corp's White Mesa Mill Site, San Juan County, Utah*, April 30, 2008, prepared by INTERA, Inc. and Table 16 and Appendix D of the *Revised Background Groundwater Quality Report: Existing Wells for Denison Mines (USA) Corp.'s White Mesa Uranium Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc.

*Range of average historic values for On-Site Monitoring Wells as reported on April 30, 2008 (MW-1, MW-2, MW-3, MW-3A, MW-4, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-20, MW-22, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, MW-31 and MW-32)

Table 2.5.3-5
Results of Annual Sampling
Entrance Spring (2009-2013)

Entrance Spring							
Constituent	**2009**	**2010**	**2011 - May**	**2011 - July**	**2012**	**2013**	**Range of Average Historic Values for Monitoring Wells[1] ***
Major Ions (mg/l)							
Carbonate	<1	<1	<1	7	<1	<1	--
Bicarbonate	292	332	270	299	298	292	--
Calcium	90.8	96.5	88.8	96.6	105	121	--
Chloride	60	63	49	64	78	139	ND - 213
Fluoride	0.7	0.73	0.58	0.58	0.64	0.71	ND - 1.3
Magnesium	26.6	28.9	26.4	28.4	32.7	43	--
Nitrogen-Ammonia	0.28	<0.05	<0.05	0.32	<0.05	<0.05	--
Nitrogen-Nitrate	1.4	1	1.4	0.5	2.8	2.06	--
Potassium	2.4	2.74	2.6	2.9	2	3.83	--
Sodium	61.4	62.7	62.5	68.6	77.4	127	--
Sulfate	178	179	166	171	171	394	ND - 3455
TDS	605	661	571	582	660	828	1019 - 5548
Metals (ug/l)							
Arsenic	<5	<5	<5	<5	<5	<5	--
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND - 4.78
Chromium	<25	<25	<25	<25	<25	<25	--
Cobalt	<10	<10	<10	<10	<10	<10	--
Copper	<10	<10	<10	<10	<10	<10	--
Iron	<30	<30	37	55	34	162	ND - 7942
Lead	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
Manganese	54	11	47	84	<10	259	ND - 34,550
Mercury	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
Molybdenum	<10	<10	<10	<10	<10	<10	--
Nickel	<20	<20	<20	<20	<20	<20	ND - 61
Selenium	12.1	9.2	13.1	5.5	13.2	11.2	ND - 106.5
Silver	<10	<10	<10	<10	<10	<10	--
Thallium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
Tin	<100	<100	<100	<100	<100	<100	--
Uranium	15.2	17.8	18.8	15.3	21.1	38.8	ND - 59.8
Vanadium	<15	<15	<15	<15	<15	<15	--
Zinc	<10	<10	<10	<10	<10	<10	--
Radiologics (pCi/l)							
Gross Alpha	0.9	<0.5	1.5	1.6	0.5	2.3	ND - 36

VOCS (ug/L)							
Acetone	<20	<20	<20	<20	<20	<20	--
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
Carbon tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
Chloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
MEK	<20	<20	<20	<20	<20	<20	--
Methylene Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
Naphthalene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
Tetrahydrofuran	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
Xylenes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--

[1] From Figure 3, Table 10 and Appendix B of the *Revised Addendum, Background Groundwater Quality Report: New Wells for Denison Mines (USA) Corp's White Mesa Mill Site, San Juan County, Utah*, April 30, 2008, prepared by INTERA, Inc. and Table 16 and Appendix D of the *Revised Background Groundwater Quality Report: Existing Wells for Denison Mines (USA) Corp.'s White Mesa Uranium Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc.

*Range of average historic values for On-Site Monitoring Wells as reported on April 30, 2008 (MW-1, MW-2, MW-3, MW-3A, MW-4, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-20, MW-22, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, MW-31 and MW-32)

Table 2.9.1.3-1
Groundwater Monitoring Constituents Listed in Table 2 of the Permit

Nutrients:
Ammonia (as N)
Nitrate & Nitrite (as N)

Heavy Metals:
Arsenic
Beryllium
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Mercury
Molybdenum
Nickel
Selenium
Silver
Thallium
Tin
Uranium
Vanadium
Zinc

Radiologics:
Gross Alpha

Volatile Organic Compounds:
Acetone
Benzene
2-Butanone (MEK)
Carbon Tetrachloride
Chloroform
Chloromethane
Dichloromethane
Naphthalene
Tetrahydrofuran
Toluene
Xylenes (total)

Others:
Field pH (S.U.)
Fluoride
Chloride
Sulfate
TDS

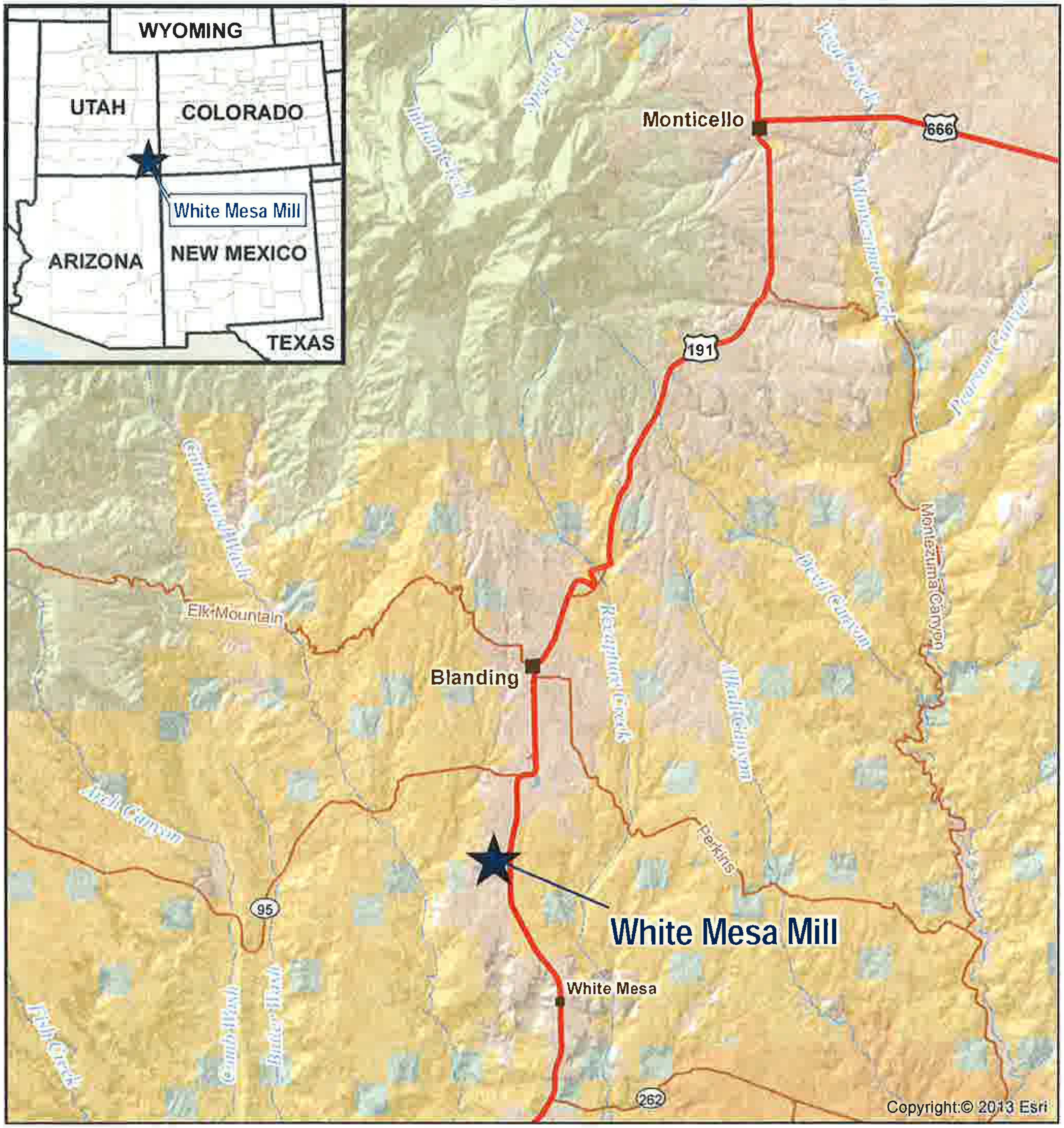
Table 2.11.2-1					
Plan & Time Schedule and Source Assessment Report Status					
Plan and Time Schedule (P&TS) Date	Monitoring Periods Covered	DRC P&TS Approval Date	SAR Date	SAR Approval Date	Constituents
6/13/2011	Q1, Q2, Q3, Q4 of 2010, Q1 of 2011	7/12/2012	10/10/2012	4/25/2013	Multiple
9/7/2011	Q2 2011	7/12/2012	10/10/2012	4/25/2013	Multiple
4/13/2012	Multiple	7/12/2012	pH report - 11/9/12 Pyrite Report - 12/7/12	4/25/2013	pH - multiple wells
12/13/2012	Q3 2012	2/4/2013	5/8/2013	7/23/2013	TDS - MW-29
3/15/2013	Q4 2012	5/30/2013	8/30/2013	9/17/2013	Se - MW-31
8/28/2013	Q1 2013	9/17/2013	12/17/2013	1/7/2014	THF-MW-01
9/20/2013	Q2 2013	10/16/2013	1/13/2014	3/10/2014	Gross Alpha - MW-32
12/5/2013	Q3 2013	12/18/2013	Submitted 3/19/14		SO4 - MW-01, TDS - MW-03A

Table 2.13.1-1
Drainage Areas of Mill Vicinity and Region

Basin Description	Drainage Area	
	sq. miles	km^2
Corral Creek at confluence with Recapture Creek	5.8	15.0
Westwater Creek at confluence with Cottonwood Wash	26.6	68.8
Cottonwood Wash at USGS Gauge west of project site	≈ 205	<531
Cottonwood Wash at confluence with San Juan River	≈ 332	<860
Recapture Creek at USGS gauge	3.8	9.8
Recapture Creek at confluence with San Juan River	≈ 200	<518
San Juan River at USGS gauge downstream at Bluff, Utah	≈ 23,000	<60,000

Source: Adapted from 1978 ER, Table 2.6-3

INDEX OF FIGURES



Legend

★ White Mesa Mill

■ Town

▪ Village

Highway

Road

Stream

Intermittent Stream

Public Land Ownership

- Private
- Tribal Land
- Bureau of Land Management
- Forest Service
- State Trust Land

1:300,000

3 1.5 0 3

MILES

N

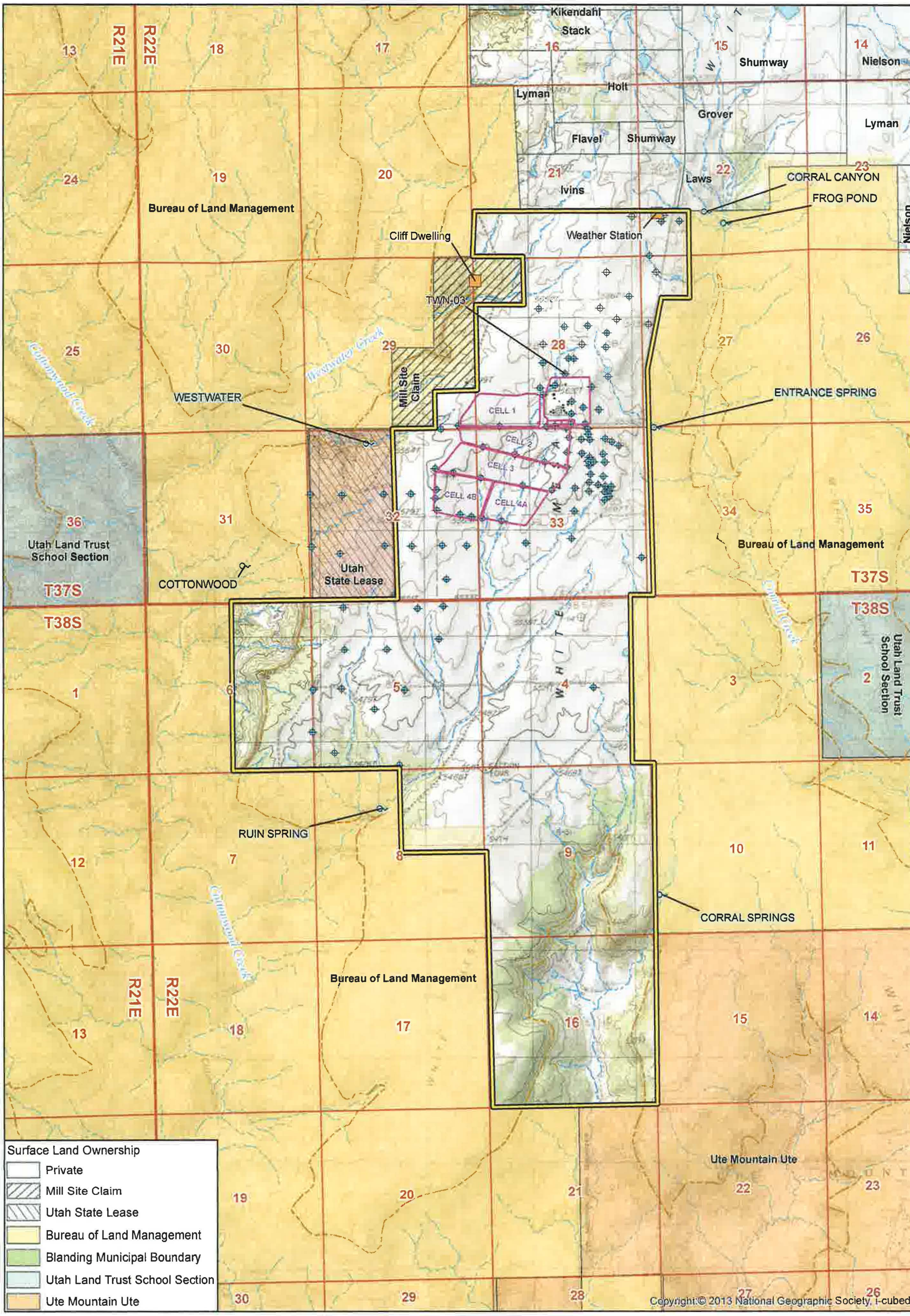
ENERGY FUELS

REVISIONS		Project: WHITE MESA MILL	
Date:	By:	County: San Juan	State: Utah
		Location: Portions of T37S R22E S28	
		FIGURE 1	
		WHITE MESA MILL LOCATION MAP	

Author: areither | Date: 5/20/2014 | Drafted By: areither

W:\USA\Utah\MILL\Mapping\GWDischargePermitApp\MillSiteLocation.mxd / 5/7/2014 4:55:14 PM by areither

W:\USA\Utah\MILL\Mapping\GWDischargePermitApp\LandOwnershipMap.mxd / 6/2/2014 10:28:23 AM by mhenington



Legend

- Property Boundary
- Structures
- Seep or Spring
- Well
  - Active
  - Abandoned
- Township and Range
- Section
- Canyon Rim
- Pond
- Drainage

Coordinate System: NAD 1983
StatePlane Utah South FIPS 4303 Feet

1 IN = 3,000 FT

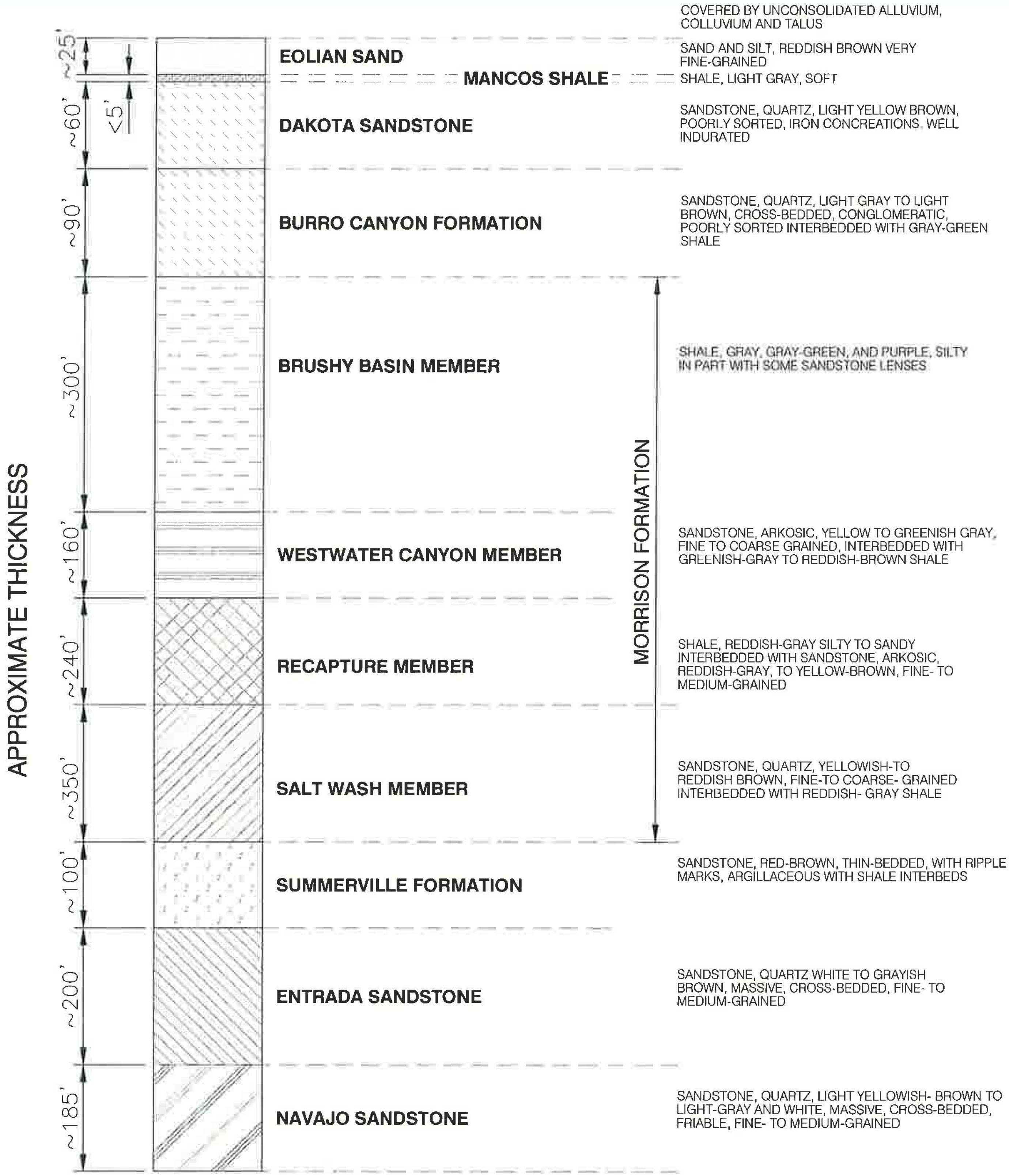
3,000 1,500 0 3,000

SCALE IN FEET

N

ENERGY FUELS

REVISIONS		Project: WHITE MESA MILL	
Date:	By:	County: San Juan	State: Utah
		Location: Portions of T37S R22E	
		FIGURE 2 WHITE MESA MILL LAND MAP	
		Author: mhenington	Date: 6/2/2014 Drafted By: mhenington



Energy Fuels

Energy Fuels Resources (USA) Inc.
225 Union Blvd. Suite 600
Lakewood, CO 80228

REVISIONS		WHITE MESA MILL	
Date	By	County: San Juan	State: Utah
5-14	DLS	Location:	

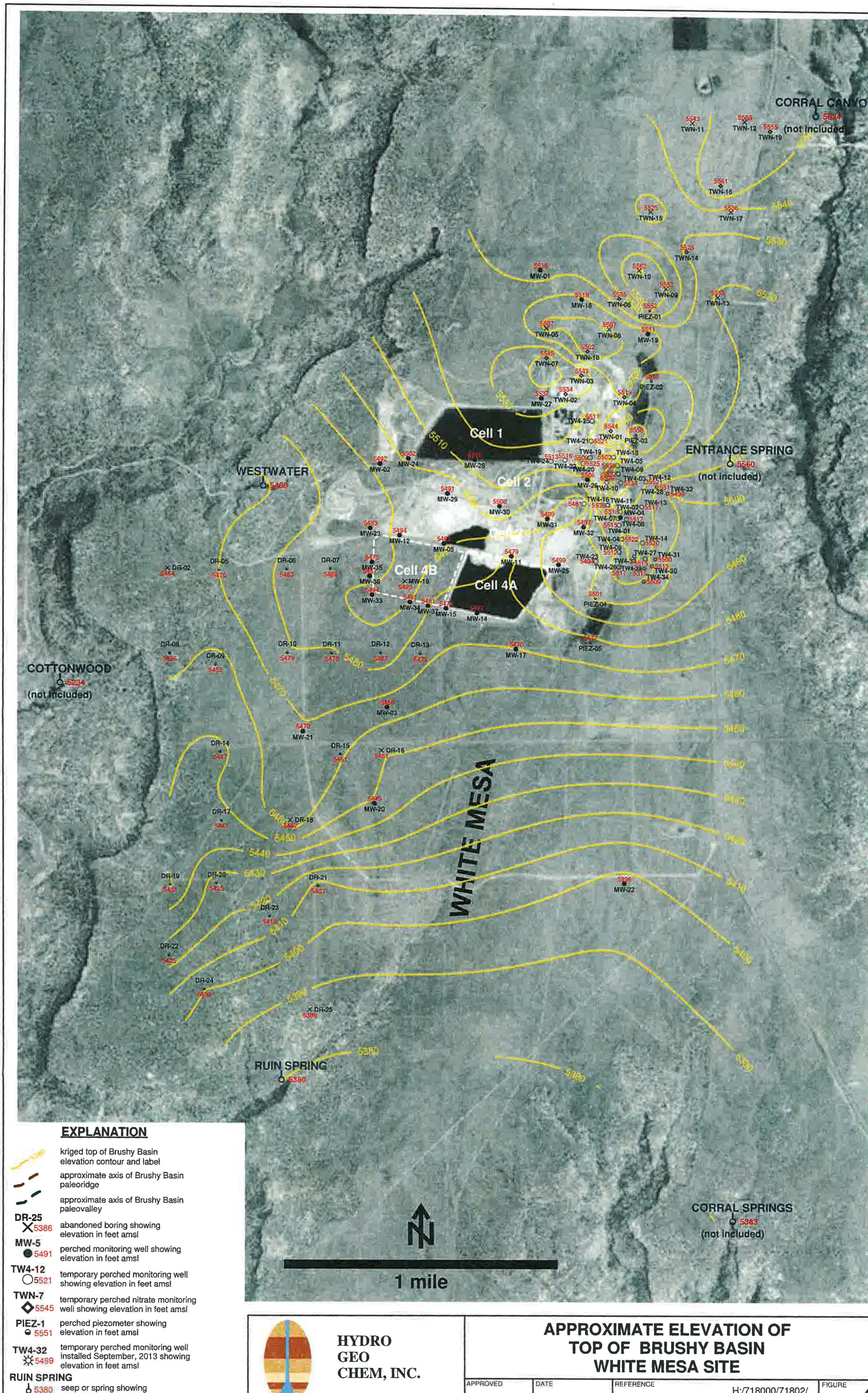
FIGURE 3

GENERALIZED STRATIGRAPHY OF WHITE MESA MILL

Scale: N/A | Date: Aug. 2009 | Drafted By: D.Sledd

Stratigraphy dwg Figure 3

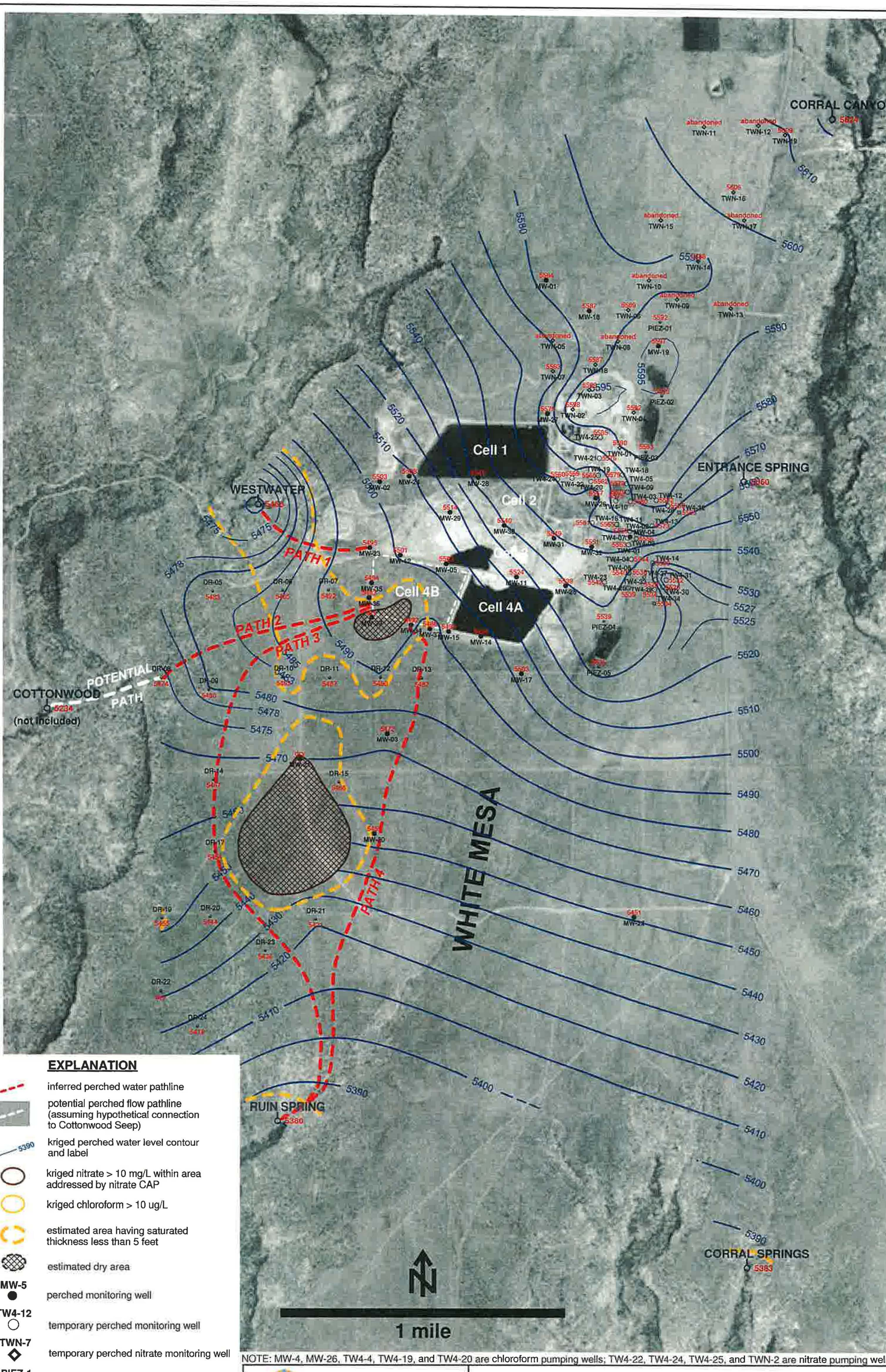
Taken from Stratigraphic Section near Water Well #3



HYDRO GEO CHEM, INC.

APPROXIMATE ELEVATION OF TOP OF BRUSHY BASIN WHITE MESA SITE

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/71802/ 2014_GWDP_renewal_app/Ubbel14rv.srf	4

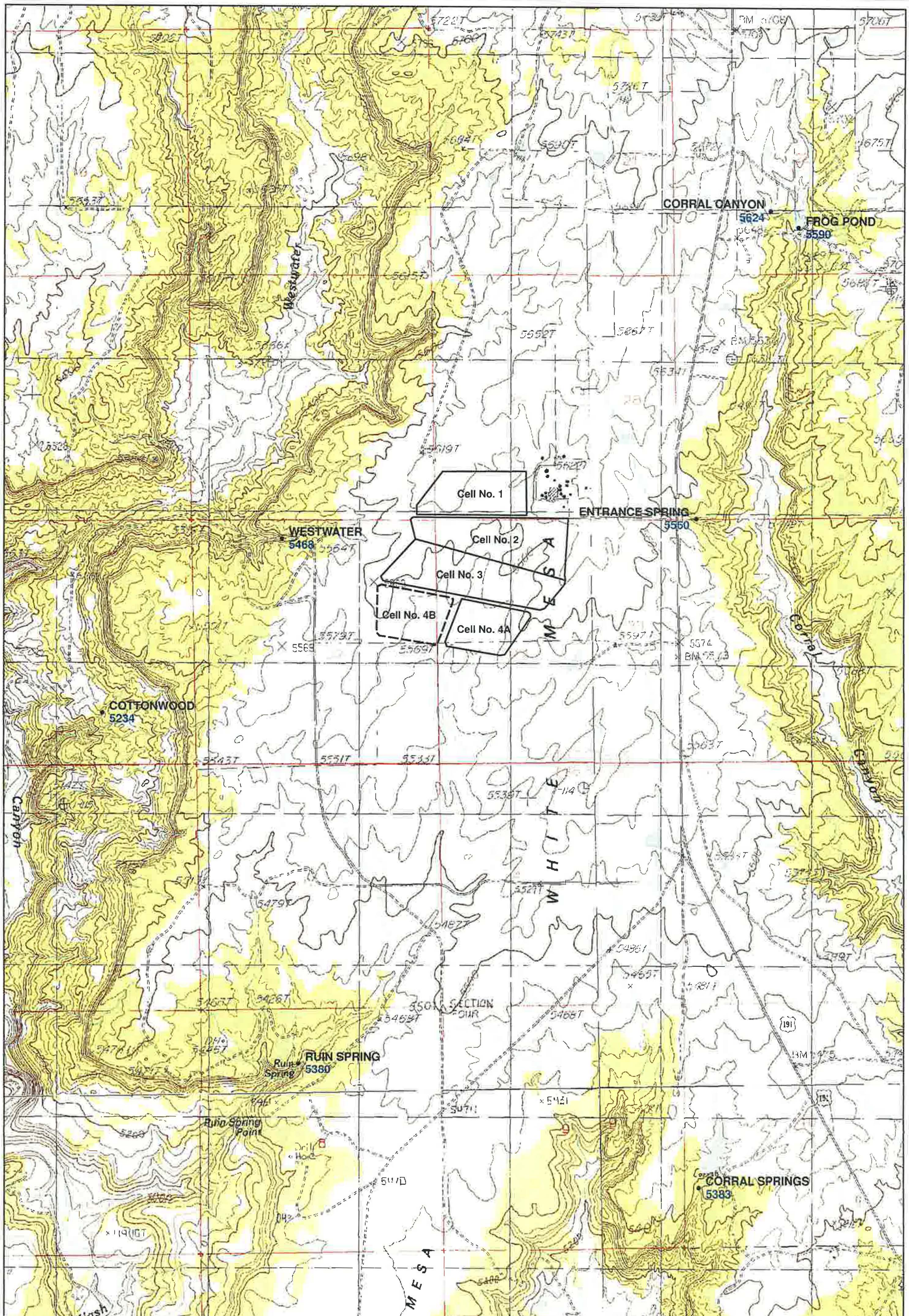


NOTE: MW-4, MW-26, TW4-4, TW4-19, and TW4-20 are chloroform pumping wells; TW4-22, TW4-24, TW4-25, and TWN-2 are nitrate pumping wells

HYDRO GEO CHEM, INC.

KRIGED 1st QUARTER, 2014 WATER LEVELS SHOWING INFERRED PERCHED WATER FLOW PATHS SOUTHWEST OF TAILINGS CELLS

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/71802/ 2014_GWDP_renewal_app/Uwl0314path.srf	5



0.5 0.25 0 0.5 1 Mile

● **WESTWATER** Seep or Spring
5468 Elevation (feet) above mean sea level

NORTH

HYDRO GEO CHEM, INC.

SEEPS AND SPRINGS ON USGS TOPOGRAPHIC BASE WHITE MESA

Approved	Date	Author	Date	File Name	Figure
SJS	09/17/10	DRS	07/16/10	7180002G	6

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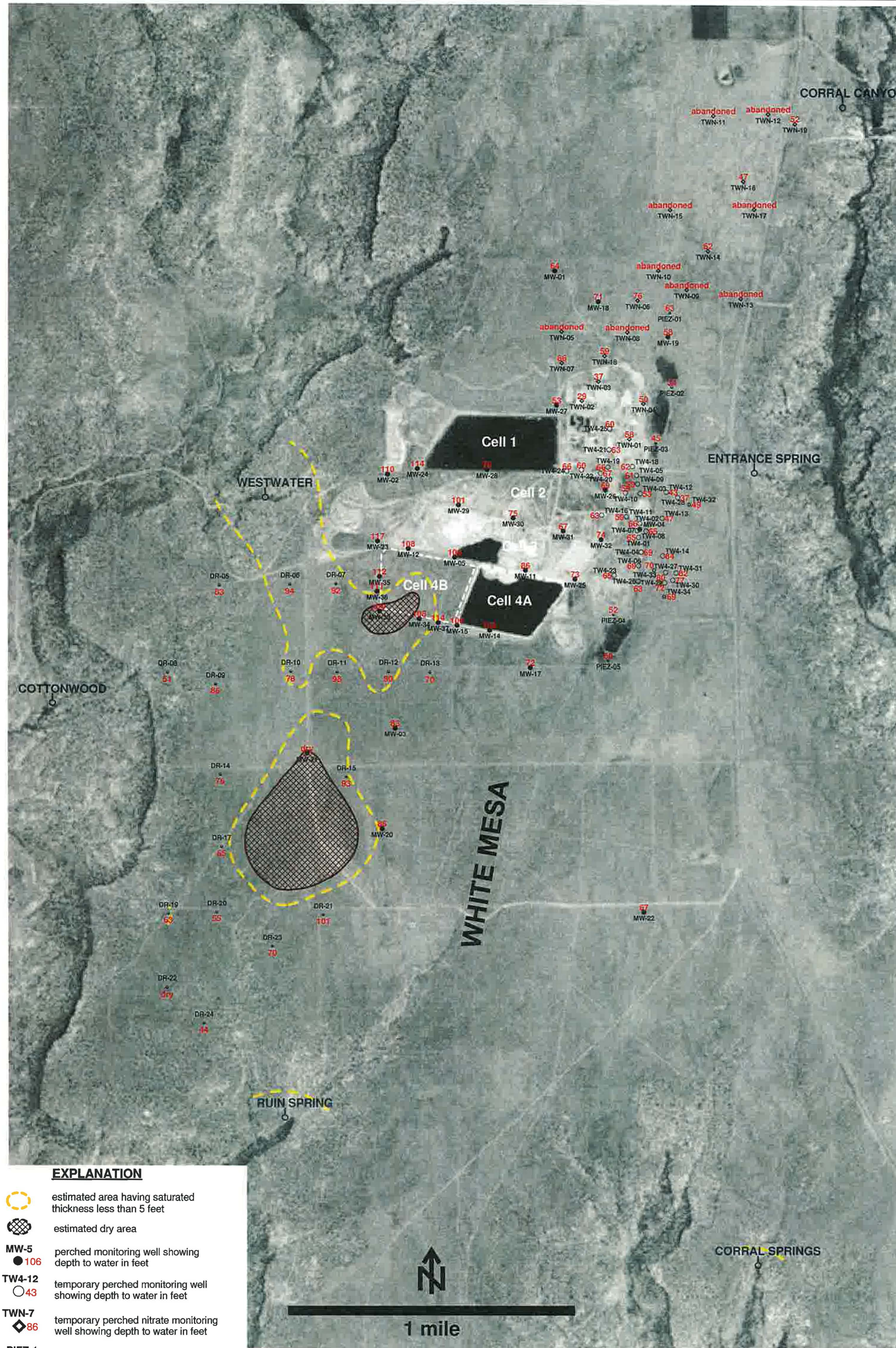


EXPLANATION

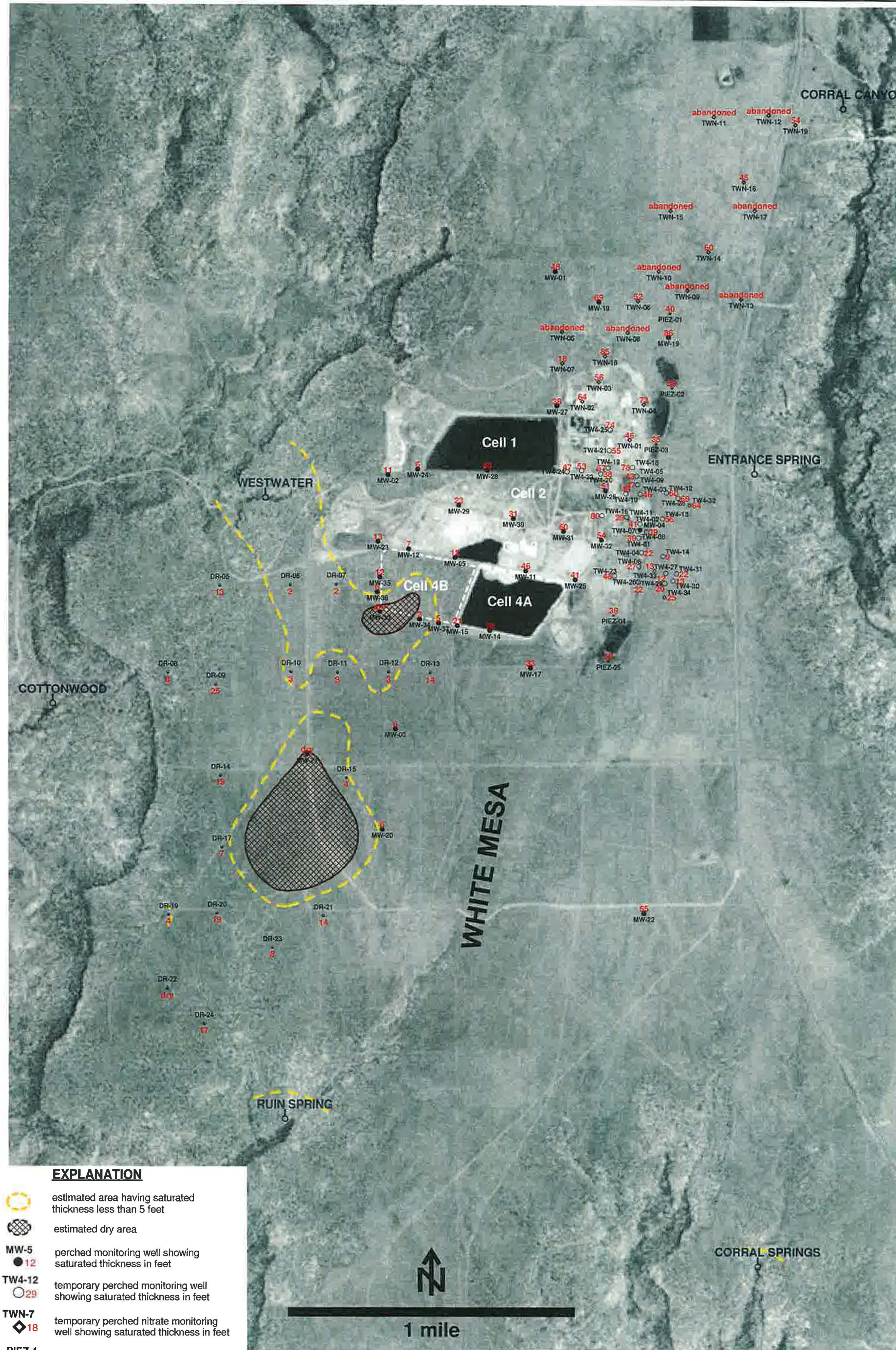
(yellow dashed outline)	estimated area having saturated thickness less than 5 feet
(cross-hatched)	estimated dry area
MW-5 ● 106	perched monitoring well showing depth to water in feet
TW4-12 ○ 43	temporary perched monitoring well showing depth to water in feet
TWN-7 ◆ 86	temporary perched nitrate monitoring well showing depth to water in feet
PIEZ-1 ◒ 63	perched piezometer showing depth to water in feet
TW4-32 ☼ 49	temporary perched monitoring well installed September, 2013 showing depth to water in feet
RUIN SPRING ♁	seep or spring

NOTE: MW-4, MW-26, TW4-4, TW4-19, and TW4-20 are chloroform pumping wells; TW4-22, TW4-24, TW4-25, and TWN-2 are nitrate pumping wells

HYDRO GEO CHEM, INC.

1st QUARTER, 2014 DEPTHS TO PERCHED WATER WHITE MESA SITE

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/71802/ 2014_GWDP_renewal_app/Udtw0314.srf	7



EXPLANATION

estimated area having saturated thickness less than 5 feet

estimated dry area

MW-5 ●12 perched monitoring well showing saturated thickness in feet

TW4-12 ○29 temporary perched monitoring well showing saturated thickness in feet

TWN-7 ◆18 temporary perched nitrate monitoring well showing saturated thickness in feet

PIEZ-1 40 perched piezometer showing saturated thickness in feet

TW4-32 64 temporary perched monitoring well installed September, 2013 showing saturated thickness in feet

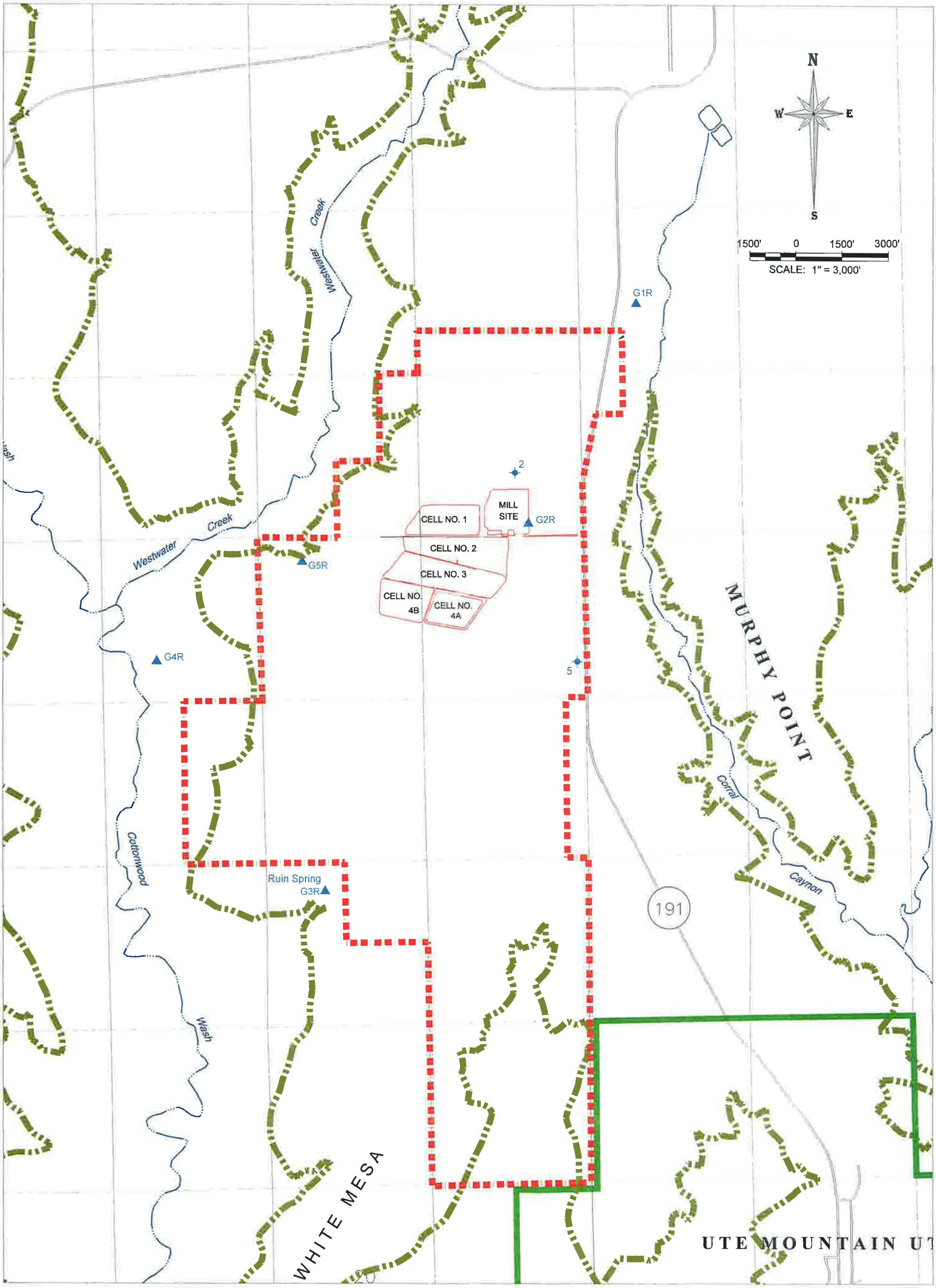
RUIN SPRING seep or spring

NOTE: MW-4, MW-26, TW4-4, TW4-19, and TW4-20 are chloroform pumping wells; TW4-22, TW4-24, TW4-25, and TWN-2 are nitrate pumping wells

HYDRO GEO CHEM, INC.

1st QUARTER, 2014 PERCHED ZONE SATURATED THICKNESSES WHITE MESA SITE

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/71802/ 2014_GWDP_renewal_app/Usat0314.srf	8



▲ G4R	GROUNDWATER (WELL OR SPRING) SAMPLING LOCATION
5	WATER SUPPLY WELL
(red dashed line)	PROPERTY BOUNDARY
(green line)	RESERVATION BOUNDARY
(green dash-dot line)	CANYON RIM

Energy Fuels

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Lakewood, CO 80228

REVISIONS

Date	By
5-14	DLS

WHITE MESA MILL

County: San Juan State: Utah

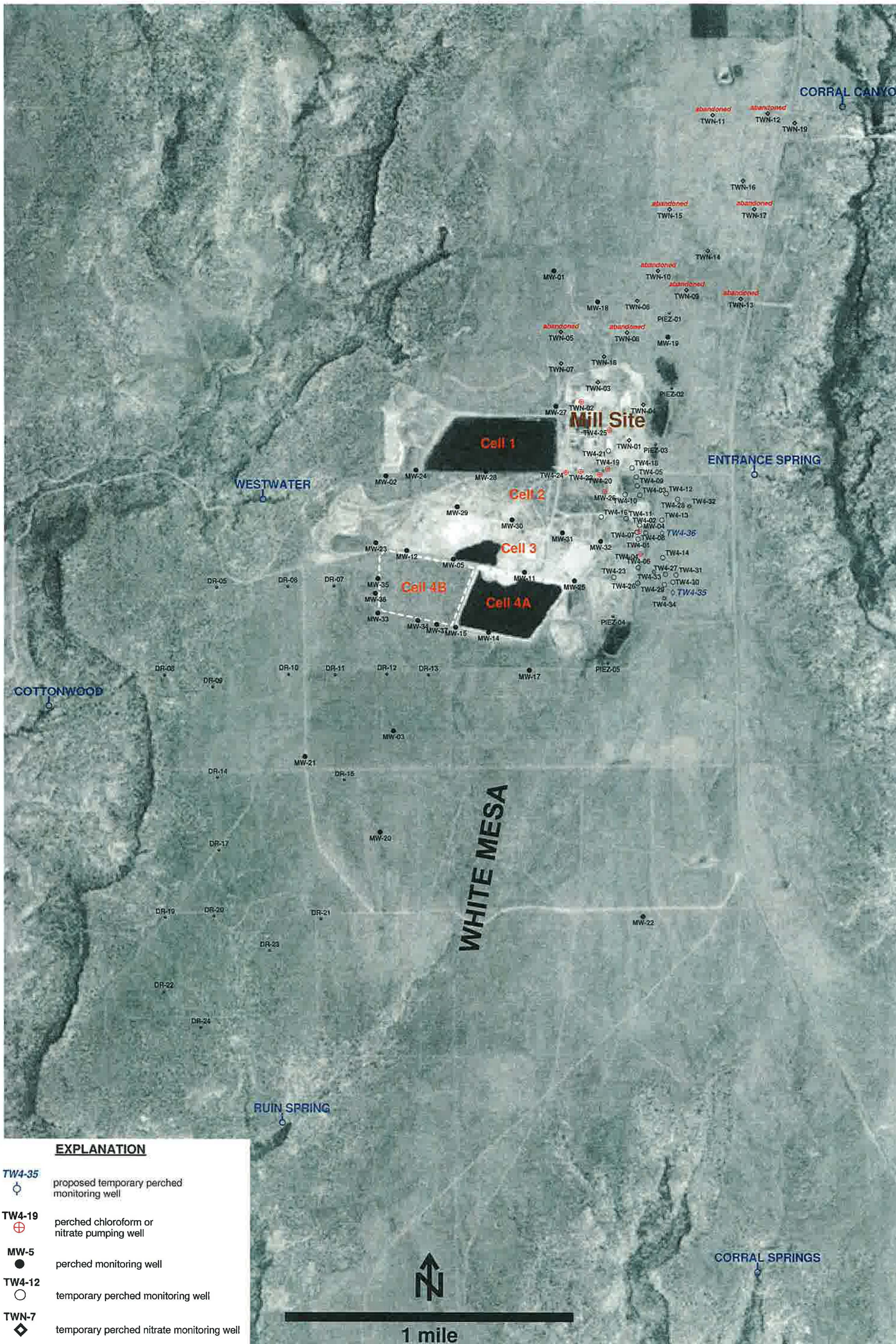
Location:

Figure 9

Groundwater (Well and Spring) Sampling Stations in the White Mesa Vicinity

Scale: 1"=3000' Date: Aug. 2009 Drafted By: D.Sledd

GW-Sampling W&S dwg Figure 9



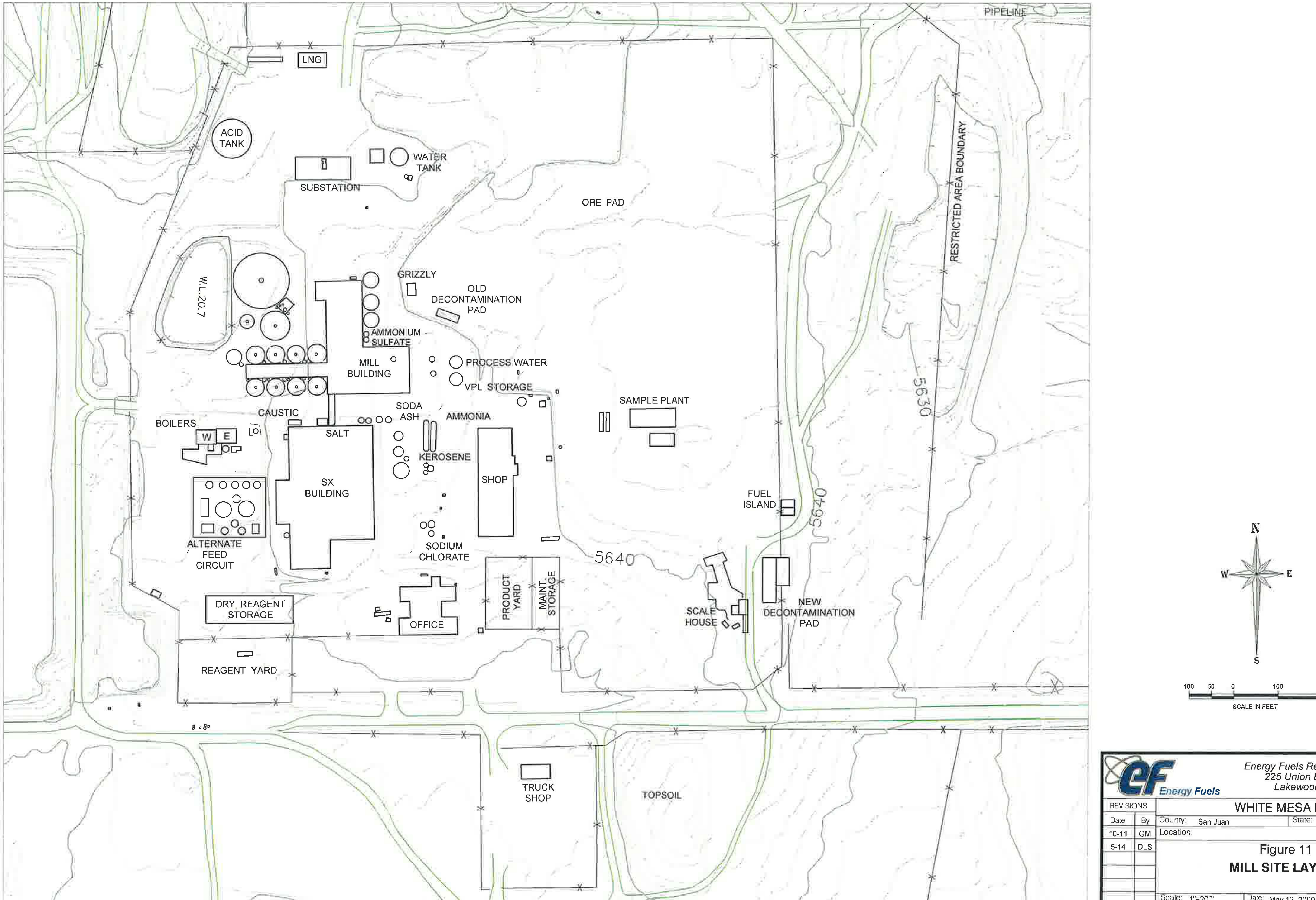
EXPLANATION

TW4-35	proposed temporary perched monitoring well
TW4-19	perched chloroform or nitrate pumping well
MW-5	perched monitoring well
TW4-12	temporary perched monitoring well
TWN-7	temporary perched nitrate monitoring well
PIEZ-1	perched piezometer
TW4-32	temporary perched monitoring well installed September, 2013
RUIN SPRING	seep or spring

HYDRO GEO CHEM, INC.

WHITE MESA MILL SITE PLAN SHOWING LOCATIONS OF PERCHED WELLS AND PIEZOMETERS

APPROVED	DATE	REFERENCE	FIGURE
		H:/718000/71802/ 2014_GWDP_renewal_app/Uwelloc14.srf	10



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REVISIONS		WHITE MESA MILL	
Date	By	County: San Juan	State: Utah
10-11	GM	Location:	
5-14	DLS		

Figure 11
MILL SITE LAYOUT

Scale: 1"=200' | Date: May 12, 2000 | Drafted By: D Sledd

Mill Site Layout dwg Figure 11

1 USGS GAUGE NO. 09376900

2 USGS GAUGE NO. 09378630

3 USGS GAUGE NO. 09378700

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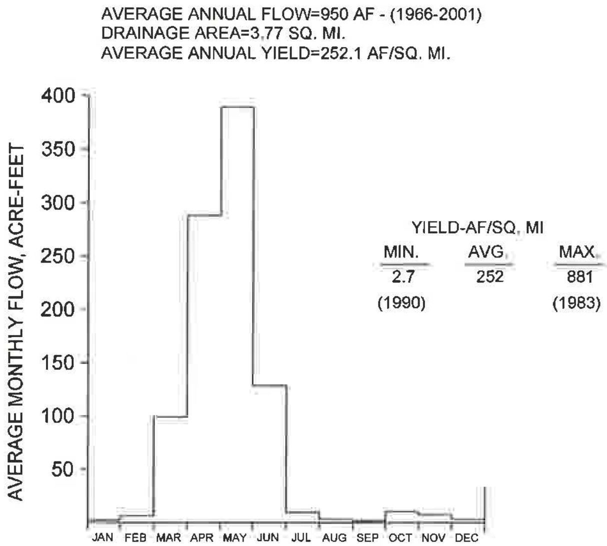
REVISIONS		WHITE MESA MILL	
Date	By	County: San Juan	State: Utah
5–14	DLS	Location:	

Figure 12

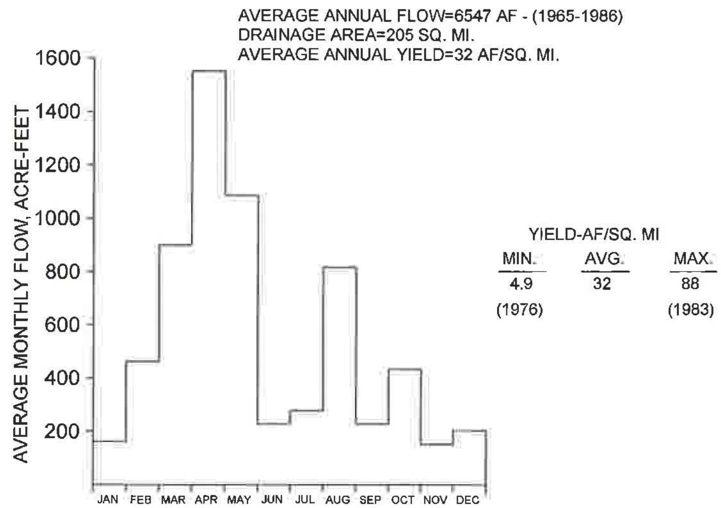
Drainage Map of the Vicinity of the White Mesa Mill

Scale: 1:250,000 | Date: Aug. 2009 | Drafted By: D.Sledd

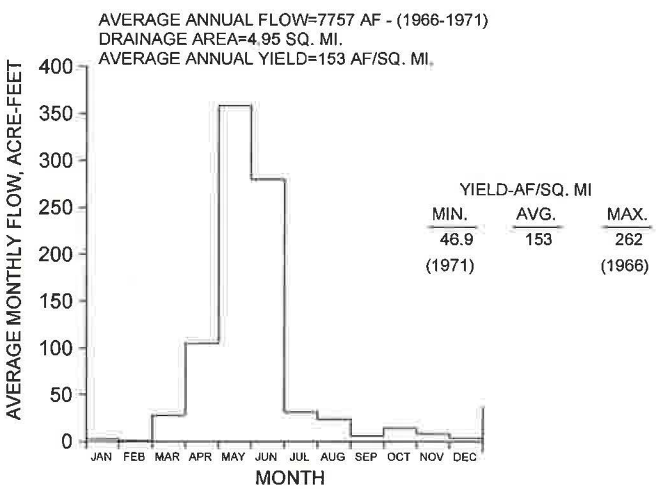
Drainage Map dwg Figure 12



RECAPTURE CREEK NEAR BLANDING
USGS GAUGE 09378630



COTTONWOOD WASH NEAR BLANDING
USGS GAUGE 09378700



SPRING CREEK ABOVE DIVERSIONS,
USGS GAUGE 09376900

NOTES

1. FOR THE LOCATION OF WATER COURSES SUMMARIZED, SEE FIGURE 3.7-1
2. SOURCE OF DATA, WATER RESOURCES DATA RECORDS. COMPILED AND PUBLISHED BY USGS.

Energy Fuels

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Lakewood, CO 80228

REVISIONS		WHITE MESA MILL	
Date	By	County: San Juan	State: Utah
5-14	DLS	Location:	

Figure 13

Streamflow Summary
Blanding UT Vicinity

Scale: N/A | Date: Aug, 2009 | Drafted By: D.Sledd

Streamflow Summary dwg Figure 13

INDEX OF APPENDICES

Appendix A

Radioactive Materials License Amendment No. 4: March 31, 2007

TECHNICAL EVALUATION REPORT
REQUEST TO RECEIVE AND PROCESS ALTERNATE FEED MATERIAL

DOCKET NO. 40-8681 LICENSE NO. SUA-1358

LICENSEE: International Uranium (USA) Corporation

FACILITY: White Mesa Uranium Mill

PROJECT MANAGER: James Park

SUMMARY AND CONCLUSIONS:

The U.S. Nuclear Regulatory Commission staff has reviewed Energy Fuels Nuclear, Inc.'s (EFN's) request dated April 3, 1997, to receive and process uranium-bearing material currently contained at Cabot Performance Materials' (CPM's) facility near Boyertown, Pennsylvania. The material would be processed at the White Mesa mill, of which EFN is the former owner. The current owner of the mill and NRC licensee, International Uranium (USA) Corporation (IUC), previously has agreed to abide by all commitments and representation made by EFN.

Based on its review of the April 3, 1997, submittal and additional information provided by letters dated May 6, May 19, June 20, and August 6, 1997, the NRC staff considers the amendment request acceptable.

DESCRIPTION OF LICENSEE'S AMENDMENT REQUEST:

By its submittal dated April 3, 1997, EFN requested that NRC Source Material License SUA-1358 be amended to allow receipt and processing of alternate feed material (i.e., material other than natural uranium ore) at its White Mesa uranium mill located near Blanding, Utah. This uranium-bearing material, weighing approximately 16,000 dry tons, is held currently by CPM at its facility near Boyertown, Pennsylvania. The material is a moist solid (up to 40 percent moisture content) which contains uranium at an average concentration of 0.3 percent by weight, and economically attractive concentrations of tantalum and niobium. CPM is authorized to possess this material under NRC Source Material License SMB-920.

The material will be shipped by train and exclusive-use trucks from CPM's facility to the White Mesa mill in intermodal containers. After being loaded and sealed at CPM's facility, the containers will be transported by truck to a nearby intermodal rail terminal. The containers will be loaded on flatbed railcars and transported cross-country to the final rail destination (either Grand Junction, Colorado or Green River, Utah), where they will be transferred to trucks for the final leg of the journey to the White Mesa mill. Each container has a capacity of 25 cubic yards, and it is expected that approximately 15 containers will be loaded and transported each day.

At the mill site, the uranium-bearing material will be emptied from the intermodal containers into the ore receiving hopper. From there, the material will be processed through the semi-autogenous grind (SAG) mill, where water will be added to create a slurry, which is then pumped to a pulp storage tank and from there into the leach circuit. In the leach circuit, the slurry will be treated to separate the uranium from the tantalum and niobium, and IUC will utilize the uranium and vanadium solvent extraction circuits, respectively, to recover these metals. IUC plans to add two filter presses and some additional piping to its mill circuit to aid in the processing of this material.

Water spray systems will be utilized to reduce the potential for dust dispersion and airborne contamination in emptying the intermodal containers. Other than the slight circuit changes mentioned previously, IUC anticipates that processing the uranium-bearing material will not differ from processing natural uranium/vanadium ores.

IUC will provide personal protective equipment (coveralls, gloves, and full-face respirators (to be used if needed)) to individuals engaged in processing the material. The efficiency of airborne contamination control measures during the material handling operations will be assessed in the immediate vicinity of these operations. Airborne particulate samples and breathing zone samples will be collected during initial material processing activities and analyzed for gross alpha. Sampling results will be used to establish health and safety guidelines to be implemented throughout the processing operations.

Additional environmental air samples will be collected at nearby locations to the material processing activities and analyzed to ensure that the established contamination control measures are adequate and effective.

Trucks used to transport the material to the mill site will be radiometrically scanned upon arrival to ensure that leakage has not occurred and that radiation levels are within appropriate limits. Trucks will again be scanned prior to their release from the site restricted area. In addition, the intermodal containers used to transport the material will be properly closed, cleaned (if necessary), surveyed, and documented before leaving the site.

TECHNICAL EVALUATION:

The NRC staff has reviewed IUC's request in accordance with 10 CFR Part 40, Appendix A, requirements and NRC staff guidance "Final Position and Guidance on the Use of Uranium Mill Feed Material Other Than Natural Ores" (60 *FR* 49296; September 22, 1995). This guidance (referred to hereinafter as the alternate feed guidance) requires that the staff make the following determinations in its reviews of licensee requests to process material other than natural uranium ores.

1. Whether the feed material meets the definition of "ore;"

2. Whether the feed material contains hazardous waste; and

3. Whether the ore is being processed primarily for its source-material content.

Determination of whether the feed material is "ore"

For the tailings and wastes from the proposed processing to qualify as 11e.(2) byproduct material, the feed material must qualify as "ore." In the alternate feed guidance, ore is defined as

> "... a natural or native matter that may be mined and treated for the extraction of any of its constituents or any other matter from which source material is extracted in a licensed uranium or thorium mill."

The proposed alternate feed material contains uranium at an average concentration of 0.3 percent by weight; therefore, it meets the definition of "source material," as defined at 10 CFR 40.4. IUC is proposing to extract this uranium. Therefore, the material meets the definition of ore, because it is a "matter from which source material is extracted in a licensed uranium or thorium mill."

Determination of whether the feed material contains hazardous waste

Under the alternate feed guidance, proposed feed material which contains a listed hazardous waste will not be approved by the NRC staff for processing at a licensed mill. Feed materials which exhibit only a characteristic of hazardous waste (i.e., ignitability, corrosivity, reactivity, or toxicity) would not be regulated as hazardous waste and could therefore be approved by the staff for recycling and extraction of source material. However, this does not apply to residues from water treatment. Therefore, NRC staff acceptance of such residues as feed material would depend on their not containing any hazardous or characteristic hazardous waste.

The NRC staff has reviewed the following sources of information in determining whether the uranium-bearing material is or contains hazardous waste: (1) the average composition data for the material, as submitted by IUC on June 20, 1997, (2) the results of additional testing, as provided by letter dated May 6, 1997, (3) NRC files for the Boyertown facility, which address, in part, the process used to produce the material and the methods used to store the material, and (4) supplementary information concerning the State of Pennsylvania Department of Environmental Protection's hazardous waste regulations. In addition, as an attachment to a letter dated August 6, 1997, IUC provided an affadavit from CPM in which CPM affirmed that the material is not and does not contain hazardous waste.

Based on its review, the NRC staff finds that the uranium-bearing material is not hazardous waste and does not contain hazardous waste. The NRC staff has determined also that the uranium-bearing material is not a residue from water treatment. This material is the result of the initial processing of raw ores containing tantalum and niobium.

Therefore, the NRC staff considers the uranium-bearing material acceptable for recycling and extraction of source material.

Determination of whether the feed material is being processed primarily for its source-material content

To show that potential alternate feed material is being processed primarily for its source-material content, a licensee must either (1) demonstrate that the material would be approved for disposal in the tailings impoundment under the "Final Revised Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments;" or (2) certify, under oath or affirmation, that the material is being processed primarily for the recovery of uranium and for no other primary purpose. Any such certification must be supported by an appropriate justification and accompanying documentation.

The licensee has provided a signed affirmation that the uranium-bearing material is being processed primarily for the recovery of uranium and for no other primary purpose. IUC states that the uranium content of the material, in conjunction with the reduced uranium processing costs associated with the recovery of the tantalum and niobium, makes processing the CPM material economically attractive to IUC. The NRC staff has discussed with IUC the business arrangements regarding the material and finds that IUC is paying CPM for the acquisition of the material.

The NRC staff has reviewed the analytical data provided by IUC and information contained in the NRC's files for the CPM facility, and finds that the uranium concentration in the material is comparable with that in natural uranium ores which are and were normally processed by uranium mills in the U.S.. These natural ores contained uranium at concentrations of 0.3 percent and below. Therefore, the NRC staff considers IUC's justification to be acceptable.

Conclusions concerning alternate feed material designation

Based on the information provided by the licensee, the NRC staff finds that the CPM's uranium-bearing material is alternate feed material because: (1) it meets the definition of "ore," (2) it does not contain hazardous waste, and (3) it is being processed primarily for its source-material content.

Other considerations

The NRC staff has also concluded that the processing of this material will not result in (1) a significant change or increase in the types or amounts of effluents that may be released offsite; (2) a significant increase in individual or cumulative occupational radiation exposure; (3) a significant construction impact; or (4) a significant increase in the potential for or consequences from radiological accidents. This conclusion is based on the following information:

a. Yellowcake produced from the processing of this material will not cause the currently-approved yellowcake production limit of 4380 tons per year to be exceeded. In addition, and as a result, radiological doses to members of the public in the vicinity of the mill will not be elevated above levels previously assessed and approved.

b. The physical changes to the mill circuit that IUC will implement to process this material are not significant. No construction impacts beyond those previously assessed will be involved with these changes.

c. Tailings produced by the processing of this material will be disposed of on-site in an existing lined tailings impoundment (Cell 3). The addition of these tailings (a maximum of 16,000 tons) to Cell 3 will increase the total amount of tailings in the cell by one percent, to a total of approximately 69 percent of cell capacity; therefore, no new impoundments are necessary. The design of the existing impoundments previously has been approved by the NRC, and IUC is required by its NRC license to conduct regular monitoring of the impoundment liners and of the groundwater around the impoundments to detect leakage if it should occur.

d. The uranium-bearing material contains metals and other parameters which already are present in the mill tailings disposed of in the Cell 3 impoundment. Analysis of samples from the uranium-bearing material and from Cell 3 show that the only parameters present in significantly higher concentrations in the uranium-bearing material are fluorine and carbon. However, these concentrations should not have an adverse impact on the overall Cell 3 tailings composition, because the amount of tailings (a maximum of 16,000 tons) produced by processing the material is not significant in comparison to the total amount of tailings currently in the cell (approximately 1.4 million tons). Additionally, as stated previously, IUC is required to conduct regular monitoring of the impoundment leak detection systems and of the groundwater in the vicinity of the impoundments to detect leakage if it should occur.

e. For the following reasons, it is not expected that transportation impacts associated with the movement of the material by train and truck from Pennsylvania to the White Mesa mill will be significant:

- The material will be shipped as "low specific activity" material in exclusive-use containers (i.e., no other materials will be in the containers with the uranium-bearing material). The containers will be appropriately labeled, placarded, and manifested, and shipments will be tracked by the shipping company from CPM's facility until they reach the White Mesa mill.

- On average during 1996, 370 trucks per day traveled the stretch of State Road 191 between Monticello, UT and Blanding, UT (personal communication with the State of Utah Department of Transportation). An additional 15 trucks per day traveling this route to the mill represents an increased traffic load of only four percent. Shipments are expected to take place over the course of a limited time period (three to six months).

- The containers and trucks involved in transporting the material to the mill site will be surveyed and decontaminated, as necessary, prior to leaving CPM's facility for White Mesa and again prior to leaving the mill site for the return trip.

f. Mill employees involved in handling the material will be provided with personal protective equipment, including respiratory protection. Airborne particulate and breathing zone sampling results will be used to establish health and safety guidelines to be implemented throughout the processing operations.

RECOMMENDED LICENSE CHANGE:

Pursuant to Title 10 of the Code of Federal Regulations, Part 40, Source Material License SUA-1358 will be amended by the addition of License Condition No. 10.9 as follows:

10.9 The licensee is authorized to receive and process source material from Cabot Performance Materials' facility near Boyertown, Pennsylvania, in accordance with the amendment request dated April 3, 1997, as amended by submittals dated May 19, and August 6, 1997.

ENVIRONMENTAL IMPACT EVALUATION:

Because IUC's receipt and processing of the material will not result in (1) a significant change or increase in the types or amounts of effluents that may be released offsite; (2) a significant increase in individual or cumulative occupational radiation exposure; (3) a significant construction impact; or (4) a significant increase in the potential for or consequences from radiological accidents, an environmental review was not performed since actions meeting these criteria are categorically excluded under 10 CFR 51.22(c)(11).

NRC FORM 374
(7-94)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. International Uranium (USA) Corporation [Applicable Amendments: 2]	3. License Number SUA-1358, Amendment No. 4
2. 6425 S. Highway 191 P.O. Box 809 Blanding, Utah 84511 [Applicable Amendments: 2]	4. Expiration Date March 31, 2007 5. Docket or Reference No. 40-8681

6. Byproduct, Source, and/or Special Nuclear Material	7. Chemical and/or Physical Form	8. Maximum Amount that Licensee May Possess at Any One Time Under This License
Natural Uranium	Any	Unlimited

SECTION 9: Administrative Conditions

9.1 The authorized place of use shall be the licensee's White Mesa uranium milling facility, located in San Juan County, Utah.

9.2 All written notices and reports to the NRC required under this license, with the exception of incident and event notifications under 10 CFR 20.2202 and 10 CFR 40.60 requiring telephone notification, shall be addressed to the Chief, Uranium Recovery Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards.

Incident and event notifications that require telephone notification shall be made to the NRC Operations Center at (301) 816-5100.

9.3 The licensee shall conduct operations in accordance with statements, representations, and conditions contained in the license renewal application submitted by letter dated August 23, 1991, as revised by submittals dated January 13, and April 7, 1992, November 22, 1994, July 27, 1995, December 13, and December 31, 1996, and January 30, 1997, which are hereby incorporated by reference, and for the Standby Trust Agreement, dated April 29, 1997, except where superseded by license conditions below.

Whenever the word "will" is used in the above referenced documents, it shall denote a requirement. [Applicable Amendments: 2]

9.4 A. The licensee may, without prior NRC approval, and subject to the conditions specified in Part B of this condition:

(1) Make changes in the facility or process, as presented in the application.

(2) Make changes in the procedures presented in the application.

(3) Conduct tests or experiments not presented in the application.

B. The licensee shall file an application for an amendment to the license, unless the following conditions are satisfied.

(1) The change, test, or experiment does not conflict with any requirement specifically stated in this license, or impair the licensee's ability to meet all applicable NRC regulations.

(2) There is no degradation in the essential safety or environmental commitments in the license application, or provided by the approved reclamation plan.

(3) The change, test, or experiment is consistent with the conclusions of actions analyzed and selected in the EA dated February 1997.

C. The licensee's determinations concerning Part B of this condition, shall be made by a "Safety and Environmental Review Panel (SERP)." The SERP shall consist of a minimum of three individuals. One member of the SERP shall have expertise in management and shall be responsible for managerial and financial approval changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and, one member shall be the corporate radiation safety officer (CRSO) or equivalent, with the responsibility of assuring changes conform to radiation safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, groundwater hydrology, surface-water hydrology, specific earth sciences, and other technical disciplines. Temporary members or permanent members, other than the three above-specified individuals, may be consultants.

D. The licensee shall maintain records of any changes made pursuant to this condition until license termination. These records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for determining changes are in compliance with the requirements referred to in Part B of this condition. The licensee shall furnish, in an annual report to NRC, a description of such changes, tests, or experiments, including a summary of the safety and environmental evaluation of each. In addition, the licensee shall annually submit to the NRC changed pages to the Operations Plan and Reclamation Plan of the approved license application to reflect changes made under this condition.

The licensee's SERP shall function in accordance with the standard operating procedures submitted by letter dated June 10, 1997.

[Applicable Amendments: 3]

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9.5 The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criteria 9 and 10, adequate to cover the estimated costs, if accomplished by a third party, for decommissioning and decontamination of the mill and mill site, for reclamation of any tailings or waste disposal areas, ground-water restoration as warranted and for the long-term surveillance fee. Within three months of NRC approval of a revised reclamation/decommissioning plan, the licensee shall submit, for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs in the newly approved plan exceed the amount covered in the existing financial surety. The revised surety shall then be in effect within 3 months of written NRC approval.

Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criteria 9 and 10, shall be submitted to the NRC at least 3 months prior to the anniversary date which is designated as June 4 of each year. If the NRC has not approved a proposed revision to the surety coverage 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing surety arrangement for 1 year. Along with each proposed revision or annual update, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation, maintenance of a minimum 15 percent contingency fee, changes in engineering plans, activities performed and any other conditions affecting estimated costs for site closure. The basis for the cost estimate is the NRC approved reclamation/decommissioning plan or NRC approved revisions to the plan. The previously provided guidance entitled "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates" outlines the minimum considerations used by the NRC in the review of site closure estimates. Reclamation/decommissioning plans and annual updates should follow this outline.

The currently approved surety instrument, Performance Bond 18-23-17, issued by National Union Fire Insurance Company in favor of the NRC, and the associated Standby Trust Agreement, dated April 29, 1997, shall be continuously maintained in an amount not less than $11,278,134 for the purpose of complying with 10 CFR 40, Appendix A, Criteria 9 and 10, until a replacement is authorized by the NRC.

[Applicable Amendments: 2, 3]

9.6 Standard operating procedures shall be established and followed for all operational process activities involving radioactive materials that are handled, processed, or stored. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. Additionally, written procedures shall be established for non-operational activities to include in-plant and environmental monitoring, bioassay analyses, and instrument calibrations. An up-to-date copy of each written procedure shall be kept in the mill area to which it applies.

All written procedures for both operational and non-operational activities shall be reviewed and approved in writing by the radiation safety officer (RSO) before implementation and whenever a change in procedure is proposed to ensure that proper radiation protection principles are being applied. In addition, the RSO shall perform a documented review of all existing operating procedures at least annually.

9.7 Before engaging in any activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory. All disturbances associated with the proposed development will be completed in compliance with the National Historic Preservation Act (as amended) and its implementing regulations (36 CFR 800), and the Archaeological Resources Protection Act (as amended) and its implementing regulations (43 CFR 7).

In order to ensure that no unapproved disturbance of cultural resources occurs, any work resulting in the discovery of previously unknown cultural artifacts shall cease. The artifacts shall be inventoried and evaluated in accordance with 36 CFR Part 800, and no disturbance shall occur until the licensee has received authorization from the NRC to proceed.

The licensee shall avoid by project design, where feasible, the archeological sites designated "contributing" in the report submitted by letter dated July 28, 1988. When it is not feasible to avoid a site designated "contributing" in the report, the licensee shall institute a data recovery program for that site based on the research design submitted by letter from C. E. Baker of Energy Fuels Nuclear to Mr. Melvin T. Smith, Utah State Historic Preservation Officer (SHPO), dated April 13, 1981.

The licensee shall recover through archeological excavation all "contributing" sites listed in the report which are located in or within 100 feet of borrow areas, stockpile areas, construction areas, or the perimeter of the reclaimed tailings impoundment. Data recovery fieldwork at each site meeting these criteria shall be completed prior to the start of any project related disturbance within 100 feet of the site, but analysis and report preparation need not be complete.

Additionally, the licensee shall conduct such testing as is required to enable the Commission to determine if those sites designated as "Undetermined" in the report and located within 100 feet of present or known future construction areas are of such significance to warrant their redesignation as "contributing." In all cases, such testing shall be completed before any aspect of the undertaking affects a site.

Archeological contractors shall be approved in writing by the Commission. The Commission will approve an archeological contractor who meets the minimum standards for a principal investigator set forth in 36 CFR Part 66, Appendix C, and whose qualifications are found acceptable by the SHPO.

9.8 The licensee is hereby authorized to possess byproduct material in the form of uranium waste tailings and other uranium byproduct waste generated by the licensee's milling operations authorized by this license. Mill tailings shall not be transferred from the site without specific prior approval of the NRC in the form of a license amendment. The licensee shall maintain a permanent record of all transfers made under the provisions of this condition.

9.9 The licensee is hereby exempted from the requirements of Section 20.1902 (e) of 10 CFR Part 20 for areas within the mill, provided that all entrances to the mill are conspicuously posted in accordance with Section 20.1902 (e) and with the words, "Any area within this mill may contain radioactive material."

9.10 Release of equipment or packages from the restricted area shall be in accordance with "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated May 1987, or suitable alternative procedures approved by the NRC prior to any such release.

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SECTION 10: Operational Controls, Limits, and Restrictions

10.1 The mill production rate shall not exceed 4380 tons of yellowcake per year.

10.2 All liquid effluents from mill process buildings, with the exception of sanitary wastes, shall be returned to the mill circuit or discharged to the tailings impoundment.

10.3 Freeboard limits for Cells 1-I, 3, and 4A, and tonnage limits for Cell 3, shall be as stated in Section 3.0 to Appendix E of the approved license application.

10.4 Disposal of material and equipment generated at the mill site shall be conducted as described in the licensee's submittals dated December 12, 1994 and May 23, 1995, with the following addition:

A. The maximum lift thickness for materials placed over tailings shall be less than 4-feet thick. Subsequent lifts shall be less than 2-feet thick. Each lift shall be compacted by tracking of heavy equipment, such as a Cat D-6, at least 4 times prior to placement of subsequent lifts.

10.5 In accordance with the licensee's submittal dated May 20, 1993, the licensee is hereby authorized to dispose of byproduct material generated at licensed in situ leach facilities, subject to the following conditions:

A. Disposal of waste is limited to 5000 cubic yards from a single source.

B. All contaminated equipment shall be dismantled, crushed, or sectioned to minimize void spaces. Barrels containing waste other than soil or sludges shall be emptied into the disposal area and the barrels crushed. Barrels containing soil or sludges shall be verified to be full prior to disposal. Barrels not completely full shall be filled with tailings or soil.

C. All waste shall be buried in Cell No. 3 unless prior written approval is obtained from the NRC for alternate burial locations.

D. All disposal activities shall be documented. The documentation shall include descriptions of the waste and the disposal locations, as well as all actions required by this condition. An annual summary of the amounts of waste disposed of from off-site generators shall be sent to the NRC.

10.6 The licensee is authorized to receive and process source materials from the Allied Signal Corporation's Metropolis, Illinois, facility in accordance with the amendment request dated June 15, 1993.

10.7 The licensee is authorized to receive and process source material from Allied Signal, Inc. of Metropolis, Illinois, in accordance with the amendment request dated September 20, 1996, and amended by letters dated October 30, and November 11, 1996.

10.8 The licensee is authorized to receive and process source material, in accordance with the amendment request dated March 5, 1997. [Applicable Amendments: 1]

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10.9 The licensee is authorized to receive and process source material from Cabot Performance Materials' facility near Boyertown, Pennsylvania, in accordance with the amendment request dated April 3, 1997, as amended by submittals dated May 19, and August 6, 1997. [Applicable Amendments: 4]

SECTION 11: Monitoring, Recording, and Bookkeeping Requirements

11.1 The results of sampling, analyses, surveys and monitoring, the results of calibration of equipment, reports on audits and inspections, all meetings and training courses required by this license and any subsequent reviews, investigations, and corrective actions, shall be documented. Unless otherwise specified in the NRC regulations all such documentation shall be maintained for a period of at least five (5) years.

11.2 The licensee shall implement the effluent and environmental monitoring program specified in Section 5.5 of the renewal application as revised with the following modifications or additions:

A. Stack sampling shall include a determination of flow rate.

B. Surface water samples shall also be analyzed semiannually for total and dissolved U-nat, Ra-226, and Th-230, with the exception of the Westwater Creek, which shall be sampled annually for water sediments and analyzed as above. A sediment sample shall not be taken in place of a water sample unless a water sample was not available.

C. Groundwater sampling shall be conducted in accordance with the requirements in License Condition 11.3.

D. The licensee shall utilize lower limits of detection in accordance with Section 5 of Regulatory Guide 4.14 (Revision 1), for analysis of effluent and environmental samples.

E. The inspections performed semiannually of the critical orifice assembly committed to in the submittal dated March 15, 1986, shall be documented. The critical orifice assembly shall be calibrated at least every 2 years against a positive displacement Roots meter to obtain the required calibration curve.

11.3 The licensee shall implement a groundwater detection monitoring program to ensure compliance to 10 CFR Part 40, Appendix A. The detection monitoring program shall be in accordance with the report entitled, "Points of Compliance, White Mesa Uranium Mill," submitted by letter dated October 5, 1994, as modified by the following:

A. The leak detection system for all ponds will be checked weekly. If liquid is present, it shall be analyzed for chloride, sulfate, selenium, and pH. The samples will be statistically analyzed to determine if significant linear trends exist, and the results will be submitted to NRC for review.

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B. If a significant linear trend is indicated, the licensee will submit a proposed corrective action for review and approval to NRC The corrective action shall include a discussion on delineation of the areal extent and concentration of hazardous constituents.

C. The licensee shall sample monitoring wells WMMW-5, -11, -12, -14, -15, and -17, on a quarterly basis. Samples shall be analyzed for chloride, potassium, nickel, and uranium, and the results of such sampling shall be included with the environmental monitoring reports submitted in accordance with 10 CFR 40.65.

11.4 During extended periods of mill standby, eight-hour annual sampling for U-nat, Ra-226, Th-230 and Pb-210 may be eliminated if routine airborne sampling show levels below 10 percent of the appropriate 10 CFR Part 20 limits.

During periods of standby, sampling frequencies for area airborne uranium sampling within the mill may be reduced to quarterly, provided measured levels remain below 10 percent of the derived air concentration (DAC). If these levels exceed 10 percent of the DAC, the sampling frequency should follow the recommendations in Regulatory Guide 8.30.

11.5 Calibration of in-plant air and radiation monitoring equipment shall be performed as specified in the license renewal application, under Section 3.0 of the "Radiation Protection Procedures Manual," with the exception that in-plant air sampling equipment shall be calibrated at least quarterly and air sampling equipment checks shall be documented.

11.6 The licensee shall perform an annual ALARA audit of the radiation safety program in accordance with Regulatory Guide 8.31.

SECTION 12: Reporting Requirements

12.1 The licensee shall submit to NRC for review, by June 30, 1997, a detailed reclamation plan for the authorized tailings disposal area which includes the following:

A. A post-operations interim stabilization plan which details methods to prevent wind and water erosion and recharge of the tailings area.

B. A plan to determine the best methodology to dewater and/or consolidate the tailings cells prior to placement of the final reclamation cover.

C. Plan and cross-sectional views of a final reclamation cover which details the location and elevation of tailings. The plan shall include details on cover thickness, physical characteristics of cover materials, proposed testing of cover materials (specifications and quality assurance), the estimated volumes of cover materials and their availability and location.

D. Detailed plans for placement of rock or vegetative cover on the final reclaimed tailings pile and mill site area.

E. A proposed implementation schedule for items A through D above which defines the sequence of events and expected time ranges.

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F. An analysis to show that the proposed type and thickness of soil cover is adequate to provide attenuation of radon and is adequate to assure long-term stability, as well as an analysis and proposal on methodology and time required to restore ground water in conformance to regulatory requirements.

G. The licensee shall include a detailed cost analysis of each phase of the reclamation plan to include contractor costs, projected costs of inflation based upon the schedule proposed in item E, a proposed contingency cost, and the costs of long-term maintenance and monitoring.

12.2 The licensee shall submit a detailed decommissioning plan to the NRC at least twelve (12) months prior to planned final shutdown of mill operations.

FOR THE NUCLEAR REGULATORY COMMISSION

Date Aug 15 1997

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

TECHNICAL EVALUATION REPORT
REQUEST TO RECEIVE AND PROCESS ALTERNATE FEED MATERIAL

DOCKET NO. 40-8681 LICENSE NO. SUA-1358

LICENSEE: International Uranium (USA) Corporation

FACILITY: White Mesa Uranium Mill

PROJECT MANAGER: James Park

SUMMARY AND CONCLUSIONS:

The U.S. Nuclear Regulatory Commission staff has reviewed Energy Fuels Nuclear, Inc.'s (EFN's) request dated April 3, 1997, to receive and process uranium-bearing material currently contained at Cabot Performance Materials' (CPM's) facility near Boyertown, Pennsylvania. The material would be processed at the White Mesa mill, of which EFN is the former owner. The current owner of the mill and NRC licensee, International Uranium (USA) Corporation (IUC), previously has agreed to abide by all commitments and representation made by EFN.

Based on its review of the April 3, 1997, submittal and additional information provided by letters dated May 6, May 19, June 20, and August 6, 1997, the NRC staff considers the amendment request acceptable.

DESCRIPTION OF LICENSEE'S AMENDMENT REQUEST:

By its submittal dated April 3, 1997, EFN requested that NRC Source Material License SUA-1358 be amended to allow receipt and processing of alternate feed material (i.e., material other than natural uranium ore) at its White Mesa uranium mill located near Blanding, Utah. This uranium-bearing material, weighing approximately 16,000 dry tons, is held currently by CPM at its facility near Boyertown, Pennsylvania. The material is a moist solid (up to 40 percent moisture content) which contains uranium at an average concentration of 0.3 percent by weight, and economically attractive concentrations of tantalum and niobium. CPM is authorized to possess this material under NRC Source Material License SMB-920.

The material will be shipped by train and exclusive-use trucks from CPM's facility to the White Mesa mill in intermodal containers. After being loaded and sealed at CPM's facility, the containers will be transported by truck to a nearby intermodal rail terminal. The containers will be loaded on flatbed railcars and transported cross-country to the final rail destination (either Grand Junction, Colorado or Green River, Utah), where they will be transferred to trucks for the final leg of the journey to the White Mesa mill. Each container has a capacity of 25 cubic yards, and it is expected that approximately 15 containers will be loaded and transported each day.

At the mill site, the uranium-bearing material will be emptied from the intermodal containers into the ore receiving hopper. From there, the material will be processed through the semi-autogenous grind (SAG) mill, where water will be added to create a slurry, which is then pumped to a pulp storage tank and from there into the leach circuit. In the leach circuit, the slurry will be treated to separate the uranium from the tantalum and niobium, and IUC will utilize the uranium and vanadium solvent extraction circuits, respectively, to recover these metals. IUC plans to add two filter presses and some additional piping to its mill circuit to aid in the processing of this material.

Water spray systems will be utilized to reduce the potential for dust dispersion and airborne contamination in emptying the intermodal containers. Other than the slight circuit changes mentioned previously, IUC anticipates that processing the uranium-bearing material will not differ from processing natural uranium/vanadium ores.

IUC will provide personal protective equipment (coveralls, gloves, and full-face respirators (to be used if needed)) to individuals engaged in processing the material. The efficiency of airborne contamination control measures during the material handling operations will be assessed in the immediate vicinity of these operations. Airborne particulate samples and breathing zone samples will be collected during initial material processing activities and analyzed for gross alpha. Sampling results will be used to establish health and safety guidelines to be implemented throughout the processing operations.

Additional environmental air samples will be collected at nearby locations to the material processing activities and analyzed to ensure that the established contamination control measures are adequate and effective.

Trucks used to transport the material to the mill site will be radiometrically scanned upon arrival to ensure that leakage has not occurred and that radiation levels are within appropriate limits. Trucks will again be scanned prior to their release from the site restricted area. In addition, the intermodal containers used to transport the material will be properly closed, cleaned (if necessary), surveyed, and documented before leaving the site.

TECHNICAL EVALUATION:

The NRC staff has reviewed IUC's request in accordance with 10 CFR Part 40, Appendix A, requirements and NRC staff guidance "Final Position and Guidance on the Use of Uranium Mill Feed Material Other Than Natural Ores" (60 *FR* 49296; September 22, 1995). This guidance (referred to hereinafter as the alternate feed guidance) requires that the staff make the following determinations in its reviews of licensee requests to process material other than natural uranium ores.

1. Whether the feed material meets the definition of "ore;"

2. Whether the feed material contains hazardous waste; and

3. Whether the ore is being processed primarily for its source-material content.

Determination of whether the feed material is "ore"

For the tailings and wastes from the proposed processing to qualify as 11e.(2) byproduct material, the feed material must qualify as "ore." In the alternate feed guidance, ore is defined as

> "... a natural or native matter that may be mined and treated for the extraction of any of its constituents or any other matter from which source material is extracted in a licensed uranium or thorium mill."

The proposed alternate feed material contains uranium at an average concentration of 0.3 percent by weight; therefore, it meets the definition of "source material," as defined at 10 CFR 40.4. IUC is proposing to extract this uranium. Therefore, the material meets the definition of ore, because it is a "matter from which source material is extracted in a licensed uranium or thorium mill."

Determination of whether the feed material contains hazardous waste

Under the alternate feed guidance, proposed feed material which contains a listed hazardous waste will not be approved by the NRC staff for processing at a licensed mill. Feed materials which exhibit only a characteristic of hazardous waste (i.e., ignitability, corrosivity, reactivity, or toxicity) would not be regulated as hazardous waste and could therefore be approved by the staff for recycling and extraction of source material. However, this does not apply to residues from water treatment. Therefore, NRC staff acceptance of such residues as feed material would depend on their not containing any hazardous or characteristic hazardous waste.

The NRC staff has reviewed the following sources of information in determining whether the uranium-bearing material is or contains hazardous waste: (1) the average composition data for the material, as submitted by IUC on June 20, 1997, (2) the results of additional testing, as provided by letter dated May 6, 1997, (3) NRC files for the Boyertown facility, which address, in part, the process used to produce the material and the methods used to store the material, and (4) supplementary information concerning the State of Pennsylvania Department of Environmental Protection's hazardous waste regulations. In addition, as an attachment to a letter dated August 6, 1997, IUC provided an affidavit from CPM in which CPM affirmed that the material is not and does not contain hazardous waste.

Based on its review, the NRC staff finds that the uranium-bearing material is not hazardous waste and does not contain hazardous waste. The NRC staff has determined also that the uranium-bearing material is not a residue from water treatment. This material is the result of the initial processing of raw ores containing tantalum and niobium.

Therefore, the NRC staff considers the uranium-bearing material acceptable for recycling and extraction of source material.

Determination of whether the feed material is being processed primarily for its source-material content

To show that potential alternate feed material is being processed primarily for its source-material content, a licensee must either (1) demonstrate that the material would be approved for disposal in the tailings impoundment under the "Final Revised Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments;" or (2) certify, under oath or affirmation, that the material is being processed primarily for the recovery of uranium and for no other primary purpose. Any such certification must be supported by an appropriate justification and accompanying documentation.

The licensee has provided a signed affirmation that the uranium-bearing material is being processed primarily for the recovery of uranium and for no other primary purpose. IUC states that the uranium content of the material, in conjunction with the reduced uranium processing costs associated with the recovery of the tantalum and niobium, makes processing the CPM material economically attractive to IUC. The NRC staff has discussed with IUC the business arrangements regarding the material and finds that IUC is paying CPM for the acquisition of the material.

The NRC staff has reviewed the analytical data provided by IUC and information contained in the NRC's files for the CPM facility, and finds that the uranium concentration in the material is comparable with that in natural uranium ores which are and were normally processed by uranium mills in the U.S.. These natural ores contained uranium at concentrations of 0.3 percent and below. Therefore, the NRC staff considers IUC's justification to be acceptable.

Conclusions concerning alternate feed material designation

Based on the information provided by the licensee, the NRC staff finds that the CPM's uranium-bearing material is alternate feed material because: (1) it meets the definition of "ore," (2) it does not contain hazardous waste, and (3) it is being processed primarily for its source-material content.

Other considerations

The NRC staff has also concluded that the processing of this material will not result in (1) a significant change or increase in the types or amounts of effluents that may be released offsite; (2) a significant increase in individual or cumulative occupational radiation exposure; (3) a significant construction impact; or (4) a significant increase in the potential for or consequences from radiological accidents. This conclusion is based on the following information:

a. Yellowcake produced from the processing of this material will not cause the currently-approved yellowcake production limit of 4380 tons per year to be exceeded. In addition, and as a result, radiological doses to members of the public in the vicinity of the mill will not be elevated above levels previously assessed and approved.

b. The physical changes to the mill circuit that IUC will implement to process this material are not significant. No construction impacts beyond those previously assessed will be involved with these changes.

c. Tailings produced by the processing of this material will be disposed of on-site in an existing lined tailings impoundment (Cell 3). The addition of these tailings (a maximum of 16,000 tons) to Cell 3 will increase the total amount of tailings in the cell by one percent, to a total of approximately 69 percent of cell capacity; therefore, no new impoundments are necessary. The design of the existing impoundments previously has been approved by the NRC, and IUC is required by its NRC license to conduct regular monitoring of the impoundment liners and of the groundwater around the impoundments to detect leakage if it should occur.

d. The uranium-bearing material contains metals and other parameters which already are present in the mill tailings disposed of in the Cell 3 impoundment. Analysis of samples from the uranium-bearing material and from Cell 3 show that the only parameters present in significantly higher concentrations in the uranium-bearing material are fluorine and carbon. However, these concentrations should not have an adverse impact on the overall Cell 3 tailings composition, because the amount of tailings (a maximum of 16,000 tons) produced by processing the material is not significant in comparison to the total amount of tailings currently in the cell (approximately 1.4 million tons). Additionally, as stated previously, IUC is required to conduct regular monitoring of the impoundment leak detection systems and of the groundwater in the vicinity of the impoundments to detect leakage if it should occur.

e. For the following reasons, it is not expected that transportation impacts associated with the movement of the material by train and truck from Pennsylvania to the White Mesa mill will be significant:

- The material will be shipped as "low specific activity" material in exclusive-use containers (i.e., no other materials will be in the containers with the uranium-bearing material). The containers will be appropriately labeled, placarded, and manifested, and shipments will be tracked by the shipping company from CPM's facility until they reach the White Mesa mill.

- On average during 1996, 370 trucks per day traveled the stretch of State Road 191 between Monticello, UT and Blanding, UT (personal communication with the State of Utah Department of Transportation). An additional 15 trucks per day traveling this route to the mill represents an increased traffic load of only four percent. Shipments are expected to take place over the course of a limited time period (three to six months).

- The containers and trucks involved in transporting the material to the mill site will be surveyed and decontaminated, as necessary, prior to leaving CPM's facility for White Mesa and again prior to leaving the mill site for the return trip.

f. Mill employees involved in handling the material will be provided with personal protective equipment, including respiratory protection. Airborne particulate and breathing zone sampling results will be used to establish health and safety guidelines to be implemented throughout the processing operations.

RECOMMENDED LICENSE CHANGE:

Pursuant to Title 10 of the Code of Federal Regulations, Part 40, Source Material License SUA-1358 will be amended by the addition of License Condition No. 10.9 as follows:

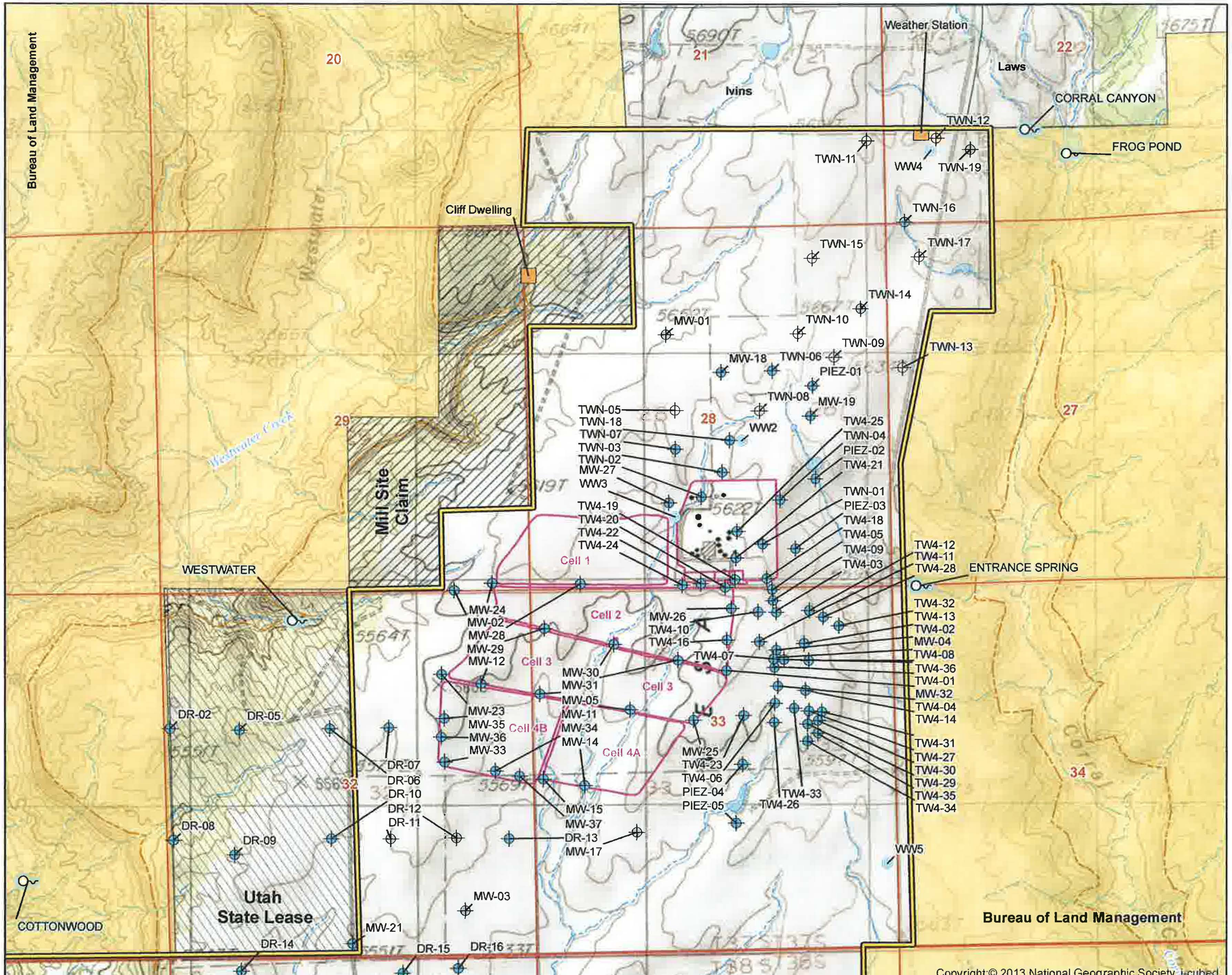
10.9 The licensee is authorized to receive and process source material from Cabot Performance Materials' facility near Boyertown, Pennsylvania, in accordance with the amendment request dated April 3, 1997, as amended by submittals dated May 19, and August 6, 1997.

ENVIRONMENTAL IMPACT EVALUATION:

Because IUC's receipt and processing of the material will not result in (1) a significant change or increase in the types or amounts of effluents that may be released offsite; (2) a significant increase in individual or cumulative occupational radiation exposure; (3) a significant construction impact; or (4) a significant increase in the potential for or consequences from radiological accidents, an environmental review was not performed since actions meeting these criteria are categorically excluded under 10 CFR 51.22(c)(11).

Appendix B

White Mesa Mill Site Maps with Well Locations



Legend

- Property Boundary
- Structure
- Seep or Spring

Well

- Abandoned Monitoring Well **
- Active Monitoring Well **
- Potable Water Well
- Township and Range
- Section
- Canyon Rim

Surface Land Ownership

- Private
- Mill Site Claim
- Utah State Lease
- Bureau of Land Management
- Blanding Municipal Boundary
- Utah Land Trust School Section
- Ute Mountain Ute
- Pond
- Drainage

**** Monitoring well depths are listed in Tables 1.2-1, 1.2-2, and 2.4-1**

Coordinate System: NAD 1983 StatePlane Utah South FIPS 4303 Feet

N

1 IN = 1,500 FT

2,000 1,000 0 2,000

SCALE IN FEET

ENERGY FUELS

REVISIONS		Project: WHITE MESA MILL	
Date:	By:	County: San Juan	State: Utah
		Location: PORTIONS OF T37S R22E	
		APPENDIX B-1 WHITE MESA MILL (NORTH)	
		Author: mhenington Date: 6/2/2014	Drafted By: mhenington

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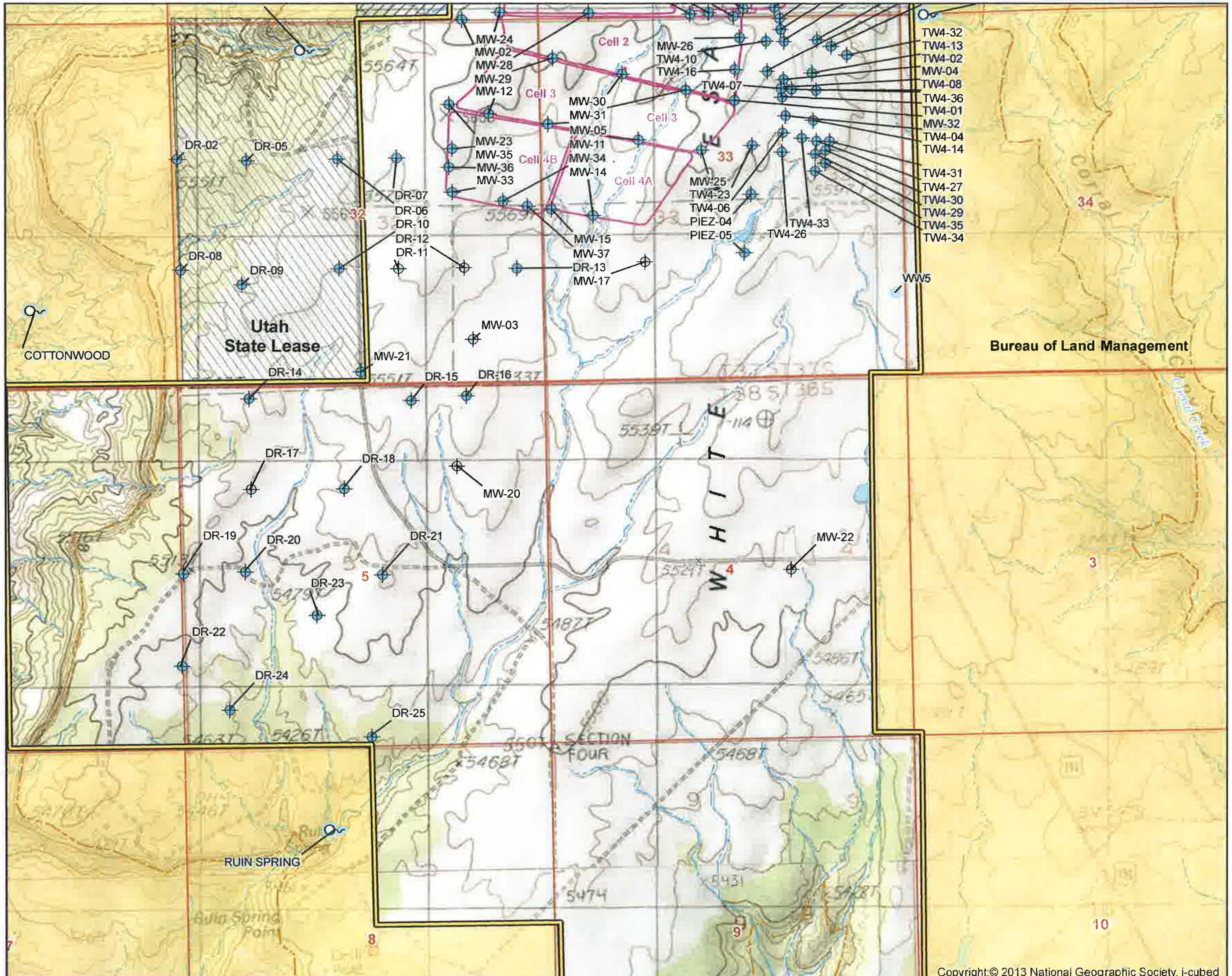

Legend

- Property Boundary
- Structure
- Seep or Spring

Well

- Abandoned Monitoring Well**
- Active Monitoring Well**
- Potable Water Well
- Township and Range
- Section
- Canyon Rim

Surface Land Ownership

- Private
- Mill Site Claim
- Utah State Lease
- Bureau of Land Management
- Blanding Municipal Boundary
- Utah Land Trust School Section
- Ute Mountain Ute
- Pond
- Drainage

**** Monitoring well depths are listed in Tables 1.2-1, 1.2-2, and 2.4-1**

Coordinate System: NAD 1983 StatePlane Utah South FIPS 4303 Feet

1 IN = 1,500 FT

2,000 1,000 0 2,000

SCALE IN FEET

N

ENERGY FUELS

REVISIONS		Project: WHITE MESA MILL	
Date:	By:	County: San Juan	State: Utah
		Location: PORTIONS OF T37S R22E	
		APPENDIX B-2 WHITE MESA MILL (SOUTH)	
		Author: mhenington Date: 6/2/2014	Drafted By: mhenington

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Appendix C

Sampling Plan for Seeps and Springs in the Vicinity of the White Mesa Uranium Mill, Revision: 1, June 10, 2011.

White Mesa Uranium Mill

SAMPLING AND ANALYSIS PLAN

FOR

SEEPS AND SPRINGS

State of Utah

Groundwater Discharge Permit No. UGW370004

Prepared by:

Denison Mines (USA) Corp.
Suite 950, 1050 17th Street
Denver CO 80265

June 10, 2011

Table of Contents

1.0 Introduction and Objectives

This Sampling and Analysis Plan ("SAP") describes the procedures for sampling seeps and springs in the vicinity of the Denison Mines (USA) Corp. ("Denison") White Mesa Uranium Mill ("the Mill") in Blanding, Utah as required by the State of Utah Groundwater Discharge Permit ("GWDP") No. UGW370004.

The objective of the seeps and springs sampling program is to collect annual surface water samples from the locations identified below as required by the GWDP. This SAP specifies the sample collection requirements, procedures, analytical methodologies and associated quality control ("QC") checks, sample handling protocols and reporting requirements for the annual seeps and springs sampling program.

2.0 Seeps and Springs Sampling Locations

The annual seeps and springs sampling locations correspond with those seeps and springs sampled for the initial site characterization performed for the Environmental Assessment as shown on Plate 2.6-10 of the Environmental Report (Dames & Moore, 1978), and additional sites located by Denison, the BLM and Ute Mountain Tribal representatives. The locations included in the annual seeps and springs sampling event are:

- Cottonwood Seep
- Westwater Seep
- Ruin Spring
- Corral Canyon Seep
- Entrance Spring
- Corral Springs

The Permit Section I.F.7 (g) requires that survey data for the seeps and springs be submitted prior to the collection of samples. UDEQ previously clarified the requirement to submit survey data only prior to the first sampling and not on an annual basis. The survey data submitted with the first annual seeps and springs report in 2009 was incorrect. In response to the incorrect data, DUSA completed another survey of the seeps and springs in December 2009. Those survey data are included in Table 1 of this SAP and the locations are shown on Figure 1 included in Tab A. The surveyed coordinates and elevations of the seeps and springs were within 1 foot of the highest point of the saturated seepage face on the day of the survey

2.1 Timing of Sample Collection

Seeps and spring sampling will be conducted on an annual basis and will be scheduled between May 1 and July 15 of each year. This sampling period is aimed at maximizing the opportunity for flow but excludes the potential for surface water influence occasioned by late summer "monsoon" conditions. For each annual sampling period, the locations noted above will be visited a minimum of three times in order to attempt collection of a sample. Should a visit reveal a change in conditions at any of these dry locations which may yield water sampling opportunities, Denison will proceed with limited hand tool excavation of the sampling location. The hand-dug excavation will be left open for a maximum of 48 hours and allowed to fill with water. If water collects in the excavation, it will be sampled. If the location is excavated with hand tools, it will be filled after sampling has been completed, with the soil that

was removed from it per the Bureau of Land Management (BLM) request included in Tab C. Should three annual visits at seeps and springs locations reveal only dry conditions, and a continued absence of physical development opportunities, a sample will not be collected and such conditions (and the inability to sample) will be recorded on the field data sheet and reported along with the results of collected samples for that annual sampling event.
Denison will provide at least 15 days notice of sampling in order to allow the Executive Secretary to collect split water quality samples of the seeps and springs.

3.0 Field Sampling Procedures

The field sampling and data collection program will obtain samples to be analyzed for the groundwater compliance parameters listed in Table 2 of the GWDP. Analyses will be completed by a State of Utah certified laboratory using the methods specified in the currently approved Denison Quality Assurance Plan for Groundwater sampling ("QAP"). Minimum detection limits or reporting limits for seeps and springs analyses will be less than or equal to the Groundwater Quality Standards defined in Table 2 of the GWDP. The minimum detection limits for total dissolved solids ("TDS"), sulfate, and chloride will be 10 mg/L, 1 mg/L, and 1 mg/L respectively.

Field activities include collecting samples, recording of field data and field parameters, and preparing and shipping samples to the analytical laboratory.

Sampling procedures employed at each location will be dependent on the site location and access. Several sampling methodologies may be employed during one annual event based on access limitations and flow rates of the seeps and springs that are sampled. Potential sampling methodologies are briefly described below.

Direct Collection
Direct collection of the samples involves collecting the sample directly into the sample container from the surface water feature or from spring out-flow. In instances where direct collection is employed the parameters which require filtration will be collected by one of two methods. In the first method the peristaltic pump will be used to draw the sample from the out-flow and pump it through a 0.45 micron filter directly into the appropriate sample container. The second method is used in situations with limited access for the generator required to run the peristaltic pump. When the generator cannot be used, a large, unused sample jug will be used to collect the sample. The peristaltic pump will then be used to transfer the sample from the large sample jug to the sample bottles through a 0.45 micron filter. This filtration and pumping will be completed at a location where there is access for the generator.

Peristaltic Pump
Sample collection with a peristaltic pump involves collecting the sample from the source or out-flow using the peristaltic pump. The peristaltic pump is used to deliver the sample from the source or out-flow to the sample bottles. Filtered parameters are pumped through a 0.45 micron filter prior to delivery to the sample bottle.

Sample Ladle
Sample collection using a ladle involves dipping or filling a ladle made from an inert material into the surface water source or out-flow and filling the ladle. The sample is transferred from the ladle to the sample bottles. This process is repeated until the sample bottles are filled. Filtered parameters are collected into a large, unused sample jug. The peristaltic pump is then used to transfer the sample from the large sample jug to the sample bottles through a 0.45 micron filter.

3.1 Field Data

In addition to the analytical parameters noted above, field data will be recorded at the time of sample collection. Field parameters required by the GWDP include pH, specific conductance and temperature. Additional field parameters such as oxidation reduction potential (REDOX) and turbidity may be measured as available sample volume allows. Field data will be recorded on the Field Data Record included in Tab B of this SAP.

As previously noted, the dates of the site visits, the availability of surface water for sampling, and the possibility for development will be recorded on the field data sheets for inclusion in the annual report.

3.2 Decontamination

Decontamination of sampling equipment will be completed if non-dedicated and/or non-disposable sampling equipment is used to collect samples. Decontamination procedures will be as described in the approved QAP. Rinsate blanks will be collected daily after decontamination of sampling equipment. If disposable or dedicated sampling equipment is used to collect samples then rinsate blanks will not be collected.

3.3 Field QC

The field QC samples generated during the annual seeps and springs sampling event will include sample duplicates, trip blanks, and rinsate blank samples as appropriate.

Sample Duplicates
Sample duplicates will be collected at a frequency of one duplicate per 20 field samples. Sample duplicates will be collected by filling the sample container for a certain analytical parameter for the duplicate immediately following the collection of the parent sample for that parameter.

Trip Blanks
Trip blank samples will be included in every shipment of samples that has field samples to be analyzed for Volatile Organic Compounds ("VOCs"). Trip blank samples are VOC sample containers filled by the analytical laboratory with laboratory grade deionized water and shipped to the site. Trip blank samples are taken into the field with the sample containers, never opened, and kept with the field samples from collection through shipment to the analytical laboratory for analysis. Trip blanks are analyzed to determine if the sample concentration of VOCs have been effected by the "trip" from collection through shipment.

Rinsate Blank Samples
Rinsate blank samples are collected at a frequency of one per day when non-disposable, non-dedicated, reusable sampling equipment is used to collect samples. If the sampling equipment has a disposable component that comes in contact with the samples and the component is changed prior to sampling at each location then a rinsate blank sample will not be collected. For example, if a peristaltic pump is used to collect and filter seeps and springs samples and the tubing used in the peristaltic is changed at each location and never reused for more than one sample, no rinsate blank sample would be required.

3.4 Sample Handling

Seeps and springs sampling events will be subject to the applicable sample handling requirements noted in the approved White Mesa Mill Groundwater Quality Assurance Plan ("QAP"), Revision 6, dated March 22, 2010.

4.0 QA and Data Evaluation

The Permit requires that the annual seeps and springs sampling program be conducted in compliance with the requirements specified in the Mill's approved QAP, the approved SAP and the Permit itself. To meet this requirement, the data validation for the seeps and springs sampling program will utilize the requirements outlined in the QAP, the Permit and the approved SAP as applicable. The Mill QA Manager will perform a QA/QC review to confirm compliance of the monitoring program with requirements of the Permit, QAP and SAP. As required in the QAP, data QA includes preparation and analysis of field QC samples, review of field procedures, an analyte completeness review, and quality control review of laboratory data methods and data.

The QAP and the Permit identify the data validation steps and data quality control checks required for the seeps and springs monitoring program. Consistent with these requirements, the Mill QA Manager will performed the following evaluations: a field data QA/QC evaluation, a receipt temperature check, a holding time check, an analytical method check, a reporting limit check, a trip blank check, a QA/QC evaluation of sample duplicates, a gross alpha counting error evaluation and a review of each laboratory's reported QA/QC information.
The corrective action procedures described in the approved QAP will be followed as necessary when data validation and QC reviews indicate a non-compliant situation.

5.0 Laboratory Analysis

Samples will be analyzed for the groundwater compliance parameters listed in Table 2 of the GWDP using the analytical methods and specified reporting limits contained in the approved QAP. Laboratories used for the seeps and springs sampling program will be Utah certified as required by the GWDP Part 1.E.6 (c). Laboratory data will be validated as described in the approved QAP and as described in Section 4.0 above. Analytical QC is described below.

5.1 Analytical Quality Control

Analytical QC samples and protocols are described in the approved QAP. Laboratory QC procedures will meet, at a minimum, the requirements set forth in the analytical methods that the laboratory is certified for by the State of Utah.

The analytical QC samples included at least the following: a method blank, a laboratory control spike ("LCS"), a matrix spike ("MS") and a matrix spike duplicate ("MSD"), or the equivalent, where applicable. It should be noted that:

- Laboratory fortified blanks are equivalent to LCSs.
- Laboratory reagent blanks are equivalent to method blanks.

- Post digestion spikes are equivalent to MSs.
- Post digestion spike duplicates are equivalent to MSDs.
- For method E900.1, used to determine gross alpha, a sample duplicate was used instead of a MSD.

All qualifiers, and the corresponding explanations reported in the QA/QC Summary Reports for any of the analytical QC samples for any of the analytical methods will be reviewed by the Mill QA Manager. The effect on data usability will be discussed in the evaluation section of the annual report.

5.2 Evaluation of Analytical Data

An evaluation of the analytical data will be completed in the annual report. A discussion of the results will be included which will summarize the data relative to any detections reported in the samples with comparisons as appropriate to the Mill groundwater quality data.

6.0 Reporting

DUSA will collect seeps and springs samples annually as required by the GWDP Part 1.F.7. Each report will: 1) document the sampling event by means of providing the field sheets recorded at the time of sampling; 2) transmit copies of all field measurements and laboratory results; 3) provide a water table contour map that includes water table elevation of all groundwater monitoring wells at the facility and the elevations of the phreatic surfaces observed at each of the seeps and springs sampled; and 4) provide an evaluation and interpretation of the groundwater quality data collected. Specific reporting requirements for the seeps and springs sampling program will include but are not limited to:

- The annual seeps and springs monitoring report will be included with the 3rd quarter Routine Groundwater Monitoring Report due on December 1, of each year.

- The seeps and springs water table contour map will include all water level data measurements from all monitoring wells at the site from the 3rd quarter groundwater monitoring event for each year.

- The seeps and springs water table contour map shall be at the map scale such that all seeps and springs listed in this Plan and monitor wells at the site may be seen on one map.

Table 1
Seeps and Springs Survey Information

December 2009 Survey			
Location	**Latitude (N)**	**Longitude (W)**	**Elevation**
FROG POND	37°33'03.5358"	109°29'04.9552"	5589.56
CORRAL CANYON	37°33'07.1392"	109°29'12.3907"	5623.97
ENTRANCE SPRING	37°32'01.6487"	109°29'33.7005"	5559.71
CORRAL SPRINGS	37°29'37.9192"	109°29'35.8201"	5383.35
RUIN SPRING	37°30'06.0448"	109°31'23.4300"	5380.03
COTTONWOOD	37°31'21.7002"	109°32'14.7923"	5234.33
WESTWATER	37°31'58.5020"	109°31'25.7345"	5468.23
Verification Survey July 2010			
RUIN SPRING	37°30'06.0456"	109°31'23.4181"	5380.01
COTTONWOOD	37°31'21.6987"	109°32'14.7927"	5234.27
WESTWATER	37°31'58.5013"	109°31'25.7357"	5468.32

Attachment A

Field Data Record-Seeps and Springs Sampling

Seep or Spring Location: ____________________

Date For Initial Sampling Visit:______________ **Time:**______________

Sample Collected: □ Yes □ No

Date For Second Sampling Visit:______________ **Time:**______________

Sample Collected: □ Yes □ No

Date For Third Sampling Visit:______________ **Time:**______________

Sample Collected: □ Yes □ No

Sampling Personnel: ____________________

Weather Conditions at Time of Sampling:____________________

Estimated Seep or Spring Flow Rate: ____________________

Field Parameter Measurements:

-pH ______________
-Temperature (°C) ______________
-Conductivity µMHOC/cm ______________
-Turbidity (NTU) (if measured)______________
-Redox Potential Eh (mV) (if measured) ______________

Analytical Parameters/Sample Collection Method:

Parameter	Sample Taken		Filtered		Sampling Method			
					Direct	Peristaltic Pump	Ladle	Other (describe in notes section)
VOCs	□ Yes	□ No	□ Yes	□ No	□	□	□	□
THF	□ Yes	□ No	□ Yes	□ No	□	□	□	□
Nutrients	□ Yes	□ No	□ Yes	□ No	□	□	□	□
Other Non Radiologics	□ Yes	□ No	□ Yes	□ No	□	□	□	□
Gross Alpha	□ Yes	□ No	□ Yes	□ No	□	□	□	□

QC Samples Associated with this Location:

□ Rinsate Blank
□ Duplicate
Duplicate Sample Name:______________

Notes:____________________

Appendix D

Results of Soil Analysis at Mill Site

Results Of Soil Analyses At Mill Site

Soil Series (Symbol)	Profile No.	Depth (in)	Texture[1]	Availabe Moisture (%)	Water at Saturation (%)	1:1	1:5	Lime (%)	Gypsum (%)	ECe (mm/cc)	ESP (%)	Organic Carbon (%)	Phosphate (ppm)	Potassium (ppm)	CEC (Meq/100g)
Blanding (Bnd)	4	0-4	SiL	7.6	36.0	7.4	7.9	0.3	.15	1.2	1.1	.63	15	198	12.8
Ustollic Haplargid		4-12	SiCL	8.7	49.0	7.6	8.0	0.3	0.14	0.8	0.2	0.53	3	170	16.6
Fine-silty, mixed		18-40	SiCL	8.0	43.7	8.0	8.5	2.0	0.30	0.7	0.6	0.42	3	165	14.9
	9	0-5	SiL	8.9	38.7	7.6	8.1	0.3	0.17	0.9	1.8	0.53	10	182	13.1
		5-12	SiL	9.3	45.6	8.0	8.4	0.3	0.18	0.9	1.4	0.47	2	138	10.9
		18-40	SiL	8.0	38.7	8.5	9.0	3.8	0.18	1.2	11.5	0.37	2	123	11.9
		40-50	SiCL	9.0	38.9	8.8	9.2	1.6	0.18	1.0	12.5	0.26	1	161	15.9

Source: Adapted from 1978 ER Table 2.10-2.2
SiCL = silty clay loam; SiL = silt loam

Appendix E

Tables: Chemical and Radiological Characteristics of Tailings Solutions, Leak Detection Systems and Slimes Drains

Cell 1
Chemical and Radiological Characteristics

Constituent	1987	2003 (Avg)	2007 (Avg)	2008	2009	2010	2011	2012	2013	2013 (resample)
Major Ions (mg/l)										
Carbonate	<5	<1	ND	ND	<1	<1	<1	<1	<1	NS
Bicarbonate	<5	NA	ND	ND	<1	<1	<1	<1	<1	NS
Calcium	630	307	483.8	604	635	711	577	426	768	NS
Chloride	8000	6728	37340	9830	20700	7440	33800	78000	9900	NS
Fluoride	<100	3005	31.72	0.3	0.4	28.4	69.2	62.9	4130	NS
Magnesium	7900	5988	21220	6550	16200	5410	14300	16000	4470	NS
Nitrogen-Ammonia	7800	3353	10628	5250	15200	8120	12900	9750	3900	NS
Nitrogen-Nitrate	<100	41.8	269.4	64.9	142	58	212	556	128	NS
Potassium	NA	647	5698	1880	4140	1840	4510	9750	6580	NS
Sodium	10000	8638	62600	13200	39000	16700	29500	41700	15900	NS
Sulfate	190000	63667	287600	118000	232000	107000	182000	158000	100000	NS
pH (s.u.)	0.70	1.88	0.80	1.53	1.15	2.73	2.23	1.9	2.74	NS
TDS	120000	94700	357400	131000	140000	130000	216000	342000	149000	NS
Conductivity (umhos/cm)	NA	NA	NA	NA	365000	110000	112000	136000	94200	NS
Metals (ug/l)										
Arsenic	440000	121267	849000	271000	436000	74400	299000	25500	9800	NS
Beryllium	780	475	2262	500	410	338	1270	3180	415	NS
Cadmium	6600	3990	29320	8790	9120	2940	13700	30700	2380	NS
Chromium	13000	6365	29940	6760	18700	5620	22700	12100	8350	NS
Cobalt	120000	NA	88240	23500	97500	16200	56000	53100	25500	NS
Copper	740000	196667	881000	360000	168000	125000	483000	885000	544000	NS
Iron	3400000	2820000	13480000	3280000	2390000	3400000	8940000	840000	1420000	NS
Lead	<20000	3393	27420	11200	10600	9240	23600	17000	2810	NS
Manganese	140000	162500	990200	206000	723000	173000	735000	1560000	188000	NS
Mercury	NA	NA	ND	ND	7.61	7.2	61.4	117	6.16	NS
Molybdenum	240000	50550	415600	106000	142000	35300	235000	434000	16800	NS
Nickel	370000	36950	40860	32000	156000	27500	43700	15000	39100	NS
Selenium	<20000	1862	15420	13000	14800	5220	11600	8090	2690	NS
Silver	<5000	NA	1559.2	449	558	155	1110	4310	329	NS
Thallium	45000	NA	407.8	165	387	193	560	13	63.3	NS
Tin	<5000	NA	6512	1240	2290	263	1500	<100	<100	NS
Uranium	105000	134517	788600	416000	578000	159000	838000	1450000	140000	NS
Vanadium	280000	348000	2208200	1200000	773000	752000	2500000	1940000	98200	NS
Zinc	1300000	NA	642940	476000	229000	171000	398000	811000	228000	NS
Radiologics (pCi/l)										
Gross Alpha	NA	169333[1]	29380	21900	16500	11300	3610	12600	32700	NS
VOCS (ug/L)										
Acetone	35	NA	66.5	110	710	260	80	310	41.1	NS
Benzene	<5	NA	ND	ND	<1	<1	<1	<1	<1	NS
Carbon tetrachloride	<5	NA	ND	ND	<1	<1	<1	<1	<1	NS
Chloroform	8	NA	6.7	6.6	16	4.9	13	19	7.62	NS
Chloromethane	NA	NA	ND	9.4	11	4.4	3.6	4.0	5	NS
MEK	NA	NA	ND	ND	120	65	<1	200	<20	NS
Methylene Chloride	11	NA	ND	ND	2.0	<1	<1	2	<1	NS
Naphthalene	<10000	NA	<10	ND	1.1	5.4	2	3	<1	NS
Tetrahydrofuran	NA	NA	150	<20	<100	<10	<500	2.9	<1	NS
Toluene	<5	NA	ND	ND	<1	<1	<1	<1	<1	NS
Xylenes	<5	NA	ND	ND	<1	<1	<1	<1	<1	NS
SVOCS (ug/L)										
1,2,4-Trichlorobenzene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
1,2-Dichlorobenzene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
1,3-Dichlorobenzene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
1,4-Dichlorobenzene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
1-Methylnaphthalene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2,4,5-Trichlorophenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2,4,6-Trichlorophenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2,4-Dichlorophenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2,4-Dimethylphenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2,4-Dinitrophenol	NA	NA	NA	NA	<250	<20	<20	<20	<21.6	<20
2,4-Dinitrotoluene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10

Cell 1
Chemical and Radiological Characteristics

Constituent	1987	2003 (Avg)	2007 (Avg)	2008	2009	2010	2011	2012	2013	2013 (resample)
Major Ions (mg/l)										
2,6-Dinitrotoluene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2-Chloronaphthalene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2-Chlorophenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2-Methylnaphthalene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2-Methylphenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
2-Nitrophenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
3&4-Methylphenol	NA	NA	NA	NA	<22	<10	<10	<10	<10.8	<10
3,3´-Dichlorobenzidine	NA	NA	NA	NA	<100	<10	<10	<10	<10.8	<10
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	<250	<10	<10	<10	<10.8	<10
4-Bromophenyl phenyl ether	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
4-Chloro-3-methylphenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
4-Nitrophenol	NA	NA	NA	NA	<250	<10	<10	<10	<10.8	<10
Acenaphthene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Acenaphthylene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Anthracene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Azobenzene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Benz(a)anthracene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Benzidine	NA	NA	NA	NA	<100	<10	<10	<10	<10.8	<10
Benzo(a)pyrene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Benzo(b)fluoranthene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Benzo(g,h,i)perylene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Benzo(k)fluoranthene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Bis(2-chloroethyl) ether	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Bis(2-chloroisopropyl) ether	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	<50	27	<10	<10	<10.8	<10
Butyl benzyl phthalate	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Chrysene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Dibenz(a,h)anthracene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Diethyl phthalate	NA	NA	NA	NA	170	<10	<10	<10	<10.8	<10
Dimethyl phthalate	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Di-n-butyl phthalate	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Di-n-octyl phthalate	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Fluoranthene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Fluorene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Hexachlorobenzene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Hexachlorobutadiene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Hexachlorocyclopentadiene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Hexachloroethane	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Isophorone	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Naphthalene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Nitrobenzene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
N-Nitrosodimethylamine	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
N-Nitrosodiphenylamine	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Pentachlorophenol	NA	NA	NA	NA	<250	<10	<10	<10	<10.8	<10
Phenanthrene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Phenol	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Pyrene	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10
Pyridine	NA	NA	NA	NA	<50	<10	<10	<10	<10.8	<10

[1] Historic values reported for Gross Alpha from 1987 and 2003 are total gross alpha reported in pCi/L. All other gross alpha data are reported as Gross Alpha minus Rn & U.

Cell 2 Slimes Drain
Chemical and Radiological Characteristics

Major Ions (mg/l)	2007	2008	2009	2010	2011	2012	2013
Carbonate	ND	ND	<1	<1	<1	<1	<1
Bicarbonate	ND	ND	<1	<1	<1	<1	<1
Calcium	572	528	508	496	474	462	465
Chloride	3700	3860	2750	3510	3110	3730	3270
Fluoride	3.3	ND	<0.1	2.4	2.1	1.32	161
Magnesium	4100	4030	3750	3790	3640	3760	3320
Nitrogen-Ammonia	4020	3620	3240	3820	2940	3540	1880
Nitrogen-Nitrate	30.9	20.3	38	126	38	27	47.2
Potassium	636	560	689	620	636	611	622
Sodium	4050	4600	4410	4770	4590	4380	3980
Sulfate	60600	74000	72200	63700	64200	58300	83700
pH (s.u.)	3.18	3.24	3.11	3.39	3.18	3.0	3.02
TDS	84300	74600	84100	79900	80200	83800	92200
Conductivity (umhos/cm)	NA	NA	88700	60200	51400	52900	51100
Metals (ug/l)							
Arsenic	26900	19300	14200	23500	17800	19400	21000
Beryllium	298	245	271	267	231	251	262
Cadmium	5500	5840	5510	6370	5580	5290	5780
Chromium	2750	2450	2230	2510	2380	2350	2290
Cobalt	46500	43800	38700	48200	42500	48700	44900
Copper	106000	154000	170000	148000	132000	138000	137000
Iron	2770000	3310000	3230000	2720000	2960000	2850000	2810000
Lead	566	528	403	586	501	619	515
Manganese	117000	130000	160000	144000	123000	141000	122000
Mercury	ND	ND	<0.5	<4	11.1	1.9	<0.5
Molybdenum	4080	3190	2240	4630	3510	3610	3650
Nickel	123000	122000	108000	126000	111000	125000	108000
Selenium	422	647	726	844	714	711	678
Silver	ND	ND	<10	<10	<10	<10	<10
Thallium	361	703	368	470	371	338	278
Tin	ND	ND	<100	<100	<100	<100	<100
Uranium	23000	29200	29900	30600	27100	33400	22800
Vanadium	409000	463000	536000	469000	454000	475000	452000
Zinc	767000	750000	582000	652000	574000	639000	631000
Radiologics (pCi/l)							
Gross Alpha	1290	1570	1580	1000	1230	1370 (2400)*	2270
VOCS (ug/L)							
Acetone	550	410	570	460	690	600	384
Benzene	ND	ND	<1	<1	<1	<1	<1
Carbon tetrachloride	ND	ND	<1	<1	<1	<1	<1
Chloroform	20	17	16	15	20	16	21.4
Chloromethane	1.8	ND	2.2	2.3	2	3	2.04
MEK	65	ND	100	83	130	100	95.5
Methylene Chloride	ND	ND	<1	<1	<1	<1	<1
Naphthalene	14	7.5	16	17	13	12	16.8
Tetrahydrofuran	15	NA	<100	<10	<10	3.2	3.98
Toluene	1.7	ND	2.6	2.6	3	2	3.23
Xylenes	1.5	ND	<1	2.2	<1	2	5.97
SVOCS (ug/L)							
1,2,4-Trichlorobenzene	NA	NA	<11	<10	<10	<10	<10
1,2-Dichlorobenzene	NA	NA	<11	<10	<10	<10	<10
1,3-Dichlorobenzene	NA	NA	<11	<10	<10	<10	<10
1,4-Dichlorobenzene	NA	NA	<11	<10	<10	<10	<10
1-Methylnaphthalene	NA	NA	<11	<10	<10	<10	<10
2,4,5-Trichlorophenol	NA	NA	<11	<10	<10	<10	<10
2,4,6-Trichlorophenol	NA	NA	<11	<10	<10	<10	<10
2,4-Dichlorophenol	NA	NA	<11	<10	<10	<10	<10
2,4-Dimethylphenol	NA	NA	<51	<20	<20	<10	<10
2,4-Dinitrophenol	NA	NA	<11	<10	<10	<20	<20
2,4-Dinitrotoluene	NA	NA	<11	<10	<10	<10	<10

Cell 2 Slimes Drain
Chemical and Radiological Characteristics

Major Ions (mg/l)	2007	2008	2009	2010	2011	2012	2013
2,6-Dinitrotoluene	NA	NA	<11	<10	<10	<10	<10
2-Chloronaphthalene	NA	NA	<11	<10	<10	<10	<10
2-Chlorophenol	NA	NA	<11	<10	<10	<10	<10
2-Methylnaphthalene	NA	NA	<11	<10	<10	<10	<10
2-Methylphenol	NA	NA	<11	<10	<10	<10	<10
2-Nitrophenol	NA	NA	<11	<10	<10	<10	<10
3&4-Methylphenol	NA	NA	<21	<10	<10	<10	<10
3,3´-Dichlorobenzidine	NA	NA	<51	<10	<10	<10	<10
4,6-Dinitro-2-methylphenol	NA	NA	<11	<10	<10	<10	<10
4-Bromophenyl phenyl ether	NA	NA	<11	<10	<10	<10	<10
4-Chloro-3-methylphenol	NA	NA	<11	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	NA	NA	<51	<10	<10	<10	<10
4-Nitrophenol	NA	NA	<11	<10	<10	<10	<10
Acenaphthene	NA	NA	<11	<10	<10	<10	<10
Acenaphthylene	NA	NA	<11	<10	<10	<10	<10
Anthracene	NA	NA	<11	<10	<10	<10	<10
Azobenzene	NA	NA	<11	<10	<10	<10	<10
Benz(a)anthracene	NA	NA	<21	<10	<10	<10	<10
Benzidine	NA	NA	<11	<10	<10	<10	<10
Benzo(a)pyrene	NA	NA	<11	<10	<10	<10	<10
Benzo(b)fluoranthene	NA	NA	<11	<10	<10	<10	<10
Benzo(g,h,i)perylene	NA	NA	<11	<10	<10	<10	<10
Benzo(k)fluoranthene	NA	NA	<11	<10	<10	<10	<10
Bis(2-chloroethoxy)methane	NA	NA	<11	<10	<10	<10	<10
Bis(2-chloroethyl) ether	NA	NA	<11	<10	<10	<10	<10
Bis(2-chloroisopropyl) ether	NA	NA	<11	<10	<10	<10	<10
Bis(2-ethylhexyl) phthalate	NA	NA	<11	<10	<10	<10	<10
Butyl benzyl phthalate	NA	NA	<11	<10	<10	<10	<10
Chrysene	NA	NA	<11	<10	<10	<10	<10
Dibenz(a,h)anthracene	NA	NA	<11	<10	<10	<10	<10
Diethyl phthalate	NA	NA	<11	<10	<10	<10	<10
Dimethyl phthalate	NA	NA	<11	<10	<10	<10	<10
Di-n-butyl phthalate	NA	NA	<11	<10	<10	<10	<10
Di-n-octyl phthalate	NA	NA	<11	<10	<10	<10	<10
Fluoranthene	NA	NA	<11	<10	<10	<10	<10
Fluorene	NA	NA	<11	<10	<10	<10	<10
Hexachlorobenzene	NA	NA	<11	<10	<10	<10	<10
Hexachlorobutadiene	NA	NA	<11	<10	<10	<10	<10
Hexachlorocyclopentadiene	NA	NA	<11	<10	<10	<10	<10
Hexachloroethane	NA	NA	<11	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	NA	NA	<11	<10	<10	<10	<10
Isophorone	NA	NA	<11	<10	<10	<10	<10
Naphthalene	NA	NA	<11	<10	<10	<10	<10
Nitrobenzene	NA	NA	<11	<10	<10	<10	<10
N-Nitrosodimethylamine	NA	NA	<11	<10	<10	<10	<10
N-Nitrosodi-n-propylamine	NA	NA	<11	<10	<10	<10	<10
N-Nitrosodiphenylamine	NA	NA	<51	<10	<10	<10	<10
Pentachlorophenol	NA	NA	<11	<10	<10	<10	<10
Phenanthrene	NA	NA	<11	<10	<10	<10	<10
Phenol	NA	NA	<11	10.7	<10	<10	<10
Pyrene	NA	NA	<11	<10	<10	<10	<10
Pyridine	NA	NA	<11	<10	<10	<10	<10

* Sample was reanalyzed due to comparability with the duplicate sample. The reanalysis data are in (parenthesis).

Cell 2 LDS
Chemical and Radiological Characteristics

Constituent	2009	2010	2011	2012	2013
Major Ions (mg/l)					
Carbonate	<1	<1	Not Sampled	Not Sampled	Not Sampled
Bicarbonate	168	324			
Calcium	711	615			
Chloride	1750	1360			
Fluoride	0.4	0.4			
Magnesium	596	454			
Nitrogen-Ammonia	32.6	0.7			
Nitrogen-Nitrate	2.8	2.2			
Potassium	22	13.0			
Sodium	412	318			
Sulfate	2700	1780			
pH (s.u.)	6.60	7.36			
TDS	6750	5310			
Conductivity (umhos/cm)	11000	6500			
Metals (ug/l)					
Arsenic	<5	<5	Not Sampled	Not Sampled	Not Sampled
Beryllium	<0.50	<0.50			
Cadmium	33.4	1.10			
Chromium	<25	<25			
Cobalt	314	<10			
Copper	59	12			
Iron	208	37			
Lead	<1.0	<1.0			
Manganese	1810	395			
Mercury	<0.50	0.52			
Molybdenum	21	13			
Nickel	948	<20			
Selenium	7.9	9.4			
Silver	<10	<10			
Thallium	0.92	<0.50			
Tin	<100	<100			
Uranium	83.8	79.6			
Vanadium	22	<15			
Zinc	4220	78			
Radiologics (pCi/l)					
Gross Alpha	13.5	7.3	Not Sampled	Not Sampled	Not Sampled
VOCS (ug/L)					
Acetone	<20	<20	Not Sampled	Not Sampled	Not Sampled
Benzene	<1	<1			
Carbon tetrachloride	<1	<1			
Chloroform	<1	<1			
Chloromethane	<1	<1			
MEK	<20	<20			
Methylene Chloride	<1	<1			
Naphthalene	<1	<1			
Tetrahydrofuran	<100	6.13			
Toluene	<1	<1			
Xylenes	<1	<1			
SVOCS (ug/L)					
1,2,4-Trichlorobenzene	NA	<10	Not Sampled	Not Sampled	Not Sampled
1,2-Dichlorobenzene	NA	<10			
1,3-Dichlorobenzene	NA	<10			
1,4-Dichlorobenzene	NA	<10			
1-Methylnaphthalene	NA	<10			
2,4,5-Trichlorophenol	NA	<10			
2,4,6-Trichlorophenol	NA	<10			
2,4-Dichlorophenol	NA	<10			
2,4-Dimethylphenol	NA	<10			
2,4-Dinitrophenol	NA	<20			

Cell 2 LDS
Chemical and Radiological Characteristics

Constituent	2009	2010	2011	2012	2013
Major Ions (mg/l)					
2,4-Dinitrotoluene	NA	<10	Not Sampled	Not Sampled	Not Sampled
2,6-Dinitrotoluene	NA	<10			
2-Chloronaphthalene	NA	<10			
2-Chlorophenol	NA	<10			
2-Methylnaphthalene	NA	<10			
2-Methylphenol	NA	<10			
2-Nitrophenol	NA	<10			
3&4-Methylphenol	NA	<10			
3,3´-Dichlorobenzidine	NA	<10			
4,6-Dinitro-2-methylphenol	NA	<10			
4-Bromophenyl phenyl ether	NA	<10			
4-Chloro-3-methylphenol	NA	<10			
4-Chlorophenyl phenyl ether	NA	<10			
4-Nitrophenol	NA	<10			
Acenaphthene	NA	<10			
Acenaphthylene	NA	<10			
Anthracene	NA	<10			
Azobenzene	NA	<10			
Benz(a)anthracene	NA	<10			
Benzidine	NA	<10			
Benzo(a)pyrene	NA	<10			
Benzo(b)fluoranthene	NA	<10			
Benzo(g,h,i)perylene	NA	<10			
Benzo(k)fluoranthene	NA	<10			
Bis(2-chloroethoxy)methane	NA	<10			
Bis(2-chloroethyl) ether	NA	<10			
Bis(2-chloroisopropyl) ether	NA	<10			
Bis(2-ethylhexyl) phthalate	NA	<10			
Butyl benzyl phthalate	NA	<10			
Chrysene	NA	<10			
Dibenz(a,h)anthracene	NA	<10			
Diethyl phthalate	NA	<10			
Dimethyl phthalate	NA	<10			
Di-n-butyl phthalate	NA	<10			
Di-n-octyl phthalate	NA	<10			
Fluoranthene	NA	<10			
Fluorene	NA	<10			
Hexachlorobenzene	NA	<10			
Hexachlorobutadiene	NA	<10			
Hexachlorocyclopentadiene	NA	<10			
Hexachloroethane	NA	<10			
Indeno(1,2,3-cd)pyrene	NA	<10			
Isophorone	NA	<10			
Naphthalene	NA	<10			
Nitrobenzene	NA	<10			
N-Nitrosodimethylamine	NA	<10			
N-Nitrosodi-n-propylamine	NA	<10			
N-Nitrosodiphenylamine	NA	<10			
Pentachlorophenol	NA	<10			
Phenanthrene	NA	<10			
Phenol	NA	<10			
Pyrene	NA	<10			
Pyridine	NA	<10			

Cell 3
Chemical and Radiological Characteristics

Constituent	1987	2003 (Avg)	2007 (Avg)	2008	2009	2010	2011	2012	2013	2013 (resample)
Major Ions (mg/l)										
Carbonate	NA	<1	ND	ND	<1	<1	<1	<1	<1	NS
Bicarbonate	<5	NA	ND	ND	<1	<1	<1	<1	<1	NS
Calcium	300	418	887	478	628	560	200	591	586	NS
Chloride	NA	2460	15965	15400	17200	3470	40400	8880	38400	NS
Fluoride	<100	667	42.8	1.4	0.6	54.8	64.1	2300	12400	NS
Magnesium	5400	3386	15767	13100	17100	2500	22100	5680	15400	NS
Nitrogen-Ammonia	13900	1302	13867	9010	21600	2650	6470	6840	100	NS
Nitrogen-Nitrate	<100	20	102	44	142	26	261	64	277	NS
Potassium	NA	254	6657	4760	3820	782	2590	1190	2110	NS
Sodium	5900	3198	25583	22900	28600	5620	47900	6660	34400	NS
Sulfate	180000	33400	173667	167000	214000	40400	197000	80000	440000	NS
pH (s.u.)	0.82	2.28	1.60	1.79	1.4	2.18	1.27	2.4	1.05	NS
TDS	189000	51633	228500	193000	243000	56200	296000	120000	410000	NS
Conductivity (umhos/cm)	NA	NA	NA	NA	304000	59800	86400	80300	84300	NS
Metals (ug/l)										
Arsenic	163000	32867	256500	489000	ND	52900	263000	4340	66000	NS
Beryllium	540	430	913	840	905	206	1570	678	2570	NS
Cadmium	2600	1958	9260	15400	ND	1960	12200	3460	24000	NS
Chromium	12000	3742	14883	12800	ND	3360	22800	10900	30600	NS
Cobalt	48000	NA	82783	57000	ND	13000	76000	76100	99700	NS
Copper	360000	87333	505000	345000	ND	89000	768000	379000	954000	NS
Iron	2100000	1278333	4874500	4400000	5970000	1460000	1.02E+7	3400000	9700000	NS
Lead	<20000	2507	9647	16900	ND	17200	16700	1860	14400	NS
Manganese	82000	144000	496833	313000	ND	101000	587000	3110000	2470000	NS
Mercury	ND	NA	ND	16	ND	<4	30.9	9.6	21.6	NS
Molybdenum	52000	12250	122167	209000	14	21300	96200	790	56100	NS
Nickel	170000	20917	131833	241000	ND	23800	75800	150000	122000	NS
Selenium	<2000	910	5856	10200	ND	3080	6900	2460	7060	NS
Silver	<2500	NA	305	1010	ND	101	792	1850	3380	NS
Thallium	4700	NA	446	1200	ND	190	518	1080	694	NS
Tin	NA	NA	1090	1070	ND	155	325	<100	<100	NS
Uranium	118000	67833	332333	636000	3690	180000	458000	835000	1200000	NS
Vanadium	210000	158333	935000	1130000	ND	692000	2370000	836000	3220000	NS
Zinc	590000	NA	748833	515000	ND	134000	726000	652000	1430000	NS
Radiologics (pCi/l)										
Gross Alpha	NA	101583[1]	16533	21700	17000	4030	11100	1530	81900	NS
VOCS (ug/L)										
Acetone	28	NA	80	100	67	37	330	64	302	159
Benzene	<5	NA	ND	ND	<1	<1	<1	<1	<5	<1
Carbon tetrachloride	<5	NA	ND	ND	<1	<1	<1	<1	<5	<1
Chloroform	6	NA	ND	11	4.2	2.6	31	2	56.3	21
Chloromethane	NA	NA	ND	ND	1.4	1.8	3.5	1	<5	2.58
MEK	NA	NA	ND	ND	<1	<1	67	<20	<100	24.5
Methylene Chloride	10	NA	ND	ND	<1	<1	7.4	<1	6.95	<1
Naphthalene	<10000	NA	ND	<10	<1	2.1	1.2	<1	<5	<1
Tetrahydrofuran	NA	NA	150	<20	<100	<10	<10	<1	<5	<1
Toluene	<5	NA	ND	ND	<1	<1	<1	<1	<5	<1
Xylenes	<5	NA	ND	ND	<1	<1	<1	<1	<5	<1
SVOCS (ug/L)										
1,2,4-Trichlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
1,2-Dichlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
1,3-Dichlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
1,4-Dichlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
1-Methylnaphthalene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2,4,5-Trichlorophenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2,4,6-Trichlorophenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2,4-Dichlorophenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2,4-Dimethylphenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2,4-Dinitrophenol	NA	NA	NA	NA	<53	<20	<20	<20	<21.1	<20
2,4-Dinitrotoluene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10

Cell 3
Chemical and Radiological Characteristics

Constituent	1987	2003 (Avg)	2007 (Avg)	2008	2009	2010	2011	2012	2013	2013 (resample)
Major Ions (mg/l)										
2,6-Dinitrotoluene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2-Chloronaphthalene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2-Chlorophenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2-Methylnaphthalene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2-Methylphenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
2-Nitrophenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
3&4-Methylphenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
3,3´-Dichlorobenzidine	NA	NA	NA	NA	<21	<10	<10	<10	<10.5	<10
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	<53	<10	<10	<10	<10.5	<10
4-Bromophenyl phenyl ether	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
4-Chloro-3-methylphenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
4-Nitrophenol	NA	NA	NA	NA	<53	<10	<10	<10	<10.5	<10
Acenaphthene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Acenaphthylene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Anthracene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Azobenzene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Benz(a)anthracene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Benzidine	NA	NA	NA	NA	<21	<10	<10	<10	<10.5	<10
Benzo(a)pyrene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Benzo(b)fluoranthene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Benzo(g,h,i)perylene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Benzo(k)fluoranthene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Bis(2-chloroethyl) ether	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Bis(2-chloroisopropyl) ether	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	<11	10.6	<10	<10	<10.5	<10
Butyl benzyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Chrysene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Dibenz(a,h)anthracene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Diethyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Dimethyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Di-n-butyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Di-n-octyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Fluoranthene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Fluorene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Hexachlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Hexachlorobutadiene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Hexachlorocyclopentadiene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Hexachloroethane	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Isophorone	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Naphthalene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Nitrobenzene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
N-Nitrosodimethylamine	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
N-Nitrosodiphenylamine	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Pentachlorophenol	NA	NA	NA	NA	<53	<10	<10	<10	<10.5	<10
Phenanthrene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Phenol	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Pyrene	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10
Pyridine	NA	NA	NA	NA	<11	<10	<10	<10	<10.5	<10

[1] Historic values reported for Gross Alpha from 1987 and 2003 are total gross alpha reported in pCi/L. All other gross alpha data are reported as Gross Alpha minus Rn & U.

Cell 4A
Chemical and Radiological Characteristics

Constituent	2009	2010	2011	2012	2013
Major Ions (mg/l)					
Carbonate	<1	<1	<1	<1	<1
Bicarbonate	<1	<1	<1	<1	<1
Calcium	627	598	558	591	668
Chloride	4650	7350	5870	4980	4530
Fluoride	0.3	21.6	30.6	43	1130
Magnesium	3250	4940	4720	2230	3660
Nitrogen-Ammonia	3140	5230	4930	1540	1340
Nitrogen-Nitrate	28	52	44	27	38.2
Potassium	980	1440	1450	558	773
Sodium	5980	11300	11400	7130	6860
Sulfate	67600	87100	267000	64900	83300
pH (s.u.)	1.40	1.99	1.73	1.2	1.47
TDS	81400	107000	108000	76000	90000
Conductivity (umhos/cm)	131000	101000	82100	78100	66300
Metals (ug/l)					
Arsenic	626000	109000	86600	60500	73700
Beryllium	296	215	323	167	247
Cadmium	1920	3670	2190	844	1450
Chromium	3220	7500	5900	5990	5220
Cobalt	9440	26500	22500	22900	22900
Copper	99200	168000	181000	433000	540000
Iron	2360000	2920000	3390000	3190000	2620000
Lead	5360	11800	11000	5270	11500
Manganese	178000	209000	131000	112000	143000
Mercury	1.19	<4	15.2	2.4	0.786
Molybdenum	24300	43800	24200	58200	25500
Nickel	17100	40900	43500	41300	43300
Selenium	4620	5810	4460	1310	2080
Silver	78	193	216	127	144
Thallium	162	350	410	250	256
Tin	257	378	319	169	118
Uranium	118000	217000	153000	91000	112000
Vanadium	918000	1090000	730000	237000	461000
Zinc	142000	224000	286000	200000	183000
Radiologics (pCi/l)					
Gross Alpha	8910	3400	8290	16300	15800
VOCS (ug/L)					
Acetone	60	55	100	25	28.4
Benzene	<1	<1	<1	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1
Chloroform	4.0	8.5	10	<1	<1
Chloromethane	3.4	5.5	7.9	<1	<1
MEK	<1	<1	<1	<1	<20
Methylene Chloride	<1	<1	<1	<20	<1
Naphthalene	1.8	<1	<1	<1	<1
Tetrahydrofuran	<100	<10	<10	1.36	<1
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1	<1
SVOCS (ug/L)					
1,2,4-Trichlorobenzene	<11	<10	<10	<10	<10
1,2-Dichlorobenzene	<11	<10	<10	<10	<10
1,3-Dichlorobenzene	<11	<10	<10	<10	<10
1,4-Dichlorobenzene	<11	<10	<10	<10	<10
1-Methylnaphthalene	<11	<10	<10	<10	<10
2,4,5-Trichlorophenol	<11	<10	<10	<10	<10
2,4,6-Trichlorophenol	<11	<10	<10	<10	<10
2,4-Dichlorophenol	<11	<10	<10	<10	<10
2,4-Dimethylphenol	<11	<10	<10	<10	<10
2,4-Dinitrophenol	<53	<20	<20	<20	<20
2,4-Dinitrotoluene	<11	<10	<10	<10	<10
2,6-Dinitrotoluene	<11	<10	<10	<10	<10
2-Chloronaphthalene	<11	<10	<10	<10	<10

Cell 4A
Chemical and Radiological Characteristics

Constituent	2009	2010	2011	2012	2013
Major Ions (mg/l)					
2-Chlorophenol	<11	<10	<10	<10	<10
2-Methylnaphthalene	<11	<10	<10	<10	<10
2-Methylphenol	<11	<10	<10	<10	<10
2-Nitrophenol	<11	<10	<10	<10	<10
3&4-Methylphenol	<11	<10	<10	<10	<10
3,3´-Dichlorobenzidine	<21	<10	<10	<10	<10
4,6-Dinitro-2-methylphenol	<53	<10	<10	<10	<10
4-Bromophenyl phenyl ether	<11	<10	<10	<10	<10
4-Chloro-3-methylphenol	<11	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	<11	<10	<10	<10	<10
4-Nitrophenol	<53	<10	<10	<10	<10
Acenaphthene	<11	<10	<10	<10	<10
Acenaphthylene	<11	<10	<10	<10	<10
Anthracene	<11	<10	<10	<10	<10
Azobenzene	<11	<10	<10	<10	<10
Benz(a)anthracene	<11	<10	<10	<10	<10
Benzidine	<21	<10	<10	<10	<10
Benzo(a)pyrene	<11	<10	<10	<10	<10
Benzo(b)fluoranthene	<11	<10	<10	<10	<10
Benzo(g,h,i)perylene	<11	<10	<10	<10	<10
Benzo(k)fluoranthene	<11	<10	<10	<10	<10
Bis(2-chloroethoxy)methane	<11	<10	<10	<10	<10
Bis(2-chloroethyl) ether	<11	<10	<10	<10	<10
Bis(2-chloroisopropyl) ether	<11	<10	<10	<10	<10
Bis(2-ethylhexyl) phthalate	<11	19.6	<10	<10	<10
Butyl benzyl phthalate	<11	<10	<10	<10	<10
Chrysene	<11	<10	<10	<10	<10
Dibenz(a,h)anthracene	<11	<10	<10	<10	<10
Diethyl phthalate	<11	<10	<10	<10	<10
Dimethyl phthalate	<11	<10	<10	<10	<10
Di-n-butyl phthalate	<11	<10	<10	<10	<10
Di-n-octyl phthalate	<11	<10	<10	<10	<10
Fluoranthene	<11	<10	<10	<10	<10
Fluorene	<11	<10	<10	<10	<10
Hexachlorobenzene	<11	<10	<10	<10	<10
Hexachlorobutadiene	<11	<10	<10	<10	<10
Hexachlorocyclopentadiene	<11	<10	<10	<10	<10
Hexachloroethane	<11	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	<11	<10	<10	<10	<10
Isophorone	<11	<10	<10	<10	<10
Naphthalene	<11	<10	<10	<10	<10
Nitrobenzene	<11	<10	<10	<10	<10
N-Nitrosodimethylamine	<11	<10	<10	<10	<10
N-Nitrosodi-n-propylamine	<11	<10	<10	<10	<10
N-Nitrosodiphenylamine	<11	<10	<10	<10	<10
Pentachlorophenol	<53	<10	<10	<10	<10
Phenanthrene	<11	<10	<10	<10	<10
Phenol	<11	<10	<10	<10	<10
Pyrene	<11	<10	<10	<10	<10
Pyridine	<11	<10	<10	<10	<10

Cell 4A LDS
Chemical and Radiological Characteristics

Constituent	2009	2010	2011	2012	2013
Major Ions (mg/l)					
Carbonate	<1	<1	<1	<1	<1
Bicarbonate	<1	<1	<1	<1	<1
Calcium	558	474	470	453	429
Chloride	7570	4670	6040	2710	1910
Fluoride	0.7	39.4	46	27	1970
Magnesium	6390	3240	5100	2070	1710
Nitrogen-Ammonia	4480	2290	3480	1320	1010
Nitrogen-Nitrate	69	183	94	15	28.9
Potassium	1960	934	1500	503	305
Sodium	12600	6700	11000	3500	2930
Sulfate	92400	41700	77400	39600	31400
pH (s.u.)	1.98	2.53	2.32	2.1	2.32
TDS	117000	56900	93800	55400	49700
Conductivity (umhos/cm)	150000	49000	66600	39600	31300
Metals (ug/l)					
Arsenic	133000	54000	74700	44100	35700
Beryllium	536	295	367	180	188
Cadmium	4010	2650	3160	921	1170
Chromium	9140	3890	5940	3930	2630
Cobalt	37300	15200	21700	22300	44300
Copper	222000	116000	150000	481000	754000
Iron	3940000	1420000	2530000	2460000	1370000
Lead	5270	3400	4520	2300	165
Manganese	389000	157000	207000	95200	86300
Mercury	2.66	6.2	14.7	0.7	<0.5
Molybdenum	49200	23900	29300	10200	1200
Nickel	43900	23900	29600	35000	54600
Selenium	5250	2820	3780	1260	1020
Silver	204	62	127	44	24.8
Thallium	252	194	290	332	171
Tin	504	180	119	<100	<100
Uranium	284000	145000	168000	90200	75000
Vanadium	1150000	518000	770000	240000	157000
Zinc	298000	152000	204000	181000	163000
Radiologics (pCi/l)					
Gross Alpha	7020	3230	7440	4730	6930
VOCS (ug/L)					
Acetone	240	130	120	55	57
Benzene	<1	<1	<1	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1
Chloroform	23	52	26	42	110
Chloromethane	7.9	13	3.8	6	9.93
MEK	78	50	82	36	<20
Methylene Chloride	<1	<1	<1	<1	<1
Naphthalene	<1	1.5	<1	1	2.35
Tetrahydrofuran	140	158	102	117	39.1
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1	<1
SVOCS (ug/L)					
1,2,4-Trichlorobenzene	<11	<10	<10	<10	<10
1,2-Dichlorobenzene	<11	<10	<10	<10	<10
1,3-Dichlorobenzene	<11	<10	<10	<10	<10
1,4-Dichlorobenzene	<11	<10	<10	<10	<10
1-Methylnaphthalene	<11	<10	<10	<10	<10
2,4,5-Trichlorophenol	<11	<10	<10	<10	<10
2,4,6-Trichlorophenol	<11	<10	<10	<10	<10
2,4-Dichlorophenol	<11	<10	<10	<10	<10
2,4-Dimethylphenol	<11	<10	<10	<10	<10

Cell 4A LDS
Chemical and Radiological Characteristics

Constituent	2009	2010	2011	2012	2013
Major Ions (mg/l)					
2,4-Dinitrophenol	<54	<20	<20	<20	<20
2,4-Dinitrotoluene	<11	<10	<10	<10	<10
2,6-Dinitrotoluene	<11	<10	<10	<10	<10
2-Chloronaphthalene	<11	<10	<10	<10	<10
2-Chlorophenol	<11	<10	<10	<10	<10
2-Methylnaphthalene	<11	<10	<10	<10	<10
2-Methylphenol	<11	<10	<10	<10	<10
2-Nitrophenol	<11	<10	<10	<10	<10
3&4-Methylphenol	<11	<10	<10	<10	<10
3,3´-Dichlorobenzidine	<22	<10	<10	<10	<10
4,6-Dinitro-2-methylphenol	<54	<10	<10	<10	<10
4-Bromophenyl phenyl ether	<11	<10	<10	<10	<10
4-Chloro-3-methylphenol	<11	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	<11	<10	<10	<10	<10
4-Nitrophenol	<54	<10	<10	<10	<10
Acenaphthene	<11	<10	<10	<10	<10
Acenaphthylene	<11	<10	<10	<10	<10
Anthracene	<11	<10	<10	<10	<10
Azobenzene	<11	<10	<10	<10	<10
Benz(a)anthracene	<11	<10	<10	<10	<10
Benzidine	<22	<10	<10	<10	<10
Benzo(a)pyrene	<11	<10	<10	<10	<10
Benzo(b)fluoranthene	<11	<10	<10	<10	<10
Benzo(g,h,i)perylene	<11	<10	<10	<10	<10
Benzo(k)fluoranthene	<11	<10	<10	<10	<10
Bis(2-chloroethoxy)methane	<11	<10	<10	<10	<10
Bis(2-chloroethyl) ether	<11	<10	<10	<10	<10
Bis(2-chloroisopropyl) ether	<11	<10	<10	<10	<10
Bis(2-ethylhexyl) phthalate	<11	54.9	54.9	16.6	<10
Butyl benzyl phthalate	<11	<10	<10	<10	<10
Chrysene	<11	<10	<10	<10	<10
Dibenz(a,h)anthracene	<11	<10	<10	<10	<10
Diethyl phthalate	<11	<10	<10	<10	<10
Dimethyl phthalate	<11	<10	<10	<10	<10
Di-n-butyl phthalate	<11	<10	<10	<10	<10
Di-n-octyl phthalate	<11	<10	<10	<10	<10
Fluoranthene	<11	<10	<10	<10	<10
Fluorene	<11	<10	<10	<10	<10
Hexachlorobenzene	<11	<10	<10	<10	<10
Hexachlorobutadiene	<11	<10	<10	<10	<10
Hexachlorocyclopentadiene	<11	<10	<10	<10	<10
Hexachloroethane	<11	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	<11	<10	<10	<10	<10
Isophorone	<11	<10	<10	<10	<10
Naphthalene	<11	<10	<10	<10	<10
Nitrobenzene	<11	<10	<10	<10	<10
N-Nitrosodimethylamine	<11	<10	<10	<10	<10
N-Nitrosodi-n-propylamine	<11	<10	<10	<10	<10
N-Nitrosodiphenylamine	<11	<10	<10	<10	<10
Pentachlorophenol	<54	<10	<10	<10	<10
Phenanthrene	<11	<10	<10	<10	<10
Phenol	33	23.5	<10	<10	<10
Pyrene	<11	<10	<10	<10	<10
Pyridine	<11	<10	<10	<10	<10

Cell 4B
Chemical and Radiological Characteristics

Constituent	2011	2012	2013
Major Ions (mg/l)			
Carbonate	<1	<1	<1
Bicarbonate	<1	<1	<1
Calcium	570	580	662
Chloride	8290	8170	4570
Fluoride	26.7	23.3	1050
Magnesium	3910	4500	3560
Nitrogen-Ammonia	5220	5580	2060
Nitrogen-Nitrate	39	42	51.4
Potassium	1370	1650	1110
Sodium	9050	11700	3150
Sulfate	134000	119000	98100
pH (s.u.)	1.87	1.5	1.65
TDS	98000	128000	108000
Conductivity (umhos/cm)	76900	86900	72800
Metals (ug/l)			
Arsenic	67400	80000	65400
Beryllium	311	356	334
Cadmium	1990	2540	1990
Chromium	6860	8280	6390
Cobalt	17800	29300	21300
Copper	193000	340000	340000
Iron	2960000	3580000	2830000
Lead	9960	11600	9820
Manganese	128000	148000	154000
Mercury	13.7	2.6	1.49
Molybdenum	21400	27600	26100
Nickel	33900	50500	35100
Selenium	4670	4470	3900
Silver	137	169	137
Thallium	237	368	243
Tin	196	215	163
Uranium	133000	171000	110000
Vanadium	660000	783000	163000
Zinc	191000	270000	184000
Radiologics (pCi/l)			
Gross Alpha	8590	13600	14600
VOCS (ug/L)			
Acetone	130	94	43.5
Benzene	<1	<1	<1
Carbon tetrachloride	<1	<1	<1
Chloroform	9.4	4	8.06
Chloromethane	8.5	8	7.12
MEK	<1	<1	<20
Methylene Chloride	<1	<1	<1
Naphthalene	<1	<1	<1
Tetrahydrofuran	<10	11.1	<1
Toluene	<1	<1	<1
Xylenes	<1	<1	<1
SVOCS (ug/L)			
1,2,4-Trichlorobenzene	<10	<10	<10
1,2-Dichlorobenzene	<10	<10	<10
1,3-Dichlorobenzene	<10	<10	<10
1,4-Dichlorobenzene	<10	<10	<10
1-Methylnaphthalene	<10	<10	<10
2,4,5-Trichlorophenol	<10	<10	<10
2,4,6-Trichlorophenol	<10	<10	<10
2,4-Dichlorophenol	<10	<10	<10
2,4-Dimethylphenol	<10	<10	<10
2,4-Dinitrophenol	<20	<20	<20
2,4-Dinitrotoluene	<10	<10	<10

Cell 4B
Chemical and Radiological Characteristics

Constituent	2011	2012	2013
Major Ions (mg/l)			
2,6-Dinitrotoluene	<10	<10	<10
2-Chloronaphthalene	<10	<10	<10
2-Chlorophenol	<10	<10	<10
2-Methylnaphthalene	<10	<10	<10
2-Methylphenol	<10	<10	<10
2-Nitrophenol	<10	<10	<10
3&4-Methylphenol	<10	<10	<10
3,3´-Dichlorobenzidine	<10	<10	<10
4,6-Dinitro-2-methylphenol	<10	<10	<10
4-Bromophenyl phenyl ether	<10	<10	<10
4-Chloro-3-methylphenol	<10	<10	<10
4-Chlorophenyl phenyl ether	<10	<10	<10
4-Nitrophenol	<10	<10	<10
Acenaphthene	<10	<10	<10
Acenaphthylene	<10	<10	<10
Anthracene	<10	<10	<10
Azobenzene	<10	<10	<10
Benz(a)anthracene	<10	<10	<10
Benzidine	<10	<10	<10
Benzo(a)pyrene	<10	<10	<10
Benzo(b)fluoranthene	<10	<10	<10
Benzo(g,h,i)perylene	<10	<10	<10
Benzo(k)fluoranthene	<10	<10	<10
Bis(2-chloroethoxy)methane	<10	<10	<10
Bis(2-chloroethyl) ether	<10	<10	<10
Bis(2-chloroisopropyl) ether	<10	<10	<10
Bis(2-ethylhexyl) phthalate	410	19	<10
Butyl benzyl phthalate	<10	<10	<10
Chrysene	<10	<10	<10
Dibenz(a,h)anthracene	<10	<10	<10
Diethyl phthalate	<10	<10	<10
Dimethyl phthalate	<10	<10	<10
Di-n-butyl phthalate	<10	<10	<10
Di-n-octyl phthalate	<10	<10	<10
Fluoranthene	<10	<10	<10
Fluorene	<10	<10	<10
Hexachlorobenzene	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10
Hexachlorocyclopentadiene	<10	<10	<10
Hexachloroethane	<10	<10	<10
Indeno(1,2,3-cd)pyrene	<10	<10	<10
Isophorone	<10	<10	<10
Naphthalene	<10	<10	<10
Nitrobenzene	<10	<10	<10
N-Nitrosodimethylamine	<10	<10	<10
N-Nitrosodi-n-propylamine	<10	<10	<10
N-Nitrosodiphenylamine	<10	<10	<10
Pentachlorophenol	<10	<10	<10
Phenanthrene	<10	<10	<10
Phenol	<10	<10	<10
Pyrene	<10	<10	<10
Pyridine	<10	<10	<10

Cell 4B LDS
Chemical and Radiological Characteristics

Constituent	2011	2012	2013
Major Ions (mg/l)			
Carbonate	<1	<1	Not Sampled - dry
Bicarbonate	<1	<1	
Calcium	486	456	
Chloride	3630	6850	
Fluoride	28.4	22	
Magnesium	3230	3360	
Nitrogen-Ammonia	4260	4090	
Nitrogen-Nitrate	30	31	
Potassium	1130	1060	
Sodium	8240	8080	
Sulfate	59900	99100	
pH (s.u.)	2.23	2.4	
TDS	85800	90200	
Conductivity (umhos/cm)	63000	62400	
Metals (ug/l)			
Arsenic	54200	41200	Not Sampled - dry
Beryllium	274	271	
Cadmium	1670	1740	
Chromium	6250	5930	
Cobalt	15600	19000	
Copper	176000	181000	
Iron	2450000	2120000	
Lead	6060	4420	
Manganese	118000	162000	
Mercury	12.3	3	
Molybdenum	16700	15000	
Nickel	30700	33700	
Selenium	3710	2880	
Silver	111	117	
Thallium	179	175	
Tin	332	<100	
Uranium	111000	132000	
Vanadium	518000	428000	
Zinc	172000	182000	
Radiologics (pCi/l)			
Gross Alpha	6000	7500	Not Sampled - dry
VOCS (ug/L)			
Acetone	390	370	Not Sampled - dry
Benzene	<1	<1	
Carbon tetrachloride	<1	<1	
Chloroform	20	19	
Chloromethane	11	11	
MEK	240	180	
Methylene Chloride	<1	<1	
Naphthalene	<1	<1	
Tetrahydrofuran	198	322	
Toluene	<1	<1	
Xylenes	<1	<1	
SVOCS (ug/L)			
1,2,4-Trichlorobenzene	<10	<10	Not Sampled - dry
1,2-Dichlorobenzene	<10	<10	
1,3-Dichlorobenzene	<10	<10	
1,4-Dichlorobenzene	<10	<10	
1-Methylnaphthalene	<10	<10	
2,4,5-Trichlorophenol	<10	<10	
2,4,6-Trichlorophenol	<10	<10	
2,4-Dichlorophenol	<10	<10	
2,4-Dimethylphenol	<10	<10	
2,4-Dinitrophenol	<20	<20	
2,4-Dinitrotoluene	<10	<10	
2,6-Dinitrotoluene	<10	<10	

Cell 4B LDS

Chemical and Radiological Characteristics

Constituent	2011	2012	2013
Major Ions (mg/l)			
2-Chloronaphthalene	<10	<10	Not Sampled - dry
2-Chlorophenol	<10	<10	
2-Methylnaphthalene	<10	<10	
2-Methylphenol	<10	<10	
2-Nitrophenol	<10	<10	
3&4-Methylphenol	<10	<10	
3,3´-Dichlorobenzidine	<10	<10	
4,6-Dinitro-2-methylphenol	<10	<10	
4-Bromophenyl phenyl ether	<10	<10	
4-Chloro-3-methylphenol	<10	<10	
4-Chlorophenyl phenyl ether	<10	<10	
4-Nitrophenol	<10	<10	
Acenaphthene	<10	<10	
Acenaphthylene	<10	<10	
Anthracene	<10	<10	
Azobenzene	<10	<10	
Benz(a)anthracene	<10	<10	
Benzidine	<10	<10	
Benzo(a)pyrene	<10	<10	
Benzo(b)fluoranthene	<10	<10	
Benzo(g,h,i)perylene	<10	<10	
Benzo(k)fluoranthene	<10	<10	
Bis(2-chloroethoxy)methane	<10	<10	
Bis(2-chloroethyl) ether	<10	<10	
Bis(2-chloroisopropyl) ether	<10	<10	
Bis(2-ethylhexyl) phthalate	191	191	
Butyl benzyl phthalate	<10	<10	
Chrysene	<10	<10	
Dibenz(a,h)anthracene	<10	<10	
Diethyl phthalate	<10	<10	
Dimethyl phthalate	<10	<10	
Di-n-butyl phthalate	<10	<10	
Di-n-octyl phthalate	<10	<10	
Fluoranthene	<10	<10	
Fluorene	<10	<10	
Hexachlorobenzene	<10	<10	
Hexachlorobutadiene	<10	<10	
Hexachlorocyclopentadiene	<10	<10	
Hexachloroethane	<10	<10	
Indeno(1,2,3-cd)pyrene	<10	<10	
Isophorone	<10	<10	
Naphthalene	<10	<10	
Nitrobenzene	<10	<10	
N-Nitrosodimethylamine	<10	<10	
N-Nitrosodi-n-propylamine	<10	<10	
N-Nitrosodiphenylamine	<10	<10	
Pentachlorophenol	<10	<10	
Phenanthrene	<10	<10	
Phenol	<10	<10	
Pyrene	<10	<10	
Pyridine	<10	<10	

1980 – 2003 IUC/NRC Tailings Wastewater Samples*[1]

Constituent	Minimum	Maximum
pH (Std units)	0.7	2.33
Nutrients (mg/L)		
Ammonia (N)	3.0	13900
Nitrite (N)	<100	<100
Nitrate (N)	24	24
Nitrate+Nitrite (N)	17.0	49.2
Phosphorus – total	88.1	620
TKN (N)	4900	5300
Inorganics (mg/L)		
Bicarbonate (HCO3)	<5	<5
Bromide	<500	<500
Carbonate (CO3)	<1	<5
Chloride	2110	8000
Cyanide – total	0.022	0.022
Fluoride	0.02	4400
Phosphate	<500	<500
Silica	110	400
Sulfate	29800	190000
Sulfide	<5	<5
TDS	43100	189000
TOC	76.0	81
TSS	31.0	115
Metals (mg/l)		
Aluminum	330	2530
Antimony	<20	<20
Arsenic	0.3	440
Barium	1.021	0.1
Beryllium	0.347	0.78
Boron	3.5	11.3
Cadmium	1.64	6.6
Calcium	90.0	630
Chromium	1.0	13
Cobalt	14.0	120
Copper	72.2	740
Iron	1080	3400
Gallium	<30	<30
Lead	0.21	6.0
Lithium	<10	<20
Magnesium	1800	7900
Manganese	74.0	222
Mercury	0.0008	17.6
Molybdenum	0.44	240
Nickel	7.2	370
Potassium	219.0	828
Selenium	0.18	2.4
Silver	0.005	0.14
Sodium	1400	10000
Strontium	3.6	14
Thallium	0.7	45
Tin	<5	<5
Titanium	6.5	33.3
Uranium	5.0	154
Vanadium	136	510
Zinc	50	1300
Zirconium	2.3	38.5
Radiologics (pCi/L)		
Gross Alpha	14000	189000
Gross Beta	74	116000
Lead-210	680	20700
Thorium-230	3650	76640
Thorium-232	49	121
Polonium-210	1410	1410
Radium-226	40	1690
Radium-228	1.9	1.9

1980 – 2003 IUC/NRC Tailings Wastewater Samples*[1]

Constituent	Minimum	Maximum
Total Radium	42	1700
Selected VOCs (ug/L)		
Acetone	28	514
Benzene	<5	<5
2-butanone (MEK)	11	15.13
Carbon Disulfide	16	16
Carbon Tetrachloride	<5	<5
Chloroform	6	16.84
1,1-Dichloroethane	<5	<5
1,2-Dichloroethane	<5	<5
Dichloromethane	10	11
Tetrahydofuran	N/A	N/A
Toluene	<5	6.25
Vinyl Chloride	<10	<10
Xylene (total)	<5	<5
Selected Semivolatiles (ug/L)		
Benzo(a)pyrene	<10	<10
Bis(2-ethylhexyl)phthalate	1	1
Chrysene	<10	<10
Diethyl phthalate	<10	18.1
Dimethylphthalate	2.7	2.7
Di-n-butylphthalate	1.08	1.08
Fluoranthene	<10	<10
2-Methylnaphthalene	<10	<10
Naphthalene	2.44	2.44
Phenol	<10	38.4

*Reproduced from the Utah Division of Radiation Control Groundwater Quality Discharge Permit, Statement of Basis for a Uranium Mining Facility at White Mesa, South of Blanding, Utah, dated December 1, 2004.

[1]The data in the Utah Division of Radiation Control Groundwater Quality Discharge Permit, Statement of Basis are based on historical data collected from Cell 1, Cell 2, and Cell 3. The date of collection reflects which cells were operational at the time of sampling. The location of the samples and date of collection is referenced in the Statement of Basis.

Appendix F

Cell 4A and 4B BAT Monitoring, Operations and Maintenance Plan 07/11
Revision: Denison 2.3

Cell 4A and 4B BAT Monitoring, Operations and Maintenance Plan.

TABLE OF CONTENTS

1.0 Introduction

Construction of Cell 4A was authorized by the Utah Department of Environmental Quality, Division of Radiation Control ("DRC) on June 25, 2007. The construction authorization provided that Cell 4A shall not be in operation until after a BAT Monitoring, Operations and Maintenance Plan is submitted for Executive Secretary review and approval. The Plan shall include requirements in Part I.F.3 of the Groundwater Discharge Permit No. UGW370004 ("GWDP") and fulfill the requirements of Parts I.D.6, I.E.8, and I.F.9 of the GWDP.

Construction of Cell 4B was authorized by DRC on June 21, 2010. The construction authorization provided that Cell 4B shall not be in operation until after a BAT Monitoring, Operations and Maintenance Plan is submitted for Executive Secretary review and approval. The Plan shall include requirements in Part I.F.3 of the GWDP and fulfill the requirements of Parts I.D.12, I.E.12, and I.F.9 of the GWDP

2.0 Cell Design

2.1 Cell 4A Design

Tailings Cell 4A consists of the following major elements:

a) Dikes – consisting of earthen embankments of compacted soil, constructed between 1989-1990, and composed of four dikes, each including a 15-foot wide road at the top (minimum). On the north, east, and south margins these dikes have slopes of 3H to 1V. The west dike has an interior slope of 2H to 1V. Width of these dikes varies; each has a minimum crest width of at least 15 feet to support an access road. Base width also varies from 89-feet on the east dike (with no exterior embankment), to 211-feet at the west dike.

b) Foundation – including subgrade soils over bedrock materials. Foundation preparation included excavation and removal of contaminated soils, compaction of imported soils to a maximum dry density of 90%. Floor of Cell 4A has an average slope of 1% that grades from the northeast to the southwest corners.

c) Tailings Capacity – the floor and inside slopes of Cell 4A encompass about 40 acres and have a maximum capacity of about 1.6 million cubic yards of tailings material storage (as measured below the required 3-foot freeboard).

d) Liner and Leak Detection Systems – including the following layers, in descending order:

   1) Primary Flexible Membrane Liner (FML) – consisting of impermeable 60

mil high density polyethylene (HDPE) membrane that extends across both the entire cell floor and the inside side-slopes, and is anchored in a trench at the top of the dikes on all four sides. The primary FML will be in direct physical contact with the tailings material over most of the Cell 4A floor area. In other locations, the primary FML will be in contact with the slimes drain collection system (discussed below).

2) Leak Detection System – includes a permeable HDPE geonet fabric that extends across the entire area under the primary FML in Cell 4A, and drains to a leak detection sump in the southwest corner. Access to the leak detection sump is via an 18-inch inside diameter (ID) PVC pipe placed down the inside slope, located between the primary and secondary FML liners. At its base this pipe will be surrounded with a gravel filter set in the leak detection sump, having dimensions of 10 feet by 10 feet by 2 feet deep. In turn, the gravel filter layer will be enclosed in an envelope of geotextile fabric. The purpose of both the gravel and geotextile fabric is to serve as a filter.

3) Secondary FML – consisting of an impermeable 60-mil HDPE membrane found immediately below the leak detection geonet. Said FML also extends across the entire Cell 4A floor, up the inside side-slopes and is also anchored in a trench at the top of all four dikes.

4) Geosynthetic Clay Liner – consisting of a manufactured geosynthetic clay liner (GCL) composed of 0.2-inch of low permeability bentonite clay centered and stitched between two layers of geotextile. Prior to disposal of any wastewater in Cell 4A, the Permittee shall demonstrate that the GCL has achieved a moisture content of at least 50% by weight. This item is a revised requirement per DRC letter to DUSA dated September 28, 2007

e) Slimes Drain Collection System – including a two-part system of strip drains and perforated collection pipes both installed immediately above the primary FML, as follows:

1) Horizontal Strip Drain System – is installed in a herringbone pattern across the floor of Cell 4A that drain to a "backbone" of perforated collection pipes. These strip drains are made of a prefabricated two-part geo-composite drain material (solid polymer drainage strip) core surrounded by an envelope of non-woven geotextile filter fabric. The strip drains are placed immediately over the primary FML on 50-foot centers, where they conduct fluids downgradient in a southwesterly direction to a physical and hydraulic connection to the perforated slimes drain collection pipe. A series of continuous sand bags, filled with filter sand cover the strip drains. The sand bags are composed of a woven polyester fabric filled with well graded filter sand to protect the drainage system from plugging.

2) Horizontal Slimes Drain Collection Pipe System – includes a "backbone" piping system of 4-inch ID Schedule 40 perforated PVC slimes drain collection (SDC) pipe found at the downgradient end of the strip drain lines. This pipe is in turn overlain by a berm of gravel that runs the entire diagonal length of the cell, surrounded by a geotextile fabric cushion in immediate contact with the primary FML. The non-woven geotextile material is overlain at the surface by a woven geotextile fabric, which is ballasted laterally by sandbags on each side of the backbone of the berm.

In turn, the gravel is overlain by a layer of non-woven geotextile to serve as an additional filter material. This perforated collection pipe serves as the "backbone" to the slimes drain system and runs from the far northeast corner downhill to the far southwest corner of Cell 4A where it joins the slimes drain access pipe.

3) Slimes Drain Access Pipe – consisting of an 18-inch ID Schedule 40 PVC pipe placed down the inside slope of Cell 4A at the southwest corner, above the primary FML. Said pipe then merges with another horizontal pipe of equivalent diameter and material, where it is enveloped by gravel and nonwoven geotextile that serves as a cushion to protect the primary FML. The non-woven geotextile material is overlain at the surface by a woven geotextile fabric, which is ballasted by sandbags.A reducer connects the horizontal 18-inch pipe with the 4-inch SDC pipe. At some future time, a pump will be set in this 18-inch pipe and used to remove tailings wastewaters for purposes of de-watering the tailings cell.

f) Dike Splash Pads – A minimum of eight (8) 20-foot wide splash pads are installed on the interior dike slopes to protect the primary FML from abrasion and scouring by tailings slurry. These pads consist of an extra layer of 60 mil HDPE membrane that is placed down the inside slope of Cell 4A, from the top of the dike and down the inside slope. The pads extend to a point 5-feet beyond the toe of the slope to protect the liner bottom during initial startup of the Cell. The exact location of the splash pads is detailed on the As-Built Plans and Specifications.

g) Rub Protection Sheets – In addition to the splash pads described in f) above, rub sheets are installed beneath all piping entering or exiting Cell 4A that is not located directly on the splash pads.

h) Emergency Spillway – a concrete lined spillway constructed near the western corner of the north dike to allow emergency runoff from Cell 3 into Cell 4A. This spillway will be limited to a 6-inch reinforced concrete slab set directly over the primary FML in a 4-foot deep trapezoidal channel. A second spillway has been constructed in the southwest corner of Cell 4A to allow emergency runoff from Cell 4A into Cell 4B. All stormwater runoff and tailings wastewaters not retained in Cells 3 and 4A, will be managed and contained in Cell 4B, including the Probable Maximum Precipitation and flood event.

2.2 Cell 4B Design

Tailings Cell 4B consists of the following major elements:

a) Dike – consisting of a newly-constructed dike on the south side of the cell with a 15-foot wide road at the top (minimum) to support an access road. The grading plan for the Cell 4B excavation includes interior slopes of 2H to 1V. The exterior slope of the southern dike will have the typical slopes of 3H to 1V. Limited portions of the Cell 4B interior sideslopes in the northwest corner and southeast corner of the cell (where the slimes drain and leak detection sump will be located) will also have a slope of 3H to 1V. The base width of the southern dike varies from approximately 100 feet at the western end to approximately 190 feet at the eastern end of the dike, with no exterior embankment present on any other side of the cell.

b) Foundation – including subgrade soils over bedrock materials. Foundation preparation included 6-inch over excavation of rock and placement and compaction of imported soils to a maximum dry density of 90% at a moisture content between +3% and -3% of optimum moisture content, as determined by ASTM D-1557. The floor of Cell 4B has an average slope of 1% that grades from the northwest corner to the southeast corner.

c) Tailings Capacity – the floor and inside slopes of Cell 4B encompass about 45 acres and the cell will have a water surface area of 40 acres and a maximum capacity of about 1.9 million cubic yards of tailings material storage (as measured below the required 3-foot freeboard).

d) Liner and Leak Detection Systems – including the following layers, in descending order:

1) Primary Flexible Membrane Liner (FML) – consisting of 60 mil high density polyethylene (HDPE) membrane that extends across both the entire cell floor and the inside side-slopes, and is anchored in a trench at the top of the dikes on all four sides. The primary FML will be in direct physical contact with the tailings material over most of the Cell 4B floor area. In other locations, the primary FML will be in contact with the slimes drain collection system (discussed below).

2) Leak Detection System – includes a permeable HDPE geonet fabric that extends across the entire area under the primary FML in Cell 4B, and drains to a leak detection sump in the southeast corner. Access to the leak detection sump is via an 18-inch inside diameter (ID) PVC pipe placed down the inside slope, located between the primary and secondary FML liners. At its base this pipe will be surrounded with a gravel filter set in the leak detection sump, having dimensions of 10 feet by 10 feet by 2 feet deep. In turn, the gravel filter layer will be enclosed in an envelope of geotextile fabric. The purpose of both the gravel and geotextile fabric is to serve as a filter.

3) Secondary FML – consisting of a 60-mil HDPE membrane found immediately below the leak detection geonet. Said FML also extends across the entire Cell 4B floor, up the inside side-slopes and is also anchored in a trench at the top of all four dikes.

4) Geosynthetic Clay Liner – consisting of a manufactured geosynthetic clay liner (GCL) composed of 0.2-inch of low permeability bentonite clay centered and stitched between two layers of geotextile. Prior to disposal of any wastewater in Cell 4B, the Permittee shall demonstrate that the GCL has achieved a moisture content of at least 50% by weight.

e) Slimes Drain Collection System – including a two-part system of strip drains and perforated collection pipes both installed immediately above the primary FML, as follows:

1) Horizontal Strip Drain System – is installed in a herringbone pattern across the floor of Cell 4B that drain to a "backbone" of perforated collection pipes. These strip drains are made of a prefabricated two-part geo-composite drain material (solid polymer drainage strip) core surrounded by an envelope of non-woven geotextile filter fabric. The strip drains are placed immediately over the primary FML on 50-foot centers, where they conduct fluids downgradient in a southeasterly direction to a physical and hydraulic connection to the perforated slimes drain collection pipe. A series of continuous sand bags, filled with filter sand cover the strip drains. The sand bags are composed of a woven polyester fabric filled with well graded filter sand to protect the drainage system from plugging.

2) Horizontal Slimes Drain Collection Pipe System – includes a "backbone" piping system of 4-inch ID Schedule 40 perforated PVC slimes drain collection (SDC) pipe found at the downgradient end of the strip drain lines. This pipe is in turn overlain by a berm of gravel that runs the entire diagonal length of the cell, surrounded by a geotextile fabric cushion in immediate contact with the primary FML. In turn, the gravel is overlain by a layer of non-woven geotextile to serve as an additional filter material. The non-woven geotextile material is overlain at the surface by a woven geotextile fabric, which is ballasted by sandbags. This perforated collection pipe serves as the "backbone" to the slimes drain system and runs from the far northwest corner downhill to the far southeast corner of Cell 4B where it joins the slimes drain access pipe.

3) Slimes Drain Access Pipe – consisting of an 18-inch ID Schedule 40 PVC pipe placed down the inside slope of Cell 4B at the southeast corner, above the primary FML. Said pipe then merges with another horizontal pipe of equivalent diameter and material, where it is enveloped by gravel and non-woven geotextile that serves as a cushion to protect the primary FML. The non-woven geotextile material is overlain at the surface by a woven geotextile fabric, which is ballasted laterally by sandbags on each side of the backbone of the berm. A reducer connects the horizontal 18-inch pipe with the 4-inch SDC pipe. At some future time, a pump will be set in this 18-inch pipe and used to remove tailings wastewaters for purposes of de-watering the tailings cell.

f) Cell 4B North and East Dike Splash Pads - Nine 20-foot-wide splash pads will be constructed on the north and east dikes to protect the primary FML from abrasion and scouring by tailings slurry. These pads will consist of an extra layer of textured, 60 mil HDPE membrane that will be installed in the anchor trench and placed down the inside slope of Cell 4B, from the top of the dike, under the inlet pipe, and down the inside slope to a point at least 5 feet onto the Cell 4B floor beyond the toe of the slope.

g) Rub Protection Sheets – In addition to the splash pads described in f) above, rub sheets are installed beneath all piping entering or exiting Cell 4B that is not located directly on the splash pads.

h) Emergency Spillway – a concrete lined spillway constructed near the southern corner of the east dike to allow emergency runoff from Cell 4A into Cell 4B. This spillway will be limited to a 6-inch reinforced concrete slab, with a welded-wire fabric installed within its midsection, set atop a cushion geotextile placed directly over the primary FML in a 4-foot deep trapezoidal channel. A 100 foot wide, 60 mil HDPE geomembrane splash pad will be installed beneath the emergency spillway. No other spillway or overflow structure will be constructed at Cell 4B. All stormwater runoff and tailings wastewaters not retained in Cells 2, 3 and 4A, will be managed and contained in Cell 4B, including the Probable Maximum Precipitation and flood event.

3.0 Cell Operation

3.1 Solution Discharge to Cell 4A

Cell 4A will initially be used for storage and evaporation of process solutions from the Mill operations. These process solutions will be from the uranium/vanadium solvent extraction circuit, or transferred from Cell 1 evaporation pond or the free water surface from Cell 3, or transferred from Cell 2 tailings dewatering operations. The solution will be pumped to Cell 4A through appropriately sized pipelines. The initial solution discharge will be in the southwest corner of the Cell. The solution will be discharged in the bottom of the Cell, away from any sand bags or other installation on the top of the FML. Building the solution pool from the low end of the Cell will allow the solution pool to gradually rise around the slimes drain strips, eliminating any damage to the strip drains or the sand bag cover due to solution flowing past the drainage strips. The solution will eventually be discharged along the dike between Cell 3 and Cell 4A, utilizing the Splash Pads described above. The subsequent discharge of process solutions will be near the floor of the pond, through a discharge header designed to discharge through multiple points, thereby reducing the potential to damage the Splash Pads or the Slimes Drain system. At no time, subsequent to initial filling, will the solution be discharged into less than 2 feet of solution. As the cell begins to fill with solution the discharge point will be pulled back up the Splash Pad and allowed to continue discharging at or near the solution level.

3.2 Solution Discharge to Cell 4B

Cell 4B will initially be used for storage and evaporation of process solutions from the Mill operations. These process solutions will be from the uranium/vanadium solvent extraction circuit, or transferred from Cell 1 evaporation pond or the free water surface from Cell 3 or Cell 4A, or transferred from Cell 2 dewatering operations. The solution will be pumped to Cell 4B through appropriate sized pipelines pipelines. The initial solution discharge will be in the southeast corner of the Cell. The discharge pipe will be routed down the Splash Pad provided in the southeast corner of the Cell at the spillway to protect the primary FML. The solution will be discharged in the bottom of the Cell, away from any sand bags or other installation on the top of the FML. Building the solution pool from the low end of the Cell will allow the solution pool to gradually rise around the slimes drain strips, eliminating any damage to the strip drains or the sand bag cover due to solution flowing past the drainage strips. The solution will eventually be discharged along the dike between Cell 3 and Cell 4B, utilizing the Splash Pads described above. The subsequent discharge of process solutions will be near the floor of the pond, through a discharge header designed to discharge through multiple points, thereby reducing the potential to damage the Splash Pads or the Slimes Drain system. At no time, subsequent to initial filling, will the solution be discharged into less than 2 feet of solution. As the cell begins to fill with solution the discharge point will be pulled back up the Splash Pad and allowed to continue discharging at or near the solution level.

3.3 Initial Solids Discharge into Cell 4A

Once Cell 4A is needed for storage for tailings solids the slurry discharge from No. 8 CCD thickener will be pumped to the cell through appropriately sized pipelines. The pipelines will be routed along the dike between Cell 3 and Cell 4A, with discharge valves and drop pipes extending down the Splash Pads to the solution level. One or all of the discharge points can be used depending on operational considerations. Solids will settle into a cone, or mound, of material under the solution level, with the courser fraction settling out closer to the discharge point. The initial discharge locations are shown on Figure 1A. Figure 2A illustrates the general location of the solution and slurry discharge pipelines and control valve locations. The valves are 6" or 8" stainless steel knife-gate valves. The initial discharge of slurry will be at or near the toe of the Cell slope and then gradually moved up the slope, continuing to discharge at or near the water surface. This is illustrated in Section A-A on Figure 2A. Because of the depth of Cell 4A, each of the discharge points will be utilized for an extended period of time before the cone of material is above the maximum level of the solution. The discharge location will then be moved further to the interior of the cell allowing for additional volume of solids to be placed under the solution level. The solution level in the cell will vary depending on the operating schedule of the Mill and the seasonal evaporation rates. The tailings slurry will not be allowed to discharge directly on to the Splash Pads, in order to further protect the FML. The tailings slurry will discharge directly in to the solution contained in the Cell, onto an additional protective sheet, or on to previously deposited tailings sand.

3.4 Initial Solids Discharge into Cell 4B

Once Cell 4B is needed for storage for tailings solids the slurry discharge from No. 8 CCD thickener will be pumped to the cell through appropriately sized pipelines. The pipelines will be routed along the dike between Cell 3 and Cell 4B, with discharge valves and drop pipes extending down the Splash Pads to the solution level. One or all of the discharge points can be used depending on operational considerations. Solids will settle into a cone, or mound, of material under the solution level, with the courser fraction settling out closer to the discharge point. The initial discharge locations are shown on Figure 1B. Figure 2B illustrates the general location of the solution and slurry discharge pipelines and control valve locations. The valves are 6" or 8" stainless steel knife-gate valves. The initial discharge of slurry will be at or near the toe of the Cell slope and then gradually moved up the slope, continuing to discharge at or near the water surface. This is illustrated in Section A-A on Figure 2B. Because of the depth of Cell 4B, each of the discharge points will be utilized for an extended period of time before the cone of material is above the maximum level of the solution. The discharge location will then be moved further to the interior of the cell allowing for additional volume of solids to be placed under the solution level. The solution level in the cell will vary depending on the operating schedule of the Mill and the seasonal evaporation rates. The tailings slurry will not be allowed to discharge directly on to the Splash Pads, in order to further protect the FML. The tailings slurry will discharge directly in to the solution contained in the Cell, onto an additional protective sheet, or on to previously deposited tailings sand.

3.5 Equipment Access to Cell 4A and Cell 4B

Access will be restricted to the interior portion of the cells due to the potential to damage the flexible membrane liners. Only low pressure rubber tired all terrain vehicles or foot traffic will be allowed on the flexible membrane liners. Personnel are also cautioned on the potential damage to the flexible membrane liners through the use and handling of hand tools and maintenance materials.

3.6 Reclaim Water System at Cell 4A

A pump barge and solution recovery system is operating in the southwest corner of the cell to pump solution from the cell for water balance purposes or for re-use in the Mill process. Figure 3A illustrates the routing of the solution return pipeline and the location of the pump barge. The pump barge will be constructed and maintained to ensure that the flexible membrane liner is not damaged during the initial filling of the cell or subsequent operation and maintenance activities. The condition of the pump barge and access walkway will be noted during the weekly Cell inspections.

3.7 Reclaim Water System at Cell 4B

A pump barge and solution recovery system will be installed in the southeast corner of the cell to pump solution from the cell for water balance purposes or for re-use in the Mill process. Figure 3B illustrates the routing of the solution return pipeline and the location of the pump barge. The pump barge will be constructed and maintained to ensure that the flexible membrane liner is not damaged during the initial filling of the cell or subsequent operation and maintenance activities. The condition of the pump barge and access walkway will be noted during the weekly Cell inspections.

3.8 Interim Solids Discharge to Cell 4A

Figure 4A illustrates the progression of the slurry discharge points around the north and east sides of Cell 4A. Once the tailings solids have been deposited along the north and east sides of the Cell, the discharges points will subsequently be moved to the sand beaches, which will eliminate any potential for damage to the liner system.

3.9 Interim Solids Discharge to Cell 4B

Figure 4B illustrates the progression of the slurry discharge points around the north and east sides of Cell 4B. Once the tailings solids have been deposited along the north and east sides of the Cell, the discharges points will subsequently be moved to the sand beaches, which will eliminate any potential for damage to the liner system.

3.10 Liner Maintenance and QA/QC for Cell 4A

Any construction defects or operational damage discovered during observation of the flexible membrane liner will be repaired, tested and documented according to the procedures detailed in the approved **Revised Construction Quality Assurance Plan for the Construction of the Cell 4A Lining System, May 2007, by GeoSyntec Consultants.**

3.11 Liner Maintenance and QA/QC for Cell 4B

Any construction defects or operational damage discovered during observation of the flexible membrane liner will be repaired, tested and documented according to the procedures detailed in the approved **Construction Quality Assurance Plan for the Construction of the Cell 4B Lining System, October 2009, by Geosyntec Consultants.**

4.0 BAT Performance Standards for Tailings Cell 4A and 4B

DUSA will operate and maintain Tailings Cell 4A and 4B so as to prevent release of wastewater to groundwater and the environment in accordance with this BAT Monitoring Operations and Maintenance Plan, pursuant to Part I.H.8 of the GWDP. These performance standards shall include:

1) Leak Detection System Pumping and Monitoring Equipment – the leak detection system pumping and monitoring equipment in each cell

includes a submersible pump, pump controller, water level indicator (head monitoring), and flow meter with volume totalizer. The pump controller is set to maintain the maximum level in the leak detection system in each cell at no more than 1 foot above the lowest level of the secondary flexible membrane, not including the sump. A second leak detection pump with pressure transducer, flow meter, and manufacturer recommended spare parts for the pump controller and water level data collector is maintained in the Mill warehouse to ensure that the pump and controller can be replaced and operational within 24 hours of detection of a failure of the pumping system. The root cause of the equipment failure will be documented in a report to Mill management with recommendations for prevention of a re-occurrence.

2) Maximum Allowable Head – the Permittee shall measure the fluid head above the lowest point on the secondary flexible membrane in each cell by the use of procedures and equipment specified in the **White Mesa Mill Tailings Management System and Discharge Minimization Technology (DMT) Monitoring Plan, 10/10 Revision: Denison-10.2,** or the currently approved DMT Plan. Under no circumstance shall fluid head in the leak detection system sump exceed a 1-foot level above the lowest point in the lower flexible membrane liner, not including the sump.

3) Maximum Allowable Daily LDS Flow Rates - the Permittee shall measure the volume of all fluids pumped from each LDS on a weekly basis, and use that information to calculate an average volume pumped per day. Under no circumstances shall the daily LDS flow volume exceed 24,160 gallons/day for Cell 4A or 26,145 gallons/day for Cell 4B. The maximum daily LDS flow volume will be compared against the measured cell solution levels detailed on the attached Table 1A or 1B for Cells 4A or 4B, respectively, to determine the maximum daily allowable LDS flow volume for varying head conditions in the cell.

4) 3-foot Minimum Vertical Freeboard Criteria – the Permittee shall operate and maintain wastewater levels to provide a 3-foot Minimum of vertical freeboard in Tailings Cell 4A and Cell 4B. Said measurements shall be made to the nearest 0.1 foot.

5) Slimes Drain Recovery Head Monitoring – immediately after the Permittee initiates pumping conditions in the Tailings Cell 4A or Cell 4B slimes drain system, quarterly recovery head tests and fluid level measurements will be made in accordance with a plan approved by the DRC Executive Secretary. The slimes drain system pumping and monitoring equipment, includes a submersible pump, pump controller, water level indicator (head monitoring), and flow meter with volume totalizer.

5.0 Routine Maintenance and Monitoring

Trained personnel inspect the White Mesa tailings system on a once per day basis. Any abnormal occurrences or changes in the system will be immediately reported to Mill management and maintenance personnel. The inspectors are trained to look for events involving the routine placement of tailings material as well as events that could affect the integrity of the tailings cell dikes or lining systems. The daily inspection reports are summarized on a monthly basis and reviewed and signed by the Mill Manager and RSO.

5.1 Solution Elevation

Measurements of solution elevation in Cell 4A and Cell 4B are to be taken by survey on a weekly basis, and measurements of the beach area in Cell 4A and Cell 4B with the highest elevation are to be taken by survey on a monthly basis, by the use of the procedures and equipment specified in the latest approved edition of the DMT Plan.

5.2 Leak Detection System

The Leak Detection System in Cell 4A and Cell 4B is monitored on a continuous basis by use of a pressure transducer that feeds water level information to an electronic data collector. The water levels are measured every hour and the information is stored for later retrieval. The water levels are measured to the nearest 0.10 inch. The data collector is currently programmed to store 7 days of water level information. The number of days of stored data can be increased beyond 7 days if needed. The water level data is downloaded to a laptop computer on a weekly basis and incorporated into the Mill's environmental monitoring data base, and into the files for weekly inspection reports of the tailings cell leak detection systems. Within 24 hours after collection of the weekly water level data, the information will be evaluated to ensure that: 1) the water level in the Cell 4A and Cell 4B leak detection sumps did not exceed the allowable level (5556.14 feet amsl in the Cell 4A LDS sump and 5558.5 feet amsl in the Cell 4B sump), and 2) the average daily flow rate from the LDS did not exceed the maximum daily allowable flow rate at any time during the reporting period. For Cell 4A and Cell 4B, under no circumstance shall fluid head in the leak detection system sump exceed a 1-foot level above the lowest point in the lower flexible membrane liner, not including the sump. To determine the Maximum Allowable Daily LDS Flow Rates in the Cell 4A and Cell 4B leak detection system, the total volume of all fluids pumped from the LDS of each cell on a weekly basis shall be recovered from the data collector, and that information will be used to calculate an average volume pumped per day for each cell. Under no circumstances shall the daily LDS flow volume exceed 24,160 gallons/day from Cell 4A or 26,145 gallons/day from Cell 4B. The maximum daily LDS flow volume will be compared against the measured cell solution levels detailed on the attached Tables 1A and 1B, to determine the maximum daily allowable LDS flow volume for varying head conditions in Cell 4A and Cell 4B. Any abnormal or out of compliance water levels must be immediately reported to Mill management. The data collector on each cell is also equipped with an visual strobe light that flashes on the control panel if the water level in the leak detection sump exceeds the allowable level (5556.14 feet amsl in the Cell 4A LDS sump and 5558.5 feet amsl in the Cell 4B sump). The current water level is displayed at all times on each data collector and available for recording on the daily inspection form. Each leak detection system is also equipped with a leak detection pump, EPS Model # 25S05-3 stainless steel, or equal. Each pump is capable of pumping in excess of 25 gallons per minute at a total dynamic head of 50 feet. Each pump has a 1.5 inch diameter discharge, and operates on 460 volt 3 phase power. Each pump is equipped with a pressure sensing transducer to start the pump once the level of solution in the leak detection sump is approximately 2.25 feet (elevation 5555.89 in the Cell 4A LDS sump and 5557.69 feet amsl in the Cell 4B sump) above the lowest level of the leak detection sump (9 inches [0.75 feet] above the lowest point on the lower flexible membrane liner for Cell 4A and 2 1/4 inches [0.19 feet] for Cell 4B), to ensure the allowable 1.0 foot (5556.14 feet amsl in the Cell 4A LDS sump and 5558.5 feet amsl in the Cell 4B sump) above the lowest point on the lower flexible membrane liner is not exceeded). The attached Figures 6A and 6B (Cell 4A and 4B, respectively), Leak Detection Sump Operating Elevations, illustrates the relationship between the sump elevation, the lowest point on the lower flexible membrane liner and the pump-on solution elevation for the leak detection pump. The pump also has manual start and stop controls. The pump will operate until the solution is drawn down to the lowest level possible, expected to be approximately 4 inches above the lowest level of the sump (approximate elevation 5554.0 and 5555.77 ft amsl for Cells 4A and 4B, respectively). The pump discharge is equipped with a 1.5 inch flow meter, EPS Paddle Wheel Flowsensor, or equal, that reads the pump discharge in gallons per minute, and records total gallons pumped. The flow rate and total gallons are recorded by the Inspector on the weekly inspection form. The leak detection pump is installed in the horizontal section of the 18 inch, perforated section of the PVC collection pipe. The distance from the top flange face, at the collection pipe invert, to the centerline of the 22.5 degree elbow is 133.4 feet in Cell 4A and 135.6 feet in Cell 4B, and the vertical height is approximately 45 feet in Cell 4A and approximately 42.5 feet in Cell 4B. The pump is installed at least 2 feet beyond the centerline of the elbow. The bottom of the pump will be installed in the leak detection sump at least 135.4 feet in Cell 4A and 137.6 feet in Cell 4B or more from the top of the flange invert. A pressure transducer installed within the pump continuously measures the solution head and is programmed to start and stop the pump within the ranges specified above. The attached Figure 5, illustrates the general configuration of the pump installation.

A spare leak detection pump with pressure transducer, flow meter, and manufacturer recommended spare parts for the pump controller and water level data collector will be maintained in the Mill warehouse to ensure that the pump and controller on either cell can be replaced and operational within 24 hours of detection of a failure of the pumping system. The root cause of the equipment failure will be documented in a report to Mill management with recommendations for prevention of a re-occurrence.

5.3 Slimes Drain System

(i) A pump, Tsurumi Model # KTZ23.7-62 stainless steel, or equal, will be placed inside of the slimes drain access riser pipe of each cell and a near as possible to the bottom of the slimes drain sump. The bottom of the slimes drain sump in Cell 4A and Cell 4B are 38 and 35.9 feet below a water level measuring point, respectively, at the centerline of the slimes drain access pipe, near the ground surface level. Each pump discharge will be equipped with a 2 inch flow meter, E/H Model #33, or equal, that reads the pump discharge in gallons per minute, and records total gallons pumped. The flow rate and total gallons will be recorded by the Inspector on the weekly inspection form.

(ii) The slimes drain pumps will be on adjustable probes that allow the pumps to be set to start and stop on intervals determined by Mill management.

(iii)The Cell 4A and Cell 4B slimes drain pumps will be checked weekly to observe that they are operating and that the level probes are set properly, which is noted on the Weekly Tailings Inspection Form. If at any time either pump is observed to be not working properly, it will be repaired or replaced within 15 days;

(iv)Depth to wastewater in the Cell 4A and Cell 4B slimes drain access riser pipes shall be monitored and recorded weekly to determine maximum and minimum fluid head before and after a pumping cycle, respectively. All head measurements must be made from the same measuring point, to the nearest 0.01 foot. The results will be recorded as depth-in-pipe measurements on the Weekly Tailings Inspection Form;

(v) After initiation of pumping conditions in Tailings Cell 4A or 4B, n a quarterly basis, each slimes drain pump will be turned off and the wastewater in the slimes drain access pipe will be allowed to stabilize for at least 90 hours. Once the water level has stabilized (based on no change in water level for three (3) successive readings taken no less than one (1) hour apart) the water level of the wastewater will be measured and recorded as a depth-in-pipe measurement on a Quarterly Data form, by measuring the depth to water below the water level measuring point on the slimes drain access pipe;

The slimes drain pumps for each cell will not be operated until Mill management has determined that no additional process solutions will be discharged to that cell, and the cell has been partially covered with the first phase of the reclamation cap. The long term effectiveness and performance of the slimes drain dewatering will be evaluated on the same basis as the currently operating slimes drain system for Cell 2.

6.0 Tailings Emergencies

Inspectors will notify the Radiation Safety Officer and/or Mill management immediately if, during their inspection, they discover that an abnormal condition exists or an event has occurred that could cause a tailings emergency. Until relieved by the Environmental or Radiation Technician or Radiation Safety Officer, inspectors will have the authority to direct resources during tailings emergencies.

Any major catastrophic events or conditions pertaining to the tailings area should be reported immediately to the Mill Manager or the Radiation Safety Officer, one of whom will notify Corporate Management. If dam failure occurs, notify your supervisor and the Mill Manager immediately. The Mill Manager will then notify Corporate Management, MSHA (303-231-5465), and the State of Utah, Division of Dam Safety (801-538-7200).

7.0 Solution Freeboard Calculations

The maximum tailings cell pond wastewater levels in Cell 1, Cell 2, Cell 3, Cell 4A, and Cell 4B are regulated by condition 10.3 of the White Mesa Mill 11e.(2) Materials License. However, freeboard limits are no longer applicable to Cell 2, Cell 3, and Cell 4A, as discussed below.

Condition 10.3 states that "Freeboard limits, stormwater and wastewater management for the tailings cells shall be determined as follows:

A. The freeboard limit for Cell 1 shall be set annually in accordance with the procedures set out in Section 3.0 to Appendix E of the previously approved NRC license application, including the January 10, 1990 Drainage Report. Discharge of any surface water or wastewater from Cell 1 is expressly prohibited.

B. The freeboard limit for Cell 4B shall be recalculated annually in accordance with the procedures established by the Executive Secretary. Said calculations for freeboard limits shall be submitted as part of the Annual Technical Evaluation Report (ATER), as described in Condition 12.3 below [of the license and not included herein]. Based on approved revisions to the DMT Plan dated January 2011, the freeboard limit is no longer applicable to Cells 2, 3 and 4A.

C. The discharge of any surface water, stormwater, or wastewater from Cells 3, 4A, and 4B shall only be through an Executive Secretary authorized spillway structure. [Applicable NRC Amendment:16] [Applicable UDRC Amendment: 3] [Applicable UDRC Amendment:4]"

The freeboard limits set out in Section 6.3 of the DMT Plan are intended to capture the Local 6-hour Probable Maximum Precipitation (PMP) event, which was determined in the January 10, 1990 Drainage Report for the White Mesa site to be 10 inches.

Based on the PMP storm event, the freeboard requirement for Cell 1 is a maximum operating water level of 5615.4 feet above mean sea level (amsl). The Cell 1 freeboard limit is not affected by operations or conditions in Cells 2, 3, 4A, or 4B.

Cells 2 and 3 have no freeboard limit because those Cells are full or near full of tailings solids. Cell 4A has no freeboard limit because it is assumed that all precipitation falling on Cell 4A will overflow to Cell 4B. All precipitation falling on Cell 2, 3, and 4A and the adjacent drainage areas must be contained in Cell 4B. The flood volume from the PMP event over the Cell 2, 3, and Cell 4A pond areas, plus the adjacent drainage areas, which must be contained in Cell 4B, is 159.4 acre-feet of water.

The flood volume from the PMP event over the Cell 4A area is 36 acre-feet of water (40 acres, plus the adjacent drainage area of 3.25 acres, times the PMP of 10 inches). For the purposes of establishing the freeboard in Cell 4B, it is assumed Cell 4A has no freeboard limit and all of the flood volume from the PMP event will be contained in Cell 4B. The flood volume from the PMP event over the Cell 4B area is 38.1 acre-feet of water (40 acres, plus the adjacent drainage area of 5.7 acres, times the PMP of 10 inches). This would result in a total flood volume of 197.5 acre-feet, including the 123.4 acre-feet of solution from Cells 2 and 3 and 36 acre-feet of solution from Cells 2, 3, and 4A that must be contained in Cell 4B. The procedure for calculating the freeboard limit for Cell 4B is set out in the DMT Plan.

The Groundwater Quality Discharge Permit, No. UGW370004, for the White Mesa Mill requires that the minimum freeboard be no less than 3.0 feet for Cells 1, 4A, and 4B but based on License condition 10.3 and the procedure set out in the DMT Plan, the freeboard limits for Cells 1, 4A, and 4B will be at least three feet.

Figure 7, Hydraulic Profile Schematic, shows the relationship between the Cells, and the relative elevations of the solution pools and the spillway elevations.

The required freeboard for Cell 4B will be recalculated annually.

8.0 List of Attachments

1) Figures 1A and 1B, Initial Filling Plan, Geosyntec Consultants

2) Figure 2A and 2B, Initial Filling Plan, Details and Sections, Geosyntec Consultants

3) Figure 3A and 3B, Initial Filling Plan, Solution and Slurry Pipeline Routes, Geosyntec Consultants

4) Figure 4A and 4B, Interim Filling Plan, Geosyntec Consultants

5) Figure 5, Leak Detection System Sumps for Cell 4A and 4B, Geosyntec Consultants

6) Figure 6A and 6B, Leak Detection Sump Operating Elevations, Geosyntec Consultants

7) Figure 7, Hydraulic Profile Schematic

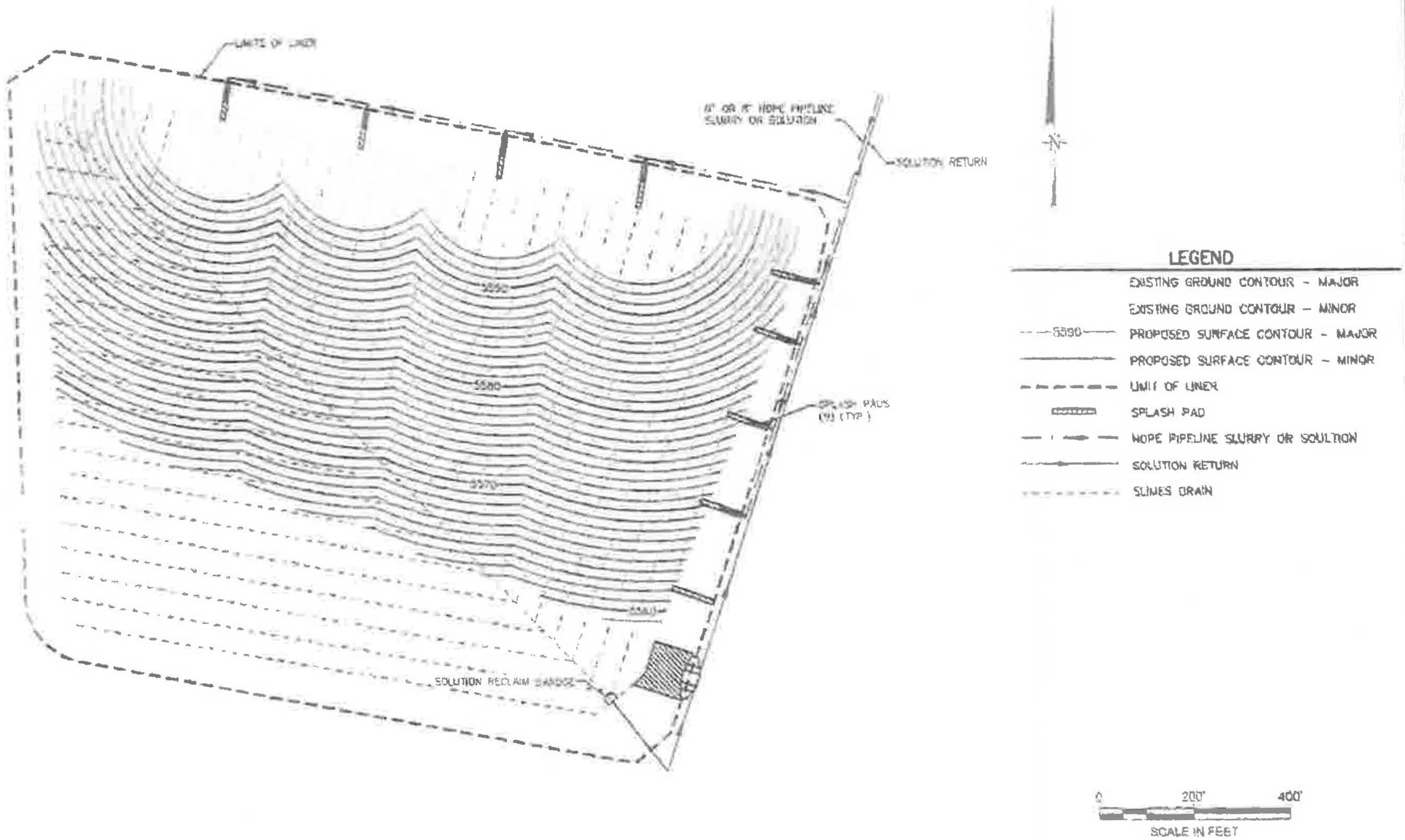
8) Cell 4A and Cell 4B Freeboard Calculations

9) Table 1A, Calculated Action leakage Rates for Various Head Conditions, Cell 4A, White Mesa Mill, Blanding, Utah, Geosyntec Consultants

10) Table 1B, Calculated Action leakage Rates for Various Head Conditions, Cell 4B, White Mesa Mill, Blanding, Utah, Geosyntec Consultants

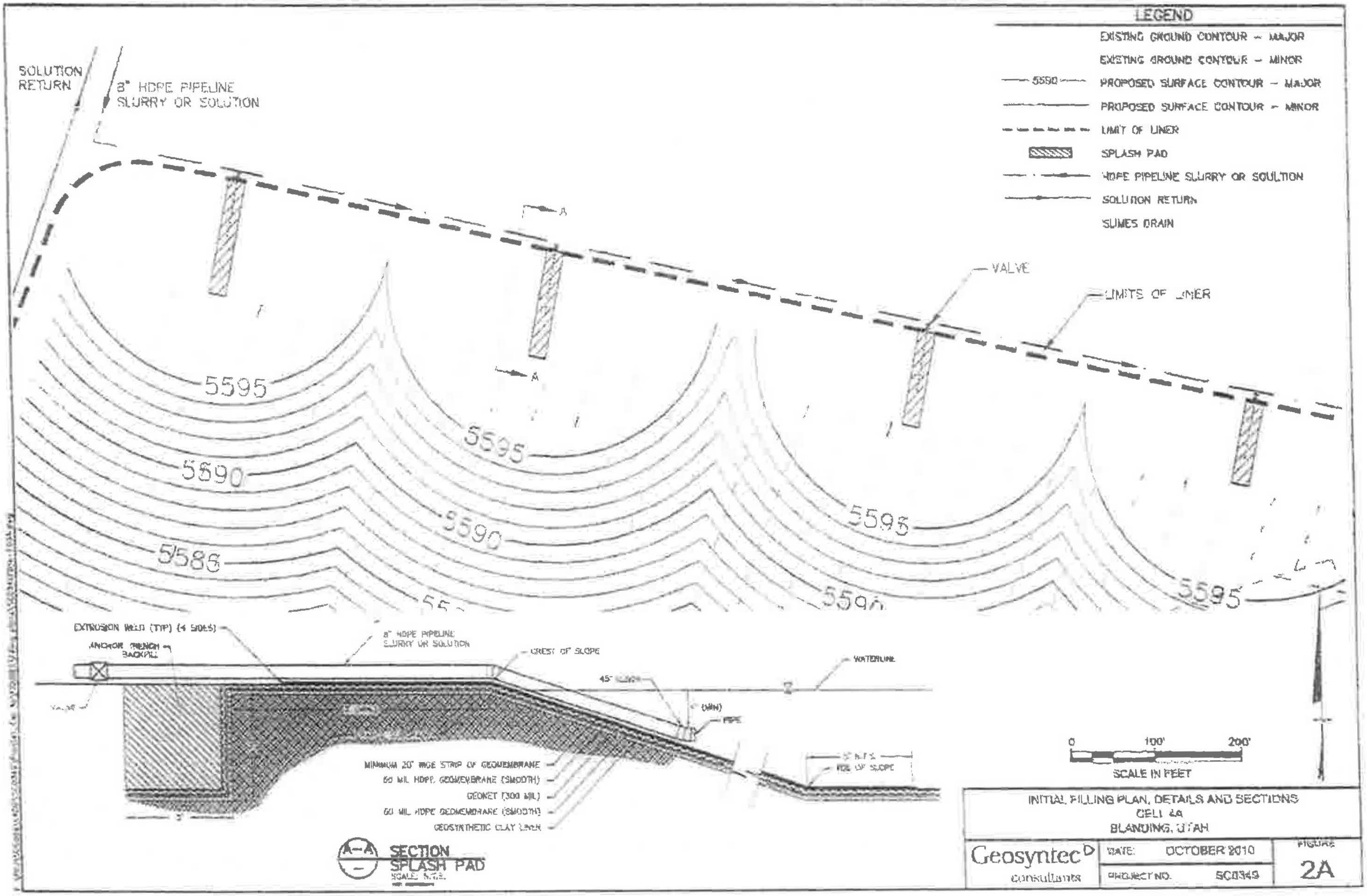
11) White Mesa Mill Tailings Management System and Discharge Minimization Technology (DMT) Monitoring Plan.
    - The most recent, approved version of the DMT Plan is included as Attachment G to this Application.

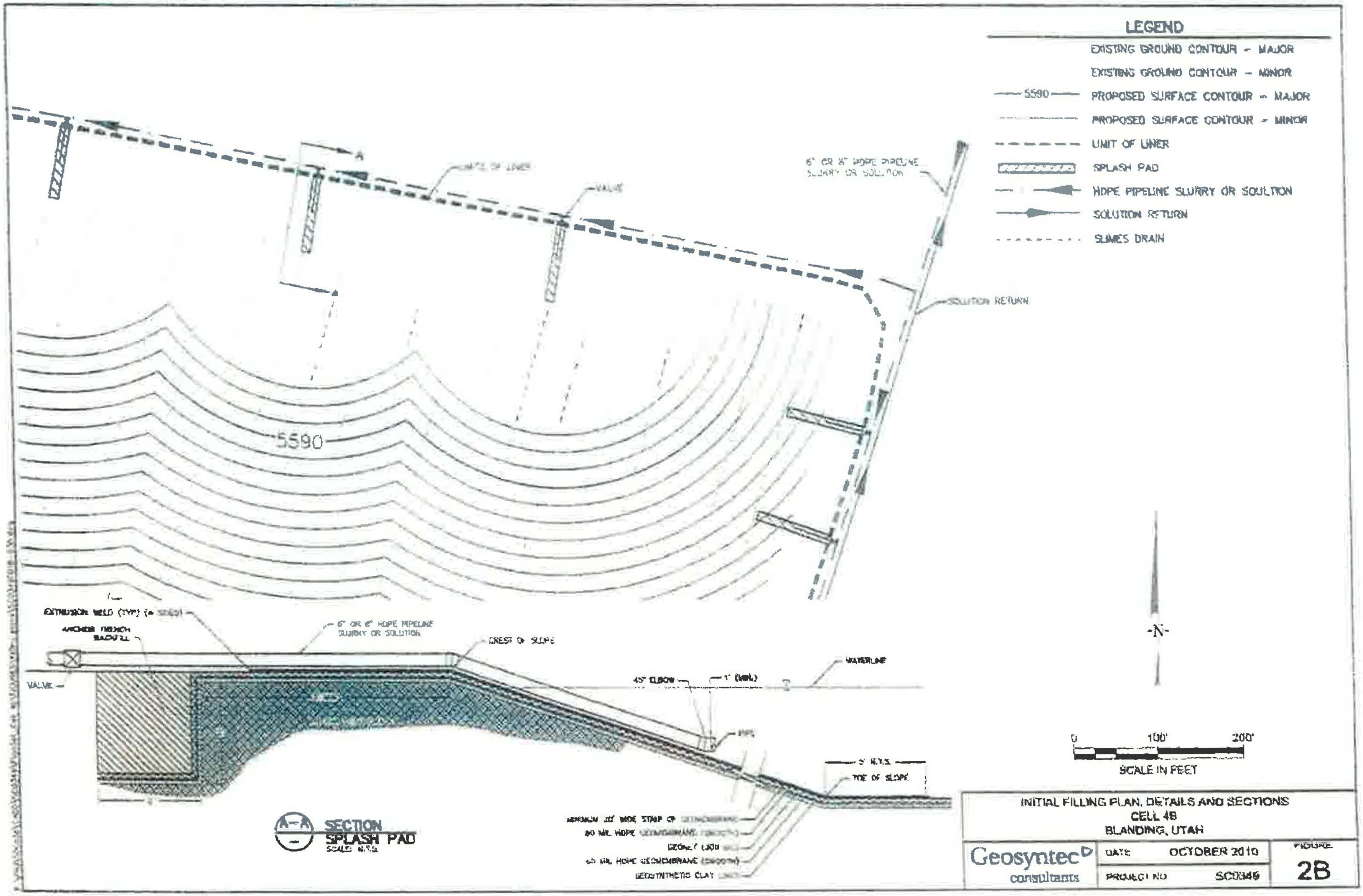
LEGEND
5600 EXISTING GROUND CONTOUR - MAJOR
EXISTING GROUND CONTOUR - MINOR
5590 PROPOSED SURFACE CONTOUR - MAJOR
PROPOSED SURFACE CONTOUR - MINOR
LIMIT OF LINER
SPLASH PAD
HDPE PIPELINE SLURRY OR SOULTION
SOLUTION RETURN
SLIMES DRAIN
0
200'
400'
SCALE IN FEET
INITIAL FILLING PLAN
CELL 4A
BLANDING, UTAH
Geosyntec consultants
DATE: OCTOBER 2010
PROJECT NO. SC0349
FIGURE
1A



INITIAL FILLING PLAN
CELL 4B
BLANDING, UTAH

Geosyntec consultants	DATE:	OCTOBER 2010	FIGURE
	PROJECT NO	SC0349	1B

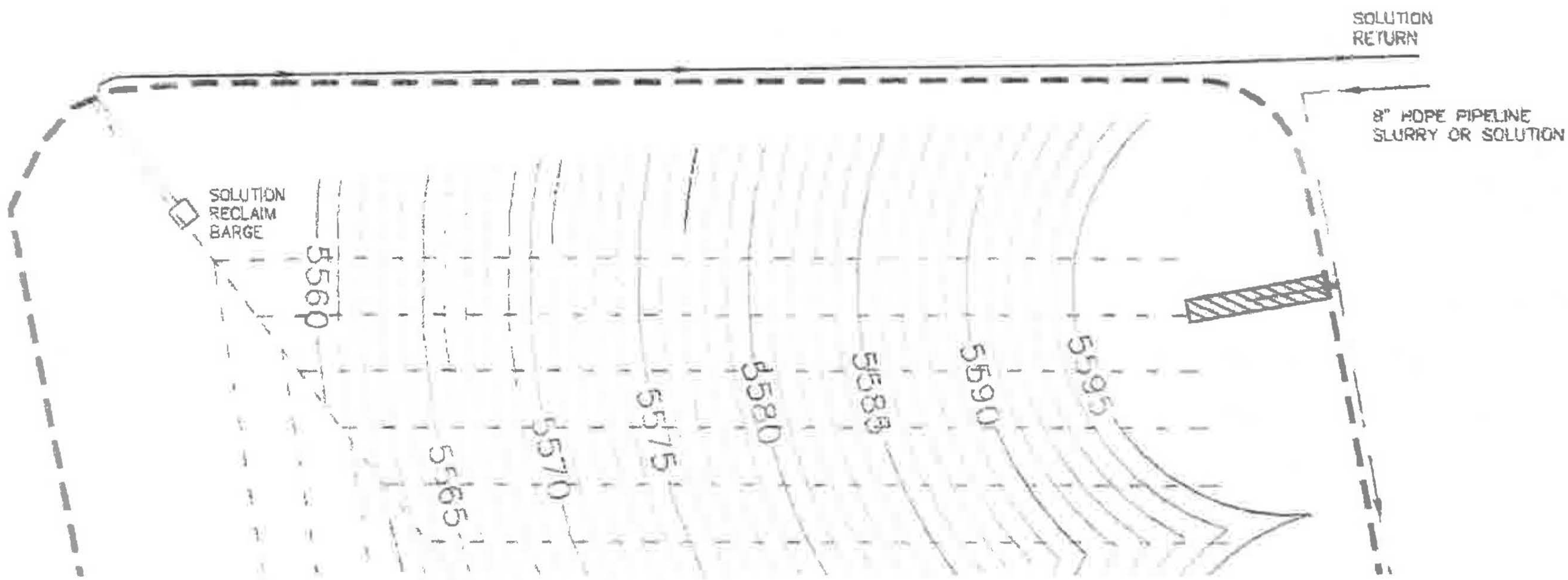

LEGEND
EXISTING GROUND CONTOUR – MAJOR
EXISTING GROUND CONTOUR – MINOR
5590
PROPOSED SURFACE CONTOUR – MAJOR
PROPOSED SURFACE CONTOUR – MINOR
LIMIT OF LINER
SPLASH PAD
HDPE PIPELINE SLURRY OR SOULTION
SOLUTION RETURN
SLIMES DRAIN
SOLUTION RETURN
8" HDPE PIPELINE SLURRY OR SOLUTION
VALVE
LIMITS OF LINER
A
A
5595
5595
5595
5595
5590
5590
5586
0
100'
200'
SCALE IN FEET
EXTRUSION WELD (TYP) (4 SIDES)
ANCHOR TRENCH BACKFILL
8" HDPE PIPELINE SLURRY OR SOLUTION
CREST OF SLOPE
WATERLINE
45° ELBOW
PIPE
MINIMUM 20' WIDE STRIP OF GEOMEMBRANE
60 MIL HDPE GEOMEMBRANE (SMOOTH)
GEONET (300 MIL)
60 MIL HDPE GEOMEMBRANE (SMOOTH)
GEOSYNTHETIC CLAY LINER
TOE OF SLOPE
A–A
SECTION
SPLASH PAD
SCALE: N.T.S.
INITIAL FILLING PLAN, DETAILS AND SECTIONS
CELL 4A
BLANDING, UTAH
Geosyntec
consultants
DATE: OCTOBER 2010
PROJECT NO. SC0349
FIGURE
2A



INITIAL FILLING PLAN, DETAILS AND SECTIONS
CELL 4B
BLANDING, UTAH

Geosyntec consultants

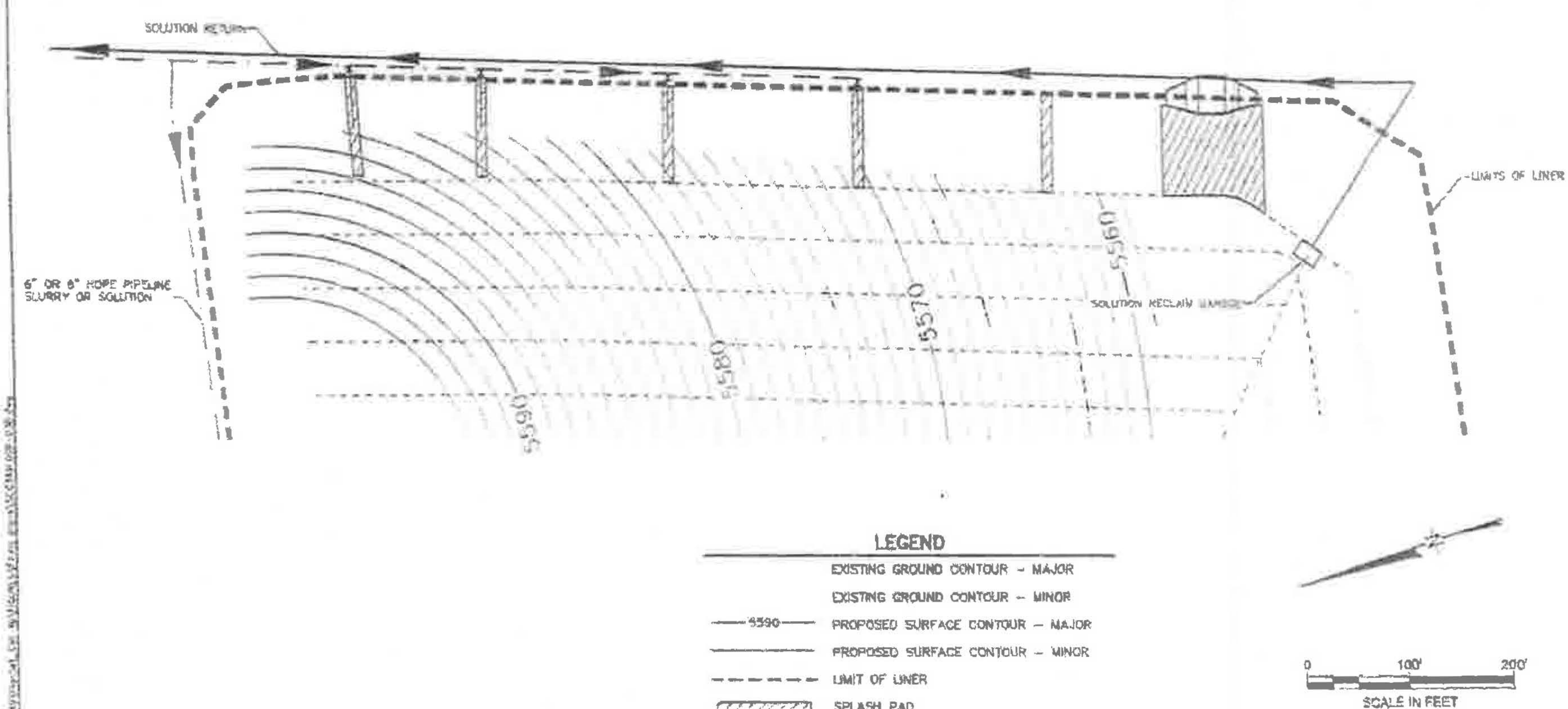
DATE	OCTOBER 2010	FIGURE	2B
PROJECT NO.	SC0349		



LEGEND

- EXISTING GROUND CONTOUR – MAJOR
- EXISTING GROUND CONTOUR – MINOR
- 5590 PROPOSED SURFACE CONTOUR – MAJOR
- PROPOSED SURFACE CONTOUR – MINOR
- LIMIT OF LINER
- SPLASH PAD
- HDPE PIPELINE SLURRY OR SOLUTION
- SOLUTION RETURN
- SLIMES DRAIN

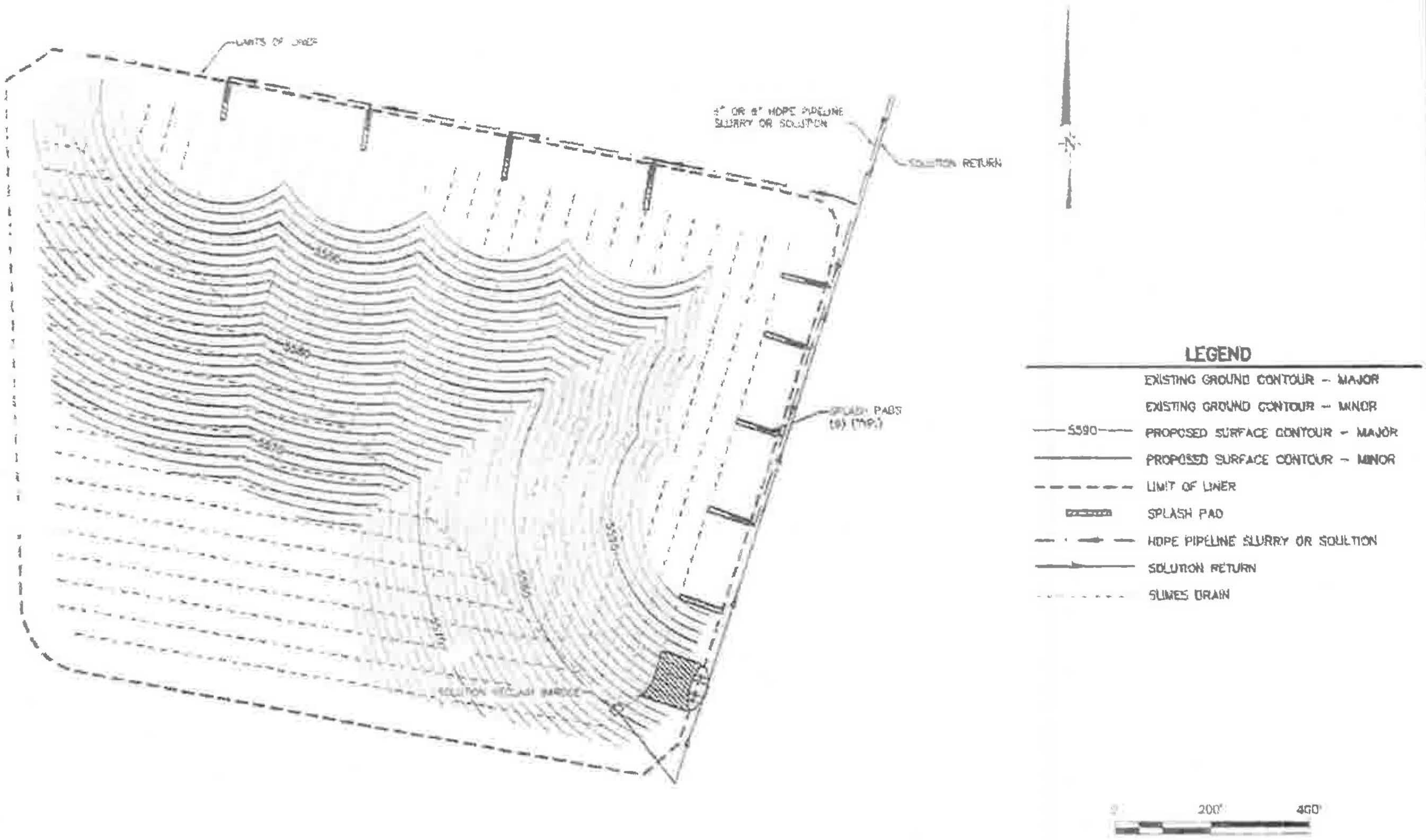
INITIAL FILLING PLAN, SOLUTION AND SLURRY PIPELINE ROUTES CELL 4A BLANDING, UTAH		
Geosyntec consultants	DATE: OCTOBER 2010 PROJECT NO SC0349	FIGURE 3A



INITIAL FILLING PLAN, SOLUTION AND SLURRY PIPELINE ROUTES
CELL 4B
BLANDING, UTAH

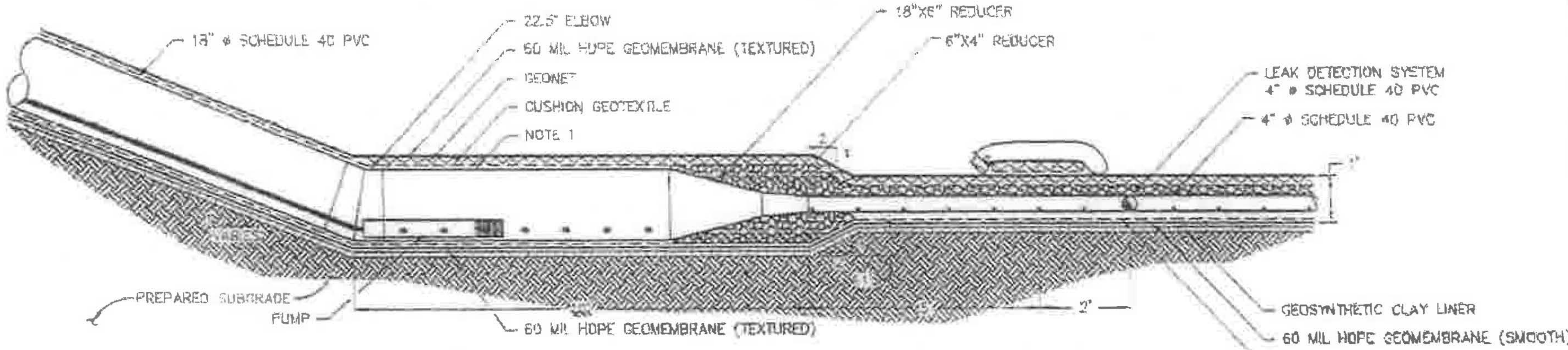
Geosyntec consultants	DATE: OCTOBER 2010	FIGURE
	PROJECT NO. SC0349	3B


LEGEND
EXISTING GROUND CONTOUR - MAJOR
EXISTING GROUND CONTOUR - MINOR
5590 PROPOSED SURFACE CONTOUR - MAJOR
PROPOSED SURFACE CONTOUR - MINOR
LIMIT OF LINER
SPLASH PAD
HDPE PIPELINE SLURRY OR SOLUTION
SOLUTION RETURN
SLIMES DRAIN
0 200' 400'
SCALE IN FEET
INTERIM FILLING PLAN
CELL 4A
BLANDING, UTAH
Geosyntec consultants
DATE: OCTOBER 2010
PROJECT NO SC0349
4A



INTERIM FILLING PLAN
CELL 4B
BLANDING, UTAH

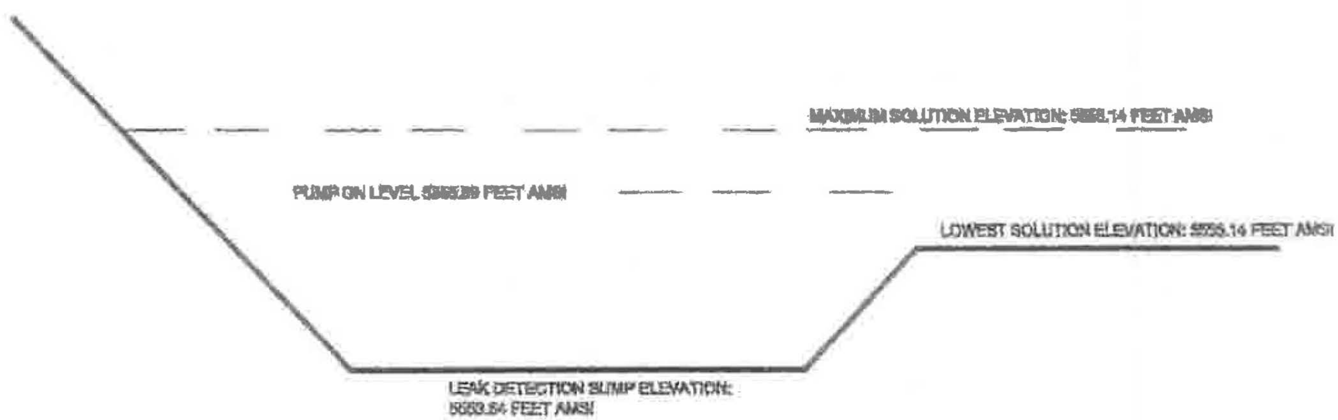
Geosyntec consultants	DATE: OCTOBER 2010	FIGURE
	PROJECT NO. SC0349	4B



SECTION
LEAK DETECTION SYSTEM SUMP
N.T.S.

LEAK DETECTION SYSTEM SUMP
CELLS 4A AND 4B
BLANDING, UTAH

Geosyntec consultants	DATE: OCTOBER 2010	FIGURE 5
	PROJECT NO. SC0349	



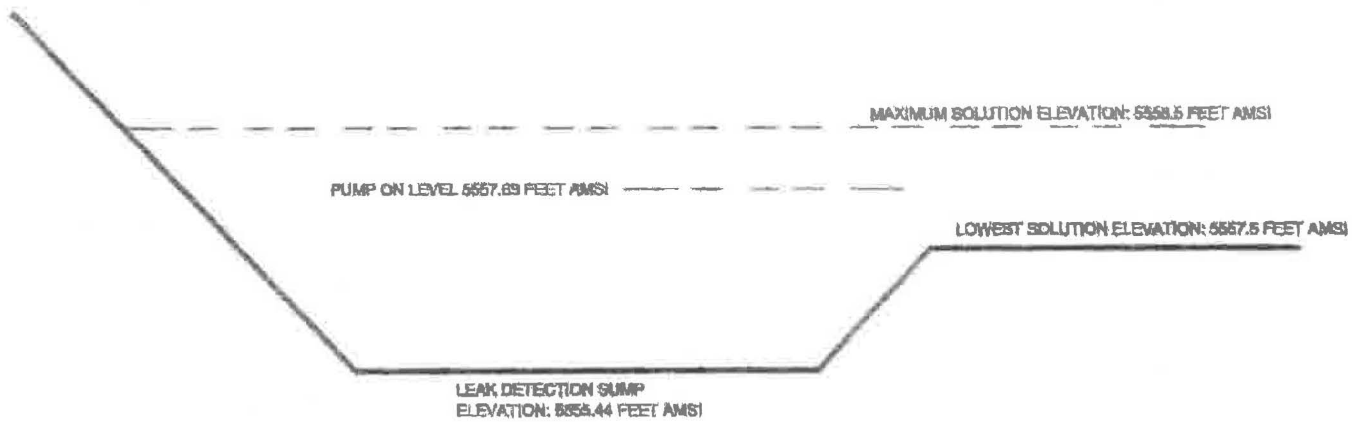
LEAK DETECTION SUMP
CELL 4A
BLANDING, UTAH

Geosyntec consultants

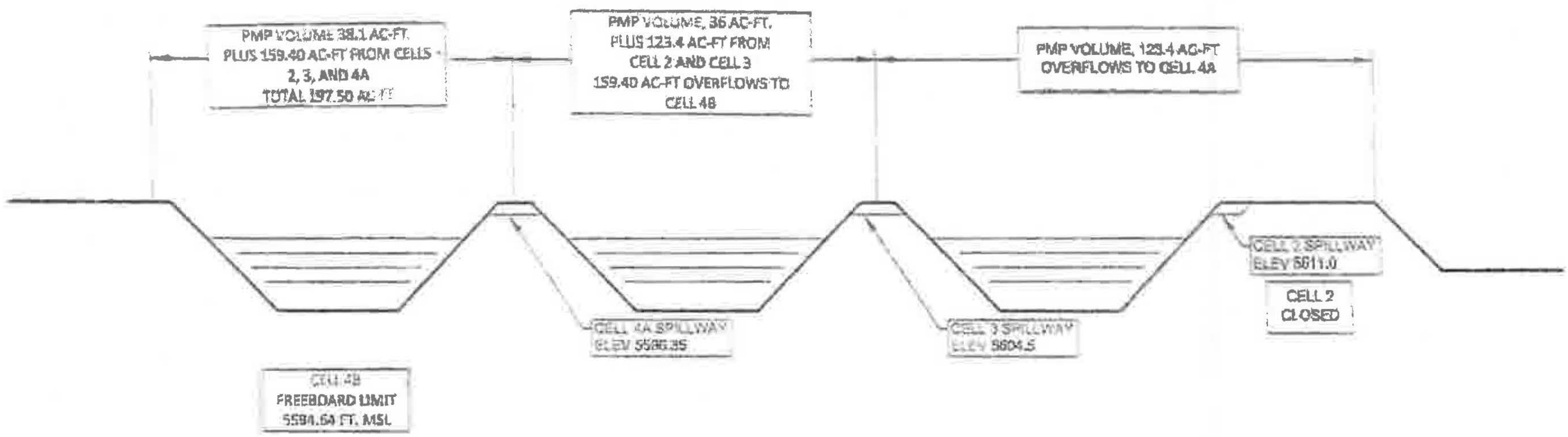
DATE: OCTOBER 2010

PROJECT NO.

FIGURE 6A



LEAK DETECTION SUMP CELL 4B BLANDING, UTAH			
Geosyntec consultants	DATE:	OCTOBER 2010	FIGURE 6B
	PROJECT NO.	SC0349	



NOT TO SCALE

HYDRAULIC PROFILE SCHEMATIC
CELL 4B
BLANDING, UTAH

Geosyntec consultants	DATE: OCTOBER 2010	FIGURE
	PROJECT NO. SC0349	7

Table 1A
Calculated Action Leakage Rates for Various Head Conditions
Cell 4A, White Mesa Mill
Blanding, Utah

Head Above Liner System (feet)	Calculated Action Leakage Rate (gallons/acre/day)
5	222.04
10	314.0
15	384.58
20	444.08
25	496.5
30	543.88
35	587.5
37	604.0

Table 1B
Calculated Action Leakage Rates for Various Head Conditions
Cell 4B, White Mesa Mill
Blanding, Utah

Head Above Liner System (feet)	Calculated Action Leakage Rate (gallons/acre/day)
5	211.4
10	317.0
15	369.9
20	422.7
25	475.6
30	528.4
35	570.0
37	581.2

Appendix G

Stormwater Best Management Practices Plan,
Revision 1.5: September 2012

STORMWATER
BEST MANAGEMENT PRACTICES PLAN

for

White Mesa Uranium Mill
6425 South Highway 191
P.O. Box 809
Blanding, Utah

September 2012

Prepared by:
Energy Fuels Resources (USA) Inc.
1050 17th Street, Suite 950
Denver, CO 80265

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Figures

Tables

1.0 INTRODUCTION/PURPOSE

Energy Fuels Resources (USA) Inc. ("EFR") operates the White Mesa Uranium Mill ("the Mill) in Blanding, Utah. The Mill is a net water consumer, and is a zero-discharge facility with respect to water effluents. That is, no water leaves the Mill site because the Mill has:

- no outfalls to public stormwater systems,
- no surface runoff to public stormwater systems,
- no discharges to publicly owned treatment works ("POTWs"), and
- no discharges to surface water bodies.

The State of Utah issued Groundwater Discharge Permit No. UGW370004 to EFR on March 8, 2005. As a part of compliance with the Permit, EFR is required to submit a Stormwater Best Management Practices Plan ("BMPP") to the Executive Secretary of the Division of Radiation Control, Utah Department of Environmental Quality. This BMPP presents operational and management practices to minimize or prevent spills of chemicals or hazardous materials, which could result in contaminated surface water effluents potentially impacting surface waters or ground waters through runoff or discharge connections to stormwater or surface water drainage routes. Although the Mill, by design, cannot directly impact stormwater, surface water, or groundwater, the Mill implements these practices in a good faith effort to minimize all sources of pollution at the site.

2.0 SCOPE

This BMPP identifies practices to prevent spills of chemicals and hazardous materials used in process operations, laboratory operations, and maintenance activities, and minimize spread of particulates from stockpiles and tailings management areas at the Mill. Storage of ores and alternate feeds on the ore pad, and containment of tailings in the Mill tailings impoundment system are not considered "spills" for the purposes of this BMPP.

The Mill site was constructed with an overall grade and diversion ditch system designed to channel all surface runoff, including precipitation equivalent to a Probable Maximum Precipitation/Probable Maximum Flood ("PMP/PMF") storm event, to the tailings management system. In addition, Mill tailings, all other process effluents, all solid waste and debris (except used oil and recyclable materials), and spilled materials that cannot be recovered for reuse are transferred to one or more of the tailings cells in accordance with the Mill's NRC license conditions. All of the process and laboratory building sinks, sumps, and floor drains are tied to the transfer lines to the tailings impoundments. A site map of the Mill is provided in Figure 1. A sketch of the site drainage basins is provided in Figure 2.

As a result, unlike other industrial facilities, whose spill management programs focus on minimizing the introduction of chemical and solid waste and wastewater into the process sewers and storm drains, the Mill is permitted by NRC license to manage some spills via draining or wash down to the process sewers, and ultimately the tailings system. However, as good environmental management practice, the Mill attempts to minimize:

1. the number and size of material spills, and
2. the amount of unrecovered spilled material and wash water that enters the process sewers after a spill cleanup.

Section 4.0 itemizes the practices in place at the Mill to meet these objectives.

This BMPP addresses the management of stormwater, and the prevention of spills of chemicals and hazardous materials, at the Mill site. Detailed requirements and methods for management, recordkeeping, and documentation of hazardous material spills are addressed separately in the EFR White Mesa Mill Spill Prevention, Control and Countermeasures ("SPCC") Plan, the Emergency Response Plan ("ERP") , and the housekeeping procedures incorporated in the White Mesa Mill Standard Operating Procedures ("SOPs").

3.0 RESPONSIBILITY

All Mill personnel are responsible for implementation of the practices in this BMPP. EFR White Mesa Mill management is responsible for providing the facilities or equipment necessary to implement the practices in this BMPP.

The Mill Management Organization is presented in Figure 3. The EFR Corporate Management Organization is presented in Figure 4.

An updated spill prevention and control notification list is provided in Table l.

4.0 BEST MANAGEMENT PRACTICES

A summary list and inventory of all liquid and solid materials managed at the Mill is provided in Tables 2 through 5.

4.1 General Management Practices Applicable to All Areas

4.1.1 Keep Potential Pollutants from Contact with Soil, and Surface Water:

- Store hazardous materials and other potential pollutants in appropriate containers.
- Label the containers.
- Keep the containers covered when not in use.

4.1.2 Keep Potential Pollutants from Contact with Precipitation

- Store bulk materials in covered tanks or drums.
- Store jars, bottle, or similar small containers in buildings or under covered areas.
- Replace or repair broken dumpsters and bins.
- Keep dumpster lids and large container covers closed when not in use (to keep precipitation out).

4.1.3 Keep Paved Areas from Becoming Pollutant Sources

- Sweep paved areas regularly, and dispose of debris in the solid waste dumpsters or tailings area as appropriate.

4.1.4 Inspection and Maintenance of Diversion Ditches and Drainage Channels within the Process and Reagent Storage Area

- Diversion ditches, drainage channels and surface water control structures in and around the Mill area will be inspected at least monthly in accordance with the regularly scheduled inspections required by Groundwater Discharge Permit No. UGW370004, and by product Materials License #UT1900479. Areas requiring maintenance or repair, such as excessive vegetative growth, channel erosion or pooling of surface water runoff, will be reported to site management and maintenance departments for necessary action to repair damage or perform reconstruction in order for the control feature to perform as intended. Status of maintenance or repairs will be documented during follow up inspections and additional action taken if necessary.

4.1.5 Recycle Fluids Whenever Possible:

- When possible, select automotive fluids, solvents, and cleaners that can be recycled or reclaimed
- When possible, select consumable materials from suppliers who will reclaim empty containers.
- Keep spent fluids in properly labeled, covered containers until they are picked up for recycle or transferred to the tailings area for disposal.

4.2 Management Practices for Process and Laboratory Areas

4.2.1 Clean Up Spills Properly

- Clean up spills with dry cleanup methods (absorbents, sweeping, collection drums) instead of water whenever possible.
- Clean spills of stored reagents or other chemicals immediately after discovery.
- (Groundwater Discharge Permit No. UGW370004, Section I.D.10.c.)
- Recover and re-use spilled material whenever possible.
- Keep supplies of rags, sorbent materials (such as cat litter), spill collection drums, and personnel protective equipment ("PPE") near the areas where they may be needed for spill response.
- If spills must be washed down, use the minimum amount of water needed for effective cleanup.

4.2.2 Protect Materials Stored Outdoors

- If drummed feeds or products must be stored outdoors, store them in covered or diked areas when possible.
- If drummed chemicals must be stored outdoors, store them in covered or diked areas when possible.
- Make sure drums and containers stored outdoors are in good condition and secured against wind or leakage. Place any damaged containers into an overpack drum or second container.

4.2.3 Management

- When possible, recycle and reuse water from flushing and pressure testing equipment. When possible, wipe down the outsides of containers instead of rinsing them off in the sink.
- When possible, wipe down counters and work surfaces instead of hosing or rinsing them off to sinks and drain

4.2.4 Materials Management

- Purchase and inventory the smallest amount of laboratory reagent necessary.
- Do not stock more of a reagent than will be used up before its expiration date.
- All new construction of reagent storage facilities will include secondary containment which shall control and prevent any contact of spilled reagents, or otherwise released
- reagent or product, with the ground surface. (Groundwater Discharge Permit No.
- UGW370004, Section I.D.3.g.)

4.3 Management Practices for Maintenance Activities

4.3.1 Keep a Clean Dry Shop

- Sweep or vacuum shop floors regularly.
- Designate specific areas indoors for parts cleaning, and use cleaners and solvents only in those areas.
- Clean up spills promptly. Don't let minor spills spread.
- Keep supplies of rags, collection containers, and sorbent material near each work area where they are needed.
- Store bulk fluids, waste fluids, and batteries in an area with secondary containment (double drum, drip pan) to capture leakage and contain spills.

4.3.2 Manage Vehicle Fluids

- Drain fluids from leaking or wrecked/damaged vehicles and equipment as soon as possible. Use drip pans or plastic tarps to prevent spillage and spread of fluids.
- Promptly contain and transfer drained fluids to appropriate storage area for reuse, recycle, or disposal.
- Recycle automotive fluids, if possible, when their useful life is finished.

4.3.3 Use Controls During Paint Removal

- Use drop cloths and sheeting to prevent windborne contamination from paint chips and sandblasting dust.
- Collect, contain, and transfer, as soon as possible, accumulated dusts and paint chips to a disposal location in the tailings area authorized to accept waste materials from maintenance or construction activities.

4.3.4 Use Controls During Paint Application and Cleanup

- Mix and use the right amount of paint for the job. Use up one container before opening a second one.
- Recycle or reuse leftover paint whenever possible.
- Never clean brushes or rinse or drain paint containers on the ground (paved or unpaved).
- Clean brushes and containers only at sinks and stations that drain to the process sewer to the tailings system.
- Paint out brushes to the extent possible before water washing (water-based paint) or solvent rinsing (oil-based paint).
- Filter and reuse thinners and solvent whenever possible). Contain solids and unusable excess liquids for transfer to the tailings area

4.4 Management Practices for Ore Pad, Tailings Area, and Heavy Equipment

Detailed instructions for ore unloading, dust suppression, and tailings management are provided in the Mill SOPs.

4.4.1 Wash Down Vehicles and Equipment in Proper Areas

- Wash down trucks, trailers, and other heavy equipment only in areas designated for this purpose (such as wash down pad areas and tile truck wash station).
- At the truck wash station, make sure the water collection and recycling system is working before turning on water sprays.

4.4.2 Manage Stockpiles to Prevent Windborne Contamination

- Water spray the ore pad and unpaved areas at appropriate frequency in accordance with Mill SOPs.
- Water spray stockpiles as required by opacity standards or weather conditions.
- Don't over-water. Keep surfaces moist but minimize runoff water.

4.4.3 Keep Earthmoving Activities from Becoming Pollutant Sources

- Schedule excavation, grading, and other earthmoving activities when extreme dryness and high winds will not be a factor (to prevent the need for excessive dust suppression).
- Remove existing vegetation only when absolutely necessary.
- Seed or plant temporary vegetation for erosion control on slopes.

TABLES

TABLE 1
White Mesa Mill Management Personnel
Responsible for Implementing This BMPP

Mill Staff

Personnel	Title	Work Phone	Home Phone/ Other Contact Number
Dan Hillsten	Mill Manager	435-678-4105	Cell: 435-979-3041
Wade Hancock	Maintenance Superintendent	435-678-4166	435-678-2753 Cell: 435-979-0410
Scot Christensen	Mill Superintendent	435-678-2221	435-678-2015
David E. Turk	Manager, Environment, Health and Safety	435-678-4113	435- 678-7802 Cell: 435-459-9786
Garrin Palmer	Mill Environmental Compliance Coordinator	435-678-4115	Cell: 435-459-9463

Corporate Management Staff

Personnel	Title	Work Phone	Home Phone / Other Contact Number
Stephen P. Antony,	President and Chief Operating Officer	303-974-2142	Cell: 303-378-8254
Harold R. Roberts	Executive Vice President and Chief Operating Officer	303-389-4160	Cell: 303-902-2870
David C. Frydenlund	Sr. Vice President Regulatory Affairs and General Counsel	303-389-4130	303-221-0098 Cell: 303-808-6648
Jo Ann Tischler	Director, Compliance	303-389-4132	Cell: 303-501-9226

TABLE 2
REAGENT YARD LIST

REAGENT	QUANTITY (LBS)	NUMBER OF STORAGE TANKS	CAPACITY (GALLONS)
AMMONIUM SULFATE(BULK)	54,000	2	24,366
AMMONIUM SULFATE(BAGS)	26,000	---	
ANHYDROUS AMMONIA	107,920	2	31,409
TRIDECYLALCOHOL	45,430	---	
DIESEL FUEL		2	250
		1	6,000
GRINDING BALLS	72,000	---	
KEROSENE	1,344	1	10,315
		2	10,095
POLOX	10,360	---	
PROPANE		1	25,589
SALT (BAGS)	39,280	---	
SALT (BULK)	0	1	13,763
		1	18,864
SODA ASH (BAGS)	39,280	---	
SODA ASH (BULK)	84,100	1	16,921
		1	8,530
SODIUM CHLORATE	101,128	1	16,921
		1	22,561
		1	29,940
SODIUM HYDROXIDE	0	1	19,905
SULFURIC ACID	4,801,440	1	1,394,439
UNLEADED GASOLINE		1	3,000
USED OIL		1	5,000

TABLE 3.0
LABORATORY CHEMICAL INVENTORY LIST [1]

Chemical In Lab	RQ[2]	Quantity in Stock
Aluminum nitrate	2270 kg	1.8 kg
Ammonium bifluoride	45.4 kg	2.27 kg
Ammonium chloride	2270 kg	2.27 kg
Ammonium oxalate	2270 kg	6.8 kg
Ammonium thiocyanate	2270 kg	7.8 kg
Antimony potassium tatrate	45.4 kg	0.454
n-8utyl acetate	2270 kg	4L
Cyclohexane 454	kg 24	L
Ferric chloride	454 kg	6.81 kg
Ferrous ammonium sulfate	454 kg	0.57
Potassium chromate	4.54 kg	0.114 kg
Sodium nitrite	45.4 kg	2.5 kg
Sodium phosphate tribasic	2270kg	1.4
Zinc acetate	454 kg	0.91 kg

Chemical. in Volatiles and Flammables Lockers (A,B,C)	RQ[2]	Quantity in Stock
Chloroform	4.54 kg	8 L
Formaldehyde	45.4 kg	<1L of 37% solution
Nitrobenzene	454 kg	12 L
Toluene	454 kg	12 L

Chemical in Acid Shed	RQ[2]	Quantity in Stock
Chloroform	4.54 kg	55 gal
Hydrochloric acid	2,270 kg	58 gal
Nitrate acid	454 kg	5 L
Phosphoric Acid	2,270 kg	10 L
Sulfuric acid	454 kg	25 L
Hydrofluoric acid	45.4 kg	1 L
Ammonium hydroxide	454 kg	18 L

1. This list identifies chemicals which are regulated as hazardous substances under the Federal Water Pollution Control Act 40 CFR Part 117. The lab also stores small quantities of other materials that are not hazardous substances per the above regulation.

2. Reportable Quantities are those identified in 40 CFR Part 117 Table 117.3: "Reportable Quantities of Hazardous Substances Designated Pursuant to Section 311 of the Clean Water Act."

TABLE 4.0
REAGENT YARD/SMALL QUANTITY CHEMICALS LIST [1]

CHEMICAL	RQ[2]	QUANTITY IN STORAGE COMPOUND
Acetic Acid, Glacial	1,000 lbs	4 gal
Ammonium Hydroxide	1,000 lbs	5L
Calcium Hypochlorite	10 lbs	2 kg (4.4 lbs)
Chlorine	10 lbs	0 lbs
Ferrous Sulfate Heptahydrate	1,000 lbs	5 kg (11lbs)
Hydrochloric	5,000 lbs	60 gal of 40% solution
Nitric Acid	1,000 lbs	10 L
Potassium Permanganate 0.1 N	32 gal	5 kg (11lbs)
Sodium Hypochlorite 5.5%	100 lbs	2 kg (11 lbs) of 5.5% solution
Silver Nitrate	1 lb	0 lbs
Trichloroethylene	100 lb	2 L

1. This list identifies chemicals which are regulated as hazardous substances under the Federal Water Pollution Control Act 40 CFR Part 117, Materials in this list are stored in a locked storage compound near the bulk storage tank area. The Mill also stores small quantities of other materials that are not hazardous substances per the above regulation.

2. Reportable Quantities are those identified in40 CFR Part 117 Table 117.3: "Reportable Quantities of Hazardous Substances Designated Pursuant to Section 311 of the Clean Water Act."

TABLE 5.0
REAGENT YARD/BULK CHEMICALS LIST[1]

REAGENT	RQ'	QUANTITY IN REAGENT YARD
Sulfuric Acid	1,000 lbs	9,000,000 lbs
Hyperfloc 102	None	1,500 lbs
Ammonia – East Tank	100 lbs	0 lbs
Ammonia – West Tank	100 lbs	105,000 lbs
Kerosene	100 gal	500 gal
Salt (Bags)	None	20,000 lbs
Soda Ash Dense (Bag)	None	50,000 lbs
Polyox	None	490 lbs
Tributyl phosphate	None	9,450 lbs
Diesel	100 gal	Approx. 3300 gal
Gasoline	100 gal	Approx. 6000 gal
Alamine 336 drums	None	8,250 gal
Salt(Bulk Solids)	None	50,000 lbs
Salt(Bulk Solutions)	None	9,000 gal
Caustic Soda	1,000 lbs	16,000 lbs
Ammonium Sulfate	None	150,000 lbs
Sodium Chlorate	None	350,000 lbs
Alamine 310 Bulk	None	0 lbs
Isodecanol	None	2,420 gal
Vanadium Pentoxide3	1000 lbs	30,000 lbs
Yellowcake3	None	<100,000 lbs
Ammonia Meta Vanadate	1000 lbs	0 lbs
Floc 655		21,000 lbs
Floc 712		1,250 lbs

1. This list identifies all chemicals in the reagent yard whether or not they are regulated as hazardous substances under the Federal Water Pollution Control Act 40 CFR Part 117.

2. Reportable Quantities are those identified in 40 CFR Part 117 Table 117.3: "Reportable Quantities of Hazardous Substances Designated Pursuant to Section 311 of the Clean Water Act."

3. Vanadium Pentoxide and Yellowcake, the Mill's products, are not stored in the Reagent Yard itself, but are present in closed containers in the Mill Building *and/or* Mill Yard

TABLE 6.0
PETROLEUM PRODUCTS AND SOLVENTS LIST[1]

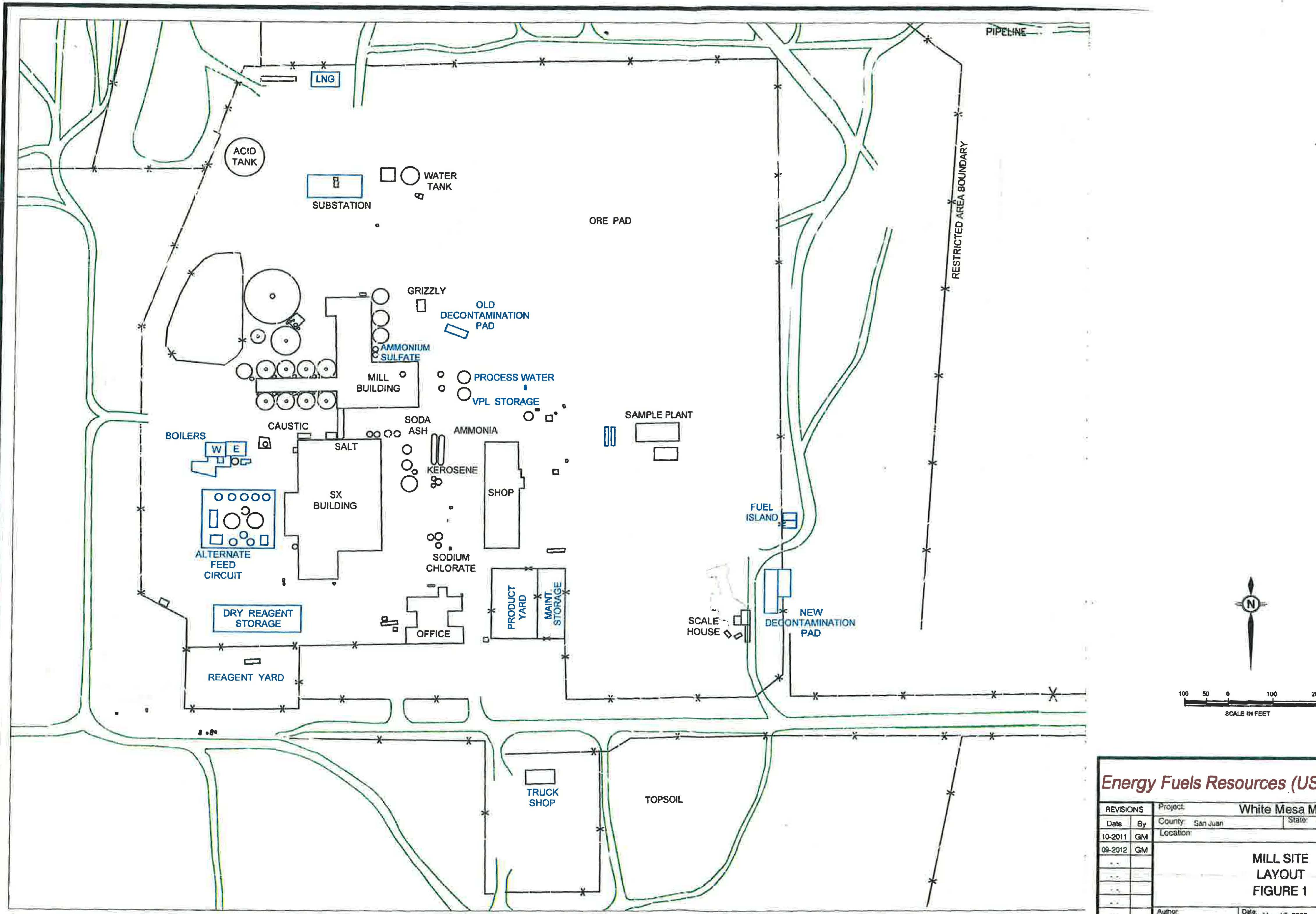
PRODUCT	RQ	QUANTITY IN WAREHOUSE
Lubricating Oils in 55 gallon drums	100 gal	1,540 gallons
Transmission Oils	100 gal	110 gallons
Water Soluble Oils	100 gal	110 gallons
Xylene (mixed isomers)	100 gal	0 gallons
Toluene	1000 gal	0 gallons
Varsol Solvent (2% trimethyl benzene in petroleum distillates)	100 gal	0 gallons

1. This list includes all solvents and petroleum-based products in the Mill warehouse petroleum and chemical storage aisles.
2. Reportable Quantities are those identified in 40 CFR Part 117 Table 117.3: "Reportable Quantities of Hazardous Substances Designated Pursuant to Section 311 of the Clean Water Act."

FIGURES

Figure 1
White Mesa Mill
Mill Site Layout

Figure 2
White Mesa Mill
Mill Site Drainage Basins



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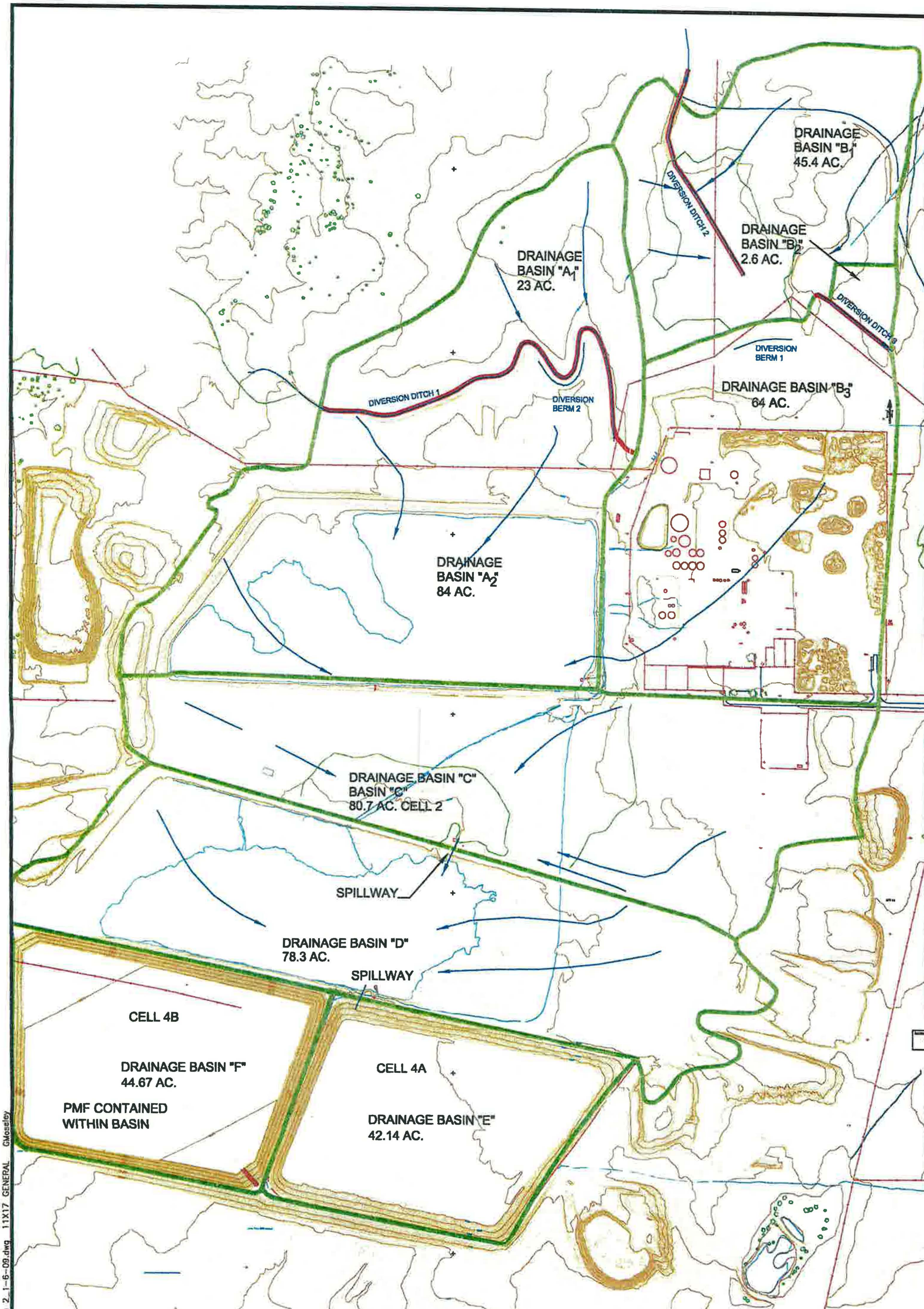
Energy Fuels Resources (USA) Inc.

REVISIONS		Project: White Mesa Mill
Date	By	County: San Juan State: UT
10-2011	GM	Location:
09-2012	GM	MILL SITE LAYOUT FIGURE 1
- -		
- -		
- -		
- -		
- -		Author: Date: May 12, 2000 Drafted By: SleddCad



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- Sufrace Water Flow
- Drainage Basins
- Diversion Ditches
- Diversion Berm

Energy Fuels Resources (USA) Inc.

REVISIONS		Project: White Mesa Mill	
Date	By	County: San Juan	State: UT
2/15/07	BM	Location:	
10/24/07	BM	MILL SITE	
05/16/08	BM	DRAINAGE BASINS	
06/11/08	BM	FIGURE 2	
12/9/08	DLS		
1/7/09	BM		
11/15/11	GM	Author: HRR Date: 2005	Drafted By

Figure 3
White Mesa Mill
Mill Management Organization Chart

Figure 3
Energy Fuels Resources (USA) Inc.
White Mesa Mill Management
Organizational Structure

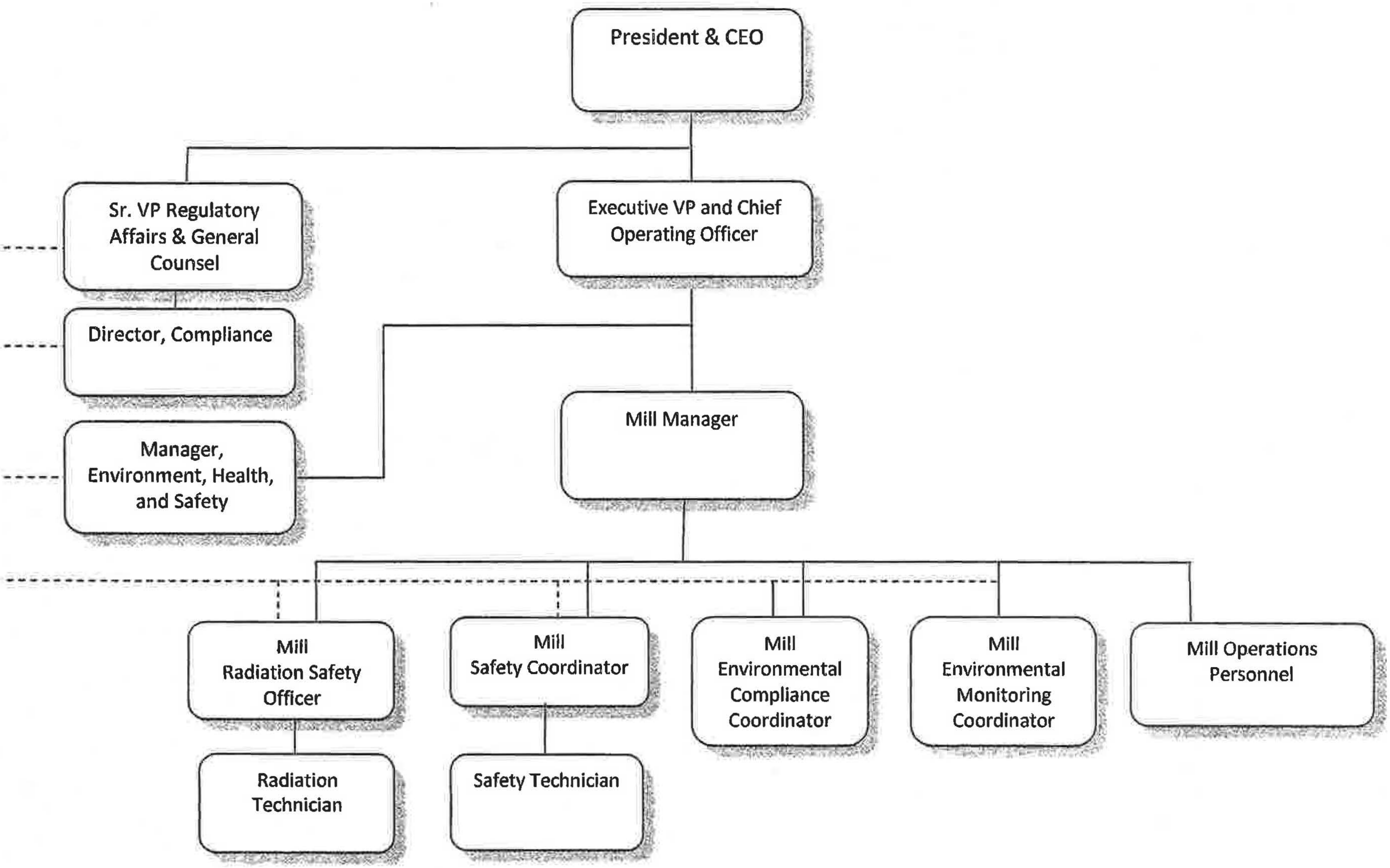
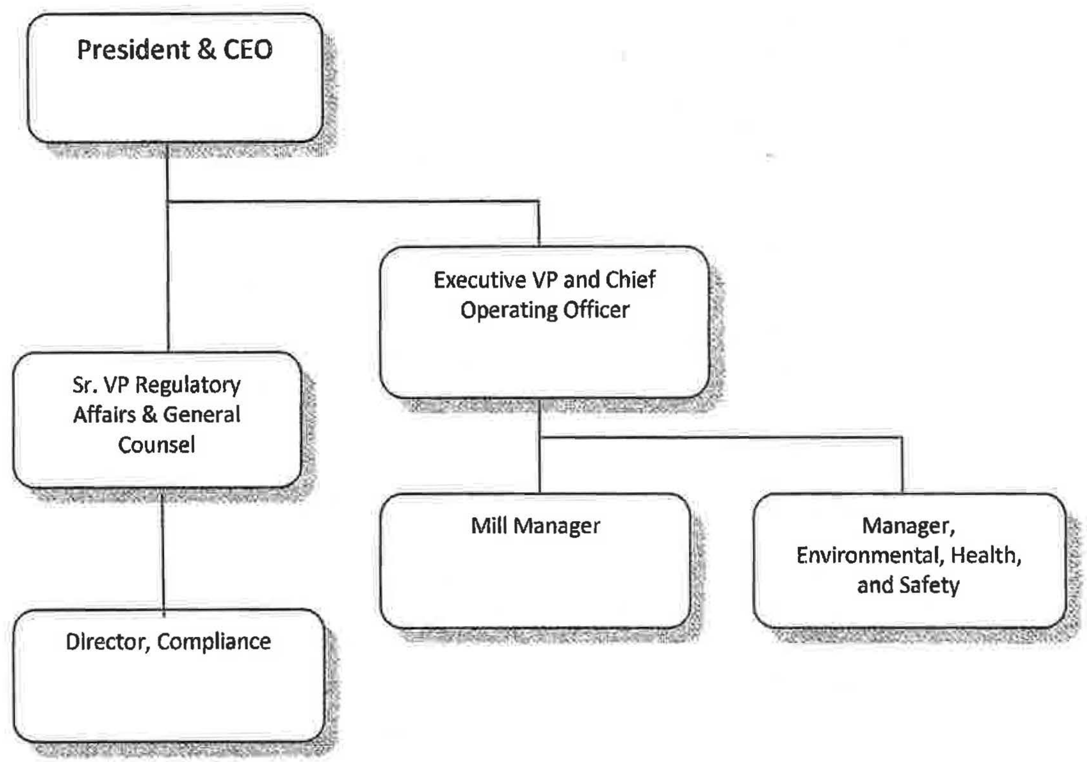


Figure 4
White Mesa Mill
Energy Fuels Resources (USA) Inc.
Organizational Structure

Figure 4
Energy Fuels Resources (USA) Inc.
Organizational Structure



Appendix H

White Mesa Mill Discharge Minimization Technology (DMT) Monitoring Plan, 7/2012, Revision: Denison-12.1

WHITE MESA MILL DISCHARGE MINIMIZATION TECHNOLOGY (DMT) MONITORING PLAN

Revision 12.1
July 2012

Prepared by:
Denison Mines (USA) Corp.
1050 17th Street, Suite 950
Denver, CO 80265

WHITE MESA MILL
DISCHARGE MINIMIZATION TECHNOLOGY (DMT) MONITORING PLAN

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ATTACHMENTS

1. INTRODUCTION

This DMT Monitoring Plan ("DMT Plan") sets out the procedures to demonstrate compliance with Discharge Minimization Technology ("DMT") as specified throughout Parts I.D, I.E and I.F of the White Mesa Mill's (the "Mill's") Groundwater Discharge Permit ("GWDP") Number 370004. Additional procedures for monitoring the tailings cell systems as required under State of Utah Radioactive Materials License No. UT1900479 (the "RML") are set out in the Tailings Management System procedure for the Mill, which comprises Chapter 3.1 of the Mill's Environmental Protection Manual.

This DMT Plan and the Tailings Management System procedure when implemented in concert are designed as a comprehensive systematic program for constant surveillance and documentation of the integrity of the tailings impoundment system including dike stability, liner integrity, and transport systems, as well as monitoring of water levels in Roberts Pond and feedstock storage areas at the Mill.

This DMT Plan is issued as a stand-alone document, while the Tailings Management System procedure is published and maintained in the Mill's Environmental Protection Manual.

1.1. Background

The Tailings Management System procedure was originally developed as Chapter 3.1 of the Mill's Environmental Protection Manual, under the Mill's NRC Source Material License, and constituted a comprehensive systematic program for constant surveillance and documentation of the integrity of the tailings impoundment system. Upon the State of Utah becoming an Agreement State for uranium mills in 2004, the Mill's Source Material License was replaced by the State of Utah RML and the State of Utah GWDP. The GWDP required that Denison develop the initial DMT Plan in response to GWDP requirements. In developing the initial DMT Plan, Denison combined the existing Tailings Management System procedure set out as Chapter 3.1 of the Mill's Environmental Protection Manual with a number of new DMT requirements from the GWDP to form the initial DMT Plan. The initial DMT Plan and subsequent revisions (through revision 11.5) maintained the requirements from the RML (i.e., Chapter 3.1 of the Mill's Environmental Protection Manual) and the DMT requirements of the GWDP in a single document.

However, after several years of implementing the DMT Plan, Denison concluded that it is preferable to separate the RML portions of the DMT Plan from the GWDP portions of the DMT Plan, into two separate documents. This DMT Plan continues to be a stand-alone plan that contains the DMT requirements from the GWDP except for the daily recording of the Cells 1, 2, and 3 LDS measurements as noted below. However, the portions of the initial DMT Plan that flowed from the RML and not from the GWDP have been separated from the DMT Plan and have been returned to their original status as the Tailings Management System procedure, which comprises Chapter 3.1 of the Mill's Environmental Protection Manual. This allows the DMT Plan to be managed, inspected and enforced under the requirements of the GWDP and this Tailings Management System procedure to be managed, inspected and enforced under the requirements of the RML.

This division of the requirements was discussed with DRC on October 26, 2011. DRC agreed with the division of the requirements into two distinct documents as noted in their correspondence dated December 20, 2011. Pursuant to a written request from DRC, dated May 30, 2012, the RML requirements for the inspections of the Cells 1, 2, and 3 Leak Detection Systems ("LDSs") has been included in this DMT Plan. The inclusion of this RML requirement into this DMT Plan is to address the DRC request for uniformity in monitoring and reporting requirements for Cells 1, 2, and 3 and to address anticipated GWDP modifications regarding the LDS monitoring in Cells 1, 2, and 3.

2. DAILY TAILINGS INSPECTIONS

The following daily tailings inspections shall be performed:

2.1. Daily Inspection

On a daily basis, including weekends, the Cells 1, 2, 3, 4A, and 4B leak detection systems must be inspected either under the DMT Plan or the Tailings Management System procedure.

The Radiation Safety Officer (RSO) or his designee is responsible for performing these daily tailings inspections. The RSO may designate other individuals with training, as described in Section 2.4 below, to perform these inspections.

Observations made by the inspector will be recorded on Attachment A to this DMT Plan. The inspector will place a check by all inspection items that appear to be operating properly. Those items where conditions of potential concern are observed should be marked with an "X". A note should accompany the "X" specifying what the concern is and what corrective measures will resolve the problem. This observation of concern should be noted on the form until the problem has been remedied. The date that corrective action was taken should be noted as well. See the Tailings Management System procedure for additional daily inspection requirements.

a) Daily measurements in the leak detection system sumps of Cells 1, 2, 3, (as required by the RML) and Cells 4A, and 4B (as required by the GWDP) are recorded. For simplicity, the leak detection system measurements for all cells have been combined on the Daily Inspection Data Form included as Attachment A-1 to this DMT Plan regardless of the origin of the requirement.

The triggers for further action and the associated actions when evaluating Cells 1, 2, and 3, leak detection systems are discussed in the Tailings Management

System procedure, Section 2.1q).

The solution level in Cell 4A or 4B leak detection system is not allowed to be more than 1.0 foot above the lowest point on the bottom flexible membrane liner (FML) (Cell 4A FML elevation is 5555.14 amsl and with the addition of the 1.0 foot of solution the solution elevation is 5556.14 feet amsl. For Cell 4B the FML elevation is 5557.50 amsl and with the addition of the 1.0 foot of solution the solution elevation is 5558.50 feet amsl). If any of these observations are made, the Mill Manager should be notified immediately and the leak detection system pump started. In addition, the requirement to notify the Executive Secretary in accordance with Parts I.D.6 and I.G.3 of the Groundwater Discharge Permit must be adhered to when the solution level trigger for Cell 4A or 4B has been exceeded.

3. WEEKLY TAILINGS AND DMT INSPECTION

3.1. Weekly Tailings Inspections

Weekly tailings inspections are to be conducted by the RSO or his designee and include the following:

a) Leak Detection Systems

Each tailings cell's LDS shall be checked weekly (as well as daily) to determine whether it is wet or dry. If marked wet, the liquid levels need to be measured and reported. In Cells 1, 2, and 3 the LDS is measured by use of a dual probe system that senses the presence of solutions in the LDS (comparable to the systems in Cell 4A and Cell 4B) and indicates the presence of solution with a warning light. The Cell 4A and 4B leak detection systems are monitored on a continuous basis by use of a pressure transducer that feeds water level information to an electronic data collector. The pressure transducer is calibrated for fluid with a specific gravity of 1.0. The water levels are measured every hour and the information is stored for later retrieval. The water levels are measured to the nearest 0.10 inch. The data collector is currently programmed to store 7 days of water level information. The number of days of stored data can be increased beyond 7 days if needed. For Cells 1, 2, and 3, the water level data is recorded on the Daily Tailings Inspection Form included as Attachment A-1 of this DMT Plan . For Cells 4A and 4B, the water level data is downloaded to a laptop computer periodically and incorporated into the Mill's environmental monitoring data storage. The data are reviewed during the weekly inspections of the tailings cell leak detection systems.

If an LDS monitoring system becomes inoperable, alternate methods for LDS fluid measurements may be employed with Executive Secretary approval.

If sufficient fluid is present in the leak detection system of any cell, the fluid shall be pumped from the LDS, to the extent reasonably possible, and record the volume of fluid recovered. Any fluid pumped from an LDS shall be returned to a disposal cell.

For Cells 1, 2, and 3, if fluid is pumped from an LDS, the procedures specified in the Tailings Management System procedure Section 3.1 a) shall be implemented. For Cells 1, 2, and 3, upon the initial pumping of fluid from an LDS, a fluid sample shall be collected and analyzed in accordance with paragraph 11.3C of the RML as described in the Tailings Management System procedure.

For Cell 4A and 4B, under no circumstance shall fluid head in the leak detection system sump exceed a 1-foot level above the lowest point in the lower flexible membrane liner. To determine the Maximum Allowable Daily LDS Flow Rates in the Cell 4A and 4B leak detection systems, the total volume of all fluids pumped from the LDS on a weekly basis shall be recovered from the data collector, and that information will be used to calculate an average volume pumped per day. Under no circumstances shall the daily LDS flow volume exceed 24,160 gallons/day for Cell 4A or 26,145 gallons/day for Cell 4B. The maximum daily LDS flow volume will be compared against the measured cell solution levels detailed on Table 1A and 1B (for Cells 4A and 4B, respectively) in Attachment C, to determine the maximum daily allowable LDS flow volume for varying head conditions in Cell 4A and 4B.

b) *Slimes Drain Water Level Monitoring*

(i) Cell 3 is nearly full and will commence closure when filled. Cell 2 is partially reclaimed with the surface covered by platform fill. Each cell has a slimes drain system which aids in dewatering the slimes and sands placed in the cell;

(ii) Denison re-graded the interim fill on Cell 2 in order to reduce the potential for the accumulation of storm water on the surface of Cell 2. As a result of the re-grading of the interim cover and the placement of an additional 62,000 cubic yards of fill material on Cell 2, the slimes drain access pipe was extended 6.97 feet. The extension pipe is 6.97 feet in length, and therefore the new measuring point is 37.97 feet from the bottom of the slimes drain. The measuring point on the extension pipe was surveyed by a Utah-Certified Land Surveyor. The measuring point elevation is 5618.73 fmsl. For the quarterly recovery test described in section vi below, this extension has no effect on the data measurement procedures.

Cell 2 has a pump placed inside of the slimes drain access pipe at the bottom of the slimes drain. As taken from actual measurements, the bottom of the slimes drain is 37.97 feet below a water level measuring point which is a notch on the side of the Cell 2 slimes drain access pipe.. This means that the bottom of the slimes drain pool and the location of the pump are one foot above the lowest point of the FML in Cell 2, which, based on construction reports, is at a depth of 38.97 feet below the water level measuring point on the slimes drain access pipe for Cell 2;

(iii) The slimes drain pump in Cell 2 is activated and deactivated by a float mechanism and water level probe system. When the water level reaches the level of the float mechanism the pump is activated. Pumping then occurs until the water level reaches the lower probe which turns the pump off. The lower probe is located one foot above the bottom of the slimes drain standpipe, and the float valve is located at three feet above the bottom of the slimes drain standpipe. The average wastewater head in the Cell 2 slimes drain is therefore less than 3 feet and is below the phreatic surface of tailings Cell 2, about 27 feet below the water level measuring point on the slimes drain access pipe. As a result, there is a continuous flow of wastewater from Cell 2 into the slimes drain collection system. Mill management considers that the average allowable wastewater head in the Cell 2 slimes drain resulting from pumping in this manner is satisfactory and is as low as reasonably achievable.

(iv) All head measurements must be made from the same measuring point (the notch at the north side of the access pipe 5618.73 fmsl), and made to the nearest 0.01 foot. The equation specified in the GWDP will be used to calculate the slimes drain recovery elevation (SDRE). To calculate the SDRE contemplated by the GWDP, the depth to wastewater in the Cell 2 slimes drain access pipe (in feet) will be subtracted from the surveyed elevation of the measuring point. The calculation is as follows: 5618.73 - Depth to wastewater in the Cell 2 slimes drain access pipe = SDRE

(v) Effective July 11, 2011, on a quarterly basis, the slimes drain pump will be turned off and the wastewater in the slimes drain access pipe will be allowed to stabilize for at least 90 hours. Once the water level has stabilized (based on no change in water level for three (3) successive readings taken no less than one (1) hour apart) the water level of the wastewater will be measured and recorded as a depth-in-pipe measurement on Quarterly Data form, by measuring the depth to water below the water level measuring point on the slimes drain access pipe;

(vi) No process liquids shall be allowed to be discharged into Cell 2;

(vii) If at any time the most recent average annual head in the Cell 2 slimes drain is found to have increased above the average head for the previous calendar year, the Licensee will comply with the requirements of Part I.G.3 of the GWDP, including the requirement to provide notification to the Executive Secretary orally within 24 hours followed by written notification;

(viii) Because Cell 3, Cell 4A, and 4B are currently active, no pumping from the Cell 3, Cell 4A, or 4B slimes drain is authorized. Prior to initiation of tailings dewatering operations for Cell 3, Cell 4A, or Cell 4B, a similar procedure will be developed for ensuring that average head elevations in the Cell 3, Cell 4A, and 4B slimes drains are kept as low as reasonably achievable, and that the Cell 3, Cell 4A, and Cell 4B slimes drains are inspected and the results reported in accordance with the requirements of the permit.

c) Tailings Wastewater Pool Elevation Monitoring

Solution elevation measurements in Cells 1, 4A, and 4B and Roberts Pond are to be taken by survey on a weekly basis. The beach area in Cell 4B with the maximum elevation is to be taken by survey on a monthly basis when beaches are first observed, as follows:

(i) The survey will be performed by the Mill's Radiation Safety Officer or designee (the "Surveyor") with the assistance of another Mill worker (the "Assistant");
(ii) The survey will be performed using a survey instrument (the "Survey Instrument") accurate to 0.01 feet, such as a Sokkai No. B21, or equivalent, together with a survey rod (the "Survey Rod") having a visible scale in 0.01 foot increments;
(iii) The Reference Points for Cells 1, Cell 4A, and 4B, and Roberts Pond are known points established by professional survey. For Cell 1 and Roberts Pond, the Reference Point is a wooden stake with a metal disk on it located on the southeast corner of Cell 1. The elevation of the metal disk (the "Reference Point Elevation") for Cell 1 and Roberts Pond is at 5,623.14 feet above mean sea level ("FMSL"). For Cell 4A and 4B, the Reference Point is a piece of stamped metal monument located next to the transformer on the south side of Cell 4A and 4B. The elevation at the top of this piece of rebar (the Reference Point Elevation for Cell 4A and 4B) is 5600.49 fmsl. The Surveyor will set up the Survey Instrument in a location where both the applicable Reference Point and pond surface are visible.
(iv) Once in location, the Surveyor will ensure that the Survey Instrument is level by centering the bubble in the level gauge on the Survey Instrument;
(v) The Assistant will place the Survey Rod vertically on the Reference Point (on the metal disk on the Cell 1/Roberts Pond Reference Point on the top of the rebar on the Cell 4A and 4B Reference Point. The Assistant will ensure that the Survey Rod is vertical by gently rocking the rod back and forth until the Surveyor has established a level reading;
(vi) The Surveyor will focus the cross hairs of the Survey Instrument on the scale on the Survey Rod, and record the number (the "Reference Point Reading"), which represents the number of feet the Survey Instrument is reading above the Reference Point;
(vii) The Assistant will then move to a designated location where the Survey Rod can be placed on the surface of the main solution pond in the Cell 1, Cell 4A, Cell 4B, or Roberts Pond, or the area of the beach in Cell 4B with the highest elevation, as the case may be. These designated locations, and the methods to be used by the Assistant to consistently use the same locations are as follows:

For a newly-constructed cell, when the cell is first placed into operation, the solution level is typically zero feet above the FML or a minimal elevation above the FML due to natural precipitation. For newly-constructed cells, measurement of solution level will commence within 30 days of authorization for use. Measurements will be conducted as described above in items d) (i) through d) (vii) of this Section consistent with current Mill health and safety procedures. The measurements will be completed using survey equipment and the appropriate length survey rod (either 25' or 45').

A. Pond Surface Measurements

I. Cell 4A

The Assistant will walk down the slope in the northeast corner of Cell 4A and place the Survey Rod at the liquid level.

II. Cell 4B

The Assistant will walk down the slope in the southeast corner of Cell 4B and place the Survey Rod at the liquid level.

III. Cell 1

A mark has been painted on the north side of the ramp going to the pump platform in Cell 1. The Assistant will place the Survey Rod against that mark and hold the rod vertically, with one end just touching the liquid surface; and

IV. Roberts Pond

A mark has been painted on the railing of the pump stand in Roberts Pond. The Assistant will place the Survey Rod against that mark and hold the rod vertically, with one end just touching the liquid surface.

Based on the foregoing methods, the approximate coordinate locations for the measuring points for Roberts Pond and the Cells are:

	Northing	Easting
Roberts Pond	323,041	2,579,697
Cell 1	322,196	2,579,277
Cell 4A	320,300	2,579,360
Cell 4B	320,690	2,576,200

These coordinate locations may vary somewhat depending on solution elevations in the Pond and Cells;

B. Cell 4B Beach Elevation

Beach elevations in Cell 4B will commence when beaches are first observed. The Assistant will place the Survey Rod at the point on the beach area of Cell 4B that has the highest elevation. If it is not clear which area of the beach has the highest elevation, then multiple points on the beach area will be surveyed until the Surveyor is satisfied that the point on the Cell 4B beach area with the highest elevation has been surveyed. If it is clear that all points on the Cell 4B beach area are below 5,593 FMSL, then the Surveyor may rely on one survey point;

(i) The Assistant will hold the Survey Rod vertically with one end of the Survey Rod just touching the pond surface. The Assistant will ensure that the Survey Rod is vertical by gently rocking the rod back and forth until the Surveyor has established a level reading;
(ii) The Surveyor will focus the cross hairs of the Survey Instrument on the scale on the Survey Rod, and record the number (the "Pond Surface Reading"), which represents the number of feet the Survey Instrument is reading above the pond surface level.

The Surveyor will calculate the elevation of the pond surface as FSML by adding the Reference Point Reading for the Cell or Roberts Pond, as the case may be, to the Reference Point Elevation for the Cell or Roberts Pond and subtracting the Pond Surface Reading for the Cell or Roberts Pond, and will record the number accurate to 0.01 feet.

d) *Decontamination Pads*

(i) *New Decontamination Pad*

The New Decontamination Pad is located in the southeast corner of the ore pad, near the Mill's scale house.

A. In order to ensure that the primary containment of the New Decontamination Pad water collection system has not been compromised, and to provide an inspection capability to detect leakage from the primary containment, vertical inspection portals have been installed between the primary and secondary containments;

B. These portals will be visually observed on a weekly basis as a means of detecting any leakage from the primary containment into the void between the primary and secondary containment. The depth to water in each portal will be measured weekly, by physically measuring the depth to water with an electrical sounding tape/device. All measurements must be made from the same measuring point and be made to the nearest 0.01 foot;

C. These inspections will be recorded on the Weekly Tailings Inspection form;

D. The water level shall not exceed 0.10 foot above the concrete floor in any standpipe, at any time. This will be determined by subtracting the weekly depth to water measurement from the distance from the measuring point in the standpipe to the dry concrete floor The depth to water from the top (elevation 5589.8 feet amsl) of any of the three (3) observation ports to the standing water shall be no less than 6.2 feet. Depths less than 6.2 feet shall indicate more that 0.1 foot of standing water above the concrete floor (elev. 5583.5 feet amsl), and shall indicate a leak in the primary containment.

E. Any observation of fluid between the primary and secondary containments will be reported to the Radiation Safety Officer (RSO).

F. In addition to inspection of the water levels in the standpipes, the New Decontamination Pad, including the concrete integrity of the exposed surfaces of the pad, will be inspected on a weekly basis. Any soil and debris will be removed from the New Decontamination Pad immediately prior to inspection of the concrete wash pad for cracking. Observations will be made of the current condition of the New Decontamination Pad. Any abnormalities relating to the pad and any damage to the concrete wash surface of the pad will be noted on the Weekly Tailings Inspection form. If there are any cracks greater than 1/8 inch separation (width), the RSO must be contacted. The RSO will have the responsibility to cease activities and have the cracks repaired.

(ii) *Existing Decontamination Pad*

The Existing Decontamination Pad is located between the northwest corner of the Mill's maintenance shop and the ore feeding grizzly. Weekly inspection requirements for the Existing Decontamination Pad are discussed in the Tailings Management System Procedure.

e) *Summary*

In addition, the weekly inspection should summarize all activities concerning the tailings area for that particular week.

Results of the weekly tailings inspection are recorded on the *Weekly Tailings and DMT Inspection* form. An example of the *Weekly Tailings and DMT Inspection* form is provided in Appendix A to the Tailings Management System and as Attachment A to this DMT Plan.

3.2. Weekly Inspection of Solution Levels in Roberts Pond

On a weekly basis, solution elevations are taken on Roberts Pond, in accordance with the procedures set out in Section 3.1 d) above. The Weekly solution level in Roberts Pond is recorded on the *Weekly Tailings and DMT Inspection* form. Based on historical observations, the FML at the Pond Surface Reading area for Roberts Pond is approximately six inches above the lowest point on the pond's FML. If the pond solution elevation at the Pond Surface Reading area is at or below the FML for that area, the pond will be recorded as being dry.

3.3. Weekly Feedstock Storage Area Inspections

Weekly feedstock storage area inspections will be performed by the Radiation Safety Department to confirm that:

a) the bulk feedstock materials are stored and maintained within the defined area described in the GWDP, as indicated on the map attached hereto as Attachment B;

b) a 4 ft. buffer is maintained at the periphery of the storage area which is absent bulk material in order to assure that the materials do not encroach upon the boundary of the storage area; and

c) all alternate feedstock located outside the defined Feedstock Area are maintained within water tight containers.

The results of this inspection will be recorded on the *Ore Storage/Sample Plant Weekly Inspection Report*, a copy of which is contained in Attachment A. Any variance in stored materials from this requirement or observed leaking alternate feedstock drums or other containers will be brought to the attention of Mill Management and rectified within 15 days.

4. ANNUAL EVALUATIONS

The following annual evaluations shall be performed:

4.1. Freeboard Limits

4.1.1. Roberts Pond

The freeboard limit for Roberts Pond is a liquid maximum elevation of 5,624.0 feet above mean sea level, as specified in the GWDP.

4.2. Annual Leak Detection Fluid Samples

Pursuant to Part I.E.10(c) of the GWDP, a sample will be collected from the Cells 4A and 4B leak detection systems annually as part of the Tailings Cell Wastewater Quality Monitoring. Sampling procedures are described in the Tailings Sampling and Analysis Plan.

4.3. Annual Inspection of the Decontamination Pads

a) New Decontamination Pad

During the second quarter of each year, the New Decontamination Pad will be taken out of service and inspected to ensure the integrity of the wash pad's exposed concrete surface. If any abnormalities are identified, i.e. cracks in the concrete with greater than 1/8 inch separation (width) or any significant deterioration or damage of the pad surface, repairs will be made prior to resuming the use of the facility. All inspection findings and any repairs required shall be documented on the Annual Decontamination Pad Inspection form. The inspection findings, any repairs required and repairs completed shall be summarized in the 2nd Quarter DMT Monitoring Report due September 1 of each calendar year.

b) Existing Decontamination Pad

During the second quarter of each year, the Existing Decontamination Pad will be taken out of service and inspected to ensure the integrity of the steel tank. Once the water and any sediment present is removed from the steel tank containment, the walls and bottom of the tank will be visually inspected for any areas of damage, cracks, or bubbling indicating corrosion that may have occurred since the last inspection. If any abnormalities are identified, defects or damage will be reported to Mill management and repairs will be made prior to resuming the use of the facility. All inspection findings and any repairs required shall be documented on the Annual Decontamination Pad Inspection form. A record of the repairs will be maintained as a part of the Annual Inspection records at the Mill site. The inspection findings, any repairs required and repairs completed shall be summarized in the 2nd Quarter DMT Monitoring Report due September 1 of each calendar year.

4.4. Annual Inspection of the Ammonium Sulfate Pad

During the second quarter of each year, the Ammonium Sulfate Pad will be inspected to ensure the integrity of the pad's exposed concrete surface. If any abnormalities are identified, i.e. cracks in the concrete with greater than 1/8 inch separation (width) or any significant deterioration or damage of the pad surface, repairs will be made within 7 calendar days of the inspection. All inspection findings and any repairs required shall be documented on the Annual Decontamination Pad/Ammonium Sulfate Pad Inspection form. The inspection findings, any repairs required and repairs completed shall be summarized in the 2nd Quarter DMT Monitoring Report due September 1 of each calendar year. The first inspection of the Ammonium Sulfate Pad will be conducted during the second quarter in the year following installation/completion of the pad.

5. OTHER INSPECTIONS

All daily, weekly, monthly, quarterly and annual inspections and evaluations should be performed as specified in this DMT Plan. See also the Tailings Management System procedure included in the EPM for additional inspection requirements. However, additional inspections should be conducted after any significant storm or significant natural or man-made event occurs.

6. REPORTING REQUIREMENTS

In addition to the forms included in this DMT Plan, the following additional reports shall also be prepared:

6.1. DMT Reports

Quarterly reports of DMT monitoring activities, which will include the following information, will be provided to the Executive Secretary on the schedule provided in Table 5 of the GWDP:

a) On a quarterly basis, all required information required by Part 1.F.2 of the GWDP relating to the inspections described in Section 3.1 (a) (Leak Detection Systems Monitoring), Section 3.1(b) (Slimes Drain Water Level Monitoring), 3.1 (c) (Tailings Wastewater Pool Elevation Monitoring), 3.1(d) (Tailings Wastewater Pool and Beach Area Elevation Monitoring), 3.2 (Weekly Inspection of Solution Levels in Roberts Pond) and 3.3 (Weekly Feedstock Storage Area Inspections);

b) On a quarterly basis, a summary of the weekly water level (depth) inspections for the quarter for the presence of fluid in all three vertical inspection portals for each of the three chambers in the concrete settling tank system for the New Decontamination Pad, which will include a table indicating the water level measurements in each portal during the quarter;

c) With respect to the annual inspection of the New Decontamination Pad described in Section 6.5(a), the inspection findings, any repairs required, and repairs completed shall be summarized in the 2nd Quarter report, due September 1 of each calendar year;

d) With respect to the annual inspection of the Existing Decontamination Pad described in Section 6.5(b), the inspection findings, any repairs required, and repairs completed shall be summarized in the 2nd Quarter report, due September 1 of each calendar year; and

e) An annual summary and graph for each calendar year of the depth to wastewater in the Cell 2 slimes drain must be included in the fourth quarter report. After the first year, and beginning in 2008, quarterly reports shall include both the current year monthly values and a graphic comparison to the previous year.

ATTACHMENT A

FORMS

Attachment A-1
DAILY INSPECTION DATA

Inspector:______________
Date;_________________
Accompanied by:________
Time:_________________

Any Item not "OK" must be documented. A check mark = OK, X = Action Required

VII. DAILY LEAK DETECTION CHECK					
	Cell 1	Cell 2	Cell 3	Cell 4A	Cell 4B
Leak Detection System Checked	________Checked _____Wet_____Dry Initial level_________ Final level__________ Gal. pumped__________	________Checked _____Wet_____Dry Initial level_________ Final level__________ Gal. pumped__________	________Checked _____Wet_____Dry Initial level_________ Final level__________ Gal. pumped__________	________Checked _____Wet_____Dry Initial level_________ Final level__________ Gal. pumped__________	________Checked _____Wet_____Dry Initial level_________ Final level__________ Gal. pumped__________

Record Observations of Potential Concern and Actions Required on the Daily Inspection Form included in the Tailings Management System (Appendix A-1)

ATTACHMENT A-2
DENISON MINES (USA) CORP.
WEEKLY TAILINGS INSPECTION

Date:________________ Inspectors: ____________________________

1. Pond and Beach elevations (msl, ft)

Cell 1: (a) Pond Solution Elevation ______________

(b) FML Bottom Election ______5597_____

(c) Depth of Water above FML ((a)-(b)) ______________

Cell 4A: (a)Pond Solution Elevation ______________

(b)FML Bottom Elevation ______5555.14__

(c)Depth of Water above FML ((a)-(b)) ______________

Cell 4B: (a)Pond Solution Elevation ______________

(b)FML Bottom Elevation ______5557.50

(c)Depth of Water above FML ((a)-(b)) ______________

(d)Elevation of Beach Area with Highest Elevation (monthly) ___________

Roberts Pond: (a)Pond Solution Elevation ______________

(b)FML Bottom Elevation ______5612.3___

(c)Depth of Water above FML ((a)-(b)) ______________

2. Leak Detection Systems

Observation:			
	New Decon Pad, Portal 1	New Decon Pad, Portal 2	New Decon Pad Portal 3
Is LDS (Portal) wet or dry?	_____wet____dry	_____wet____dry	_____wet____dry
If wet, Record liquid level:	_______Ft to Liquid	_______Ft to Liquid	_______Ft to Liquid
If wet, Report to RSO			

* Does Level exceed 12 inches above the lowest point on the bottom flexible membrane liner (solution elevation of 5556.14 amsl for Cell 4A and 5558.50 for Cell 4B)? _____ no _____ yes

If Cell 4A leak detection system level exceeds 12 inches above the lowest point on the bottom flexible membrane liner (elevation 5556.14 amsl), notify supervisor or Mill manager immediately.

3. New Decontamination Pad (concrete): ______________________________

____

ATTACHMENT A-3

ORE STORAGE/SAMPLE PLANT WEEKLY INSPECTION REPORT

Week of ________ through ________ Date of Inspection: ________________

Inspector: ________________________

Weather conditions for the week:

____
____
____

Blowing dust conditions for the week:

____
____
____
____

Corrective actions needed or taken for the week:

____
____
____
____

Are all bulk feedstock materials stored in the area indicated on the attached diagram:
yes: _______ no: ________
comments: ____
____

Are all alternate feedstock materials located outside the area indicated on the attached diagram maintained within water-tight containers:
yes: _______ no: _______
comments (e.g., conditions of containers): ____________________________________
____
____

Are all sumps and low lying areas free of standing solutions?
Yes: _______ No: _______
If "No", how was the situation corrected, supervisor contacted and correction date?

____
____

Is there free standing water or water running off of the feedstock stockpiles?
Yes: ______ No: _______
Comments: ____
____

Other comments:

ATTACHMENT A-4

ANNUAL DECONTAMINATION/AMMONIUM SULFATE PAD INSPECTION

Date of Inspection: ________________

Inspector: ________________________

New Decontamination Pad:

Are there any cracks on the wash pad surface greater than 1/8 inch of separation?

__Yes ___No

Is there any significant deterioration or damage of the pad surface? ____Yes ____No

Findings:

____

____

____

Repair Work Required:

____

____

____

Existing Decontamination Pad:

Were there any observed problems with the steel tank? ____Yes ____No

Findings:

____

____

____

Repair Work Required:

____

____

____

Ammonium Sulfate Pad:

Are there any cracks on the concrete pad surface greater than 1/8 inch of separation?

__Yes ___No

Is there any significant deterioration or damage of the pad surface? ____Yes ____No

Findings:

____

____

____

Repair Work Required:

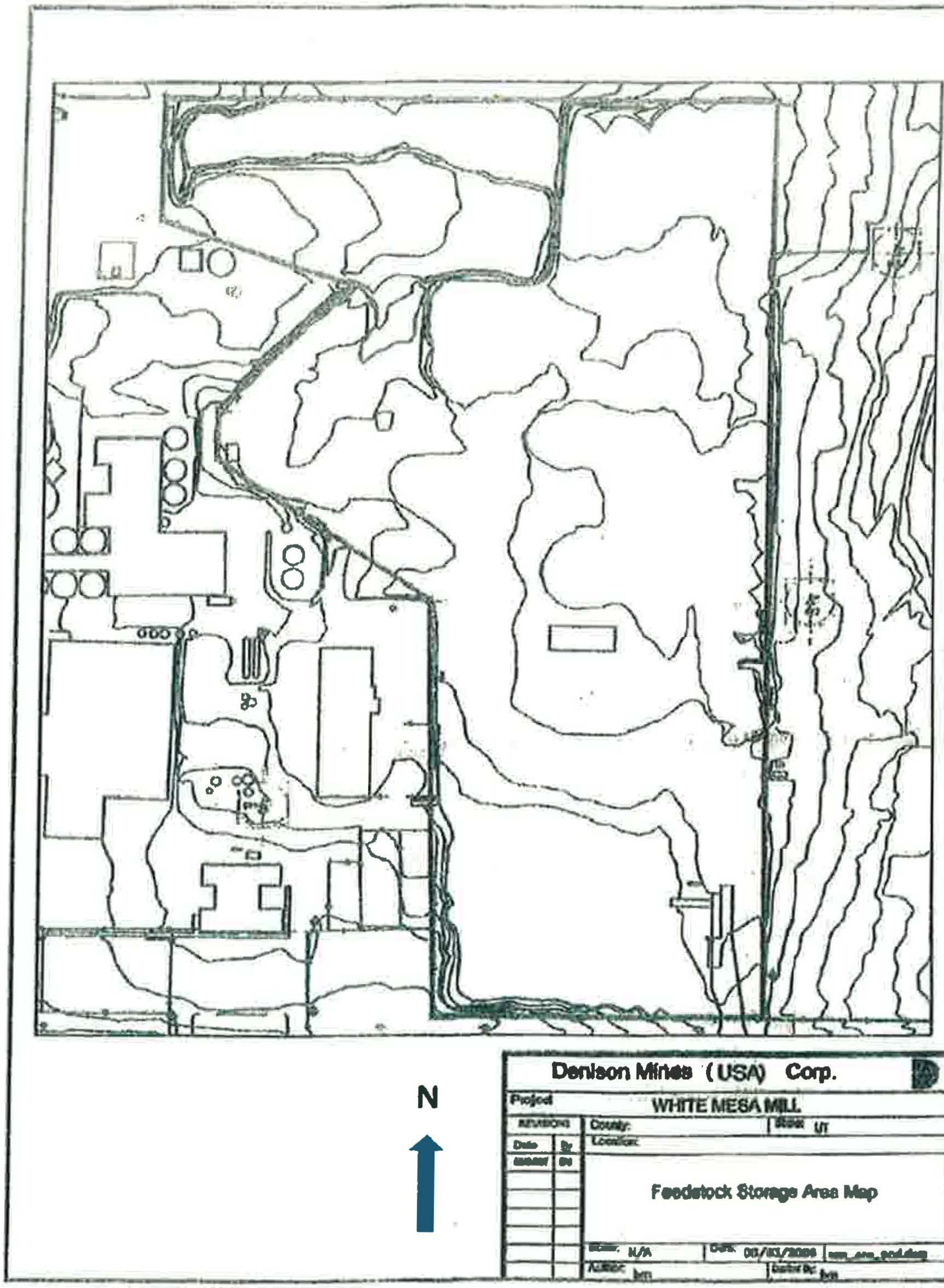
____

____

____

Note: For the annual inspection of the Existing, New Decontamination Pads and the Ammonium Sulfate Pad, the annual inspection findings, any repairs required, and repairs completed, along with a summary of the weekly inspections of the Decontamination Pads, shall be discussed in the 2nd Quarter report, due September 1 of each calendar year

ATTACHMENT B
FEEDSTOCK STORAGE AREA


N
Denison Mines (USA) Corp.
Project
WHITE MESA MILL
County:
State: UT
Location:
Date
By
Feedstock Storage Area Map
N/A
bm
bm

ATTACHMENT C

TABLES

Table 1A

Calculated Action leakage Rates
for Various head Conditions
Cell 4A White mesa Mill
Blanding, Utah

Head above Liner System (feet)	Calculated Action leakage Rate (gallons / acre / day)
5	222.04
10	314.01
15	384.58
20	444.08
25	496.50
30	543.88
35	587.46
37	604.01

Table 1B

Calculated Action leakage Rates
for Various head Conditions
Cell 4B White mesa Mill
Blanding, Utah

Head above Liner System (feet)	Calculated Action leakage Rate (gallons / acre / day)
5	211.40
10	317.00
15	369.90
20	422.70
25	475.60
30	528.40
35	570.00
37	581.20

Appendix I

White Mesa Mill Tailings Management System, 7/2012,
Revision: Denison 12.1

WHITE MESA MILL TAILINGS MANAGEMENT SYSTEM

Revision 2.1
July 2012

Prepared by:
Denison Mines (USA) Corp.
1050 17th Street, Suite 950
Denver, CO 80265

WHITE MESA MILL TAILINGS MANAGEMENT SYSTEM

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

This Tailings Management System procedure for the White Mesa Mill (the "Mill") provides procedures for monitoring the tailings cell systems as required under State of Utah Radioactive Materials License No. UT1900479 (the "RML"). The procedures to demonstrate compliance with Discharge Minimization Technology ("DMT") as specified throughout Parts I.D, I.E and I.F of the Mill's Groundwater Discharge Permit ("GWDP") Number 370004, are presented in the DMT Monitoring Plan ("DMT Plan"), which is a separate Plan.

This Tailings Management System procedure and the DMT Plan when implemented in concert are designed as a comprehensive systematic program for constant surveillance and documentation of the integrity of the tailings impoundment system including dike stability, liner integrity, and transport systems, as well as monitoring of water levels in Roberts Pond and feedstock storage areas at the Mill.

This Tailings Management System is published and maintained in the Mill's Environmental Protection Manual while the DMT Plan is issued as a stand-alone document.

1.1. Background

This Tailings Management System procedure was originally developed as Chapter 3.1 of the Mill's Environmental Protection Manual, under the Mill's NRC Source Material License, and constituted a comprehensive systematic program for constant surveillance and documentation of the integrity of the tailings impoundment system. Upon the State of Utah becoming an Agreement State for uranium mills in 2004, the Mill's Source Material License was replaced by the State of Utah RML and the State of Utah GWDP. The GWDP required that Denison develop the initial DMT Plan in response to GWDP requirements. In developing the initial DMT Plan, Denison combined the existing Tailings Management System procedure set out as Chapter 3.1 of the Mill's Environmental Protection Manual with a number of new DMT requirements from the GWDP to form the initial DMT Plan. The initial DMT Plan and subsequent revisions (through revision 11.5) maintained the requirements from the RML (i.e., Chapter 3.1 of the Mill's Environmental Protection Manual) and the DMT requirements of the GWDP in a single document.

However, after several years of implementing the DMT Plan, Denison concluded that it is preferable to separate the RML portions of the DMT Plan from the GWDP portions of the DMT Plan, into two separate documents. The DMT Plan continues to be a stand-alone plan that contains the DMT requirements from the GWDP except for the daily recording of the Cells 1, 2, and 3 LDS measurements as noted below. However, the portions of the DMT Plan that flow from the RML and not from the GWDP have been separated from the DMT Plan and have been returned to their original status as this Tailings Management System procedure, which comprises Chapter 3.1 of the Mill's Environmental Protection Manual. This allows the DMT Plan to be managed, inspected and enforced under the requirements of the GWDP and this Tailings Management System procedure to be managed, inspected and enforced under the requirements of the RML.

This division of the requirements was discussed with DRC on October 26, 2011. DRC agreed with the division of the requirements into two distinct documents as noted in their correspondence dated December 20, 2011. Pursuant to a written request from DRC, dated May 30, 2012, the RML requirements for the inspections of the Cells 1, 2, and 3 Leak Detection Systems ("LDSs") have been included in this DMT Plan. The inclusion of this RML requirement is to address the DRC request for uniformity in monitoring and reporting requirements for Cells 1, 2, and 3 and to address anticipated GWDP modifications regarding the LDS monitoring in Cells 1, 2, and 3.

2. DAILY TAILINGS INSPECTIONS

The following daily tailings inspections shall be performed:

2.1. Daily Comprehensive Tailings Inspection

On a daily basis, including weekends, all areas connected with the evaporation cell (Cell 1) and the four tailings cells (Cells 2, 3, 4A, and 4B) will be inspected. Observations will be made of the current condition of each cell, noting any corrective action that needs to be taken.

The Radiation Safety Officer (RSO) or his designee is responsible for performing the daily tailings inspections. The RSO may designate other individuals with training, as described in Section 2.4 below, to perform the daily tailings inspection.

Observations made as required by this Tailings Management System by the inspector will be recorded on the *Daily Inspection Data* form (a copy of which is included in Appendix A to this Tailings Management System procedure). The daily leak detection check for Cells 1, 2, and 3 will be recorded on the Daily Inspection Data form included as Attachment A-1 of the DMT Plan. The *Daily Inspection Data* form included with this Tailings Management System procedure contains an inspection checklist, which includes a tailings cells map, and spaces to record observations, especially those of immediate concern and those requiring corrective action. The inspector will place a check by all inspection items that appear to be operating properly. Those items where conditions of potential concern are observed should be marked with an "X". A note should accompany the "X" specifying what the concern is and what corrective measures will resolve the problem. This observation of concern should be noted on the form until the problem has been remedied. The date that corrective action was taken should be noted as well. Additional inspection items are required under the DMT Plan, which requires that the daily inspection form requirements in Attachment A to the DMT Plan also be completed.

Areas to be inspected include the following: Cell 1, 2, 3, 4A and 4B, the liners of Cells 1, 2, and 3, Dikes 4A-S, 4A-E, and 4B-S, wind movement of tailings, effectiveness of dust minimization methods, spray evaporation, Cell 2 spillway, Cell 3 spillway, Cell 4A spillway, Cell 3, Cell 4A and 4B liquid pools and associated liquid return equipment, and the Cell 1, 2, and 3 leak detection systems.

Operational features of the tailings area are checked for conditions of potential concern. The following items require visual inspection during the daily tailings inspection:

a) Tailings slurry and SX raffinate transport systems from the Mill to the active disposal cell(s), and pool return pipeline and pumps.

   Daily inspections of the tailings lines are required to be performed when the Mill is operating. The lines to be inspected include the: tailings slurry lines from CCD to the active tailings cell; SX raffinate lines that can discharge into Cell 1, Cell 4A or Cell 4B; the pond return line from the tailings area to the Mill; and, lines transporting pond solutions from one cell to another.

b) Cell 1.

c) Cell 2.

d) Cell 3.

e) Cell 4A.

f) Cell 4B.

g) Dike structures including dikes 4A-S, 4A-E, and 4B-S.

h) The Cell 2 spillway, Cell 3 spillway, Cell 4A spillway, Cell 3, Cell 4A and Cell 4B liquid pools and associated liquid return equipment.

i) Presence of wildlife and/or domesticated animals in the tailings area, including waterfowl and burrowing animal habitations.

j) Spray evaporation pumps and lines.

k) Wind movement of tailings and dust minimization.

   Wind movement of tailings will be evaluated for conditions which may require initiation of preventative dust minimization measures for cells containing tailings sand. During tailings inspection, general surface conditions will be evaluated for the following: 1) areas of tailings subject to blowing and/or wind movement, 2) liquid pool size, 3) areas not subject to blowing and/or wind movement, expressed as a percentage of the total cell area. The evaluations will be reviewed on a weekly basis, or more frequently if warranted, and will be used to direct dust minimization activities.

l) Observation of flow and operational status of the dust control/spray evaporation system(s).

m) Observations of any abnormal variations in tailings pond elevations in Cells 1, 3, 4A, and 4B.

n) Locations of slurry and SX discharge within the active cells. Slurry and SX discharge points need to be indicated on the tailings cells map included in the *Daily Inspection Data* form.

o) An estimate of flow for active tailings slurry and SX line(s).

p) An estimate of flow in the solution return line(s).

q) Daily measurements in the leak detection system sumps of the tailings Cells 1, 2, and 3 will be made when warranted by changes in the solution level of the respective leak detection system. Measurement of fluids in the Cells 4A and 4B leak detection system and recording of the daily measurements of the Cells 1, 2, and 3 leak detection systems sumps are discussed in the DMT Plan.

The trigger for further action when evaluating the measurements in the Cells 1, 2, and 3 leak detection systems is a gain of more than 12 inches in 24 hours. If observations of trigger levels of fluids are made, the Mill Manager should be notified immediately and the leak detection system pump started.

Whenever the leak detection system pump is operating and the flow meter and totalizer is recording on Cells 1, 2, and 3, a notation of the date and the time will be recorded on the *Daily Inspection Data* form. This data will be used in accordance with License Condition 11.3.B through 11.3.E of the Mill's Radioactive Materials License, to determine whether or not the flow rate into the leak detection system is in excess of the License Conditions.

If an LDS monitoring system becomes inoperable, alternate methods for LDS fluid measurements may be employed following notification to the Executive Secretary.

Items (a), (m), (n), and (o) are to be done only when the Mill is operating. When the Mill is down, these items cannot be performed.

2.2. Daily Operations Inspection

During Mill operation, the Shift Foreman, or other person with the training specified in Section 2.4 below, designated by the Radiation Safety Officer, will perform an inspection of the tailings line and tailings area at least once per shift, paying close attention for potential leaks and to the discharges from the pipelines. Observations by the Inspector will be recorded on the appropriate line on the *Operating Foreman's Daily Inspection* form.

2.3. Daily Operations Patrol

In addition to the inspections described in Sections 2.1 and 2.2 above, a Mill employee will patrol the tailings area at least twice per shift during Mill operations to ensure that there are no obvious safety or operational issues, such as leaking pipes or unusual wildlife activity or incidences.

No record of these patrols need be made, but the inspectors will notify the RSO and/or Mill management in the event that during their inspection they discover that an abnormal condition or tailings emergency has occurred.

2.4. Training

All individuals performing inspections described in Sections 2.1 and 2.2 above must have Tailings Management System training as set out in the Tailings Inspection Training procedure, which is attached as Appendix B. This training will include a training pack explaining the procedure for performing the inspection and addressing inspection items to be observed. In addition, each individual, after reviewing the training pack, will sign a certification form, indicating that training has been received relative to his/her duties as an inspector.

2.5. Tailings Emergencies

Inspectors will notify the RSO and/or Mill management immediately if, during their inspection, they discover that an abnormal condition exists or an event has occurred that could cause a tailings emergency. Until relieved by the Environmental or Technician or RSO, inspectors will have the authority to direct resources during tailings emergencies.

Any major catastrophic events or conditions pertaining to the tailings area should be reported immediately to the Mill Manager or the RSO, one of whom will notify Corporate Management. If dam failure occurs, notify your supervisor and the Mill Manager immediately. The Mill Manager will then notify Corporate Management, MSHA (303-231-5465), and the State of Utah, Division of Dam Safety (801-538-7200).

3. WEEKLY TAILINGS AND DMT INSPECTION

3.1. Weekly Tailings Inspections

Weekly tailings inspections are to be conducted by the Radiation Safety Department and include the following:

a) *Leak Detection Systems*

Each tailings cell's leak detection system shall be checked weekly (as well as daily) to determine whether it is wet or dry. If marked wet, the liquid levels need to be measured and reported. In Cell 1, 2, and Cell 3 the leak detection system is measured by use of a dual-probe system that senses the presence of solutions in the LDS system (comparable to the systems in Cells 4A and 4B) and indicates the presence of solution with a warning light. The water levels are measured to the nearest 0.10 inch. The water level data in Cells 1, 2, and 3 is recorded on the Daily Tailings Inspection Form included as Attachment A-1 of the DMT Plan.

If sufficient fluid is present in the leak detection system of Cells 1, 2, and 3, the fluid shall be pumped from the LDS, to the extent reasonably possible, and the volume of fluid recovered will be recorded. Any fluid pumped from an LDS shall be returned to a disposal cell.

For Cells 1, 2, and 3, if fluid is pumped from an LDS, the flow rate shall be calculated by dividing the recorded volume of fluid recovered by the elapsed time since fluid was last pumped or increases in the LDS fluid levels were recorded, whichever is the more recent. This calculation shall be documented as part of the weekly inspection.

For Cells 1 and 3, upon the initial pumping of fluid from an LDS, a fluid sample shall be collected and analyzed in accordance with paragraph 11.3 C. of the RML. The LDS requirements for Cells 4A and 4B are discussed in the DMT Plan.

b) *Slimes Drain Water Level Monitoring*

(i) Cell 3 is nearly full and will commence closure when filled. Cell 2 is partially reclaimed with the surface covered by platform fill. Each cell has a slimes drain system which aids in dewatering the slimes and sands placed in the cell;
(ii) Denison re-graded the interim fill on Cell 2 in order to reduce the potential for the accumulation of storm water on the surface of Cell 2. As a result of the re-grading of

the interim cover and the placement of an additional 62,000 cubic yards of fill material on Cell 2, the slimes drain access pipe was extended 6.97 feet. The extension pipe is 6.97 feet in length, and therefore the new measuring point is 37.97 feet from the bottom of the slimes drain. The measuring point on the extension pipe was surveyed by a Utah-Certified Land Surveyor. The measuring point elevation is 5618.73 fmsl. For the quarterly recovery test described in section vi below, this extension has no effect on the data measurement procedures.

Cell 2 has a pump placed inside of the slimes drain access pipe at the bottom of the slimes drain. As taken from actual measurements, the bottom of the slimes drain is 37.97 feet below a water level measuring point which is a notch on the side of the Cell 2 slimes drain access pipe. This means that the bottom of the slimes drain pool and the location of the pump are one foot above the lowest point of the FML in Cell 2, which, based on construction reports, is at a depth of 38.97 feet below the water level measuring point on the slimes drain access pipe for Cell 2;

(iii) The slimes drain pump in Cell 2 is activated and deactivated by a float mechanism and water level probe system. When the water level reaches the level of the float mechanism the pump is activated. Pumping then occurs until the water level reaches the lower probe which turns the pump off. The lower probe is located one foot above the bottom of the slimes drain standpipe, and the float valve is located at three feet above the bottom of the slimes drain standpipe. The average wastewater head in the Cell 2 slimes drain is therefore less than 3 feet and is below the phreatic surface of tailings Cell 2, about 27 feet below the water level measuring point on the slimes drain access pipe. As a result, there is a continuous flow of wastewater from Cell 2 into the slimes drain collection system. Mill management considers that the average allowable wastewater head in the Cell 2 slimes drain resulting from pumping in this manner is satisfactory and is as low as reasonably achievable.

(iv) The Cell 2 slimes drain pump is checked weekly to observe that it is operating and that the water level probe and float mechanism are working properly, which is noted on the Weekly Tailings Inspection Form. If at any time the pump is observed to be not working properly, it will be fixed or replaced within 15 days;

(v) Depth to wastewater in the Cell 2 slimes drain access pipe shall be monitored and recorded weekly to determine maximum and minimum fluid head before and after a pumping cycle, respectively. The extension of the Cell 2 slimes drain access pipe did not require any changes to the measurement procedure. The surveyed measuring point on the extended pipe is used as required. The elevation of the measuring point is 5618.73 fmsl. The head measurements are calculated in the same manner, using the same procedures as those used prior to the extension of the Cell 2 slimes drain access pipe; however, the total depth to the bottom of the pipe is now 37.97 feet as noted on the corrected form in Attachment A.

All head measurements must be made from the same measuring point (the notch at the north side of the access pipe 5618.73 fmsl), and made to the nearest 0.01 foot. The results will be recorded as depth-in-pipe measurements on the Weekly Tailings

Inspection Form. The quarterly recovery test specified in the GWDP is discussed in the DMT Plan.

It is important to note that the extension of the Cell 2 slimes access pipe has not changed the method of calculation of the pre- and post-pump head calculations, only the constant (Cell 2 slimes drain access pipe height) used in the calculation has changed. The head is calculated by subtracting the depth to liquid from 37.97 feet rather than from the previous measurement of 38 feet. The weekly Tailings Inspection form included in Attachment A has been changed to reflect the extension height;

(vi)No process liquids shall be allowed to be discharged into Cell 2;

(vii) Because Cell 3, Cell 4A, and 4B are currently active, no pumping from the Cell 3, Cell 4A, or 4B slimes drain is authorized. Prior to initiation of tailings dewatering operations for Cell 3, Cell 4A, or Cell 4B, a similar procedure will be developed for ensuring that average head elevations in the Cell 3, Cell 4A, and 4B slimes drains are kept as low as reasonably achievable, and that the Cell 3, Cell 4A, and Cell 4B slimes drains are inspected and the results reported in accordance with the requirements of the permit.

c) *Wind Movement of Tailings*

An evaluation of wind movement of tailings or dusting and control measures shall be taken if needed.

d) *Decontamination Pads*

(i) *New Decontamination Pad*

The New Decontamination Pad is located in the southeast corner of the ore pad, near the Mill's scale house. Weekly and annual inspection requirements for the New Decontamination Pad are discussed in the DMT Plan.

(ii) *Existing Decontamination Pad*

The Existing Decontamination Pad is located between the northwest corner of the Mill's maintenance shop and the ore feeding grizzly.

A. The Existing Decontamination Pad will be inspected on a weekly basis. Any soil and debris will be removed from the Existing Decontamination Pad immediately prior to inspection of the concrete wash pad for cracking Observations will be made of the current condition of the Existing Decontamination Pad, including the concrete integrity of the exposed surfaces of the pad. Any abnormalities relating to the pad and any damage or cracks on the concrete wash surface of the pad will be noted on the Weekly Tailings Inspection form. If there are any cracks greater than 1/8 inch separation (width), the RSO must be contacted. The RSO will have the responsibility to cease activities and have the cracks repaired.

e) Summary

In addition, the weekly inspection should summarize all activities concerning the tailings area for that particular week.

Results of the weekly tailings inspection are recorded on the *Weekly Tailings and DMT Inspection* form. An example of the *Weekly Tailings Inspection* form is provided in Appendix A of this Tailings Management System procedure. A similar form containing DMT inspection requirements is provided as Attachment A of the DMT Plan.

4. MONTHLY TAILINGS INSPECTION

Monthly tailings inspections will be performed by the RSO or his designee from the Radiation Safety Department and recorded on the *Monthly Inspection Data* form, an example of which is contained in Appendix A. Monthly inspections are to be performed no sooner than 14 days since the last monthly tailings inspection and can be conducted concurrently with the quarterly tailings inspection when applicable. The following items are to be inspected:

a) Tailings Slurry Pipeline

When the Mill is operating, the slurry pipeline will be visually inspected at key locations to determine pipe wear. The critical points of the pipe include bends, slope changes, valves, and junctions, which are critical to dike stability. These locations to be monitored will be determined by the Radiation Safety Officer or his designee from the Radiation Safety Department during the Mill run.

b) Diversion Ditches

Diversion ditches 1, 2 and 3 shall be monitored monthly for sloughing, erosion, undesirable vegetation, and obstruction of flow. Diversion berm 2 should be checked for stability and signs of distress.

c) Sedimentation Pond

Activities around the Mill and facilities area sedimentation pond shall be summarized for the month.

d) *Overspray Dust Minimization*

The inspection shall include an evaluation of overspray minimization, if applicable. This entails ensuring that the overspray system is functioning properly. In the event that overspray is carried more than 50 feet from the cell, the overspray system should be immediately shut-off.

e) *Remarks*

A section is included on the *Monthly Inspection Data* form for remarks in which recommendations can be made or observations of concern can be documented.

f) *Summary of Daily, Weekly and Quarterly Inspections*

The monthly inspection will also summarize the daily, weekly and, if applicable, quarterly tailings inspections for the specific month.

In addition, settlement monitors are typically surveyed monthly and the results reported on the *Monthly Inspection Data* form.

5. QUARTERLY TAILINGS INSPECTION

The quarterly tailings inspection is performed by the RSO or his designee from the Radiation Safety Department, having the training specified in Section 2.4 above, once per calendar quarter. A quarterly inspection should be performed no sooner than 45 days since the previous quarterly inspection was performed.

Each quarterly inspection shall include an Embankment Inspection, an Operations/Maintenance Review, a Construction Review and a Summary, as follows:

a) *Embankment Inspection*

The Embankment inspection involves a visual inspection of the crest, slope and toe of each dike for movement, seepage, severe erosion, subsidence, shrinkage cracks, and exposed liner.

b) *Operations/Maintenance Review*

The Operations/Maintenance Review consists of reviewing Operations and Maintenance activities pertaining to the tailings area on a quarterly basis.

c) *Construction Review*

The Construction Review consists of reviewing any construction changes or modifications made to the tailings area on a quarterly basis.

An estimate of the percentage of the tailings beach surface area and solution pool area is made, including estimates of solutions, cover areas, and tailings sands for Cells 3, 4A and 4B.

d) *Summary*

The summary will include all major activities or observations noted around the tailings area on a quarterly basis.

If any of these conditions are noted, the conditions and corrective measures taken should be documented in the *Quarterly Inspection Data* form. An example of the *Quarterly Inspection Data* form is provided in Appendix A.

6. ANNUAL EVALUATIONS

The following annual evaluations shall be performed:

6.1. Annual Technical Evaluation

An annual technical evaluation of the tailings management system is performed by a registered professional engineer (PE), who has experience and training in the area of geotechnical aspects of retention structures. The technical evaluation includes an on-site inspection of the tailings management system and a thorough review of all tailings records for the past year. The Technical Evaluation also includes a review and summary of the annual movement monitor survey (see Section 5.2 below).

All tailings cells and corresponding dikes will be inspected for signs of erosion, subsidence, shrinkage, and seepage. The drainage ditches will be inspected to evaluate surface water control structures.

In the event tailings capacity evaluations (as per SOP PBL-3) were performed for the receipt of alternate feed material during the year, the capacity evaluation forms and associated calculation sheets will be reviewed to ensure that the maximum tailings capacity estimate is accurate. The amount of tailings added to the system since the last evaluation will also be calculated to determine the estimated capacity at the time of the evaluation.

Tailings inspection records will consist of daily, weekly, monthly, and quarterly tailings inspections.

These inspection records will be evaluated to determine if any freeboard limits are being approached. Records will also be reviewed to summarize observations of potential concern. The evaluation also involves discussion with the Environmental and/or Radiation Technician and the RSO regarding activities around the tailings area for the past year. During the annual inspection, photographs of the tailings area will be taken. The training of individuals will be reviewed as a part of the Annual Technical Evaluation.

The registered engineer will obtain copies of selected tailings inspections, along with the monthly and quarterly summaries of observations of concern and the corrective actions taken. These copies will then be included in the Annual Technical Evaluation Report.

The Annual Technical Evaluation Report must be submitted by November 15th of every year to the Executive Secretary and to the Assistant State Engineer, Utah Division of Water Rights at the address specified below.

Assistant State Engineer
Utah Division of Water Rights
1594 West North Temple, Suite 220
P.O. Box 146300
Salt Lake City, Utah 84114-6300

6.2. Movement Monitors

A movement monitor survey is to be conducted by a licensed surveyor annually during the second quarter of each year. The movement monitor survey consists of surveying monitors along dikes 4A-E, 4A-S, and 4B-S to detect any possible settlement or movement of the dikes. The data generated from this survey is reviewed and incorporated into the *Annual Technical Evaluation Report* of the tailings management system.

6.3. Freeboard Limits

The freeboard limits set out in this Section are intended to capture the Local 6-hour Probable Maximum Precipitation (PMP) event, which was determined in the January 10, 1990 Drainage Report (the "Drainage Report") for the White Mesa site to be 10 inches.

The flood volume from the PMP event over the Cell 1 pond area plus the adjacent drainage areas, was calculated in the Drainage Report to be 103 acre feet of water, with a wave run up factor of 0.90 feet.

The flood volume from the PMP event over the Cell 2 and Cell 3 pond areas, plus the adjacent drainage areas was calculated in the Drainage Report to be 123.4 acre-feet of water.

The flood volume from the PMP event over the Cell 4A area was calculated in the Drainage Report to be 36 acre-feet of water (40 acres, plus the adjacent drainage area of 3.25 acres), times the PMP of 10 inches), with a wave run up factor of 0.77 feet.

The flood volume from the PMP event over the Cell 4B area has been calculated to be 38.1 acre-feet of water (40 acres, plus the adjacent drainage area of 5.72 acres), times the PMP of 10 inches, with a wave run up factor of 0.77 feet.

The total pool surface area in Cell 1 is 52.9 acres, in Cell 4A is 40 acres, and in Cell 4B is 40 acres. The top of the flexible membrane liner ("FML") for Cell 1 is 5,618.2 FMSL, for Cell 4A is 5,598.5 FMSL and for Cell 4B is 5600.4 FMSL.

Based on the foregoing, the freeboard limits for the Mill's tailings cells will be set as follows:

6.3.1. Cell 1

The freeboard limit for Cell 1 will be set at 5,615.4 FMSL. This will allow Cell 1 to capture all of the PMP volume associated with Cell 1. The total volume requirement for Cell 1 is 103 acre feet divided by 52.9 acres equals 1.95 feet, plus the wave run up factor of 0.90 feet equals 2.85 feet. The freeboard limit is then 5,618.2 FMSL minus 2.85 feet equals 5,615.4 FMSL. Under Radioactive Materials License condition 10.3, this freeboard limit is set and is not recalculated annually.

6.3.2. Cell 2

The freeboard limit for Cell 2 is inapplicable, since Cell 2 is filled with solids. All of the PMP volume associated with Cell 2 will be attributed to Cell 4A (and/or any future tailings cells).

6.3.3. Cell 3

The freeboard limit for Cell 3 is inapplicable, since Cell 3 is close to being filled with solids, and all of the PMP flood volume associated with Cell 3 will be attributed to Cell 4B (and/or any future tailings cells).

6.3.4. Cell 4A

The freeboard limit for Cell 4A is inapplicable since all of the PMP flood volume associated with Cell 4A will be attributed to Cell 4B. A spillway has been added to Cell 4A to allow overflow into Cell 4B.

6.3.5. Cell 4B

The freeboard limit for Cell 4B will be set assuming that the total PMP volume for Cells 2, 3, 4A, and 4B of 159.4 acre feet will be accommodated in Cell 4B. The procedure for calculating the freeboard limit for Cell 4B is as follows:

(a) When the Pool Surface Area is 40 Acres

When the pool surface area in Cell 4B is 40 acres (i.e., when there are no beaches), the freeboard limit for Cell 4B will be 5,594.6FMSL, which is 5.7 feet below the FML. This freeboard value was developed as follows:

PMP Flood Volume	38.1 acre-feet
Overflow from Cell 4A assuming no storage in Cell 3 or 4A	159.4 acre-feet
Sum of PMP volume and overflow volume	197.5 acre-feet
Depth to store PMP an overflow volume	
= 197.5 acre-feet/40 acres	4.9 feet
Wave run up factor	0.77 feet
Total required freeboard	5.7 feet

(all values in the above calculation have been rounded to the nearest one-tenth of a foot);

(b) When the Maximum Elevation of the Beach Area is 5,594 FMSL or Less

When the maximum elevation of the beach area in Cell 4B is 5594 FMSL or less, then the freeboard limit will be 5,594.6 FMSL, which is the same as in (a) above. This allows for the situation where there may be beaches, but these beaches are at a lower elevation than the freeboard limit established in (a) above, and there is therefore ample freeboard above the beaches to hold the maximum PMP volume. The maximum elevation of the beach area will be determined by monthly surveys performed by Mill personnel in accordance with the Mill's DMT Plan.

(c) When the Maximum Elevation of the Beach Area First Exceeds 5,594 FMSL

When the maximum elevation of the beach area in Cell 4B first exceeds 5,594 FMSL, then the freeboard limit for the remainder of the ensuing year (period t=0) (until the next November 1) will be calculated when that elevation is first exceeded (the "Initial Calculation Date"), as follows:

i) The total number of dry tons of tailings that have historically been deposited into Cell 4B prior to the Initial Calculation Date ("T_0") will be determined;
ii) The expected number of dry tons to be deposited into Cell 4B for the remainder of the ensuing year (up to the next November 1), based on production estimates for that period ("Δ_0*"), will be determined;
iii) Δ_0* will be grossed up by a safety factor of 150% to allow for a potential underestimation of the number of tons that will be deposited in the cell during the remainder of the ensuing year. This grossed up number can be referred to as the "modeled tonnage" for the period;
iv) The total design tailings solid storage capacity of Cell 4B will be accepted as 2,094,000 dry tons of tailings;
v) The available remaining space in Cell 4B for solids as at the Initial Calculation Date will be calculated as 2,094,000 dry tons minus T_0;
vi) The reduction in the pool surface area for the remainder of the ensuing year will be assumed to be directly proportional to the reduction in the available space in Cell 4B

for solids. That is, the reduced pool surface area for period t=0 ("RPA_0"), after the reduction, will be calculated to be:

$$(1 - (\Delta_0{}^* \times 1.5) / (2{,}094{,}000 - T_0)) \times 40 \text{ acres} = RPA_0$$

vii) The required freeboard for Cell 4B for the remainder of the period t=0 can be calculated in feet to be the wave run up factor for Cell 4B of 0.77 feet plus the quotient of 197.5 acre feet divided by the RPA_0. The freeboard limit for Cell 4B for the remainder of period t=0 would then be the elevation of the FML for Cell 4B of 5594.0 FMSL less this required freeboard amount, rounded to the nearest one-tenth of a foot; and

viii) The foregoing calculations will be performed at the Initial Calculation Date and the resulting freeboard limit will persist until the next November 1.

An example of this calculation is set out in Appendix F.

(d) Annual Freeboard Calculation When the Maximum Elevation of the Beach Area Exceeds 5,594 FMSL

On November 1 of each year (the "Annual Calculation Date"), the reduction in pool area for the ensuing year (referred to as period t) will be calculated by:

i) First, calculating the Adjusted Reduced Pool Area for the previous period ($ARPA_{t-1}$) to reflect actual tonnages deposited in Cell 4B for the previous period (period t-1). The RPA_{t-1} used for the previous period was based on expected tonnages for period t-1, grossed up by a safety factor. The $ARPA_{t-1}$ is merely the RPA that would have been used for period t-1 had the actual tonnages for year t-1 been known at the outset of period t-1 and had the RPA been calculated based on the actual tonnages for period t-1. This allows the freeboard calculations to be corrected each year to take into account actual tonnages deposited in the cell as of the date of the calculation. The $ARPA_{t-1}$ can be calculated using the following formula:

$$(1 - \Delta_{t-1} / (2{,}094{,}000 - T_{t-1})) \times ARPA_{t-2} = ARPA_{t-1}$$

Where:

- Δ_{t-1} is the actual number of dry tons of tailings solids deposited in Cell 4B during period t-1;
- T_{t-1} is the actual number of dry tons of tailings solids historically deposited in Cell 4B prior to the beginning of period t-1; and
- $ARPA_{t-2}$ is the Adjusted Reduced Pool Area for period t-2. If period t-2 started at the Initial Calculation Date, then $ARPA_{t-2}$ is 40 acres;

ii) Once the $ARPA_{t-1}$ for the previous period (period t-1) has been calculated, the RPA for the subject period (period t) can be calculated as follows:

$$(1 - (\Delta_t{}^* \times 1.5) / (2{,}094{,}000 - T_t)) \times ARPA_{t-1} = RPA_t$$

Where:

- Δ_t* is the expected number of dry tons of tailings to be deposited into Cell 4B for the ensuing year (period t), based on production estimates for the year (as can be seen from the foregoing formula, this expected number is grossed up by a safety factor of 1.5);
- T_t is the actual number of dry tons of tailings solids historically deposited in Cell 4B prior to the beginning of period t; and
- $ARPA_{t-1}$ is the Adjusted Reduced Pool Area for period t-1, which is the pool surface area for the previous period (period t-1) that should have applied during that period, had modeled tonnages (i.e., expected tonnages grossed up by the 150% safety factor) equaled actual tonnages for the period;

iii) The required freeboard for period t can be calculated in feet to be the wave run up factor for Cell 4B of 0.77 feet plus the quotient of 197.5 acre feet divided by the RPA_t. The freeboard limit for Cell 4B for period t would then be the elevation of the FML for Cell 4B of 5594.0 FMSL less this required freeboard amount, rounded to the nearest one-tenth of a foot; and

iv) The foregoing calculations will be performed at the Annual Calculation Date for period t and the resulting freeboard limit will persist until the next Annual Calculation Date for period t+1.

An example of this calculation is set out in Appendix D.

(e) When a Spillway is Added to Cell 4B that Allows Overflow Into a New Tailings Cell

When a spillway is added between Cell 4B and a new tailings cell then, if an approved freeboard limit calculation method for the new cell is set to cover the entire PMP event for Cells 2, 3, 4A, 4B and the new tailings cell, the freeboard limit for Cell 4B will be inapplicable, except for approved provisions to prevent storm water runoff from overtopping dikes.

7. OTHER INSPECTIONS

All daily, weekly, monthly, quarterly and annual inspections and evaluations should be performed as specified in Sections 2, 3, 4, 5 and 6 above. However, additional inspections should be conducted after any significant storm or significant natural or man-made event occurs.

8. REPORTING REQUIREMENTS

In addition to the *Daily inspection* forms included as Appendix A to this Tailings Management System procedure, the inspection forms included as Attachment A of the DMT Plan and the *Operating Foreman's Daily Inspection* form the following additional reports shall also be prepared:

8.1. Monthly Tailings Reports

Monthly tailings reports are prepared every month and summarize the previous month's activities around the tailings area. If not prepared by the RSO, the report shall be submitted to the RSO for review. The Mill Manager will review the report as well before the report is filed in the Mill Central File. The report will contain a summary of observations of concern noted on the daily and weekly tailings inspections. Corrective measures taken during the month will be documented along with the observations where appropriate. All daily and weekly tailings inspection forms will be attached to the report. A monthly inspection form will also be attached. Quarterly inspection forms will accompany the report when applicable. The report will be signed and dated by the preparer in addition to the Radiation Safety Officer and the Mill Manager.

APPENDIX A

FORMS

APPENDIX A-1
DAILY INSPECTION DATA

Inspector:_______________
Date;_______________
Accompanied by:________
Time:_______________

Any Item not "OK" must be documented. A check mark = OK, X = Action Required

I. TAILINGS SLURRY TRANSPORT SYSTEM						
Inspection Items	Conditions of Potential Concern	Cell 1	Cell 2	Cell 3	Cell 4A	Cell 4B
Slurry Pipeline	Leaks, Damage, Blockage, Sharp Bends					
Pipeline Joints	Leaks, Loose Connections					
Pipeline Supports	Damage, Loss of Support					
Valves	Leaks, Blocked, Closed					
Point(s) of Discharge	Improper Location or Orientation					

II. OPERATIONAL SYSTEMS and INTERIOR of CELLS															
Inspection Items	Conditions of Potential Concern	Cell 1				Cell 2	Cell 3	Cell 4A				Cell 4B			
		N	S	E	W			N	S	E	W	N	S	E	W
Interior Cell Walls															
Liner	Observable Liner Damage														
Water Level	Greater Than Operating Level, Large Change Since Previous Inspection														
Beach	Cracks, Severe Erosion, Subsidence														
Liner and Cover	Erosion of cover, Exposure of Liner														

III. DIKES AND EMBANKMENTS								
Inspection Items	Conditions of Potential Concern	Dike 1-I	Dike 1-1A	Dike 2	Dike 3	Dike 4A-S	Dike 4A-E	Dike 4B-S
Slopes	Sloughs or Sliding Cracks, Bulges, Subsidence, Severe Erosion, Moist Areas, Areas of Seepage Outbreak	No visible exterior slope or dike to inspect	No visible exterior slope or dike to inspect	No visible exterior slope or dike to inspect	No visible exterior slope or dike to inspect			
Crest	Cracks, Subsidence, Severe Erosion	No visible exterior slope or dike to inspect	No visible exterior slope or dike to inspect	No visible exterior slope or dike to inspect	No visible exterior slope or dike to inspect			

IV. FLOW RATES				
	Slurry Line(s)	Pond Return	S-X Tails	Spray System
GPM				

V. PHYSICAL INSPECTION OF SLURRY LINES(S)

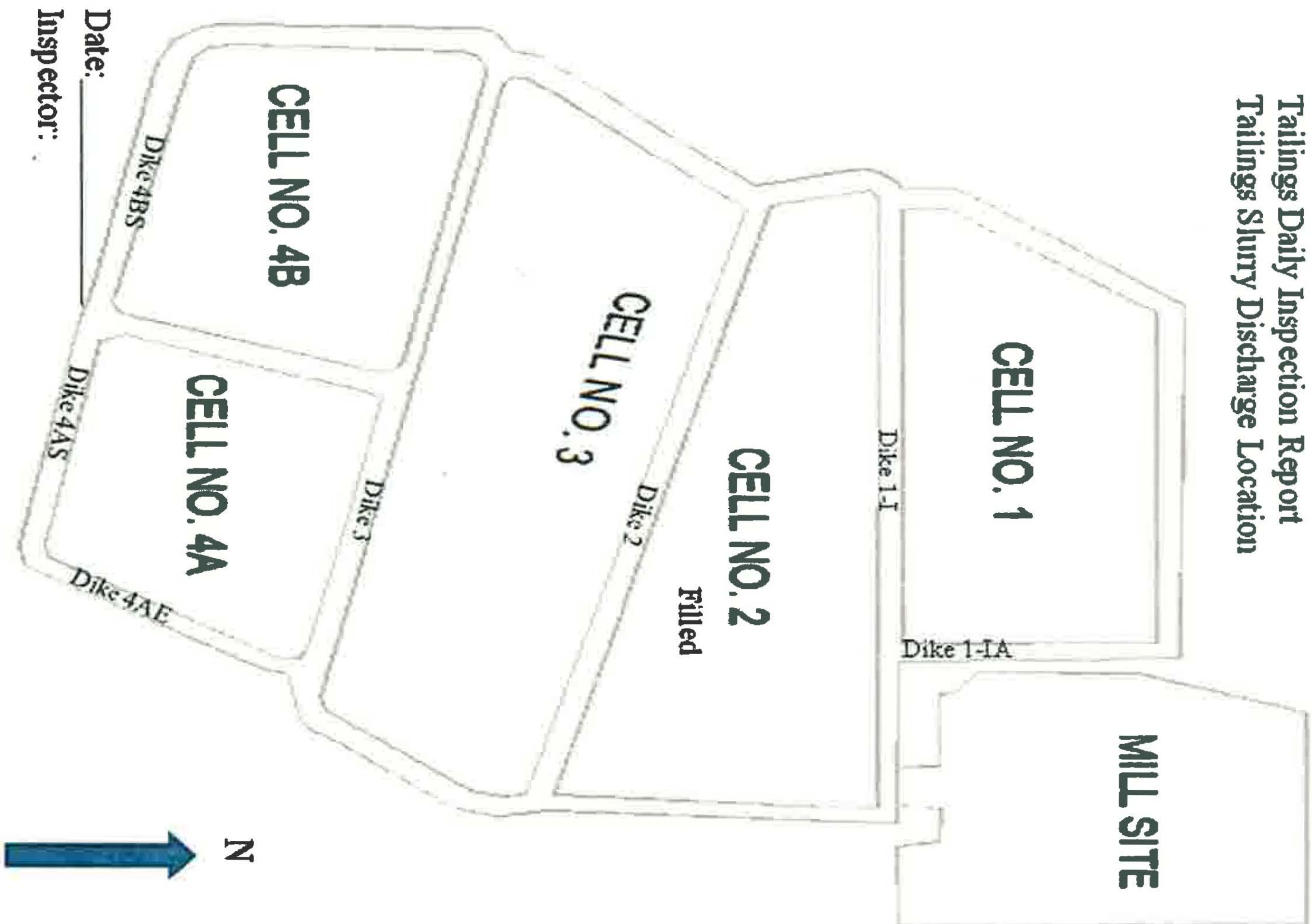
Walked to Discharge Point ______Yes ______No
Observed Entire Discharge Line ______Yes ______No

VI. DUST CONTROL				
	Cell 2	Cell 3	Cell 4A	Cell 4B
Dusting				
Wind Movement of Tailings				
Precipitation: ______ inches liquid				

General Meteorological conditions:________________				

VII. DAILY LEAK DETECTION CHECK
Daily Leak Detection Checks are recorded on the Daily Inspection Data form included as Attachment A-1 of the DMT Plan

VIII OBSERVATIONS OF POTENTIAL CONCERN	**Action Required**


Tailings Daily Inspection Report
Tailings Slurry Discharge Location
Date:
Inspector:
CELL NO. 4B
CELL NO. 4A
CELL NO. 3
CELL NO. 2
Filled
CELL NO. 1
MILL SITE
Dike 4BS
Dike 4AS
Dike 4AE
Dike 3
Dike 2
Dike 1-I
Dike 1-IA
N

APPENDIX A-2

DENISON MINES (USA) CORP.
WEEKLY TAILINGS INSPECTION

Date:_________________ Inspectors: ______________________________

1. Slimes Drain Liquid Levels Cell 2

Pump functioning properly ________

________________Depth to Liquid pre-pump
________________Depth to Liquid Post-pump

(all measurements are depth-in-pipe)

Pre-pump head is 37.97'-Depth to Liquid Pre-pump = _______
Post-pump head is 37.97' –Depth to Liquid Post-pump = ______

2. Existing Decontamination Pad (concrete)____

3. Tailings Area Inspection (Note dispersal of blowing tailings):
____
____

4. Control Methods Implemented:____
____
____

5. Remarks:____
____

6. Designated Disposal Area for Non-Tailings Mill Waste (awaiting DRC approval)
____

APPENDIX A-3
MONTHLY INSPECTION DATA

Inspector: ___________________________

Date: ______________________________

1. Slurry Pipeline: ____
____
____
____
____

2. Diversion Ditches and Diversion Berm:

Observation:

	Diversion Ditch 1	Diversion Ditch 2	Diversion Ditch 3	Diversion Berm 2
Diversion Ditches:				
Sloughing	_____yes_____no	_____yes_____no	_____yes_____no	
Erosion	_____yes_____no	_____yes_____no	_____yes_____no	
Undesirable Vegetation	_____yes_____no	_____yes_____no	_____yes_____no	
Obstruction of Flow	_____yes_____no	_____yes_____no	_____yes_____no	

Diversion Berm:
Stability Issues _____yes_____n
o
Signs of Distress _____yes_____n
o

Comments:____
____
____
____
____
____

3. Summary of Activities Around Sedimentation Pond: ______________________________
____
____
____
____
____

4. Overspray Dust Minimization:

Overspray system functioning properly: _______yes_______no

Overspray carried more than 50 feet from the cell: _____yes______no
If "yes", was system immediately shut off? _____yes_____no

Comments:____

5. Remarks: ____

6. Settlement Monitors

Cell 2 W1: ______	Cell 2W3-S: ______	Cell 3-1N: ______
Cell 2 W2: ______	Cell 2E1-N: ______	Cell 3-1C: ______
Cell 2 W3: ______	Cell 2E1-1S: ______	Cell 3-1S: ______
Cell 2 W4: ______	Cell 2E1-2S: ______	Cell 3-2N: ______
Cell 2W7-C: ______	Cell 2 East: ______	Cell 2W5-N: ______
Cell 2 W7N: ______	Cell 2 W7S: ______	Cell 2 W6N: ______
Cell 2 W6C: ______	Cell 2 W6S: ______	Cell 2 W4N: ______
Cell 4A-Toe: ______	Cell 2 W4S: ______	Cell 2 W5C: ______
Cell 3-2C: ______	Cell 3-2S: ______	Cell 2 W5S: ______
Cell 3-3S: ______	Cell 3-3C; ______	Cell3-3N: ______
Cell 3-4N: ______	Cell 3-6N: ______	Cell 3-7S: ______
Cell 3-7C: ______	Cell 3-7N: ______	Cell 3-8S: ______
Cell 3-8C: ______	Cell 3-8N: ______	

7. Movement Monitors: (Is there visible damage to any movement monitor or to adjacent surfaces)?

____

8. Summary of Daily, Weekly and Quarterly Inspections: ____

APPENDIX A-4

WHITE MESA MILL
TAILINGS MANAGEMENT SYSTEM

QUARTERLY INSPECTION DATA

Inspector: ______________________________

Date: __________________________________

1. **Embankment Inspection:** ____

____
____
____
____
____

2. **Operations/Maintenance Review:** _______________________________________

____
____
____
____
____

3. **Construction Activities:** ____

____
____
____
____

4. **Estimated Areas:**

	Cell 3	Cell 4A	Cell 4B
Estimated percent of beach surface area			
Estimated percent of solution pool area			
Estimated percent of cover area			

Comments: ___________________________

APPENDIX B

TAILINGS INSPECTOR TRAINING

This document provides the training necessary for qualifying management-designated individuals for conducting daily tailings inspections. Training information is presented by the Radiation Safety Officer or designee from the Environmental Department. Daily tailings inspections are conducted in accordance with the White Mesa Mill Tailings Management System and Discharge Minimization Technology (DMT) Monitoring Plan. The Radiation Safety Officer or designee from the Radiation Safety Department is responsible for performing monthly and quarterly tailings inspections. Tailings inspection forms will be included in the monthly tailings inspection reports, which summarize the conditions, activities, and areas of concern regarding the tailings areas.

Notifications:

The inspector is required to record whether all inspection items are normal (satisfactory, requiring no action) or that conditions of potential concern exist (requiring action). A "check" mark indicates no action required. If conditions of potential concern exist the inspector should mark an "X" in the area the condition pertains to, note the condition, and specify the corrective action to be taken. If an observable concern is made, it should be noted on the tailings report until the corrective action is taken and the concern is remedied. The dates of all corrective actions should be noted on the reports as well.

Any major catastrophic events or conditions pertaining to the tailings area should be reported immediately to the Mill Manager or the Radiation Safety Officer, one of whom will notify Corporate Management. If dam failure occurs, notify your supervisor and the Mill Manager immediately. The Mill Manager will then notify Corporate Management, MSHA (303-231-5465), and the State of Utah, Division of Dam Safety (801-538-7200).

Inspections:

All areas of the tailings disposal system are routinely patrolled and visible observations are to be noted on a daily tailings inspection form. Refer to Appendix A of this Tailings Management System procedure. A similar form containing DMT inspection requirements is provided as Attachment A of the DMT Plan. The inspection form contained in this Tailings Management System procedure is summarized as follows:

1. **Tailings Slurry Transport System:**

The slurry pipeline is to be inspected for leaks, damage, and sharp bends. The pipeline joints are to be monitored for leaks, and loose connections. The pipeline supports are to be inspected for damage and loss of support. Valves are also to be inspected particularly for leaks, blocked valves, and closed valves. Points of discharge need to be inspected for improper location and orientation.

2. Operational Systems:

Operating systems including water levels, beach liners, and covered areas are items to be inspected and noted on the daily inspection forms. Sudden changes in water levels previously observed or water levels exceeding the operating level of a pond are potential areas of concern and should be noted. Beach areas that are observed as having cracks, severe erosion or cavities are also items that require investigation and notation on daily forms. Exposed liner or absence of cover from erosion are potential items of concern for ponds and covered areas. These should also be noted on the daily inspection form.

Cells 1, 3, 4A and 4B solution levels are to be monitored closely for conditions nearing maximum operating level and for large changes in the water level since the last inspection. All pumping activities affecting the water level will be documented. In Cells 1 and 3, the PVC liner needs to be monitored closely for exposed liner, especially after storm events. It is important to cover exposed liner immediately as exposure to sunlight will cause degradation of the PVC liner. Small areas of exposed liner should be covered by hand. Large sections of exposed liner will require the use of heavy equipment

These conditions are considered serious and require immediate action. After these conditions have been noted to the Radiation Safety Officer, a work order will be written by the Radiation Safety Officer and turned into the Maintenance Department. All such repairs should be noted in the report and should contain the start and finish date of the repairs.

3. Dikes and Embankments:

Inspection items include the slopes and the crests of each dike. For slopes, areas of concern are sloughs or sliding cracks, bulges, subsidence, severe erosion, moist areas, and areas of seepage outbreak. For crests, areas of concern are cracks, subsidence, and severe erosion. When any of these conditions are noted, an "X" mark should be placed in the section marked for that dike.

In addition, the dikes, in particular dikes 4A-S, 4A-E, and 4B-S, , should be inspected closely for mice holes and more importantly for prairie dog holes, as the prairie dogs are likely to burrow in deep, possibly to the liner. If any of these conditions exist, the inspection report should be marked accordingly.

4. Flow Rates:

Presence of all flows in and out of the cells should be noted. Flow rates are to be estimated in gallons per minute (GPM). Rates need to be determined for slurry lines, pond return, SX-tails, and the spray system. During non-operational modes, the flow rate column should be marked as "0". The same holds true when the spray system is not utilized.

5. Physical Inspection of Slurry Line(s):

A physical inspection of all slurry lines has to be made every 4 hours during operation of the mill. If possible, the inspection should include observation of the entire discharge line and discharge spill point into the cell. If "fill to elevation" flags are in place, the tailings and build-up is to be monitored and controlled so as to not cover the flags.

6. Dust Control:

Dusting and wind movement of tailings should be noted for Cells 2, 3, 4A, and 4B. Other observations to be noted include a brief description of present weather conditions, and a record of any precipitation received. Any dusting or wind movement of tailings should be documented. In addition, an estimate should be made for wind speed at the time of the observed dusting or wind movement of tailings.

The Radiation Safety Department measures precipitation on a daily basis. Daily measurements should be made as near to 8:00 a.m. as possible every day. Weekend measurements will be taken by Environmental, Health and Safety personnel as close to 8:00 a.m. as possible. All snow or ice should be melted before a reading is taken.

7. Observations of Potential Concern:

All observations of concern during the inspection should be noted in this section. Corrective action should follow each area of concern noted. All work orders issued, contacts, or notifications made should be noted in this section as well. It is important to document all these items in order to assure that the tailings management system records are complete and accurate.

8. Map of Tailings Cells:

The last section of the inspection involves drawing, as accurately as possible, the following items where applicable.

1. Cover area
2. Beach/tailing sands area
3. Solution as it exists
4. Pump lines
5. Activities around tailings cell (i.e. hauling trash to the dump, liner repairs, etc.)
6. Slurry discharge when operating
7. Over spray system when operating

9. Safety Rules:

All safety rules applicable to the mill are applicable when in the tailings area. These rules meet the required MSHA regulations for the tailings area. Please pay particular notice to the following rules:

1. The posted speed limit on Cell 4A and 4B dike is 5 mph, and the posted speed limit for the tailings area (other than the Cell 4A and 4B dike) is 15 mph. These limits should not be exceeded.
2. No food or drink is permitted in the area.
3. All personnel entering the tailings area must have access to a two-way radio.
4. Horseplay is not permitted at any time.
5. Only those specifically authorized may operate motor vehicles in the restricted area.
6. When road conditions are muddy or slick, a four-wheel drive vehicle is required in the area.
7. Any work performed in which there is a danger of falling or slipping in the cell will require the use of a safety belt or harness with attended life line and an approved life jacket. A portable eyewash must be present on site as well.
8. Anytime the boat is used to perform any work; an approved life jacket and goggles must be worn at all times. There must also be an approved safety watch with a two-way hand-held radio on shore. A portable eyewash must be present on site as well.

10. Preservation of Wildlife:

Every effort should be made to prevent wildlife and domesticated animals from entering the tailings area. All wildlife observed should be reported on the Wildlife Report Worksheet during each shift. Waterfowl seen near the tailings cells should be discouraged from landing by the use of noisemakers.

11. Certification:

Following the review of this document and on-site instruction on the tailings system inspection program, designated individuals will be certified to perform daily tailings inspections. The Radiation Safety Officer authorizes certification. Refer to the Certification

Form, Appendix C. This form should be signed and dated only after a thorough review of the tailings information previously presented. The form will then be signed by the RSO and filed.

APPENDIX C

CERTIFICATION FORM

Date: ________________________

Name: ________________________

I have read the document titled "Tailings Management System, White Mesa Mill Tailings Inspector Training" and have received on-site instruction at the tailings system. This instruction included documentation of daily tailings inspections, analysis of potential problems (dike failures, unusual flows), notification procedures and safety.

____
Signature

I certify that the above-named person is qualified to perform the daily inspection of the tailings system at the White Mesa Mill.

____
Radiation Safety Personnel/ Tailings System Supervisor

APPENDIX D

Example of Freeboard Calculations For Cell 4B

Assumptions and Factors:

- Total PMP volume to be stored in Cell 4B – 159.4 acre feet
- Wave runup factor for Cell 4B – 0.77 feet
- Total capacity of Cell 4B – 2,094,000 dry tons
- Elevation of FML of Cell 4B – 5,600.35 FMSL
- Maximum pool surface area of Cell 4B – 40 acres
- Total tailings solids deposited into Cell 4B at time beach area first exceeds 5,594 FMSL – 1,000,000 dry tons*
- Date beach area first exceeds 5,594, FMSL – March 1, 2012*
- Expected and actual production is as set forth in the following table:

Time Period	Expected Tailings Solids Disposition into Cell4B Determined at the beginning of the period (dry tons)*	Expected Tailings Solids Disposition into Cell 4B at the beginning of the period, multiplied by 150% Safety Factor (dry tons)	Actual Tailings Solids Disposition into Cell 4B determined at end of the period (dry tons)*
March 1, 2012 to November 1, 2012	150,000	225,000	225,000
November 1, 2012 to November 1, 2013	300,000	450,000	275,000
November 1, 2013 to November 1, 2014	200,000	300,000	250,000

*These expected and actual tailings and production numbers and dates are fictional and have been assumed for illustrative purposes only.

Based on these assumptions and factors, the freeboard limits for Cell 4B would be calculated as follows:

1. <u>Prior to March 1, 2012</u>

Prior to March 1, 2012, the maximum elevation of the beach area in Cell 4B is less than or equal to 5,594 FMSL, therefore the freeboard limit is set at 5,594.6 FMSL.

2. March 1, 2012 to November 1, 2012

The pool surface area would be reduced to the following amount

$$(1 - 225{,}000 / (2{,}094{,}000 - 1{,}000{,}000)) \times 40 \text{ acres} = 31.77 \text{ acres}$$

Based on this reduced pool area, the amount of freeboard would be 197.5 acre feet divided by 31.77 acres equals 6.22 feet. When the wave run up factor for Cell 4B of 0.77 feet is added to this, the total freeboard required is 6.99 feet. This means that the freeboard limit for Cell 4B would be reduced from 5594.6 FMSL to 5592.2 FMSL (5594.6 FMSL minus 6.22 feet, rounded to the nearest one-tenth of a foot). This calculation would be performed at March 1, 2012, and this freeboard limit would persist until November 1, 2012.

3. November 1, 2012 to November 1, 2013

The pool surface area would be reduced to the following amount:

First, recalculate the pool surface area that should have applied during the previous period, had modeled tonnages (i.e., expected tonnages grossed up by the 150% safety factor) equaled actual tonnages for the period. Since the actual tonnage of 225,000 dry tons was the same as the modeled tonnage of 225,000 dry tons, the recalculated pool surface area is the same as the modeled pool surface area for the previous period, which is 31.77 acres.

Then, calculate the modeled pool surface area to be used for the period:

$$(1 - 450{,}000 / (2{,}094{,}000 - 1{,}000{,}000 - 225{,}000)) \times 31.77 \text{ acres} = 15.32 \text{ acres}$$

Based on this reduced pool area, the amount of freeboard would be 197.5 acre feet divided by 15.32 acres equals 12.89 feet. When the wave run up factor for Cell 4B of 0.77 feet is added to this, the total freeboard required is 13.66 feet. This means that the freeboard limit for Cell 4B would be reduced from 5592.2 FMSL to 5586.7 FMSL (5600.35 FMSL minus 13.66 feet, rounded to the nearest one-tenth of a foot). This calculation would be performed at November 1, 2012, and this freeboard limit would persist until November 1, 2013.

4. November 1, 2013 to November 1, 2014

The pool surface area would be reduced to the following amount:

First, recalculate the pool surface area that should have applied during the previous period, had modeled tonnages (i.e., expected tonnages grossed up by the 150% safety factor) equaled actual tonnages for the period. Since modeled tonnages exceeded actual tonnages, the pool area was reduced too much during the previous period, and must be adjusted. The recalculated pool area for the previous period is:

$$(1 - 275{,}000 / (2{,}094{,}000 - 1{,}000{,}000 - 225{,}000) \times 31.77 \text{ acres} = 21.72 \text{ acres.}$$

This recalculated pool surface area will be used as the starting point for the freeboard calculation to be performed at November 1, 2013.

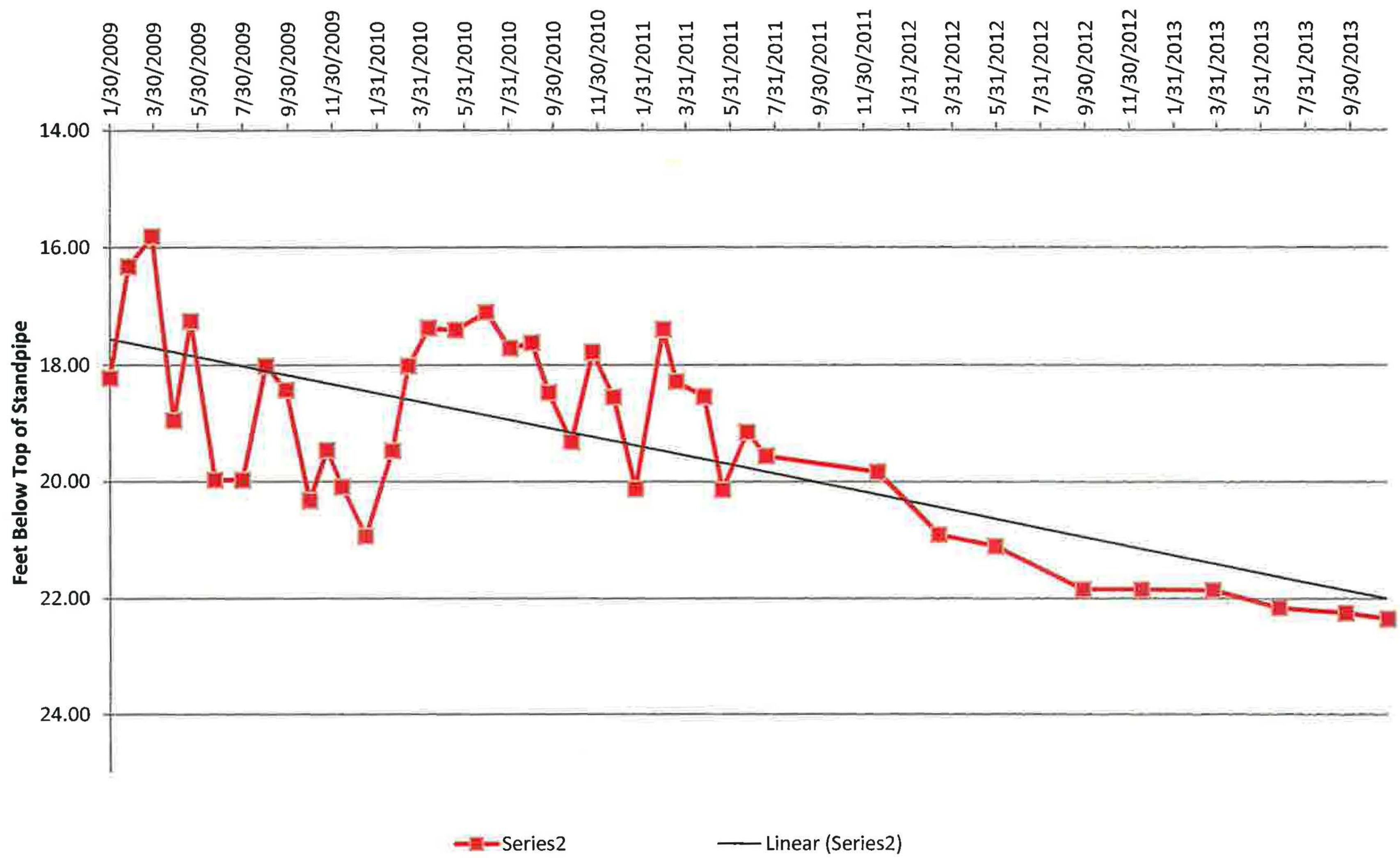
Then, calculate the modeled pool surface area to be used for the period:

(1 – 300,000 / (2,094,000 – 1,000,000 - 225,000 – 275,000)) x 21.72 acres = 10.75 acres

Based on this reduced pool area, the amount of freeboard would be 197.5 acre feet divided by 10.75 acres equals 18.37 feet. When the wave run up factor for Cell 4B of 0.77 feet is added to this, the total freeboard required is 19.14 feet. This means that the freeboard limit for Cell 4B would be reduced from 5586.7 FMSL to 5581.2 FMSL (5600.4 FMSL minus 18.4 feet, rounded to the nearest one-tenth of a foot). This calculation would be performed at November 1, 2013, and this freeboard limit would persist until November 1, 2014.

Appendix J

Cell 2 Slimes Drain Calculations and Figure 2009-2013



Cell 2 Slimes Drain - 2009, 2010, 2011, 2012, & 2013

Table J-1

Cell 2 Slimes Drain Recovery Head and SDRE Values from 2009-2013			
2013 Test Closing Date	**Elevation of Measurement Point (fmsl)****	**Reported Level (feet)**	**SDRE Values (Reported as fmsl)**
3/25/2013	5618.73	21.85	5596.88
6/24/2013	5618.73	22.16	5596.57
9/23/2013	5618.73	22.25	5596.48
11/19/2013	5618.73	22.35	5596.38
		ΣE_{2013}*	67158.93
		N_{2013}*	12
2012 Test Closing Date	**Elevation of Measurement Point (fmsl)**	**Reported Level (feet)**	**SDRE Values (Reported as fmsl)**
3/12/2012	5618.73	20.90	5597.83
5/29/2012	5618.73	21.10	5597.63
9/27/2012	5618.73	21.84	5596.89
12/17/2012	5618.73	21.84	5596.89
		ΣE_{2012}*	67167.72
		N_{2012}*	12
2011 Test Closing Date	**Elevation of Measurement Point (fmsl)**	**Reported Level (feet)**	**SDRE Values (Reported as fmsl)**
1/21/2011	5611.76	13.15	5598.61
2/28/2011	5611.76	10.42	5601.34
3/18/2011	5611.76	11.31	5600.45
4/25/2011	5611.76	11.57	5600.19
5/20/2011	5611.76	13.17	5598.59
6/23/2011	5611.76	12.18	5599.58
7/19/2011***	5611.76	12.59	5599.17
12/19/2011***	5611.76	12.86	5598.90
		ΣE_{2011}*	67192.97
		N_{2011}*	12

Table J-1

Cell 2 Slimes Drain Recovery Head and SDRE Values from 2009-2013			
2010 Test Closing Date	**Elevation of Measurement Point (fmsl)**	**Reported Level (feet)**	**SDRE Values (Reported as fmsl)**
1/15/2010	5611.76	13.96	5597.80
2/21/2010	5611.76	12.50	5599.26
3/15/2010	5611.76	11.04	5600.72
4/12/2010	5611.76	10.40	5601.36
5/19/2010	5611.76	10.43	5601.33
6/30/2010	5611.76	10.13	5601.63
8/2/2010	5611.76	10.74	5601.02
9/1/2010	5611.76	10.65	5601.11
9/24/2010	5611.76	11.50	5600.26
10/25/2010	5611.76	12.35	5599.41
11/23/2010	5611.76	10.81	5600.95
12/22/2010	5611.76	11.58	5600.18
		ΣE_{2010}*	67205.03
		N_{2010}*	12
2009 Test Closing Date	**Elevation of Measurement Point (fmsl)**	**Reported Level (feet)**	**SDRE Values (Reported as fmsl)**
1/30/2009	5614.83	11.25	5603.58
2/27/2009	5614.83	9.35	5605.48
3/28/2009	5614.83	8.84	5605.99
4/27/2009	5614.83	11.98	5602.85
5/20/2009	5614.83	10.28	5604.55
6/22/2009	5614.83	13.00	5601.83
7/30/2009	5614.83	13.00	5601.83
8/31/2009	5614.83	11.04	5603.79
9/28/2009	5614.83	11.46	5603.37
10/30/2009	5614.83	13.35	5601.48
11/23/2009	5614.83	12.49	5602.34
12/14/2009	5614.83	13.12	5601.71
		ΣE_{2009}*	67238.80
		N_{2009}	12

*Per the requirement of the GWDP Part I.D.3 when monthly and quarterly measurements are combined in the GWDP required equation, the quarterly values shall be multiplied by a coefficient of three (3).

** The standpipe elevation was extended and surveyed in 2011. This change in elevation has no effect on the resulting slimes drain elevation values listed in and used in the calculations.

***Per the Permit Part I.D.3.(b).2 effective July 11, 2011, the frequency of the Cell 2 slimes drain recovery tests was changed from monthly to quarterly.

Table J-2

Cell 2 Slimes Drain					
Annual SDRE Compliance Data					
Compliance for Calendar year*	SDRE Value (fmsl)	Compared to Calendar Year*	SDRE Value (fmsl)	Difference (ft.)	Date Submitted in the DMT Report**
2013	5597.77	2012	5599.05	1.28	1/29/2014
2012	5599.05	2011	5600.00	0.95	2/28/2013
2011	5600.00	2010	5600.25	0.25	2/27/2012
2010	5603.32	2009	5603.23	-0.09	2/25/2011
2009	5603.33	2008	5603.63	0.30	2/26/2010

Annual slimes drain compliance was not achieved in accordance with Part I.D.3 of the Permit in 2010. However, it was determined that noncompliance was due to the frequent downtime of the slimes drain pump in order to meet monthly sampling requirements. As such the frequency of the slimes drain recovery tests was changed from monthly to quarterly in accordnace with Part I.D.3.(b).2 of the Permit effective July 11, 2011. Annual compliance has been achieved each year since the monitoring frequency was changed.

* - Annual slimes drain compliance is determined by calculating the 3 year average as required by Part I.D.3 of the Permit, dated August 24, 2012.

** - The details of the annual slimes drain compliance calculations and the supporting data can be found the in 4th Quarter DMT reports which were submitted to UDEQ on the dates provided in the table above.

Appendix K

White Mesa Uranium Mill Ground Water Monitoring Quality Assurance Plan (QAP)
Date 6/6/2012 Revision 7.2

WHITE MESA URANIUM MILL

GROUNDWATER MONITORING
QUALITY ASSURANCE PLAN (QAP)

State of Utah
Groundwater Discharge permit No. UGW370004

Denison Mines (USA) Corp.
P.O. Box 809
Blanding, UT 84511

TABLE OF CONTENTS

ATTACHMENTS

APPENDICES

1.0 INTRODUCTION

This Groundwater Monitoring Quality Assurance Plan (the "QAP") details and describes all sampling equipment, field methods, laboratory methods, qualifications of environmental analytical laboratories, data validation, and sampling and other corrective actions necessary to comply with UAC R317-6-6.3(I) and (L) at the White Mesa Uranium Mill (the "Mill"), as required under paragraph I.H.6 of State of Utah Groundwater Discharge Permit No. UGW370004 (the "GWDP") for the Mill. This Procedure incorporates the applicable provisions of the United States Environmental Protection Agency ("EPA") *RCRA Groundwater Monitoring Technical Enforcement Guidance Document* (OSWER-9950.1, September, 1986), as updated by EPA's *RCRA Ground-Water Monitoring: Draft Technical Guidance* (November 1992).

Activities in an integrated program to generate quality data can be classified as management (i.e., quality assurance or "QA") and as functional (i.e., quality control or "QC"). The objective of this QAP is to ensure that monitoring data are generated at the Mill that meet the requirements for precision, accuracy, completeness, representativeness and comparability required for management purposes and to comply with the reporting requirements established by applicable permits and regulations.

2.0 ORGANIZATION AND RESPONSIBILITIES

2.1 Functional Groups

This QAP specifies roles for a QA Manager as well as representatives of three different functional groups: the data users; the data generators, and the data reviewers/approvers. The roles and responsibilities of these representatives are described below.

2.2 Overall Responsibility For the QA/QC Program

The overall responsibility for ensuring that the QA/QC measures are properly employed is the responsibility of the QA Manager. The QA Manager is typically not directly involved in the data generation (i.e., sampling or analysis) activities. The QA Manager is designated by Denison Mines (USA) Corp. ("DUSA") corporate management.

2.3 Data Requestors/Users

The generation of data that meets the objectives of this QAP is necessary for management to make informed decisions relating to the operation of the Mill facility, and to comply with the reporting requirements set out in the GWDP and other permits and applicable regulations. Accordingly, the data requesters/users (the "Data Users") are therefore DUSA's corporate management and regulatory authorities through the implementation of such permits and regulations. The data quality objectives ("DQOs") required for any groundwater sampling event, such as acceptable minimum detection limits, are specified in this QAP.

2.4 Data Generators

The individuals who carry out the sampling and analysis activities at the request of the Data Users are the data generators. For Mill activities, this involves sample collection, record keeping and QA/QC activities conducted by one or more sampling and quality control/data monitors (each a "Sampling and QC Monitor"). The Sampling and QC Monitors are qualified Mill personnel as designated by the QA Manager. The Sampling and QC Monitors perform all field sampling activities, collect all field QC samples and perform all data recording and chain of custody activities in accordance with this QAP. Data generation at the contract analytical laboratory (the "Analytical Laboratory") utilized by the Mill to analyze the environmental samples is performed by or under an employee or agent (the "Analysis Monitor") of the Analytical Laboratory, in accordance with specific requirements of the Analytical Laboratory's own QA/QC program.

The responsibilities of the data generators are as follows:

2.4.1 Sampling and QC Monitors

The Sampling and QC Monitors are responsible for field activities. These include:

a) Ensuring that samples are collected, preserved, and transported as specified in this QAP;

b) Checking that all sample documentation (labels, field data worksheets, chain-of-custody records,) is correct and transmitting that information, along with the samples, to the Analytical Laboratory in accordance with this QAP;

c) Maintaining records of all samples, tracking those samples through subsequent processing and analysis, and, ultimately, where applicable, appropriately disposing of those samples at the conclusion of the program;

d) Preparing quality control samples for field sample collection during the sampling event;

e) Preparing QC and sample data for review by the QA Manager; and

f) Preparing QC and sample data for reporting and entry into a computerized database, where appropriate.

2.4.2 Analysis Monitor

The Analysis Monitor is responsible for QA/QC activities at the Analytical Laboratory. These include:

a) Training and qualifying personnel in specified Analytical Laboratory QC and analytical procedures, prior to receiving samples;

b) Receiving samples from the field and verifying that incoming samples correspond to the packing list or chain-of-custody sheet; and

c) Verifying that Analytical Laboratory QC and analytical procedures are being followed as specified in this QAP, by the Analytical Laboratory's QA/QC program, and in accordance with the requirements for maintaining National Environmental Laboratory Accreditation Program ("NELAP") certification.

2.4.3 Data Reviewers/Approvers

The QA Manager has broad authority to approve or disapprove project plans, specific analyses and final reports. In general, the QA Manager is responsible for reviewing and advising on all aspects of QA/QC, including:

a) Ensuring that the data produced by the data generators meet the specifications set out in this QAP;

b) Making on-site evaluations and submitting audit samples to assist in reviewing QA/QC procedures;

c) Determining (with the Sampling and QC Monitor and Analysis Monitor) appropriate sampling equipment and sample containers, in accordance with this QAP, to minimize contamination; and

d) Supervising all QA/QC measures to assure proper adherence to this QAP and determining corrective measures to be taken when deviations from this QAP occur.

The QA Manager may delegate certain of these responsibilities to one or more Sampling and QC Monitors or to other qualified Mill personnel.

2.5 Responsibilities Of Analytical Laboratory

Unless otherwise specified by DUSA corporate management, all environmental analysis of groundwater sampling required by the GWDP or by other applicable permits, will be performed by a contract Analytical Laboratory.

The Analytical Laboratory is responsible for providing sample analyses for groundwater monitoring and for reviewing all analytical data to assure that data are valid and of sufficient quality. The Analytical Laboratory is also responsible for data validation in accordance with the requirements for maintaining NELAP certification.

In addition, to the extent not otherwise required to maintain NELAP certification, the Analytical Laboratory must adhere to U. S. EPA Guideline SW-846 and, to the extent consistent with NELAP and EPA practices, the applicable portions of NRC Regulatory Guide 4.14.

The Analytical Laboratory will be chosen by DUSA and must satisfy the following criteria: (1) experience in analyzing environmental samples with detail for precision and accuracy, (2) experience with similar matrix analyses, (3) operation of a stringent internal quality assurance program meeting NELAP certification requirements and that satisfies the criteria set out in Section 8 below, (4) ability to satisfy radionuclide requirements as stipulated in the applicable portions of NRC Regulatory Guide 4.14, and (5) certified by the State of Utah for and capable of performing the analytical methods set out in Table 1. The analytical procedures used by the Analytical Laboratory will be in accordance with Utah Administrative Code R317-6-6.3L.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT OF DATA

The objective of this QAP is to ensure that monitoring data are generated at the Mill that meet the requirements for precision, accuracy, representativeness, completeness, and comparability required for management purposes and to comply with the reporting requirements established by applicable permits and regulations (the Field and Analytical QC samples described in Sections 4.3 and 8.1 below are designed to ensure that these criteria are satisfied). Data subject to QA/QC measures are deemed more reliable than data without any QA/QC measures.

3.1 Precision

Precision is defined as the measure of variability that exists between individual sample measurements of the same property under identical conditions. Precision is measured through the analysis of samples containing identical concentrations of the parameters of concern. For duplicate measurements, precision is expressed as the relative percent difference ("RPD") of a data pair and will be calculated by the following equation:

$$RPD = [(A-B)/\{(A+B)/2\}] \times 100$$

Where A (original) and B (duplicate) are the reported concentration for field duplicate samples analyses (or, in the case of analyses performed by the Analytical Laboratory, the percent recoveries for matrix spike and matrix spike duplicate samples) (EPA SW-846, Chapter 1, Section 5.0, page 27 - 28).

3.2 Accuracy

Accuracy is defined as a measure of bias in a system or as the degree of agreement between a measured value and a known value. The accuracy of laboratory analyses is evaluated based on analyzing standards of known concentration both before and during analysis. Accuracy will be evaluated by the following equation:

$$\% \text{ Recovery} = (|A-B|/C) \times 100$$

Where:

A = the concentration of analyte in a sample
B = the concentration of analyte in an unspiked sample
C = the concentration of spike added

3.3 Representativeness

Representativeness is defined as the degree to which a set of data accurately represents the characteristics of a population, parameter, conditions at a sampling point, or an environmental condition. Representativeness is controlled by performing all sampling in compliance with this QAP.

3.4 Completeness

Completeness refers to the amount of valid data obtained from a measurement system in reference to the amount that could be obtained under ideal conditions. Laboratory completeness is a measure of the number of samples submitted for analysis compared to the number of analyses found acceptable after review of the analytical data. Completeness will be calculated by the following equation:

Completeness = (Number of valid data points/total number of measurements) x 100

Where the number of valid data points is the total number of valid analytical measurements based on the precision, accuracy, and holding time evaluation. Completeness is determined at the conclusion of the data validation.
Executive Secretary approval will be required for any completeness less than 100 percent.

3.5 Comparability

Comparability refers to the confidence with which one set of data can be compared to another measuring the same property. Data are comparable if sampling conditions, collection techniques, measurement procedures, methods, and reporting units are consistent for all samples within a sample set.

4.0 FIELD SAMPLING QUALITY ASSURANCE METHODOLOGY

4.1 Controlling Well Contamination

Well contamination from external surface factors, is controlled by installation of a cap over the surface casing and cementing the surface section of the drill hole. Wells have surface covers of mild steel with a lockable cap cover. Radiation Safety staff has access to the keys locking the wells.

4.2 Controlling Depth to Groundwater Measurements

Monitoring of depth to groundwater is controlled by comparing historical field data to actual measurement depth. This serves as a check of the field measurements.

4.3 Water Quality QC Samples

Quality assurance for groundwater monitoring consists of the following QC samples:

4.3.1 VOC Trip Blanks

Trip blanks will be used to assess contamination introduced into the sample containers by volatile organic compounds ("VOCs") through diffusion during sample transport and storage. At a minimum (at least) one trip blank will be in each shipping container containing samples to be analyzed for VOCs. Trip blanks will be prepared by the Analytical Laboratory, transported to the sampling site, and then returned to the Analytical Laboratory for analysis along with the samples collected during the sampling event. The trip blank will be unopened throughout the transportation and storage processes and will accompany the technician while sampling in the field.

4.3.2 Equipment Rinsate Samples

Where portable (non-dedicated) sampling equipment is used, a rinsate sample will be collected at a frequency of one rinsate sample per 20 field samples. Rinsate blanks will be collected after decontamination and prior to subsequent use. Rinsate blank samples for a non-dedicated pump are prepared by pumping de-ionized water into the sample containers. Rinsate blank samples for a non-disposable or non-dedicated bailerare prepared by pouring de-ionized water over and through the bailer and into the sample containers. Equipment rinsate blanks will be analyzed only for the contaminants required during the monitoring event in which they are collected.

Equipment rinsate blank sampling procedures are described in Attachments 2-2 and 2-5.

4.3.3 Field Duplicates

Field duplicate samples are collected at a frequency of one duplicate per 20 field samples. Field duplicates will be submitted to the Analytical Laboratory and analyzed for the same constituents as the parent sample.

Field duplicate sampling procedures are described in Attachment 2-5.

4.3.4 Definition of "Batch"

For the purposes of this QAP, a Batch is defined as 20 or fewer samples.

5.0 CALIBRATION

A fundamental requirement for collection of valid data is the proper calibration of all sample collection and analytical instruments. Sampling equipment shall be calibrated in accordance with manufacturers' recommendations, and Analytical Laboratory equipment shall be calibrated in accordance with Analytical Laboratory procedures.

5.1 Depth to Groundwater Measurements

Equipment used in depth to groundwater measurements will be checked prior to each use as noted in Attachment 2 to ensure that the Water Sounding Device is functional.

5.2 Water Quality

The Field Parameter Meter will be calibrated prior to each sampling event and at the beginning of each day of the sampling event according to manufacturer's specifications (for example, by using two known pH solutions and one specific conductance standard.) Temperature will be checked comparatively by using a thermometer. Calibration results will be recorded on the Field Data Worksheet.

6.0 GROUNDWATER SAMPLING AND MEASUREMENT OF FIELD PARAMETERS

6.1 Groundwater Head Monitoring

Groundwater head measurements ("depth to water") will be completed as described in Attachment 2 using the equipment specified in Attachment 2.

6.1.1 Location and Frequency of Groundwater Head Monitoring

Depth to groundwater shall be measured quarterly in the following wells and piezometers:

a) All Point of Compliance wells listed in the GWDP Parts I.E.1 (b) and (c) and I.E.2;

b) Monitoring well MW-34;

c) All piezometers (P-1, P-2, P-3, P-4, P-5 and the Dry Ridge piezometers);

d) All contaminant investigation wells required by the Executive Secretary as part of a contaminant investigation or groundwater corrective action (chloroform and nitrate wells).

6.1.2 Groundwater Head Monitoring Frequency

Depth to groundwater is measured and recorded in any well that is being sampled for groundwater quality prior to sampling. In addition, a depth to groundwater measurement campaign will be completed each quarter. The data from the quarterly campaign will be used for modeling purposes and will be completed within a 5 day period. The data from the quarterly campaign will be recorded on a data sheet. An example of a Quarterly Depth to Water data sheet is included Attachment 1. Data from the quarterly depth to water campaign will be recorded by hand on hardcopy forms in the field, but may be entered into an electronic data management system (spreadsheet or database). The data from the quarterly depth to water measurements will be included in the quarterly groundwater report.

The depth to groundwater measured immediately prior to purging/sampling will be recorded on data sheet for each well. An example of a Field Data Work Sheet for Groundwater is included in Attachment 1.

The data sheets included herein are examples and may be changed to accommodate additional data collection. If a change is made to a data sheet to accommodate additional information, a copy will be provided to the Executive Secretary. Changes to field forms will not eliminate any data collection activity without written approval of the Executive Secretary.

6.2 Ground Water Compliance Monitoring

6.2.1 Location and Frequency of Groundwater Compliance Monitoring

Groundwater quality shall be measured in the following wells at the following frequencies:

a) Semi-annually in the following Point of Compliance wells: MW-1, MW-2, MW-3, MW-3A, MW-5, MW-12, MW-15, MW-17, MW-18, MW-19, MW-23, MW-24, MW-27, MW-28, MW-29, and MW-32;

b) Semi-annually in the following General Monitoring Wells: MW-20 and MW-22;

c) Quarterly in the following Point of Compliance wells: MW-11, MW-14, MW-25, MW-26, MW-30, MW-31, MW-35, MW-36 and MW-37; and

d) Quarterly in the Chloroform Investigation and Nitrate Corrective Action wells.

In addition, quarterly or monthly sampling may be required for certain parameters in certain wells based on the requirements specified in Parts I.G.1 or I.G.2 of the GWDP. Sampling personnel should coordinate with the QA Manager prior to conducting any monitoring well sampling to determine if any parameters in any wells are subject to accelerated monitoring.

6.2.2 Quarterly and Semi-Annual Sampling Required Under Parts I.E.1.b) or I.E.1.c) of the GWDP

All quarterly and semi-annual samples collected under Parts I.E.1.b) or I.E.1.c) of the GWDP shall be analyzed for the following parameters:

a) Field parameters – depth to groundwater, pH, temperature, specific conductance, redox potential (Eh) and turbidity; and

b) Laboratory Parameters:

(i) All parameters specified in Table 2 of the GWDP; and

(ii) General inorganics – chloride, sulfate, carbonate, bicarbonate, sodium potassium, magnesium, calcium, and total anions and cations.

6.2.3 Quarterly or Monthly Sampling Required Under Paragraphs I.G.1 or I.G.2 of the GWDP

Any quarterly or monthly accelerated sampling required under paragraphs I.G.1. or I.G.2. of the GWDP shall be analyzed for the specific parameters as required by previous sampling results as determined by the QA Manager.

6.2.4 Sampling Equipment for Groundwater Compliance Monitoring

All equipment used for purging and sampling of groundwater which enters the well or may otherwise contact sampled groundwater, shall be made of inert materials.

Purging and sampling equipment is described in Attachment 2-3 of this QAP.

Field parameters are measured by using a flow cell system that enables the measurements to be taken on a real-time basis without exposing the water stream to the atmosphere;

6.2.5 Decontamination Procedure

Portable (non-dedicated) sampling equipment will be decontaminated prior to each sampling event, at the beginning of each day during the sampling event, and between each sampling location (well). Non-dedicated sampling equipment will be decontaminated using the procedure described in Attachment 2-2.

6.2.6 Pre-Purging/ Sampling Activities

Pre-purging and sampling activities are described in Attachment 2-3. The purging and sampling techniques used at each well will be a function of the well's historic recovery rates, the equipment used for purging, and the analytical suite to be completed.

6.2.7 Well Purging/Measurement of Field Parameters

The purging techniques described in Attachment 2-3 will be used for all groundwater sampling conducted at the Mill unless otherwise stated in the program-specific QAPs for the chloroform and nitrate investigations. The program-specific QAPs for the chloroform and nitrate investigations are included as Appendix A and Appendix B respectively.

Purging wells prior to sampling removes the stagnant water column present in the well casing and assures that representative samples of the formation water are collected. Purging will be completed as described in Attachment 2-3.

There are three purging strategies that will be used to remove stagnant water from the well casing during groundwater sampling at the Mill. The three strategies are as follows:

1. Purging three well casing volumes with a single measurement of field parameters
2. Purging two casing volumes with stable field parameters (within 10% RPD)
3. Purging a well to dryness and stability of a limited list of field parameters after recovery

6.2.8 Samples to be taken and order of taking samples

For each quarterly or semi-annual sampling event, samples will be collected for the analyte specified in Table 2 of the GWDP. The following is a list of the sample containers that will be collected to provide sample aliquots to the Analytical Laboratory for the completion of the analyses specified in Table 2 of the GWDP . The Analytical Laboratory will provide the sampling containers and may request that certain analytes be combined into a single container due to like sampling requirements (filtering) and/or like preservation. The container requirements will be determined by the Analytical Laboratory and specified with the bottles supplied to the Field Personnel. Bottle requirements may change if the Analytical Laboratory is changed or if advances in analytical techniques allow for reduced samples volumes. The following list is a general guideline.

a) VOCs, 3 sample containers, 40 ml each;

b) Nutrients (ammonia, nitrate and nitrite), 1 sample container, 100 ml;

c) All other non-radiologics (fluoride, general inorganics, TDS, total cations and anions), 1 sample container, 250 ml,; and

d) Gross alpha and heavy metals, 1 sample container, 1,000 ml, filtered.

The sample collection containers and sample volumes for chloroform and nitrate program sampling are specified in Appendices A and B to this document.

Accelerated samples will be analyzed for a limited list of analytes as determined by previous sampling results. Only the containers for the specific list of analytes will be collected for accelerated monitoring samples.

7.0 SAMPLE DOCUMENTATION TRACKING AND RECORD KEEPING

7.1 Field Data Worksheets

Documentation of observations and data from sampling provide important information about the sampling process and provide a permanent record for sampling activities. All observations and field sampling data will be recorded in waterproof ink on the Field Data Worksheets, which will be maintained on file at the Mill.

The Field Data Worksheets will contain the following information:

- Name of the site/facility
- description of sampling event
- location of sample (well name)
- sampler's name(s) and initials(s)
- date(s) and time(s) of well purging and sample collection

- type of well purging equipment used (pump or bailer)
- previous well sampled during the sampling event
- well depth
- depth to groundwater before purging and sampling
- field measurements (pH, specific conductance, water temperature, redox potential, turbidity)
- calculated well casing volume
- volume of water purged before sampling
- volume of water purged when field parameters are measured
- type and condition of well pump
- description of samples taken
- sample handling, including filtration and preservation
- volume of water collected for analysis
- types of sample containers and preservatives
- weather conditions and external air temperature
- name of certified Analytical Laboratory.

The Field Data Worksheets will also contain detailed notes describing any other significant factors noted during the sampling event, including, as applicable: condition of the well cap and lock; water appearance, color, odor, clarity; presence of debris or solids; any variances from this procedure; and any other relevant features or conditions. An example of a Field Data Worksheet that incorporates this information is attached in Attachment 1.

The data sheets included herein are examples and may be changed to accommodate additional data collection. If a change is made to a data sheet to accommodate additional information, a copy will be provided to the Executive Secretary. Changes to field forms will not eliminate any data collection activity without written approval of the Executive Secretary.

7.2 Chain-Of-Custody and Analytical Request Record

A Chain-of-Custody and Analytical Request Record form (the "COC Form"), provided by the Analytical Laboratory, will accompany the samples being shipped to the Analytical Laboratory. Examples of the Chain of Custody Forms used are attached as Attachment 2. If the Chain of Custody Form changes at any time, the Company shall provide a copy of the new or revised Chain of Custody Form to the Executive Secretary and substitute the new form for the old form in Attachment 2. Standard Chain-of-Custody protocol is initiated for each sample set. A COC Form is to be completed for each set of samples collected in a shipping container (cooler) and is to include the following:

- sampler's name
- company name
- date and time of collection
- sample type (e.g., water)

- sample location
- number of sample containers in the shipping container
- analyses requested
- signatures of persons involved in the chain of possession
- internal temperatures of the shipping container when opened at the laboratory
- remarks section to identify potential hazards or to relay other information to the Analytical Laboratory.

Chain-of-Custody reports will be placed inside a re-sealable bag and taped to the inside lid. Custody seals will be placed on the outside of each cooler.

The person shipping the samples to the Analytical Laboratory will sign the COC Form, document shipment method, and send the original and the second copy of the COC Form with the samples. Upon receipt of the samples, the person receiving the samples will sign the COC Form and return the second copy to the Mill's RSO.

Copies of the COC Forms and other relevant documentation will be retained at the Mill.

7.3 Record Keeping

The Field Data Worksheets are retained at the Mill.

Data from the Analytical Laboratory, showing the laboratory analytical results for the water samples, are maintained at the Mill.

Copies of the current Utah certifications of the Analytical Laboratory or Laboratories and a list of Utah Bureau of Laboratory Improvement approved parameters and methods used to perform analysis during the monitoring events conducted during the quarter will be maintained at the Mill. DUSA will ensure that the Analytical Laboratory or Laboratories used, have certifications for each parameter and method required by Section 8.2, Table 1 of the QAP.

Once all the data for the quarter (all wells sampled during the quarter) is completed, key data from the Field Data Worksheets and from the data packages are managed using electronic data management software The data management software will be managed and administered by the QA Manager or designee. The Mill Personnel will have read-only access to the electronic data management software.

8.0 ANALYTICAL PROCEDURES AND QA/QC

Analytical Laboratory QA provides a means for establishing consistency in the performance of analytical procedures and assuring adherence to analytical methods utilized. Analytical Laboratory QC programs include traceability of measurements to independent reference materials and internal controls.

8.1 Analytical Quality Control

Analytical QA/QC will be governed by the QA/QC program of the Analytical Laboratory. In choosing and retaining the Analytical Laboratory, DUSA shall ensure that the Analytical Laboratory is certified by the State of Utah and by NELAP, is capable of performing the analytical procedures specified in Section 8.2, and that the QA/QC program of the Analytical Laboratory includes the spikes, blanks and duplicates described in Section 8.1.2.

8.1.2 Spikes, Blanks and Duplicates

Analytical Laboratory QC samples will assess the accuracy and precision of the analyses. The following describes the type of QC samples that will be used by the Analytical Laboratory to assess the quality of the data. The following procedures shall be performed at least once with each analytical Batch of samples:

a) Matrix Spike/Matrix Spike Duplicate

A spiked field sample analyzed in duplicate may be analyzed with every analytical batch (depending on the analytical method requirements and or method limitations). Analytes stipulated by the analytical method, by applicable regulations, or by other specific requirements may be spiked into the samples. Selection of the sample to be spiked depends on the information required and the variety of conditions within a typical matrix. The matrix spike sample serves as a check evaluating the effect of the sample matrix on the accuracy of analysis. The matrix spike duplicate serves as a check of the analytical precision.

b) Method Blanks

Each analytical batch shall be accompanied by a method blank. The method blank shall be carried through the entire analytical procedure. Contamination detected in analysis of method blanks will be used to evaluate any Analytical Laboratory contamination of environmental samples which may have occurred.

c) Surrogate Compounds

Every blank, standard, and environmental sample (including matrix spike/matrix duplicate samples) for analysis of VOCs (or other organics only) shall be spiked with surrogate compounds prior to purging or extraction. Surrogates are organic compounds which are similar to analytes of interest in chemical composition, extraction, and chromatography, but which are not normally found in environmental samples. Surrogates shall be spiked into samples according to the appropriate organic analytical methods.

d) Check Sample

Each analytical batch shall contain a number of check samples. For each method, the Analytical Laboratory will normally analyze the following check samples or their equivalents: a method blank, a laboratory control spike, a matrix spike, and a matrix spike duplicate, or the equivalent, with relative percent difference reported.

8.2 Analytical Laboratory Procedures

The analytical procedures to be used by the Analytical Laboratory will be as specified in Table 1, or as otherwise authorized by the Executive Secretary. With respect to Chloroform Investigation and Nitrate Corrective Action sampling, the analytical procedures for parameters monitored under those programs are specified in Appendix A and B respectively.

Table 1

Contaminant	Analytical Methods to be Used	Reporting Limit[1]	Maximum Holding Times	Sample Preservation Requirements	Sample Temperature Requirements
Nutrients					
Ammonia (as N)	A4500-NH3 G or E350.1	0.05 mg/L	28 days	H_2SO_4 to pH<2	$\leq 6^oC$
Nitrate & Nitrite (as N)	E353.1 or E353.2	0.1 mg/L	28 days	H_2SO_4 to pH<2	$\leq 6^oC$
Heavy Metals					
Arsenic	E200.7 or E200.8	5 µg/L	6 months	HNO_3 to pH<2	None
Beryllium	E200.7 or E200.8	0.50 µg/L	6 months	HNO_3 to pH<2	None
Cadmium	E200.7 or E200.8	0.50 µg/L	6 months	HNO_3 to pH<2	None
Chromium	E200.7 or E200.8	25 µg/L	6 months	HNO_3 to pH<2	None
Cobalt	E200.7 or E200.8	10 µg/L	6 months	HNO_3 to pH<2	None
Copper	E200.7 or E200.8	10 µg/L	6 months	HNO_3 to pH<2	None
Iron	E200.7 or E200.7	30 µg/L	6 months	HNO_3 to pH<2	None
Lead	E200.7 or E200.8	1.0 µg/L	6 months	HNO_3 to pH<2	None
Manganese	E200.7 or E200.8	10 µg/L	6 months	HNO_3 to pH<2	None
Mercury	E 245.1 or E200.7 or E200.8	0.50 µg/L	28 days	HNO_3 to pH<2	None
Molybdenum	E200.7 or E200.8	10 µg/L	6 months	HNO_3 to pH<2	None
Nickel	E200.7 or E200.8	20 µg/L	6 months	HNO_3 to pH<2	None
Selenium	E200.7 or E200.8	5 µg/L	6 months	HNO_3 to pH<2	None
Silver	E200.7 or E200.8	10 µg/L	6 months	HNO_3 to pH<2	None
Thallium	E200.7 or E200.8	0.50 µg/L	6 months	HNO_3 to pH<2	None

Contaminant	Analytical Methods to be Used	Reporting Limit[1]	Maximum Holding Times	Sample Preservation Requirements	Sample Temperature Requirements
Tin	E200.7 or E200.8	100 µg/L	6 months	HNO_3 to pH<2	None
Uranium	E200.7 or E200.8	0.30 µg/L	6 months	HNO_3 to pH<2	None
Vanadium	E200.7 or E200.8	15 µg/L	6 months	HNO_3 to pH<2	None
Zinc	E200.7 or E200.8	10 µg/L	6 months	HNO_3 to pH<2	None
Radiologics					
Gross Alpha	E 900.0 or E900.1	1.0 pCi/L	6 months	HNO_3 to pH<2	None
Volatile Organic Compounds					
Acetone	SW8260B or SW8260C	20 µg/L	14 days	HCl to pH<2	≤ 6°C
Benzene	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C
2-Butanone (MEK)	SW8260B or SW8260C	20 µg/L	14 days	HCl to pH<2	≤ 6°C
Carbon Tetrachloride	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C
Chloroform	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C
Chloromethane	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C
Dichloromethane (Methylene Chloride)	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C
Naphthalene	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C
Tetrahydrofuran	SW8260B	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C

Contaminant	Analytical Methods to be Used	Reporting Limit[1]	Maximum Holding Times	Sample Preservation Requirements	Sample Temperature Requirements
	or SW8260C				
Toluene	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C
Xylenes (total)	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	≤ 6°C
Others					
Field pH (S.U.)	A4500-H B	0.01 s.u.	Immediate	None	None
Fluoride	A4500-F C or E300.0	0.1 mg/L	28 days	None	None
TDS	A2540 C	10 mg/L	7 days	None	≤ 6°C
General Inorganics					
Chloride	A4500-Cl B or A4500-Cl E or E300.0	1 mg/L	28 days	None	None
Sulfate	A4500-SO4 E or E300.0	1 mg/L	28 days	None	≤ 6°C
Carbonate as CO3	A2320 B	1 mg/L	14 days	None	≤ 6°C
Bicarbonate as HCO3	A2320 B	1 mg/L	14 days	None	≤ 6°C
Sodium	E200.7	0.5 mg/L	6 months	HNO_3 to pH<2	None
Potassium	E200.7	0.5 mg/L	6 months	HNO_3 to pH<2	None
Magnesium	E200.7	0.5 mg/L	6 months	HNO_3 to pH<2	None
Calcium	E200.7	0.5 mg/L	6 months	HNO_3 to pH<2	None

1. The Analytical Laboratory will be required to meet the reporting limits ("RLs") in the foregoing Table, unless the RL must be increased due to sample matrix interference (i.e., due to dilution gain), in which case the increased RL will be used, or unless otherwise approved by the Executive Secretary.

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal quality control checks are inherent in this QAP. The QA Manager will monitor the performance of the Sample and QC Monitors, and, to the extent practicable, the Analysis Monitor to ensure that they are following this QAP. In addition, either the QA Manager or a Sampling and QC Monitor will review and validate the analytical data generated by the Analytical Laboratory to ensure that it meets the DQOs established by this QAP. Finally, periodic system and performance audits will be performed, as detailed in Section 12 below.

9.1 Field QC Check Procedures

The QA Manager will perform the following QA/QC analysis of field procedures:

9.1.1 Review of Compliance With the Procedures Contained in this QAP

Observation of technician performance is monitored by the QA Manager on a periodic basis to ensure compliance with this QAP.

9.1.2 Analyte Completeness Review

The QA Manager will review all Analytical Results to confirm that the analytical results are complete (i.e., there is an analytical result for each required constituent in each well). The QA Manager shall also identify and report all instances of non-compliance and non-conformance (see Part I.E.1(a) of the Permit. Executive Secretary approval will be required for any completeness (prior to QA/QC analysis) less than 100 percent. Non-conformance will be defined as a failure to provide field parameter results and analytical results for each parameter and for each well required in Sections 6.2.2 and 6.2.3, for the sampling event, without prior written Executive Secretary approval.

9.1.3 Blank Comparisons

Trip blanks, method blanks, and equipment rinsate samples will be compared with original sample results. Non-conformance conditions will exist when contaminant levels in the samples(s) are not order of magnitude greater than the blank result. (TEGD, Field QA/QC Program, page 119).

Corrective actions for blank comparison non-conformance shall first determine if the non-conformance is a systematic issue which requires the procedures described in Section 10. If the non-conformance is limited in scope and nature, the QA Manager will

1. Review the data and determine the overall effect to the data quality,
2. Notify the laboratory of the discrepancy (if it is a laboratory generated blank), and
3. Request the laboratory review all analytical results for transcription and calculation errors, and (for laboratory generated blanks)

4. If the samples are still within holding time, the QA Manager may request the laboratory re-analyze the affected samples.

If re-analysis is not possible, qualifiers may be applied to the samples associated with a non-conforming blank. Recommendations regarding the usability of the data may be included in the quarterly report.

9.1.4 Duplicate Sample Comparisons

The following analyses will be performed on duplicate field samples:

a) Relative Percent Difference.

RPDs will be calculated in comparisons of duplicate and original field sample results. Non-conformance will exist when the RPD $\geq$ 20%, unless the measured concentrations are less than 5 times the required detection limit (Standard Methods, 1998) (EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, February 1994, 9240.1-05-01, p. 25).

b) Radiologics Counting Error Term

All gross alpha analyses shall be reported with an error term. All gross alpha analysis reported with an activity equal to or greater than the GWCL, shall have a counting variance that is equal to or less that 20% of the reported activity concentration. An error term may be greater than 20% of the reported activity concentration when the sum of the activity concentration and error term is less than or equal to the GWCL.

c) Radiologics, Duplicate Samples

Comparability of results between the original and duplicate radiologic samples will be evaluated by determining compliance with the following formula:

$$|A-B|/(s_a^2+s_b^2)^{1/2} \leq 2$$

Where:

A = the first duplicate measurement
B = the second duplicate measurement
s_a^2 = the uncertainty of the first measurement squared
s_b^2 = the uncertainty of the second measurement squared

Non-conformance exists when the foregoing equation is > 2.

(EPA Manual for the Certification of Laboratories Analyzing Drinking Water, Criteria and Procedures Quality Assurance, January 2005, EPA 815-R-05-004, p. VI-9).

Corrective actions for duplicate deviations shall first determine if the deviation is indicative of a systematic issue which requires the procedures described in Section 10. If the non-conformance is limited in scope and nature, the QA Manager will:

1. Notify the laboratory,
2. Request the laboratory review all analytical results for transcription and calculation errors, and
3. If the samples are still within holding time, the QA Manager may request the laboratory re-analyze the affected samples.

9.2 Analytical Laboratory QA Reviews

Full validation will include recalculation of raw data for a minimum of one or more analytes for ten percent of the samples analyzed. The remaining 90% of all data will undergo a QC review which will include validating holding times and QC samples. Overall data assessment will be a part of the validation process as well.

The Analysis Monitor or data validation specialist will evaluate the quality of the data based on SW-846, the applicable portions of NRC guide 4.14 and on analytical methods used. The reviewer will check the following:

(1) sample preparation information is correct and complete,
(2) analysis information is correct and complete,
(3) appropriate Analytical Laboratory procedures are followed,
(4) analytical results are correct and complete,
(5) QC samples are within established control limits,
(6) blanks are within QC limits,
(7) special sample preparation and analytical requirements have been met, and
(8) documentation is complete.

The Analytical Laboratory will prepare and retain full QC and analytical documentation. The Analytical Laboratory will report the data as a group of one batch or less, along with the QA/QC data. The Analytical Laboratory will provide the following information:
(1) cover sheet listing samples included in report with a narrative,
(2) results of compounds identified and quantified,
(3) reporting limits for all analytes, and
(4) QA/QC analytical results.

9.3 QA Manager Review of Analytical Laboratory Results and Procedures

The QA Manager shall perform the following QA reviews relating to Analytical Laboratory procedures:

a) <u>Reporting Limit (RL) Comparisons</u>

The QA Manager shall confirm that all reporting limits used by the Analytical Laboratory are in conformance with the reporting limits set out on Table 1. Non-conformance shall be defined as:
1) a reporting limit that violates these provisions, unless the reporting limit must be increased due to sample matrix interference (i.e., due to dilution); or
2) a reporting limit that exceeds the respective GWQS listed in Table 2 of the GWDP unless the reported concentration is greater than the raised reporting limit.

b) Laboratory Methods Review

The QA Manager shall confirm that the analytical methods used by the Analytical Laboratory are those specified in Table 1, unless otherwise approved by the Executive Secretary. Non-conformance shall be defined when the Analytical Laboratory uses analytical methods not listed in Table 1 and not otherwise approved by the Executive Secretary.

c) Holding Time Examination

The QA Manager will review the analytical reports to verify that the holding time for each contaminant was not exceeded. Non-conformance shall be defined when the holding time is exceeded.

d) Sample Temperature Examination

The QA Manager shall review the analytical reports to verify that the samples were received by the Analytical Laboratory at a temperature no greater than the approved temperature listed in Table 1. Non-conformance shall be defined when the sample temperature is exceeded.

9.4 Analytical Data

All QA/QC data and records required by the Analytical Laboratory's QA/QC program shall be retained by the Analytical Laboratory and shall be made available to DUSA as requested.

Analytical data submitted by the Analytical Laboratory should contain the date/time the sample was collected, the date/time the sample was received by the Analytical Laboratory, the date/time the sample was extracted (if applicable), and the date/time the sample was analyzed.

All out-of-compliance results will be logged by the Analysis Monitor with corrective actions described as well as the results of the corrective actions taken. All raw and reduced data will be stored according to the Analytical Laboratory's record keeping procedures and QA program. All Analytical Laboratory procedures and records will be available for on-site inspection at any time during the course of investigation.

If re-runs occur with increasing frequency, the Analysis Monitor and the QA Manager will be consulted to establish more appropriate analytical approaches for problem samples.

10.0 CORRECTIVE ACTION

10.1 When Corrective Action is Required

The Sampling and QC Monitors and Analytical Laboratory are responsible for following procedures in accordance with this QAP. Corrective action should be taken for any procedural or systematic deficiencies or deviations noted in this QAP. All deviations from field sampling procedures will be noted on the Field Data Worksheets or other applicable records. Any QA/QC problems that arise will be brought to the immediate attention of the QA Manager. Analytical Laboratory deviations will be recorded by the Analysis Monitor in a logbook as well.

When a procedural or systematic non-conformance is identified, DUSA shall:

a) When non-conformance occurs as specified in Sections 9.1.3 or 9.1.4 the data shall be qualified to denote the problem and the QC sample-specific corrective actions in Sections 9.1.3, 9.1.4 or 9.3 will be followed. If the non-conformance is deemed to be systematic or procedural, DUSA shall determine the root cause, and provide specific steps to resolve problems(s) in accordance with the procedure set forth in Section 10.2. Any non-conformance with QAP requirements in a given quarterly groundwater monitoring period will be corrected and reported to the Executive Secretary on or before submittal of the next quarterly ground water monitoring report.
b) When a sample is lost, sample container broken, or the sample or analyte was omitted, resample within 10 days of discovery and analyze again in compliance with all requirements of this QAP. The results for this sample(s) should be included in the same quarterly monitoring report with other samples collected for the same sampling event; and
c) For any other material deviation from this QAP, the procedure set forth in Section 10.2 shall be followed.

10.2 Procedure for Corrective Action

The need for corrective action for non-conformance with the requirements of this QAP, may be identified by system or performance audits or by standard QA/QC procedures. The procedures to be followed if the need for a corrective action is identified, are as follows:

a) Identification and definition of the problem;

b) Assignment of responsibility for investigating the problem;

c) Investigation and determination of the cause of the problem;

d) Determination of a corrective action to eliminate the problem;

e) Assigning and accepting responsibility for implementing the corrective action;

f) Implementing the corrective action and evaluating its effectiveness; and

g) Verifying that the corrective action has eliminated the problem.

The QA Manager shall ensure that these steps are taken and that the problem which led to the corrective action has been resolved. A memorandum explaining the steps outlined above will be placed in the applicable monitoring files and the Mill Central Files, and the corrective action will be documented in a Report prepared in accordance with Section 11.

11.0 REPORTING

As required under paragraph I.F.1 of the GWDP, the Mill will send a groundwater monitoring report to the Executive Secretary on a quarterly basis. Both the Routine Groundwater Monitoring Reports (pertinent to Part I.F.1 of the Permit) and Chloroform Investigation and Nitrate Corrective Action Reports shall be submitted according to the following schedule:

Quarter	Period	Due Date
First	January – March	June 1
Second	April – June	September 1
Third	July – September	December 1
Fourth	October – December	March 1

The Routine Groundwater Monitoring Reports (pertinent to Part I.F.1 of the Permit) will include the following information:

- Description of monitor wells sampled
- Description of sampling methodology, equipment an decontamination procedures to the extent they differ from those described in this QAP
- A summary data table of groundwater levels for each monitor well and piezometer
- A summary data table showing the results of the sampling event, listing all wells and the analytical results for all constituents and identifying any constituents that are subject to accelerated monitoring in any particular wells pursuant to Part I.G.1 of the GWDP or are out of compliance in any particular wells pursuant to Part I.G.2 of the GWDP
- Copies of Field Data Worksheets
- Copies of Analytical Laboratory results
- Copies of Chain of Custody Forms (included in the data packages)

- A Water Table Contour Map showing groundwater elevation data for the quarter will be contemporaneous for all wells on site, not to exceed a maximum time difference of five calendar days.
- Evaluation of groundwater levels, gradients and flow directions
- Quality assurance evaluation and data validation description (see Section 9 for further details)
- All non-conformance with this QAP and all corrective actions taken.
- Recommendations and Conclusions.

With respect to the Chloroform Investigation and Nitrate Corrective Action reporting requirements, these are specified in Appendix A and B to this document.

In addition, an electronic copy of all analytical results will be transmitted to the Executive Secretary in comma separated values (CSV) format, or as otherwise advised by the Executive Secretary.

Further reporting may be required as a result of accelerated monitoring under paragraphs I.G.1 and I.G.2 of the GWDP. The frequency and content of these reports will be defined by DUSA corporate management working with the Executive Secretary.

12.0 SYSTEM AND PERFORMANCE AUDITS

12.1 QA Manager to Perform System Audits and Performance Audits

DUSA shall perform such system audits and performance audits as it considers necessary in order to ensure that data of known and defensible quality are produced during a sampling program. The frequency and timing of system and performance audits shall be as determined by DUSA.

12.2 System Audits

System audits are qualitative evaluations of all components of field and Analytical Laboratory QC measurement systems. They determine if the measurement systems are being used appropriately. System audits will review field and Analytical Laboratory operations, including sampling equipment, laboratory equipment, sampling procedures, and equipment calibrations, to evaluate the effectiveness of the QA program and to identify any weakness that may exist. The audits may be carried out before all systems are operational, during the program, or after the completion of the program. Such audits typically involve a comparison of the activities required under this QAP with those actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities.

12.3 Performance Audits

The performance audit is a quantitative evaluation of the measurement systems of a program. It requires testing the measurement systems with samples of known composition or behavior to evaluate precision and accuracy. With respect to performance audits of the analytical process, either blind performance evaluation samples will be submitted to the Analytical Laboratory for analysis, or the auditor will request that it provide results of the blind studies that the Analytical Laboratory must provide to its NELAP accreditation agency on an annual basis. The performance audit is carried out without the knowledge of the analysts, to the extent practicable.

12.4 Follow-Up Actions

Response to the system audits and performance audits is required when deviations are found and corrective action is required. Where a corrective action is required, the steps set out in Section 10.2 will be followed.

12.5 Audit Records

Audit records for all audits conducted will be retained in Mill Central Files. These records will contain audit reports, written records of completion for corrective actions, and any other documents associated with the audits supporting audit findings or corrective actions.

13.0 PREVENTIVE MAINTENANCE

Preventive maintenance concerns the proper maintenance and care of field and laboratory instruments. Preventive maintenance helps ensure that monitoring data generated will be of sufficient quality to meet QA objectives. Both field and laboratory instruments have a set maintenance schedule to ensure proper functioning of the instruments.

Field instruments will be maintained as per the manufacturer's specifications and established sampling practice. Field instruments will be checked and calibrated prior to use, in accordance with Section 5. Batteries will be charged and checked daily when these instruments are in use. All equipment out of service will be immediately replaced. Field instruments will be protected from adverse weather conditions during sampling activities. Instruments will be stored properly at the end of each working day. Calibration and maintenance problems encountered will be recorded in the Field Data Worksheets or logbook.

The Analytical Laboratory is responsible for the maintenance and calibration of its instruments in accordance with Analytical Laboratory procedures and as required in order to maintain its NELAP certifications. Preventive maintenance will be performed on a scheduled basis to minimize downtime and the potential interruption of analytical work.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

14.1 Ongoing QA/QC Reporting

The following reporting activities shall be undertaken on a regular basis:

a) The Sample and QC Monitors shall report to the QA Manager regularly regarding progress of the applicable sampling program. The Sample and QC Monitors will also brief the QA Manager on any QA/QC issues associated with such sampling activities.

b) The Analytical Laboratory shall maintain detailed procedures for laboratory record keeping. Each data set report submitted to the Mill's QA Manager or his staff will identify the analytical methods performed and all QA/QC measures not within the established control limits. Any QA/QC problems will be brought to the QA Manager's attention as soon as possible; and

c) After sampling has been completed and final analyses are completed and reviewed, a brief data evaluation summary report will be prepared by the Analytical Laboratory for review by the QA Manager, by a Sampling and QC Monitor or by such other qualified person as may be designated by the QA Manager. The report will be prepared in accordance with NELAP requirements and will summarize the data validation efforts and provide an evaluation of the data quality.

14.2 Periodic Reporting to Management

The QA Manager shall present a report to DUSA's ALARA Committee at least once per calendar year on the performance of the measurement system and the data quality. These reports shall include:

a) Periodic assessment of measurement quality indicators, i.e., data accuracy, precision and completeness;

b) Results of any performance audits, including any corrective actions;

c) Results of any system audits, including any corrective actions; and

d) Significant QA problems and recommended solutions.

15.0 AMENDMENT

This QAP may be amended from time to time by DUSA only with the approval of the Executive Secretary.

16.0 REFERENCES

United States Environmental Protection Agency, November 2004, Test Methods for Evaluating Solid Waste, EPA SW-846.

United States Environmental Protection Agency, September, 1986, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (TEGD), Office of Solid Waste and Emergency Response, OSWER-9950.1.

United States Environmental Protection Agency, November 1992, RCRA Ground-water Monitoring Draft Technical Guidance (DTG), Office of Solid Waste.

Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. American Public Health Association, American Water Works Association, Water Environment Federation. Washington, D.C. p. 1-7.

ATTACHMENT 1
Field and Data Forms

Attachment 1-1
Quarterly Depth to Water Data Sheet

NAME: ____________________

DATE: ____________________

TIME	WELL	Static level	TIME	WELL	Static Level	TIME	WELL	Static Level

ATTACHMENT 1-2
WHITE MESA URANIUM MILL
FIELD DATA WORKSHEET FOR GROUNDWATER

Mill - Groundwater Discharge Permit
Groundwater Monitoring Quality Assurance Plan (QAP)

Date: 5/23/2012 Rev. 7.1

DENISON MINES

ATTACHMENT 1-2
WHITE MESA URANIUM MILL
FIELD DATA WORKSHEET FOR GROUND WATER

Attachment 1
See instruction

Description of Sampling Event:

Location (well name):

Sampler Name and initials:

Field Sample ID

Date and Time for Purging

and Sampling (if different)

Well Purging Equip Used: ☐ pump or ☐ bailer

Well Pump (if other than Bennet)

Purging Method Used: ☐ 2 casings ☐ 3 casings

Sampling Event

Prev. Well Sampled in Sampling Event

pH Buffer 7.0

pH Buffer 4.0

Specific Conductance ______ µMHOS/ cm

Well Depth(0.01ft):

Depth to Water Before Purging

Casing Volume (V) 4" Well: ______ (.653h)
3" Well: ______ (.367h)

Conductance (avg)

pH of Water (avg)

Well Water Temp. (avg)

Redox Potential (Eh)

Turbidity

Weather Cond.

Ext'l Amb. Temp. °C (prior sampling event)

Time		Gal. Purged	
Conductance		pH	
Temp. °C			
Redox Potential Eh (mV)			
Turbidity (NTU)			

Time		Gal. Purged	
Conductance		pH	
Temp. °C			
Redox Potential Eh (mV)			
Turbidity (NTU)			

Time		Gal. Purged	
Conductance		pH	
Temp. °C			
Redox Potential Eh (mV)			
Turbidity (NTU)			

Time		Gal. Purged	
Conductance		pH	
Temp. °C			
Redox Potential Eh (mV)			
Turbidity (NTU)			

Volume of Water Purged [ ] gallon(s)

Pumping Rate Calculation

Flow Rate (Q), in gpm.
S/60 = [ ]

Time to evacuate two casing volumes (2V)
T = 2V/Q = [ ]

Number of casing volumes evacuated (if other than two) [ ]

If well evacuated to dryness, number of gallons evacuated [ ]

Name of Certified Analytical Laboratory if Other Than Energy Labs [ ]

Type of Sample	Sample Taken		Sample Vol (indicate if other than as specified below)	Filtered		Preservative Type	Preservative Added	
	Y	N		Y	N		Y	N
VOCs	☐	☐	3x40 ml	☐	☐	HCL	☐	☐
Nutrients	☐	☐	100 ml	☐	☐	H2SO4	☐	☐
Heavy Metals	☐	☐	250 ml	☐	☐	HNO3	☐	☐
All Other Non Radiologics	☐	☐	250 ml	☐	☐	No Preserv.	☐	☐
Gross Alpha	☐	☐	1,000 ml	☐	☐	HNO3	☐	☐
Other (specify)	☐	☐	Sample volume	☐	☐		☐	☐

If preservative is used, specify
Type and Quantity of Preservative:

Final Depth [ ] Sample Time [ ]

See instruction

Comment

Do not touch this cell (SheetName)

ATTACHMENT 1-3
EXAMPLE CHAIN OF CUSTODY FORMS

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page _____ of _____

PLEASE PRINT (Provide as much information as possible.)

Company Name:	Project Name, PWS, Permit, Etc.	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address:	Contact Name: Phone/Fax:	Email:	Sampler: (Please Print)
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

☐ DW
☐ POTW/WWTP
☐ State: __________
☐ Other: __________
☐ EDD/EDT (Electronic Data)
Format: __________
☐ LEVEL IV
☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids
Vegetation Bioassay Other
DW - Drinking Water

ANALYSIS REQUESTED

SEE ATTACHED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by:
Cooler ID(s):
Receipt Temp _______ °C
On Ice: Y N
Custody Seal
On Bottle Y N
On Cooler Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX													Comments	LABORATORY USE ONLY
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Custody Record MUST be Signed						
	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
	Sample Disposal: Return to Client: ______	Lab Disposal: ______		Received by Laboratory:	Date/Time:	Signature:

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

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ıeet 1 of 1

CHAIN OF COUSTODY

Samples Shipped to: ____________________

Contact: ____________________

Chain of Custody/Sampling Analysis Request

Project	**Samplers Name**	**Samplers Signature**

Sample ID	Date Collected	Time Collected	Laboratory Analysis Requested

Please notify Tanner Holliday of Receipt temperature on these samples Immediately! Thank you.

Relinquished By:(Signature)	Date/Time	Received By:(Signature)	Date/Time
Relinquished By:(Signature)	Date/Time	Received By:(Signature)	Date/Time

ATTACHMENT 2
Field Procedures

Attachment 2-1
Groundwater Head (Depth to Water) Measurement Procedures

Measure and record all depth to water data to the nearest 0.01 feet.

Equipment Used For Groundwater Head Monitoring

Measurement of depth to groundwater is accomplished by using a Solinist – IT 300 or equivalent device (the "Water Level Indicator").

Equipment Checks

Equipment used in depth to groundwater measurements will be checked prior to each use to ensure that the Water Sounding Device is functional.

Check the Water Sounding Device as follows:

- Turn the Water Level Indicator on.
- Test the Water Level Indicator using the test button located on the instrument.
- If the Water Level Indicator alarms using the test button it is considered operational and can be used for depth to water measurements.

Measurement of Depth to Water

All depth to water measurements (quarterly and immediately prior to sample collection) will be completed using the following procedure:

- For monitoring wells - Measure depth to water from the top of the inner well casing at the designated measurement point.
- For the piezometers - Measure depth to water from the top of the casing at the designated measurement point.
- Measurements are taken by lowering the Water Level Indicator into the casing until the device alarms, indicating that the water surface has been reached.
- Record the depth to groundwater on the appropriate form in Attachment 1 as the distance from the measuring point to the liquid surface as indicated by the alarm. The distance is determined using the tape measure on the Water Level Indicator.

Attachment 2-2
Decontamination Procedures

Non-dedicated sampling equipment will be decontaminated using the following procedures:

Water level meter

Decontaminate the water level meter with a detergent/deionized ("DI") water mixture by pouring the solutions over the water level indicator.

Rinse the water level indicator with fresh DI water rinse by pouring the DI water over the water level indicator.

Field Parameter Instrument (Hydrolab or equivalent)

Rinse the field parameter instrument probe unit with DI water prior to each calibration.

Wash the cup of the flow through cell with a detergent/DI water mixture and rinse with fresh DI water prior to each calibration.

Non-Dedicated Purging/Sampling Pump

Non-dedicated sampling/purging equipment will be decontaminated after each use and prior to use at subsequent sampling locations using the following procedures:

a) submerge the pump into a 55-gallon drum of nonphosphate detergent/DI water mixture;

b) pump the detergent/DI water solution through the pump and pump outlet lines into the drain line connected to Cell 1;

c) pump as much of the detergent/DI water mixture from the drum through the pump and outlet lines as possible;

d) submerge the pump into a 55-gallon drum of DI water;

e) pump the DI water solution through the pump and pump outlet lines into the drain line connected to Cell 1;

f) pump as much of the detergent/DI water mixture from the drum through the pump and outlet lines as possible;

g) if an equipment rinsate blank is required, submerge the pump into a fresh 55-gallon drum of DI water and pump 50% or more of the DI water through the pump and pump outlet lines;

h) if required, collect the equipment rinsate blank directly from the pump outlet lines into the appropriate sample containers (filtering the appropriate aliquots as needed).

All water produced during decontamination of a non-dedicated pump will pumped to an appropriate drain line which outlets into Cell 1.

Attachment 2-3
Purging Procedures

The following equipment will be used for groundwater purging and sampling:

- Disposable Bailer: A bailer that is used at one specific well for one event for purging and/or sampling. These bailers are single use and are disposed of as trash after sampling in accordance with Mill disposal requirements for Mill-generated solid waste.
- Dedicated Pump: A pump that is dedicated to one specific well for the use of purging or sampling. A dedicated pump remains inside the well casing suspended and secured.
- Non – Dedicated Pump: A pump that is used for purging and sampling at one or more wells.
- Field Parameter Meter: A meter used to measure ground water quality parameters as listed below. Field parameters shall be measured using a Hydrolab M-5 with Flow Cell Multi-Parameter Meter system or equivalent that allows a continuous stream of water from the pump to the meter that enables measurements to be taken on a real-time basis without exposing the water stream to the atmosphere. The Field Parameter Meter measures the following parameters:

    - Water temperature;
    - Specific conductivity;
    - Turbidity;
    - pH;
    - Redox potential (Eh).

- Water Level Indicator: A tape measure with a water level probe on the end that alarms when contact is made with water.
- Diesel Generator: Mobile power supply to provide power for submersible pump.
- 150 psi air compressor and ancillary equipment, or equivalent to operate dedicated "bladder" pumps.

Additional supplies for purging and sampling are as follows:

- Field Data Sheets
- 45 micron in-line filters (when metals and gross alpha analyses are required)
- Calculator
- Clock, stopwatch or other timing device
- Buckets
- Sampling containers(as provided by the Analytical Laboratory)
- Field preservation chemicals (as provided by the Analytical Laboratory)
- Disposable gloves
- Appropriate health and safety equipment
- Sample labels and COCs (as provided by the Analytical Laboratory)

Pre-Purging/ Sampling Activities

If a portable (non-dedicated) pump is to be used, prior to commencing the event's sampling activities,

1. check the pumping equipment to ensure that no air is leaking into the discharge line, in order to prevent aeration of the sample;
2. decontaminate the sampling pump using the procedure described in Attachment 2-2 and collect a equipment rinsate blank as required; and
3. Prior to leaving the Mill office, place the Trip Blank(s) into a cooler that will transport the VOC samples. The Trip Blank(s) will accompany the groundwater (VOC) samples throughout the monitoring event.

Well Purging

The purging techniques described below will be used for all groundwater sampling conducted at the Mill unless otherwise stated in the program-specific QAPs for the chloroform and nitrate investigations. The program-specific QAPs for the chloroform and nitrate investigations are included as Appendix A and Appendix B respectively.

Purging is completed using the equipment described above. Purging is completed to remove stagnant water from the casing and to assure that representative samples of formation water are collected for analysis. There are three purging strategies that will be used to remove stagnant water from the casing during groundwater sampling at the Mill. The three strategies are as follows:

1. Purging three well casing volumes with a single measurement of field parameters
2. Purging two casing volumes with stable field parameters (within 10% RPD)
3. Purging a well to dryness and stability of a limited list of field parameters after recovery

The groundwater in the well should recover to within at least 90% of the measured groundwater static surface before sampling. If after 2 hours, the well has not recovered to 90% the well will be sampled as soon as sufficient water for the full analytical suite is available.

Turbidity measurement in the water should be ≤ 5 NTU prior to sampling unless the well is characterized by water that has a higher turbidity.

A flow-cell needs to be used for field parameters.

Procedure

a) Determine the appropriate purging strategy based on historic performance of the well (3 casing volumes, 2 casing volumes and stable parameters, or purging the well to dryness)

b) Remove the well casing cap and measure and record depth to groundwater as described in Attachment 2-1 above;

c) Determine the casing volume (V) in gallons, where h is column height of the water in the well (calculated by subtracting the depth to groundwater in the well from the total depth of the well), V = 0.653*h, for a 4" casing volume and V = .367*h for a 3" casing volume. Record the casing volume on the Field Data Worksheet;

If a portable (non-dedicated) pump is used:

- Ensure that it has been decontaminated in accordance with Attachment 2-2 since its last use.
- Lower the pump into the well. Keep the pump at least five feet from the bottom of the well.

If a non-dedicated pump or dedicated pump is used:

(i) Commence pumping;

(ii) Determine pump flow rate by using a stopwatch or other timing device and a calibrated bucket by measuring the number of seconds required to fill to the one-gallon mark. Record this in the "pumping rate" section of the Field Data Worksheet;

(iii) Calculate the amount of time to evacuate two or three casing volumes;

(iv) Evacuate two or three casing volumes by pumping for the length of time determined in paragraph (iii);

(v) If two casing volumes will be purged:

Take measurements of field parameters (pH, specific conductance, temperature, redox potential and turbidity) during well purging, using the Field Parameter Meter. These measurements will be recorded on the Field Data Worksheet. Purging is completed after two casing volumes have been removed and the field parameters pH, temperature, specific conductance, redox potential (Eh) and turbidity have stabilized to within 10% RPD over at least two consecutive measurements.

(vi)If three casing volumes will be purged:

Take one set of measurements of field parameters (pH, specific conductance, temperature, redox potential and turbidity) after three casing volumes have been purged immediately prior to sample collection using the Field Parameter Meter. Record these measurements on the Field Data Worksheet.

(vii) If the well is purged to dryness:

Record the number of gallons purged on the Field Data Worksheet.

The well should be sampled as soon as a sufficient volume of groundwater is available to fill sample containers.

Upon arrival at the well after recovery or when sufficient water is available for sampling measure depth to water and record on the Field Data Worksheet.

Take one set of measurements of field parameters for pH, specific conductance and temperature only.

Collect the samples into the appropriate sample containers.

Take an additional set of measurements of field parameters for pH, specific conductance and temperature after the samples have been collected.

If the field parameters of pH, specific conductance and temperature are within 10% RPD the samples can be shipped for analysis.

If the field parameters of pH, specific conductance and temperature are not within 10% RPD, dispose of the sample aliquots, and purge the well again as described above.

Repeat this process if necessary for three complete purging events. If after the third purging the event, the parameters of pH, specific conductance and temperature do not stabilize to within 10% RPD, the well is considered sufficiently purged and collected samples can be submitted for analysis.

Purging using a disposable bailer

For wells where a pump is not effective due to shallow water columns, a disposable bailer, made of inert materials, will be used.

When a bailer is used, the following procedure will be followed:

(i) Use the water level meter to determine the water column and figure the amount of water that must be evacuated.

(ii) Attach a disposable bailer to a rope and reel.

(iii) Lower the bailer into the well and listen for contact with the solution. Once contact is made, allow the bailer to gradually sink in the well, being careful not to allow the bailer to come in contact with the bottom sediment.

(iv) After the bailer is full, retrieve the bailer and pour the water from the bailer into 5 gallon buckets. By doing this, one can record the number of gallons purged.

(v) Repeat this process until either two casing volumes have been collected or until no more water can be bailed. When the process is finished for the well, the bailer will be disposed of.

(vi) Take field measurements from the water in the buckets.

All water produced during well purging will be containerized. Containerized water will be disposed of into an active Tailings Cell.

After the collection of all samples, and prior to leaving the sampling site, replace the well cap and lock the casing.

Attachment 2-4
Sample Collection Procedures

Sample Collection Order

Regardless of the purging method employed samples will be collected in the order specified below.

All containers and preservatives will be provided by the Analytical Laboratory. Collect the samples in accordance with the volume, container and preservation requirements specified by the Analytical Laboratory which should be provided with the supplied containers.

VOCs;
Nutrients (ammonia, nitrate and nitrite);
All other non-radiologics (fluoride, general inorganics, TDS, total cations and anions); and
Gross alpha and heavy metals (filtered).

Sample Filtering

When sampling for heavy metals and for gross alpha, the following procedure shall be followed:

a) Obtain the specifically identified sample container for the type of sample to be taken, as provided by the Analytical Laboratory;

b) Add the quantity of specified preservative provided by the Analytical Laboratory to each sample container;

c) When using a pump to sample:

    (i) Place a new 0.45 micron filter on the sample tubing;

    (ii) Pump the sample through the filter, and into the sample container containing the preservative;

    (iii) The pump should be operated in a continuous manner so that it does not produce samples that are aerated in the return tube or upon discharge;

d) When using a bailer to sample (wells with shallow water columns, i.e., where the water column is less than five feet above the bottom of the well casing), then the following procedure will be used to filter samples:

    (i) Collect samples from the bailer into a large, unused sample jug that does not contain any preservatives.

(ii) Add the appropriate preservatives to the appropriate sample container provided by the Analytical Laboratory.

(iii) Place clean unused tubing in the peristaltic pump.

(iv) Use the peristaltic pump to transfer the unpreserved sample from the large sample jug to the sample containers through a 0.45 micron filter.

Procedures to Follow After Sampling

a) In each case, once a sample is taken, identify and label the sample container using the labels provided by the Analytical Laboratory. The labels may include the following information depending on the type of analysis requested:

- Sample location
- Date and time of sample
- Any preservation method utilized
- Filtered or unfiltered

b) Immediately after sample collection, place each sample in an ice-packed cooler; and

c) Before leaving the sampling location, thoroughly document the sampling event on the Field Data Worksheet, by recording all pertinent data.

Upon returning to the office, the samples must be stored in a refrigerator at less than or equal to 6^{o} C. These samples shall be received by the Analytical Laboratory at less than or equal to 6^{o} C. Samples will then be re-packed in the plastic ice-packed cooler and transported via these sealed plastic containers by overnight delivery services to the Analytical Laboratory.

Attachment 2-5
Field QC Samples

Field Duplicates

Field duplicates are required to be collected at a frequency of one duplicate per every 20 field samples. Field duplicate samples are analyzed for the same analytes as the parent sample.

Field duplicate samples should be as near to split samples as reasonably practicable.

Collection of field duplicates is completed as follows:

Fill a single VOC vial for the parent sample. Collect a second VOC vial for the duplicate sample. Collect the second set of VOC vials for the parent immediately followed by the duplicate sample. Fill the third set of VOC vials in the same manner. Repeat this parent/duplicate process for the remaining analytes in the order specified in Attachment 2-4 blind to the Analytical Laboratory.

Field duplicate samples are labeled using a "false" well number such as MW-65 and MW-70.

Equipment Rinsate Samples

Where portable (non-dedicated) sampling equipment is used, a rinsate sample will be collected at a frequency of one rinsate sample per 20 field samples.

Equipment rinsate samples are collected after the decontamination procedure in Attachment 2-2 is completed as follows:

Submerge the pump into a fresh 55-gallon drum of DI water and pump 50% or more of the DI water through the pump and pump outlet lines;

Collect the equipment rinsate blank directly from the pump outlet lines into the appropriate sample containers (filtering the appropriate aliquots as needed).

Equipment rinsate blanks are labeled with the name of the subsequently purged well with a terminal letter "R" added (e.g. MW-11R).

Appendix A
Chloroform Investigation Monitoring
Quality Assurance Program
White Mesa Uranium Mill
Blanding, Utah

Chloroform Investigation Monitoring
Quality Assurance Program
White Mesa Uranium Mill
Blanding, Utah

This document sets out the quality assurance plan to be used by Denison Mines (USA) Corp. for Chloroform Investigation conducted pursuant to State of Utah Notice of Violation and Groundwater Corrective Action Order (UDEQ Docket No. UGW-20-01) (the "Order").

Specifically, the Mill will use the same sampling regimen for the Chloroform Investigation that is utilized for groundwater sampling under its groundwater discharge permit, as set forth in the attached groundwater discharge permit Quality Assurance Plan (QAP), except as set forth below:

1) Dedicated Purge Pump/Sampling

Chloroform Investigation samples are collected by means of disposable bailer(s) the day following the purging .The disposable bailer is used only for the collection of a sample from an individual well and disposed subsequent to the sampling. The wells are purged prior to sampling by means of a portable pump. Each quarterly purging event begins at the location least affected by chloroform (based on the previous quarters sampling event) and proceeds by affected concentration to the most affected location. Although purging will generally follows this order, the sampling order may deviate slightly from the generated list. This practice does not affect the samples for these reasons: any wells sampled in slightly different order have either dedicated pumps or are sampled via a disposable bailer. This practice does not affect the quality or usability of the data as there will be no cross-contamination resulting from sampling order. Decontamination of all sampling equipment will follow the decontamination procedure outlined in Attachment 2-2 of the QAP.

2) Chloroform Investigation Sampling Frequency, Order and Locations

The chloroform investigation wells listed below are required to be monitored on a quarterly basis under State of Utah Notice of Violation and Groundwater Corrective Action Order UDEQ Docket No. UGW-20-01. Chloroform wells shall be purged from the least contaminated to the most contaminated as based on the most recent quarterly results.

- MW-4
- TW4-1
- TW4-2
- TW4-3
- TW4-4
- TW4-5
- TW4-6
- TW4-13
- TW4-14
- MW-26
- TW4-16
- MW-32
- TW4-18
- TW4-19

- TW4-7
- TW4-8
- TW4-9
- TW4-10
- TW4-11
- TW4-12
- TW4-26
- TW4-20
- TW4-21
- TW4-22
- TW4-23
- TW4-24
- TW4-25
- TW4-27

Note: Wells MW-26 and MW-32 may be monitored under either the Chloroform Investigation Program or the Groundwater Discharge Permit Monitoring Program.

3) Chloroform Investigation Sample Containers and Collection Volume

The chloroform investigation sampling program requires a specific number of sampling containers and the collection of specific volumes of sample. Accordingly, the following sample volumes are collected by bailer from each sampling location:

- For Volatile Organic Compounds (VOC), collect three samples into three separate 40 ml containers.
- For Nitrate/Nitrite determinations, collect one sample into a 100 ml container.
- For Inorganic Chloride, collect one sample into a 100 ml container.

The Analytical Laboratory will provide the sampling containers and may request that certain analytes be combined into a single container due to like sampling requirements and/or like preservation. The container requirements will be determined by the Analytical Laboratory and specified with the bottles supplied to the Field Personnel. Bottle requirements may change if the Analytical Laboratory is changed or if advances in analytical techniques allow for reduced samples volumes. The above list is a general guideline.

4) Laboratory Requirements

Collected samples which are gathered for chloroform investigation purposes are shipped to an analytical laboratory where the requisite analyses are performed. At the laboratory the following analytical specifications must be adhered to:

Analytical Parameter	Analytical Method	Reporting Limit	Maximum Holding Times	Sample Preservation Requirement	Sample Temperature Requirement
Nitrate & Nitrite (as N)	E353.1 or E353.2	0.1 mg/L	28 days	H_2SO_4 to pH<2	$\leq 6^oC$
Carbon Tetrachloride	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	$\leq 6^oC$
Chloroform	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	$\leq 6^oC$
Dichloromethane (Methylene Chloride)	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	$\leq 6^oC$
Chloromethane	SW8260B or SW8260C	1.0 µg/L	14 days	HCl to pH<2	$\leq 6^oC$
Inorganic Chloride	A4500-Cl B or A4500-Cl E or E300.0	1 mg/L	28 days	None	$\leq 6^oC$

5) Field Parameters

Only one set of field parameters are required to be measured prior to sampling in chloroform pumping wells. This includes the following wells: MW-4, MW-26, TW4-4, TW-4-19 and TW-4-20. However, if a pumping well has been out of service for 48 hours or more, DUSA shall follow the purging requirements outlined in Attachment 2-3 of the QAP before sample collection.

Field parameters will be measured in chloroform wells which are not continuously pumped as described in Attachment 2-3 of the groundwater QAP.

6) Chloroform Investigation Reports

The Chloroform Investigation Reports will include the following information:

a) Introduction

b) Sampling and Monitoring Plan

- Description of monitor wells
- Description of sampling methodology, equipment and decontamination procedures

- Identify all quality assurance samples, e.g. trip blanks, equipment blanks, duplicate samples

c) Data Interpretation

- Interpretation of groundwater levels, gradients, and flow directions. Interpretations will include a discussion on: 1) A current site groundwater contour map, 2) hydrographs to show groundwater elevation in each monitor well over time, 3) depth to groundwater measured and groundwater elevation from each monitor well summarized in a data table, that includes historic groundwater level data for each well, and 4) an evaluation of the effectiveness of hydraulic capture of all contaminants of concern.
- Interpretation of all analytical results for each well, including a discussion on: 1) a current chloroform isoconcentration map with one of the isosconentration lines showing the 70 ug/L boundary, 2) graphs showing chloroform concentration trends in each well through time and, 3) analytical results for each well summarized in a data table, that includes historic analytical results for each well.
- Calculate chloroform mass removed by pumping wells. Calculations would include: 1) total historic chloroform mass removed, 2) total historic chloroform mass removed for each pumping well, 3) total chloroform mass removed for the quarter and, 4) total chloroform mass removed from each pumping well for the quarter.

d) Conclusions and Recommendations

e) Electronic copy of all laboratory results for Chloroform Investigation monitoring conducted during the quarter.

f) Copies of DUSA field records, laboratory reports and chain of custody forms.

Except as otherwise specified above, the Mill will follow the procedure set out in the Mill's QAP.

Appendix B
Nitrate Corrective Action Monitoring
Quality Assurance Program
White Mesa Uranium Mill
Blanding, Utah

Nitrate Corrective Action Monitoring
Quality Assurance Program
White Mesa Uranium Mill
Blanding, Utah

This document sets out the quality assurance plan to be used by Denison Mines (USA) Corp. for Nitrate Corrective Action Monitoring ("Nitrate Program") conducted pursuant to State of Utah Stipulated Consent Agreement Docket Number UGW-09-03-A.

Specifically, the Mill will use the same sampling regimen for the Nitrate program that is utilized for groundwater sampling under its groundwater discharge permit, as set forth in the attached groundwater discharge permit Quality Assurance Plan (QAP), except as set forth below:

1) Purge Pump/Sampling

The Nitrate program wells are purged and sampled by means of a portable pump. If the well is purged to dryness the samples are collected the following day by means of disposable bailer(s).The disposable bailer is used only for the collection of a sample from an individual well and disposed subsequent to the sampling.

Each quarterly purging event begins at the location least affected by nitrate (based on the previous quarters sampling event) and proceeds by affected concentration to the most affected location. Purging and sampling follows this order if the wells are not purged to dryness and the samples are collected immediately after purging using the portable pump. If the well is purged to dryness and sampled with a disposable bailer, the sampling order may deviate slightly from the generated list. This practice does not affect the samples collected with a bailer for this reason: there is no cross-contamination resulting from sampling order when the samples are collected with a disposable bailer. Decontamination of all non-disposable sampling equipment will follow the decontamination procedure outlined in Attachment 2-2 of the QAP.

2) Nitrate Program Sampling Frequency, Order and Locations

The Nitrate Program wells listed below are required to be monitored on a quarterly basis under State of Utah Docket No. UGW-09-03-A. DUSA has submitted a Corrective Action Plan ("CAP") as required by the Stipulated Consent Agreement. In that CAP, DUSA has proposed the abandonment of a number of the wells listed below. The implementation of the CAP, shall supersede any requirements contained in this QAP and Appendix. Nitrate Program wells shall be purged from the least contaminated to the most contaminated as based on the most recent quarterly results.

- TWN-1
- TWN-2
- TWN-3
- TWN-4
- TWN-5*
- TWN-6**
- TWN-7
- TWN-8*
- TWN-9*
- TWN-10*
- TWN-11*
- TWN-12*
- TWN-13*
- TWN-14**
- TWN-15*
- TWN-16**
- TWN-17*
- TWN-18
- TWN-19**
- Piezometer-01
- Piezometer-02
- Piezometer-03

*Recommended for abandonment
**Recommended for depth to water measurements only. DUSA has proposed that monitoring cease.

7) Nitrate Program Sample Containers and Collection Volume

The Nitrate Program sampling requires a specific number of sampling containers and the collection of specific volumes of sample. Accordingly, the following sample volumes are collected by bailer from each sampling location:

- For Nitrate/Nitrite determinations, collect one sample into a 100 ml container.
- For Inorganic Chloride, collect one sample into a 100 ml container.

The Analytical Laboratory will provide the sampling containers and may request that certain analytes be combined into a single container due to like sampling requirements and/or like preservation. The container requirements will be determined by the Analytical Laboratory and specified with the bottles supplied to the Field Personnel. Bottle requirements may change if the Analytical Laboratory is changed or if advances in analytical techniques allow for reduced samples volumes. The above list is a general guideline.

8) Laboratory Requirements

Collected samples which are gathered for Nitrate Program purposes are shipped to an analytical laboratory where the requisite analyses are performed. At the laboratory the following analytical specifications must be adhered to:

Analytical Parameter	Analytical Method	Reporting Limit	Maximum Holding Times	Sample Preservation Requirement	Sample Temperature Requirement
Nitrate & Nitrite (as N)	E353.1 or E353.2	0.1 mg/L	28 days	H_2SO_4 to pH<2	$\leq 6^{o}C$
Inorganic Chloride	A4500-Cl B or A4500-Cl E or E300.0	1 mg/L	28 days	None	$\leq 6^{o}C$

9) Field Parameters

Field parameters will be measured in Nitrate Program wells as described in Attachment 2-3 of the groundwater QAP.

10) Nitrate Program Investigation Reports

The Nitrate Program Reports will include the following information:

a) Introduction

b) Sampling and Monitoring Plan

- Description of monitor wells
- Description of sampling methodology, equipment and decontamination procedures
- Identify all quality assurance samples, e.g. trip blanks, equipment blanks, duplicate samples

c) Data Interpretation

- Interpretation of groundwater levels, gradients, and flow directions. Interpretations will include a discussion on: 1) A current site groundwater contour map, 2) hydrographs to show groundwater elevation in each monitor well over time, 3) depth to groundwater measured and groundwater elevation from each monitor well summarized in a data table, that includes historic groundwater level data for each well, and 4) an evaluation of the effectiveness of hydraulic capture of all contaminants of concern.
- Interpretation of all analytical results for each well, analytical results for each well summarized in a data table, that includes historic analytical results for each well.
- Calculate nitrate mass removed by pumping wells (as the pumps are installed and operational). Calculations would include: 1) total nitrate

mass removed, 2) total historic nitrate mass removed for each pumping well, 3) total nitrate mass removed for the quarter and, 4) total nitrate mass removed from each pumping well for the quarter.

d) Conclusions and Recommendations

e) Electronic copy of all laboratory results for Nitrate Program monitoring conducted during the quarter.

f) Copies of DUSA field records, laboratory reports and chain of custody forms.

Except as otherwise specified above, the Mill will follow the procedure set out in the Mill's QAP.

Appendix L

Tailings and Slimes Drain Sampling Program,
Revision 2.1, July 30, 2012

White Mesa Uranium Mill
SAMPLING AND ANALYSIS PLAN
FOR
TAILINGS CELLS, LEAK DETECTION SYSTEMS AND SLIMES DRAINS

State of Utah
Groundwater Discharge Permit No. UGW370004

Prepared by:

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July 30, 2012

Contents

1.0 Introduction

This Sampling and Analysis Plan ("SAP") describes the procedures for sampling the tailings cells, Leak Detection Systems ("LDS") and slimes drains at the White Mesa Mill in Blanding, Utah as required under Part I.E.10 of the Groundwater Discharge Permit ("GWDP") No. UGW370004.

The objective of the tailings cell, LDS and slimes drain sampling is to collect annual samples from the locations identified below as required by the GWDP. This SAP specifies the sample collection requirements, procedures, analytical methodologies, and associated Quality Control ("QC") checks, sample handling protocols and reporting requirements for the annual tailings, LDS and slimes drain sampling program.

2.0 Sampling Frequency and Monitoring Requirements

The sampling frequency and sample monitoring requirements for the tailings cells, LDS and slimes drains are as specified in the GWDP. Sampling is required to be conducted on an annual basis in August of each year for the solutions in tailings Cells 1, 3, 4A, and 4B, the solutions in the slimes drains in Cells 2, 3, 4A, and 4B (for Cells 3, 4A, and 4B after the commencement of dewatering), the solutions in the LDS in Cells 4A and 4B and any detected solutions in the LDS in Cells 1, 2, and 3 at the time of the August sampling event. Sampling locations are shown in Attachment 1.

3.0 Field Sampling Procedures

The field sampling and data collection program will obtain samples to be analyzed for the groundwater compliance parameters listed in Table 2 of the GWDP. Analyses will be completed by a State of Utah certified laboratory using methods specified in the currently approved Denison Quality Assurance Plan ("QAP") for Groundwater. Additionally per the GWDP requirements, tailings cell, LDS and slimes drain samples will be collected and analyzed for Semivolatile Organic Compounds ("SVOCs"). Per the GWDP, the SVOCs will be analyzed by Environmental Protection Agency ("EPA") Method 8270D. Minimum detection limits or reporting limits for tailings, LDS and slimes drain samples for those analytes which have Groundwater Quality Standards (GWQSs") defined in Table 2 of the GWDP, will be less than or equal to the GWQS. The minimum detection or reporting limits for total dissolved solids ("TDS") sulfate, chloride and SVOCs are specified in the GWDP and are:

- TDS will be less than or equal to 1,000 mg/L,
- Sulfate will be less than or equal to 1,000 mg/L,
- Chloride will be less than or equal to1 mg/L, and
- SVOCs will have reporting limits less than or equal to the lower limit of quantitation for groundwater listed in Table 2 of EPA Method 8270D Revision 4, dated February 2007.

Field activities include collecting samples, recording field data and field parameters, and preparing and shipping samples to the analytical laboratory.

Sampling information will be recorded on the Tailings and Slimes Drain Field Sheet, (or its equivalent), included in Attachment 2.

Sample handling and preservation requirements for tailings cell, LDS and slimes drain samples are as specified in the QAP, except for SVOCs which are not routinely collected for any other Mill sampling program. SVOCs do not require any chemical preservation per EPA Method 8270D; however, SVOCs are required to be chilled. Receipt temperatures, for all analytes except SVOCs, are as specified in the QAP. The receipt temperature requirement for SVOCs is less than or equal to 6°C.

Sample collection procedures for tailings cell, LDS and slimes drain samples are as described below. Where more than one sampling method is described, field personnel will choose a sampling method based on field conditions and safety considerations at the time of sampling.

The gross alpha and metals sample aliquots from the tailings cells, LDSs and slimes drains will not be field filtered or field preserved due to safety concerns associated with the filtering apparatus and the backpressure created by the increased viscosity of these samples. The gross alpha and metals aliquots will be filtered and preserved by the analytical laboratory within 24 hours of receipt. Field preservation of the gross alpha and metals sample aliquots may interfere with the laboratory's ability to filter the samples upon receipt. It is important to note that field preservation of the samples is to preclude biological growth and prevent the inorganic analytes from precipitating. Based on the 2011 field data, the tailings, LDS and slimes drain samples were at a pH of 3.0 or less at the time of collection without additional preservative. The addition of preservatives in the field would add minimal if any protection from biological growth or precipitation. The VOC sample aliquots will be preserved in the field.

Clean sample containers utilized for this sampling effort will be provided by the analytical laboratory.

3.1 Tailings Cell Sampling

As noted in Section 2.0, sampling is required to be conducted on an annual basis in August of each year for the solutions in tailings Cells 1, 3, 4A, and 4B.

Tailings cell samples may be collected using a ladle, a peristaltic pump or a bailer. The procedures for each sampling method are described below. In all instances the sampling equipment will be either disposable or dedicated and decontamination procedures and rinsate blanks will not be required. Sampling equipment will be inert and non-reactive.

3.1.1 Sampling with a Peristaltic Pump

Tailings samples may be collected using a peristaltic pump. Samples collected with the peristaltic pump will be collected by extending collection tubing approximately 6 ft. from the edge of the sampling station. The tubing will be attached to a horizontal rod with sufficient tubing attached to lower the suction end of the tubing to approximately 1/3 of the distance between the liquid surface and the underlying solids. The collection tubing will be attached to a peristaltic pump. The tubing will be replaced prior to each use to preclude cross contamination and to eliminate the need for decontamination of sampling equipment. Due to the nature of the peristaltic pump, sample fluids do not come in contact with any surface other than the interior of the tubing, and decontamination of the pump or rinsate blanks is therefore not required. The sample containers will be filled directly from the peristaltic pump outflow. Field filtering and field preservation of the gross alpha and metals sample aliquots will not be required, as noted in Section 3.0.

3.1.2 Sampling with a Ladle

Tailings samples may be collected using a ladle. Samples collected with the ladle will be collected by dipping the ladle directly into the tailings solution taking care not to stir up any solids below the liquid surface. Sample bottles will be filled directly from the ladle. Ladles used for sampling will be dedicated to each location or will be disposed after each use to preclude cross contamination and to eliminate the need for decontamination of sampling equipment. Field filtering and field preservation of the gross alpha and metals sample aliquots will not be completed as noted in Section 3.0.

3.1.3 Sampling with a Bailer

Tailings samples may be collected using a disposable bailer. Samples collected with the bailer will be collected by submerging the bailer into the tailings solution and allowing it to fill, taking care not to stir up any solids below the liquid surface. The bailer will withdrawn from the tailings solution and the sample bottles will be filled directly from the bailer. Bailers used for sampling will be disposed after each use to preclude cross contamination and to eliminate the need for decontamination of sampling equipment. Field filtering and field preservation of the gross alpha and metals sample aliquots will not be required as noted in Section 3.0.

3.2 LDS Sampling

The LDS systems will be sampled as noted below.

3.2.1 Cells 1, 2 and 3 LDS

The Cells 1, 2 and 3 LDSs will only be sampled if there is fluid present during the August sampling event. If fluids are present during the annual August sampling event, samples will be collected using the dedicated pumps installed in the riser pipe. Fluid level will be measured using the electronic pressure transducers currently installed in the LDS systems in the Cells. Samples will be collected directly from the pump outflow lines into the sample containers. Field filtering and field preservation of the gross alpha and metals sample aliquots will not be required as noted in Section 3.0.

3.2.2 Cells 4A and 4B LDS

Solution from the Cell 4A and 4B LDS will be collected into a dedicated stainless steel bucket. Sample bottles will be filled from the stainless steel bucket using either the peristaltic pump or a ladle. If the peristaltic pump is used to transfer the solution to the sample bottles, the tubing in the pump will be disposed of and not reused, thereby eliminating the need for decontamination of equipment or rinsate blanks. If a ladle is used to transfer the solution to the sample bottles, the ladle will be either disposed of or will be dedicated to that location thereby eliminating the need for decontamination or rinsate blanks. Field filtering and field preservation of the gross alpha and metals sample aliquots will not be required as noted in Section 3.0.

3.3 Slimes Drain Sampling

Once a tailings cell has started de-watering procedures, a sample should be collected from the slimes drain system. At this time Cell 2 is the only slimes drain that should be sampled. The location of the slime drain for Cell 2 is depicted on Attachment 1. While Cell 3,Cell 4A and 4B are each equipped with a slimes drain sample access location, these Cells have not started dewatering and the slimes drain will not be sampled until dewatering operations are underway. Because dewatering in Cell 2 is ongoing, this cell will be included in the annual sampling effort. The Cell 2 slimes drain will be sampled using a disposable bailer.

A disposable bailer will be used to collect Cell 2 slimes drain samples and will be used to fill clean sample containers. The bailer will be disposed of and not reused, thereby eliminating the need for decontamination of equipment or rinsate blanks.

3.4 Decontamination

Decontamination of sampling equipment will be completed if non-dedicated and/or non-disposable sampling equipment is used to collect samples. Decontamination procedures will be as described in the approved QAP. Rinsate blanks will be collected daily after decontamination of sampling equipment. If disposable or dedicated sampling equipment is used to collect samples, then rinsate blanks will not be collected.

3.5 Field QC

The field QC samples generated during the annual tailings cell, LDS and slimes drain sampling event will include sample duplicates, trip blanks, and rinsate blank samples as appropriate.

3.5.1 Sample Duplicates

Sample duplicates will be collected at a frequency of one duplicate per 20 field samples. Sample duplicates will be collected by filling the sample container for a certain analytical parameter for the duplicate immediately following the collection of the parent sample for that parameter.

3.5.2 Trip Blanks

Trip blank samples will be included in every shipment of samples that has field samples to be analyzed for Volatile Organic Compounds ("VOCs"). Trip blank samples are VOC sample containers filled by the analytical laboratory with laboratory grade deionized water and shipped to the site. Trip blank samples are taken into the field with the sample containers, never opened, and kept with the field samples from collection through shipment to the analytical laboratory for analysis. Trip blanks are analyzed to determine if the sample concentration of VOCs have been effected by the "trip" from collection through shipment.

3.5.3 Rinsate Blank Samples

Rinsate blank samples are collected at a frequency of one per day when non-disposable, non-dedicated, reusable sampling equipment is used to collect samples. If the sampling equipment has a disposable component that comes in contact with the samples and the component is changed prior to sampling at each location then a rinsate blank sample will not be collected. For example, if a peristaltic pump is used to collect and filter tailings, LDS and slimes drain samples and the tubing used in the peristaltic pump is changed at each location and never reused for more than one sample, no rinsate blank sample would be required.

4.0 QA and Data Evaluation

The Permit requires that the annual tailings cell LDS and slimes drain sampling program be conducted in compliance with the requirements specified in the Mill's approved QAP, the approved SAP and the Permit itself. To meet this requirement, the data validation for the tailings cell LDS and slimes drain sampling program will utilize the requirements outlined in the QAP, the Permit and the approved SAP as applicable. The Mill QA Manager will perform a QA/QC review to confirm compliance of the monitoring program with requirements of the Permit, QAP and SAP. As required in the QAP, data QA includes preparation and analysis of field QC samples, review of field procedures, an analyte completeness review, and quality control review of laboratory data methods and data.

The QAP and the Permit identify the data validation steps and data quality control checks required for the tailings cell LDS and slimes drain monitoring program. Consistent with these requirements, the Mill QA Manager will performed the following evaluations: a field data QA/QC evaluation, a receipt temperature check, a holding time check, an analytical method check, a reporting limit check, a trip blank check, a QA/QC evaluation of sample duplicates, a gross alpha counting error evaluation and a review of each laboratory's reported QA/QC information.

The corrective action procedures described in the approved QAP will be followed as necessary when data validation and QC reviews indicate a non-compliant situation.

5.0 Laboratory Analysis

As previously stated, samples will be analyzed for the groundwater compliance parameters listed in Table 2 of the GWDP and SVOCs using the analytical methods specified in the approved QAP and EPA Method 8270D for SVOCs. The Laboratories used for the tailings cell LDS and slimes drain sampling program will be Utah certified as required by the GWDP Part 1.E.6 (c). Laboratory data will be validated as described in the approved QAP and as described in Section 4.0 above. Analytical QC is described below.

5.1 Analytical Quality Control

Analytical QC samples and protocols are described in the approved QAP. Laboratory QC procedures will meet, at a minimum, the requirements set forth in the analytical methods that the laboratory is certified for by the State of Utah.

The analytical QC samples included at least the following: a method blank, a laboratory control spike ("LCS"), a matrix spike ("MS") and a matrix spike duplicate ("MSD"), or the equivalent, where applicable. It should be noted that:

- Laboratory fortified blanks are equivalent to LCSs.
- Laboratory reagent blanks are equivalent to method blanks.
- Post digestion spikes are equivalent to MSs.
- Post digestion spike duplicates are equivalent to MSDs.
- For method E900.1, used to determine gross alpha, a sample duplicate was used instead of a MSD.

All qualifiers, and the corresponding explanations reported in the QA/QC Summary Reports for any of the analytical QC samples for any of the analytical methods will be reviewed by the Mill QA Manager. The effect on data usability will be discussed in the evaluation section of the annual report.

6.0 Reporting

A Tailings Cells Wastewater Quality Sampling Report will be included with the 3rd Quarter Groundwater Monitoring Report, due each year on December 1st.

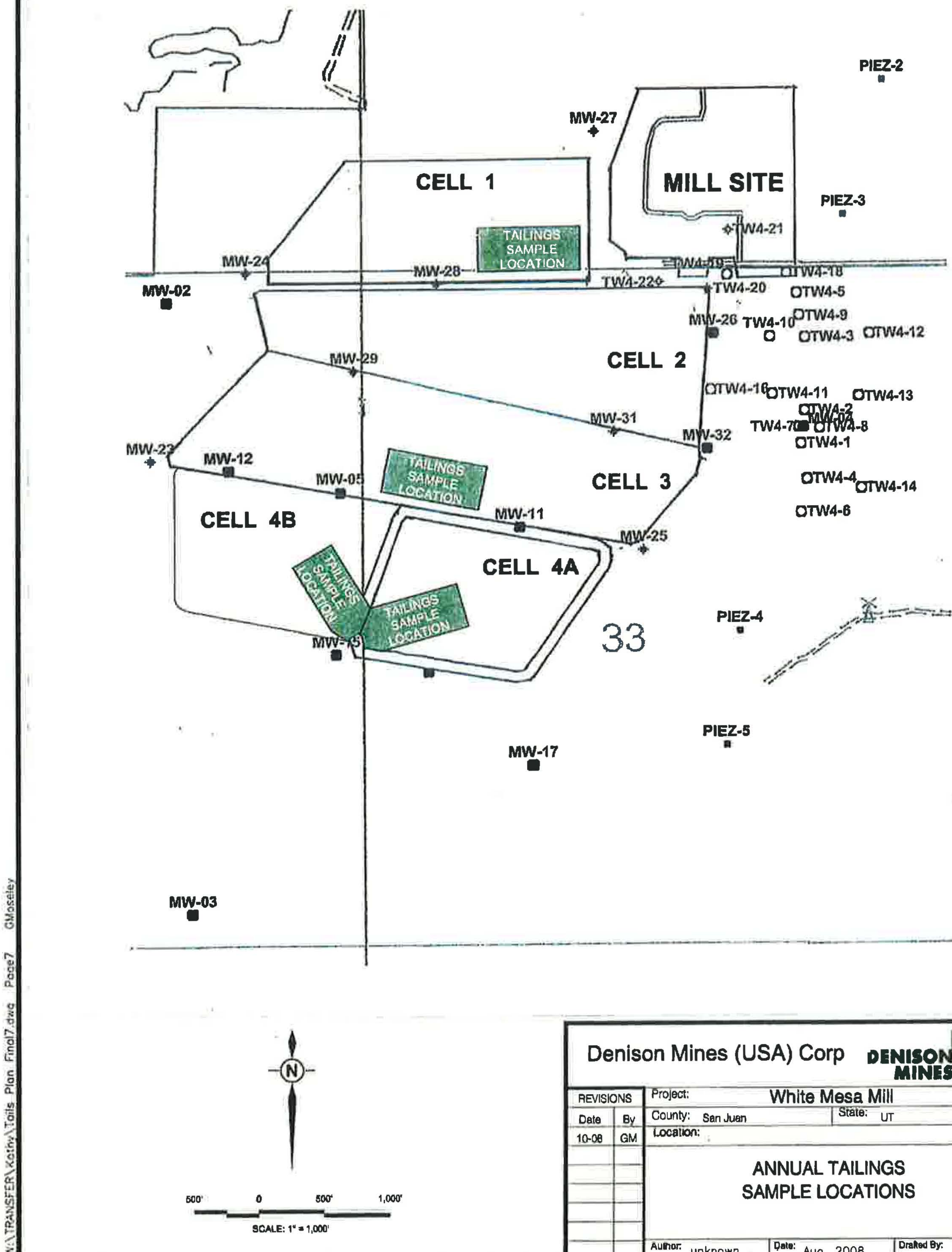
Each Tailings Cell Wastewater Sampling Report will include the following information:

- Introduction,
- A description of sampling methodology, equipment and decontamination procedures identify all quality assurance samples, e.g. trip blanks, equipment blanks, duplicate samples,
- Analytical data interpretation for each tailing cell, slimes drain, and leak detection system sample,
- A written summary and conclusions of analytical results,
- A table summarizing historic analytical results,
- A QA evaluation,
- All field data sheets accompanying the sampling event,
- Copies of the laboratory reports, and
- A "Tailings and Slime Drains System Sample Locations Map".

7.0 Agency Notification

At least 30 days advanced notice will be given to DRC prior to sampling activities described under this *Tailings and Slimes Drain Sampling Program* in order to allow the Executive Secretary to collect split samples of all tailing cell wastewater sources.

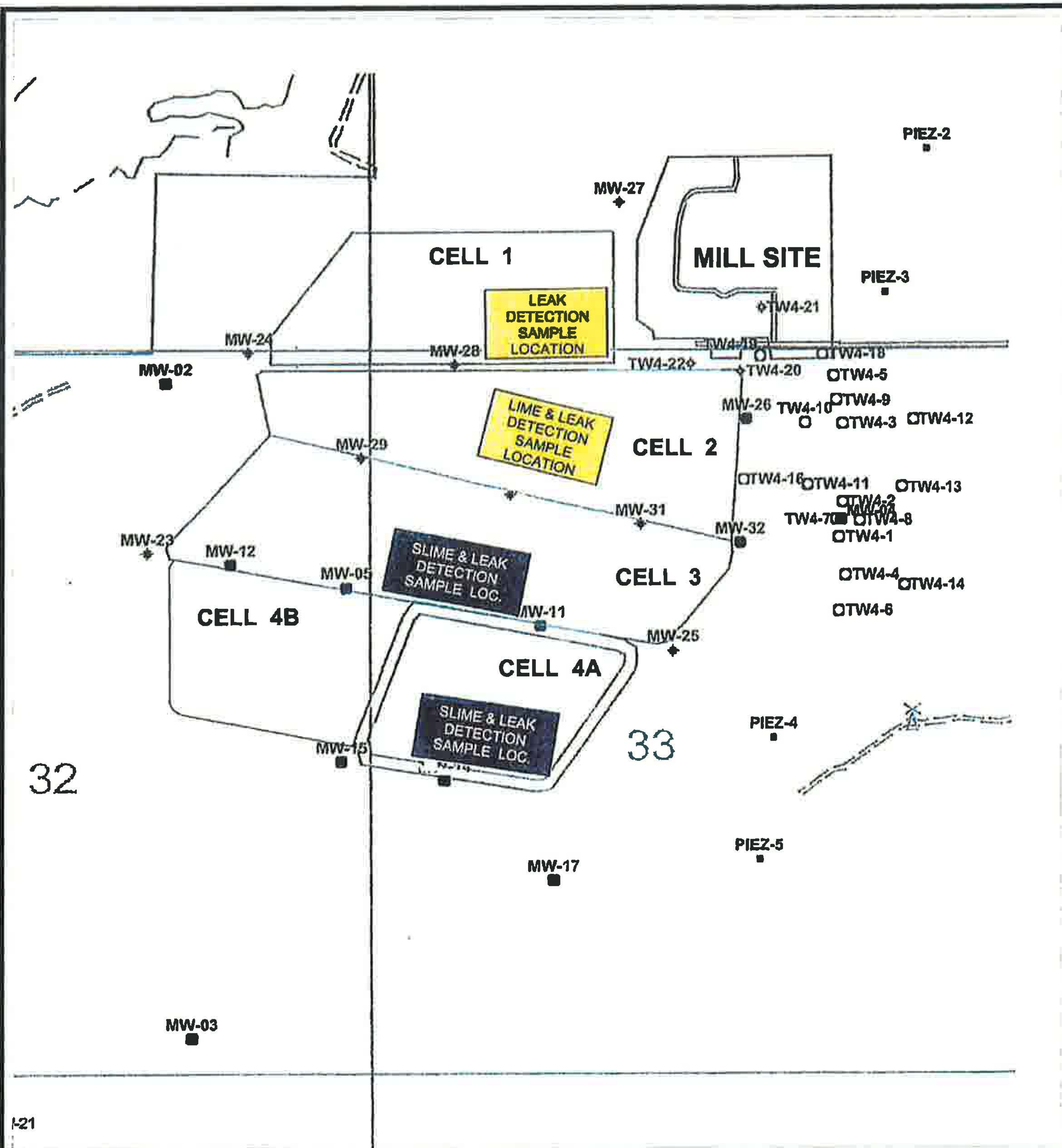
Attachment 1

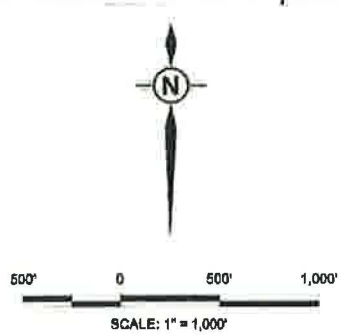


Denison Mines (USA) Corp

DENISON MINES

REVISIONS		Project: White Mesa Mill	
Date	By	County: San Juan	State: UT
10-08	GM	Location:	
		ANNUAL TAILINGS SAMPLE LOCATIONS	
		Author: unknown	Date: Aug. 2008 Drafted By:





Denison Mines (USA) Corp

DENISON MINES

REVISIONS		Project: White Mesa Mill	
Date	By	County: San Juan	State: UT
10-08	GM	Location:	

SLIMES AND LEAK DETECTION SAMPLE LOCATIONS

Author: unknown | Date: Aug. 2008 | Drafted By:

W:\TRANSFER\Kathy\Tails Plan Final6.dwg Page8 GMoseley

Attachment 2

Field Data Record-Tailings, LDS and Slimes Drain Sampling

Location: ____________________ **Sampling Personnel:**____________________

Is this a Slimes Drain? □ Yes □ No

If this is a Slimes Drain, measure depth to wastewater immediately before sampling.

DTW immediately before sampling (slimes only):__________________________

Weather Conditions at Time of Sampling:____________________________________

Field Parameter Measurements:

-pH ____

-Temperature (°C) __________________________________

Analytical Parameters/Sample Collection Method:

Parameter	Sample Taken		Filtered		Sampling Method			Lab Name
					Peristaltic Pump	Bailer	Ladle	
VOCs	□ Yes	□ No	□ Yes	□ No	□	□	□	
THF	□ Yes	□ No	□ Yes	□ No	□	□	□	
Nutrients	□ Yes	□ No	□ Yes	□ No	□	□	□	
Other Non Radiologics	□ Yes	□ No	□ Yes	□ No	□	□	□	
Gross Alpha	□ Yes	□ No	□ Yes	□ No	□	□	□	
SVOCs	□ Yes	□ No	□ Yes	□ No	□	□	□	
Conductivity	□ Yes	□ No	□ Yes	□ No	□	□	□	

QC Samples Associated with this Location:

□ Rinsate Blank

□ Duplicate

Duplicate Sample Name:__________________________

Notes:____

____

____

Appendix M

Contingency Plan, 12/11 Revision: DUSA-4

WHITE MESA URANIUM MILL

CONTINGENCY PLAN

As Contemplated by Part I.G.4(d)

of

State of Utah Groundwater Discharge Permit No.UGW370004

Prepared by:

Denison Mines (USA) Corp.
1050 17th Street, Suite 950
Denver CO 80265

December 2, 2010

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WHITE MESA URANIUM MILL
CONTINGENCY PLAN
State of Utah Groundwater Discharge Permit No. UGW370004

1.0 INTRODUCTION

The State of Utah has granted Ground Water Discharge Permit No. UGW370004 (the "GWDP") for Denison Mines (USA) Corp.'s ("Denison's") White Mesa Uranium Mill (the "Mill"). The GWDP specifies the construction, operation, and monitoring requirements for all facilities at the Mill that have a potential to discharge pollutants directly or indirectly into the underlying aquifer.

2.0 PURPOSE

This Contingency Plan (the "Plan") provides a detailed list of actions Denison will take to regain compliance with GWDP limits and Discharge Minimization Technology Plan ("DMT") and the Best Available Technology Plan ("BAT") requirements defined in Parts I.C, I.D, and I.H.4 of the GWDP. The timely execution of contingency and corrective actions outlined in this Plan will provide Denison with the basis to exercise the Affirmative Action Defense provision in Part I.G.3.c) of the GWDP and thereby avoid noncompliance status and potential enforcement action[1].

The contingency actions required to regain compliance with GWDP limits and DMT and BAT requirements defined in Parts I.C, I.D, and I.H.4 of the GWDP are described below.

3.0 GROUNDWATER CONTAMINATION

Since there are many different possible scenarios that could potentially give rise to groundwater contamination, and since the development and implementation of a remediation program will normally be specific to each particular scenario, this Plan does not outline a definitive remediation program. Rather, this Plan describes the steps that

[1] Part I.G.3.c) of the GWDP provides that, in the event a compliance action is initiated against Denison for violation of permit conditions relating to best available technology or DMT, Denison may affirmatively defend against that action by demonstrating that it has made appropriate notifications, that the failure was not intentional or caused by Denison's negligence, that Denison has taken adequate measures to meet permit conditions in a timely manner or has submitted an adequate plan and schedule for meeting permit conditions, and that the provisions of UCA 19-5-107 have not been violated.

will be followed by Denison in the event Denison is found to be out of compliance with respect to any constituent in any monitoring well, pursuant to Part I.G.2 of the GWDP.

When the concentration of any parameter in a compliance monitoring well is out of compliance, Denison will, subject to specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

3.1 Notification

Denison will notify the Executive Secretary of the out of compliance status within 24 hours after detection of that status followed by a written notice within 5 days after detection, as required under Part I.G.4.a) of the GWDP.

3.2 Continuation of Accelerated Monitoring

Denison will continue accelerated sampling for the parameter in that compliance monitoring well pursuant to Part I.G.1 of the GWDP, unless the Executive Secretary determines that other periodic sampling is appropriate, until the facility is brought into compliance, as required under Part I.G.4.b) of the GWDP.

If the accelerated monitoring demonstrates that the monitoring well has returned to compliance with respect to a parameter in a well, then, with written approval from the Executive Secretary, Denison will cease accelerated monitoring for that parameter, and will continue routine monitoring for that parameter.

3.3 Submission of Plan and Timetable

If the accelerated monitoring confirms that the Mill is out of compliance with respect to a parameter in a well, then, within 30 days of such confirmation, Denison will prepare and submit to the Executive Secretary a plan and a time schedule for assessment of the sources, extent and potential dispersion of the contamination, and an evaluation of potential remedial action to restore and maintain ground water quality to ensure that permit limits will not be exceeded at the compliance monitoring point and that DMT or BAT will be reestablished, as required under part I.G.4.c) of the GWDP. This plan will normally include, but is not limited to:

a) The requirement for Denison to prepare a detailed and comprehensive operational history of the facility and surrounding areas which explores all activities that may have contributed to the contamination;

b) A requirement for Denison to complete an evaluation, which may include geochemical and hydrogeological analyses, to determine whether or not the contamination was caused by Mill activities or was caused by natural forces or offsite activities;

c) If it is concluded that the contamination is the result of current or past activities at the Mill, Denison will prepare a Characterization Report, which characterizes the physical, chemical, and radiological extent of the ground water contamination. This will normally include a description of any additional wells to be used or installed to characterize the plume and the hydrogeologic characteristics of the affected zone, the analytical parameters to be obtained, the samples of ground water to be taken, and any other means to measure and characterize the affected ground water and contamination zone; and

d) If it is concluded that the contamination is the result of current or past activities at the Mill, Denison will evaluate potential remedial actions, including actions to restore and maintain groundwater quality to ensure that permit limits will not be exceeded at the compliance monitoring point and that DMT and BAT will be reestablished, as well as actions that merely allow natural attenuation to operate and actions that involve applying for Alternate Concentration Limits ("ACLs"). ACLs require approval of the Water Quality Board prior to becoming effective. If groundwater remediation is required, Denison will prepare and submit for Executive Secretary approval a Ground Water Remediation Plan, as described in Section 3.4 below.

3.4 Groundwater Remediation Plan

If the Executive Secretary determines that ground water remediation is needed, Denison will submit a Ground Water Remediation Plan to the Executive Secretary within the time frame requested by the Executive Secretary. The Ground Water Remediation Plan will normally include, but is not limited to:

a) A description and schedule of how Denison will implement a corrective action program that prevents contaminants from exceeding the ground water protection levels or ACLs at the compliance monitoring point(s) or other locations approved by the Executive Secretary, by removing the contaminants, treating them in place, or by other means as approved by the Executive Secretary;

b) A description of the remediation monitoring program to demonstrate the effectiveness of the plan; and

c) Descriptions of how corrective action will apply to each source of the pollution.

Denison will implement the Ground Water Remediation Plan in accordance with a schedule to be submitted by Denison and approved by the Executive Secretary.

4.0 MILL DISCHARGE VIOLATIONS – INCLUDING UNAUTHORIZED DISCHARGE OR RELEASE OF PROHIBITED CONTAMINANTS TO THE TAILING CELLS

Part I.C.2. of the GWDP provides that only 11e.(2) by-product material authorized by the Mill's State of Utah Radioactive Materials License No. UT-2300478 (the "Radioactive Materials License") shall be discharged to or disposed of in the Mill's tailings cells.

Part I.C.3 of the GWDP provides that discharge of other compounds into the Mill's tailings cells, such as paints, used oil, antifreeze, pesticides, or any other contaminant not defined as 11e.(2) material is prohibited.

In the event of any unauthorized disposal of contaminants or wastes (the "Unauthorized Materials") to the Mill's tailings cells, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

4.1 Notifications

a) Upon discovery, the Mill Manager or RSO will be notified immediately; and

b) Denison will provide verbal notification to the Executive Secretary within 24 hours of discovery followed by a written notification within five days of discovery.

4.2 Field Activities

a) Upon discovery, Mill personnel will immediately cease placement of Unauthorized Materials into the Mill's tailings cells;

b) To the extent reasonably practicable and in a manner that can be accomplished safely, Mill personnel will attempt to segregate the Unauthorized Materials from other tailings materials and mark or record the location of the Unauthorized Materials in the tailings cells. If it is not reasonably practicable to safely segregate the Unauthorized Material from other tailings materials, Mill personnel will nevertheless mark or record the location of the Unauthorized Materials in the tailings cells;

c) To the extent reasonably practicable and in a manner that can be accomplished safely, Mill personnel will attempt to remove the Unauthorized Material from the tailings cells; and

d) Denison will dispose of the removed Unauthorized Material under applicable State and Federal regulations with the approval of the Executive Secretary.

4.3 Request for Approvals and/or Waivers

If it is not reasonably practicable to safely remove the Unauthorized Materials from the tailings cells, then Denison will, in accordance with a schedule to be approved by the Executive Secretary:

a) Submit a written report to the Executive Secretary analyzing the health, safety and environmental impacts, if any, associated with the permanent disposal of the Unauthorized Material in the Mill's tailings cells;

b) Apply to the Executive Secretary for any amendments that may be required to the GWDP and the Radioactive Materials License to properly accommodate the permanent disposal of the Unauthorized Material in the Mill's tailings cells in a manner that is protective of health, safety and the environment; and

c) Make all applications required under the United States Nuclear Regulatory Commission's ("NRC's") Non-11e.(2) Disposal Policy (NRC Regulatory Issue Summary 2000-23 (November 2000), *Interim Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments)*, including obtaining approval of the Department of Energy as the long term custodian of the Mill's tailings, in order to obtain approval to permanently dispose of the Unauthorized Material in the Mill's tailings cells.

5.0 DMT VIOLATIONS

5.1 Tailings Cell Wastewater Pool Elevation Above the Maximum Elevations

Part I.D.2 and Part I.D.6.d) of the GWDP provide that authorized operation and maximum disposal capacity in each of the existing tailings cells shall not exceed the levels authorized by the Radioactive Materials License and that under no circumstances shall the freeboard be less than three feet, as measured from the top of the flexible membrane liner ("FML").

In the event that tailings cell wastewater pool elevation in any tailings cell exceeds the maximum elevations mandated by Part I.D.2 and Part I.D.6.d) of the GWDP, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Denison will provide verbal notification to the Executive Secretary within 24 hours of discovery followed by a written notification within five days of discovery;

c) Upon discovery, Mill personnel will cease to discharge any further tailings to the subject tailings cell, until such time as adequate freeboard capacity exists in the subject tailings cell for the disposal of the tailings;

d) To the extent reasonably practicable, without causing a violation of the freeboard limit in any other tailings cell, Mill personnel will promptly pump fluids from the subject tailings cell to another tailings cell until such time as the freeboard limit for the subject tailings cell is in compliance. If there is no room available in another tailings cell, without violating the freeboard limit of such other cell, then, as soon as reasonably practicable, Mill personnel will cease to discharge any further tailings to any tailings cell until such time as adequate freeboard capacity exists in all tailings cells;

e) If it is not reasonably practicable to pump sufficient solutions from the subject tailings cell to another tailings cell, then the solution levels in the subject tailings cell will be reduced through natural evaporation; and

f) Denison will perform a root cause analysis of the exceedance and will implement new procedures or change existing procedures to minimize the chance of a recurrence.

5.2 Excess Head in Tailings Cells 2, 3, 4A, and 4B Slimes Drain Systems

Part I.D.3.b)1) of the GWDP provides that Denison shall at all times maintain the average wastewater head in the slimes drain access pipe in Cell 2 to be as low as reasonably achievable, in accordance with the Mill's currently approved DMT Monitoring Plan , and that for Cell 3, this requirement shall apply only after initiation of de-watering operations. Similarly, Part I.D.6.c) of the GWDP provides that after Denison initiates pumping conditions in the slimes drain layer in Cell 4A, Denison will provide: 1) continuous declining fluid heads in the slimes drain layer, in a manner equivalent to the requirements found in Part I.D.3.b); and 2) a maximum head of 1.0 feet in the tailings (as measured from the lowest point of the upper FML) in 6.4 years or less.

In the event that the average wastewater head in the slimes drain access pipe for Cell 2 or, after initiation of de-watering activities, Cell 3 or initiation of pumping conditions in the slimes drain layer in Cell 4A exceeds the levels specified in the DMT Monitoring Plan, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Mill personnel will promptly pump the excess fluid into an active tailings cell, or other appropriate containment or evaporation facility approved by the Executive Secretary;

c) If the exceedance is the result of equipment failure, Mill personnel will attempt to repair or replace the equipment;

d) If the cause of the exceedance is not rectified within 24 hours, Denison will provide verbal notification to the Executive Secretary within the ensuing 24 hours followed by a written notification within five days; and

e) If not due to an identified equipment failure, Denison will perform a root cause analysis of the exceedance and will implement new procedures or change existing procedures to minimize the chance of a recurrence.

5.3 Excess Cell 4A Leak Detection System Fluid Head or Daily Leak Rate

Part I.D.6.a) provides that the fluid head in the Leak Detection System ("LDS") for Cell 4A shall not exceed 1 foot above the lowest point in the lower membrane liner, and Part I.D.6.b) of the GWDP provides that the maximum allowable daily leak rate measured in the LDS for Cell 4A shall not exceed 24,160 gallons/day.

In the event that the fluid head in the LDS for Cell 4A exceeds 1 foot above the lowest point in the lower membrane layer or the daily leak rate measured in the Cell 4A LDS exceeds 24,160 gallons/day, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Mill personnel will promptly pump the excess fluid into an active tailings cell, or other appropriate containment or evaporation facility approved by the Executive Secretary, until such time as the cause of exceedance is rectified or until such time as otherwise directed by the Executive Secretary;

c) If the exceedance is the result of equipment failure, Mill personnel will attempt to repair or replace the equipment;

d) If the cause of the exceedance is not rectified within 24 hours, Denison will provide verbal notification to the Executive Secretary within the ensuing 24 hours followed by a written notification within five days; and

e) If not due to an identified equipment failure, Denison will perform a root cause analysis of the exceedance and will implement new procedures or change existing procedures to remediate the exceedance and to minimize the chance of a recurrence.

5.4 Excess Cell 4B Leak Detection System Fluid Head or Daily Leak Rate

Part I.D.13.a) provides that the fluid head in the Leak Detection System ("LDS") for Cell 4B shall not exceed 1 foot above the lowest point in the lower membrane liner, and Part I.D.13.b) of the GWDP provides that the maximum allowable daily leak rate measured in the LDS for Cell 4B shall not exceed 26,145 gallons/day.

In the event that the fluid head in the LDS for Cell 4B exceeds 1 foot above the lowest point in the lower membrane layer or the daily leak rate measured in the Cell 4B LDS exceeds 26,145 gallons/day, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Mill personnel will promptly pump the excess fluid into an active tailings cell, or other appropriate containment or evaporation facility approved by the Executive Secretary, until such time as the cause of exceedance is rectified or until such time as otherwise directed by the Executive Secretary;

c) If the exceedance is the result of equipment failure, Mill personnel will attempt to repair or replace the equipment;

d) If the cause of the exceedance is not rectified within 24 hours, Denison will provide verbal notification to the Executive Secretary within the ensuing 24 hours followed by a written notification within five days; and

If not due to an identified equipment failure, Denison will perform a root cause analysis of the exceedance and will implement new procedures or change existing procedures to remediate the exceedance and to minimize the chance of a recurrence.

5.5 Excess New Decontamination Pad Leak Detection System Fluid Head

In order to ensure that the primary containment of the New Decontamination Pad water collection system has not been compromised, and to provide an inspection capability to detect leakage from the primary containment in each of the three settling tanks, a vertical inspection portal has been installed between the primary and secondary containment of each settling tank.

Section 3.1(e) of the Mill's DMT Monitoring Plan provides that the fluid head in the LDS for the New Decontamination Pad shall not exceed 0.10 feet above the concrete floor in any of the three standpipes. Compliance is defined in Part I.D.14 a) of the GWDP as a depth to standing water present in any of the LDS access pipes of more than or equal to 6.2 feet as measured from the water measuring point (top of access pipe).

In the event that the fluid head in the standpipe for a settling tank exceeds 0.10 feet above the concrete floor in the standpipe, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Denison will provide verbal notification to the Executive Secretary within the ensuing 24 hours followed by a written notification within five days;

c) Mill personnel will promptly pump the fluid from the settling tank's LDS as well as the fluids in the settling tank into another settling tank or into an active tailings cell, or other appropriate containment or evaporation facility approved by the Executive Secretary, until such time as the cause of the exceedance is rectified or until such time as otherwise directed by the Executive Secretary; and

d) Denison will perform a root cause analysis of the exceedance and, if appropriate, will implement new procedures or change existing procedures to remediate the exceedance and to minimize the chance of a recurrence.

5.6 Cracks or Physical Discrepancies on New Decontamination Pad Wash Pad.

Soil and debris will be removed form the wash pad of the NDP in accordance with the currently approved DMT Monitoring Plan. In the event that cracks of greater than 1/8 inch (width) are observed on the concrete wash pad, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) The NDP shall be taken out of service and the cracks will be repaired utilizing industry standard materials and procedures appropriate for the defect within five working days of discovery. Following recommended cure times, the cracks or deficiencies will be re-inspected and, if acceptable, the NDP will be placed back into service.

c) A record of the repairs will be maintained as a part of the inspection records at the White Mesa Mill.

5.7 Excess Elevation For Tailings Solids

Part I.D.3.c) of the GWDP provides that upon closure of any tailings cell, Denison shall ensure that the maximum elevation of the tailings waste solids does not exceed the top of the FML.

In the event that, upon closure of any tailings cell, the maximum elevation of the tailings waste solids exceeds the top of the FML, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Denison will provide verbal notification to the Executive Secretary within 24 hours of discovery followed by a written notification within five days of discovery;

c) To the extent reasonably practicable, without causing a violation of the freeboard limit in any other tailings cell, Mill personnel will promptly remove tailings solids from the subject tailings cell to another tailings cell, or other location approved by the Executive Secretary, until such time as the maximum elevation of the tailings waste solids in the subject tailings cell does not exceed the top of the FML; and

d) Denison will perform a root cause analysis of the exceedance and will implement new procedures or change existing procedures to minimize the chance of a recurrence.

5.8 Roberts Pond Wastewater Elevation

Part I.D.3.e) of the GWDP provides that the Permittee shall operate Roberts Pond so as to provide a minimum 2-foot freeboard at all times and that under no circumstances shall the water level in Roberts Pond exceed an elevation of 5,624 feet above mean sea level.

In the event that the wastewater elevation exceeds this maximum level, Denison shall remove the excess wastewater and place it into containment in Tailings Cell 1 within 72 hours of discovery, as specified in Part I.D.3.e) of the GWDP.

In the event that, Denison fails to remove the excess wastewater within 72 hours of discovery, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately; and

b) Denison will provide verbal notification to the Executive Secretary within 24 hours of discovery followed by a written notification and proposed corrective actions within five days of discovery.

5.9 Feedstock Storage Area

Part I.D.3.f) and Part I.D.11 of the GWDP provide that open-air or bulk storage of all feedstock materials at the Mill facility awaiting Mill processing shall be limited to the eastern portion of the Mill site area described in Table 4 of the GWDP, and that storage of feedstock materials at the facility outside that area shall be performed in accordance with the provisions of Part I.D.11 of the GWDP.

In the event that, storage of any feedstock at the Mill is not in compliance with the requirements specified in Part I.D.3.f) and Part I.D.11 of the GWDP, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Denison will provide verbal notification to the Executive Secretary within 24 hours of discovery followed by a written notification within five days of discovery;

c) Mill personnel will:

(i) move any open-air or bulk stored feedstock materials to the portion of the Mill site area described in Table 4 of the GWDP;

(ii) ensure that any feedstock materials that are stored outside of the area described in Table 4 of the GWDP are stored and maintained in accordance with the provisions of Part I.D.11 of the GWDP; and

(iii) to the extent that any such containers are observed to be leaking, such leaking containers will be placed into watertight over-pack containers or otherwise dealt with in accordance with the provisions of Part I.D.11 of the GWDP, and any impacted soils will be removed and will be deposited into the Mill's active tailings cell; and

d) Denison will perform a root cause analysis of the non-compliant activity and will implement new procedures or change existing procedures to minimize the chance of a recurrence.

5.10 Mill Site Chemical Reagent Storage

Part I.D.3.g) of the GWDP provides that for all chemical reagents stored at existing storage facilities, Denison shall provide secondary containment to capture and contain all volumes of reagent(s) that might be released at any individual storage area, and that for any new construction of reagent storage facilities, the secondary containment and control shall prevent any contact of the spilled reagent with the ground surface.

In the event that Denison fails to provide the required secondary containment required under Part I.D.3.g) of the GWDP, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Denison will provide verbal notification to the Executive Secretary within 24 hours of discovery followed by a written notification within five days of discovery; and

c) Denison will promptly remediate any spilled re-agent resulting from the failure to provide the required secondary containment under Part I.D.3.g) of the GWDP, by removal of the contaminated soil and disposal in the active tailings cell.

5.11 Failure to Construct as per Approval

Part I.D.4 of the GWDP provides that any construction, modification, or operation of new waste or wastewater disposal, treatment, or storage facilities shall require submittal of engineering design plans and specifications, and prior Executive Secretary review and approval, and that a Construction Permit may be issued.

In the event that, any new waste or wastewater disposal, treatment, or storage facilities are constructed at the Mill facility without obtaining prior Executive Secretary review and approval, or any such facilities are not constructed in accordance with the provisions of any applicable Construction Permit, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately; and

b) Denison will provide verbal notification to the Executive Secretary within 24 hours of discovery followed by a written notification and proposed corrective actions within five days of discovery.

5.12 Failure to Comply with Stormwater Management and Spill Control Requirements

Part I.D.10 of the GWDP provides that Denison will manage all contact and non-contact stormwater and control contaminant spills at the Mill facility in accordance with the currently approved Stormwater Best Management Practices Plan.

In the event that any contact or non-contact stormwater or contaminant spills are not managed in accordance with the Mill's approved Stormwater Best Management Practices Plan, Denison will, subject to any specific requirements of the Executive Secretary as set forth in any notice, order, remediation plan or the equivalent, implement the following process:

a) Upon discovery, the Mill Manager or RSO will be notified immediately;

b) Denison will provide verbal notification to the Executive Secretary within 24 hours of discovery followed by a written notification and proposed corrective actions within five days of discovery; and

c) To the extent still practicable at the time of discovery, Denison will manage any such contaminant spill in accordance with the Mill's approved Stormwater Best Management Practices Plan. To the extent it is no longer practicable to so manage any such spill, Denison will agree with the Executive Secretary on appropriate clean up and other measures.

Appendix N

White Mesa Mill Containerized Alternate Feedstock Material Storage Procedure, PBL-19, Revision: 1.0, December 18, 2012

1.0 Purpose

The purpose of this procedure is to assure that storage of feedstock material is conducted in a manner so as to preclude the release of Mill feed material to the environment.

2.0 Scope

Feed materials delivered to the White Mesa Mill must be stored in a manner which precludes the release of the materials to the environment. In the case of bulk materials, such as unrefined natural ores and alternate feeds delivered in inter-modal containers, these materials are offloaded from the truck or shipping container directly onto the approved ore pad where migration of material is precluded by the pad's design and operating procedures (i.e. low permeability pad material, dust control procedures and limited stockpile height). However, certain feeds are received in drums or other containers which serve to effectively contain the material during storage and, as such, are amenable for storage either on the ore pad or at locations other than the ore pad. It is the intent of this procedure to describe the environmental safety precautions utilized for contained feed storage.

3.0 Procedure

3.1 Contained Feed Material Inspections

All contained feed materials received at the White Mesa Mill are inspected upon arrival to determine that the containers are not leaking and to assure container integrity prior to placing the material into storage. Each container will be observed on all sides for damage or leakage of contents. All containers exhibiting signs of leakage will be re-packed or placed in over-pack containers prior to placing the materials into storage. Dented drums are acceptable if the dent is not located near a seam or when the dent is not accompanied by a damage crease on the drum surface. Drums damaged by dents near the seam, crease damaged drums or containers that have been otherwise compromised during shipment are re-packed or placed in over-pack containers prior to storage. Containers which are not damaged at the time of receipt are transferred directly for placement at the storage location.

3.2 Storage Locations

3.2.1 Defined Feedstock Storage

Feedstock materials stored at the defined storage location indicated on the map attached hereto as Attachment A) the "Defined Feedstock Area" can be stored in containers or in bulk form and are subject to the routine inspections described by the White Mesa Mill Tailings Management System Discharge Minimization Technology (DMT) Monitoring Plan in Section 3.3 of the Mill's Environmental Protection Manual.

3.2.2 Storage of Contained Feeds in Location Other Than the Defined Feedstock Area

a) Over-pack Containers

Materials received or transferred into over-pack containers can be stored at locations other than the Defined Feedstock Area absent a hardened ground surface or containment berms due to the fact that the over-pack container provides a secondary containment for the packaged material. Over-pack materials are subject to the routine inspections described by the White Mesa Mill Tailings Management System Discharge Minimization Technology (DMT) Monitoring Plan at Section 3.3.

b) Hardened Surface Storage Locations

Contained feed materials, including materials in containers which have not been provided with over-pack protection, can be stored at locations other than the Defined Feedstock Area when a hardened ground surface storage location is used and has been provided with containment berms. These materials are subject to the routine inspections described by the White Mesa Mill Tailings Management System Discharge Minimization Technology (DMT) Monitoring Plan at Section 3.3.

c) Single Lined Containers Stored Outside the Defined Feedstock Area Where Hardened Surfaces and Containment Berms Are Not Utilized

Contained feeds can also be stored in locations, other than the Defined Feedstock Area, that have been selected to avoid impact by site drainage and/or pooling. Prior to storage at these locations, planks or pallets are placed beneath the drum storage locations in order to raise the container from the ground surface and avoid corrosion from water which may accumulate during precipitation events (despite site selection) and from rusting due to soil moisture when drums are stored directly on the ground. These contained materials are subject to the more particular storage protocols and inspections outlined below.

3.3 Storage Protocol Single Lined Containers

In accordance with MSHA requirements, container storage must be implemented in such a manner as t limit the potential for a container to tip or fall onto a worker. For drummed materials, the agency limits such stacks to three drums in height due to stability considerations. In keeping with these concerns, Denison will configure single lined storage drums (stored off the Designated Feedstock Area) in rows no more than two containers wide at the base and may place a one-container row either on top of a single row or in the middle of a lower two-container row, in each case so as to straddle the tops of drums in the lower container row(s). This stacking configuration distributes the single upper row across bottom row(s) of containers in such a manner as to hold the bottom row(s) from leaning and allowing for limited stacking on top of these lower row(s). accordingly, when stacking is necessary, this configuration minimizes the risk of falling drums, limits stacking height for safety reasons and allows for a thorough inspection of each of the individual containers from the outside of the container row(s).

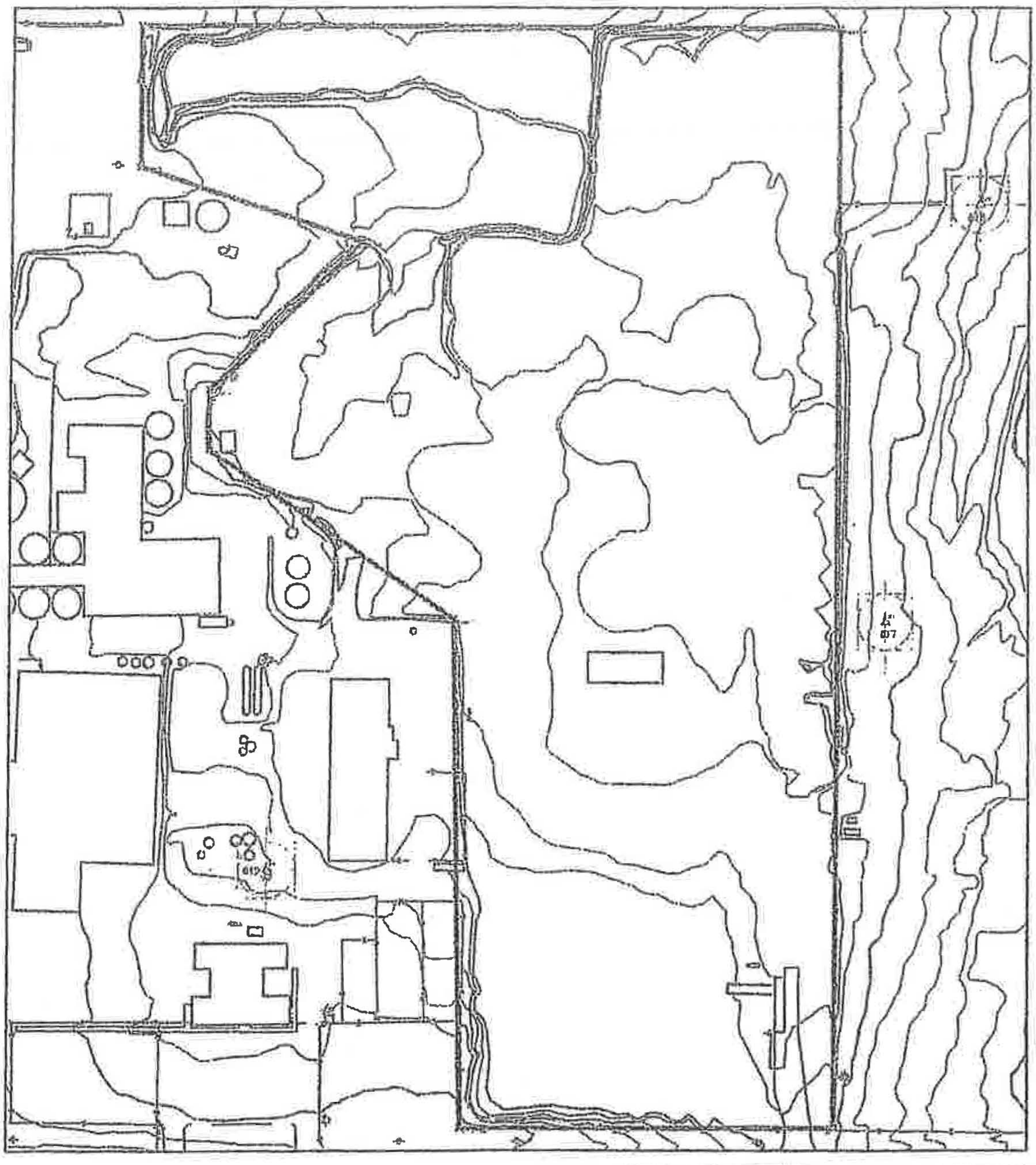
3.4 Single Lined Container Storage Area Inspections

The single lined container storage area(s) that are off of the Designated Feedstock Area will be inspected on a weekly basis (and after significant precipitation events) on both sides of any row in order to assure that the stored materials remain intact, that standing water has not accumulated and that materials are not leaking or migrating from the storage area.

3.5 Single Lined Container Storage Inspection Records

Denison will record all instances where single lined containers are received damaged (or leaking) and require re-packing or the provision of an over-pack container. This information will be recorded on a container receipt form (see Attachment B) which documents the receipt of drummed materials to be stored in locations other than the Defined Feedstock Area. Similarly, each weekly inspection shall be recorded on the inspection form referred to in the White Mesa Mill Tailings Management System Discharge Minimization Technology (DMT) Monitoring Plan at Attachment A-3 and attached as Attachment C to this procedure. Such inspections require the documentation of container condition, the drainage conditions in the storage location, the presence of leakage, if any, and any corrective actions taken due to leakage of containers or standing water at the storage location.

Attachment A



Denison Mines (USA) Corp.				
Project	WHITE MESA MILL			
REVISIONS		County:	State: UT	
Date	By	Location:		
02/26/07	BM	Feedstock Storage Area Map		
		Scale: N/A	Date: 08/03/2006	wm_ore_pad.dwg
		Author: bm	Drafted By: bm	

Z:\White Mesa Mill\2007 License Renewal Application\Figures\wm_ore_pad.dwg, Appendix B, 02/26/2007 9:27:40 AM, Adobe PDF, Letter

Attachment B

Containerized Alternate Feed Receipt

Inspection

Date: ______________________

Inspector: ____________________

Number of containers/drums in shipment: __________________

Radiation Activity Levels: ______________________

Location of Storage: ___________________________

Observations (note dented or damaged drums):

____

____

____

____

____

Corrective Action Taken for Damaged Drums:

____

____

____

____

____

____

Inspector Signature

Attachment C

ATTACHMENT A-3

ORE STORAGE/SAMPLE PLANT WEEKLY INSPECTION REPORT

Week of ________ through ________ Date of Inspection:________________

Inspector:________________________

Weather conditions for the week:

____
____
____

Blowing dust conditions for the week:

____
____
____
____

Corrective actions needed or taken for the week:

____
____
____
____

Are all bulk feedstock materials stored in the area indicated on the attached diagram:
yes:_______ no:_______
comments:____
____

Are all alternate feedstock materials located outside the area indicated on the attached diagram maintained within water-tight containers:
yes:_______ no:_______
comments (e.g., conditions of containers):____________________________________
____
____

Are all sumps and low lying areas free of standing solutions?
Yes: _______ No: _______
If "No", how was the situation corrected, supervisor contacted and correction date?
____
____

Is there free standing water or water running off of the feedstock stockpiles?
Yes: ______ No: ______
Comments:____

Other comments:

Appendix O

White Mesa Mill Chemical Inventory

Location Key

Chem Lab	CL
Maintenance Shop/Warehouse	MSW
Bulk Around the Mill	Mill

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm^3 ~1 mL***	***Quantity***	***Unit***
1,10 Phenanthroline	90	g	1.25	72	mL	200	g
1,10 Phenanthroline Ferrous Sulfate	3,400	g	*			9	kg
1,2-Cyclohexylene Dinitrilo Tetraacetic Acid	50	g	1.48	34	mL	200	g
1,4 Dioxane	12,360	g	1.03	12,000	mL	47	L
1,5 Diphenylcarbazone	20	g	1.19	17	mL	20	g
1-Amino-2-Naphthol-4-Sulfonic Acid	25	g	1.627	15	mL	10	g
1-Butanol	3,240	g	0.81	4,000	mL	20	L
1-Ethyl-2((1,4dimethyl-2-phenyl-6-pyrimidinylidenemethal) Quinolinium Chloride	1	g	*			5	g
1-Hydroxyethylidene diphosphoric acid	435	g	1.45	300	mL	10	g
3, 6-disulfonic Acid Disodium Salt	0	g		0	mL	40	g
2-(5-Bromo-2-pyridylazo)-5-(diethylamino)phenol	5	g	*			5	g
2,2-BiPyridine	10	g	1.106	9	mL	1	L
2-Butoxy ethanol	38	lb	0.9012	5	gal	20	L
2-Carboxy-2'-hydroxy-5'-Sulfoformazyl	0	g		0	mL	5	g
2-Propanol (Isopropanol)	104,625	g	0.785	16,000	mL	18	L
3,6-Disulfaric- Acid Disodium	0	g		0	mL	10	g
3-(i-decoxy) Propanoic Acid	0	g		0	mL	0.1	L
3-(n-octoxy-n-decoxy) Propanoic Acid			*	100	mL	0.1	L
4,4,4- Trifluoro-1-(2-Thienyl)-1,3-Butenediane	50	g	1.415	35	mL	50	g
4-amine-1-naphthalene Sulfuric Acid	0	g		0	mL	0.1	L
4-Amino-2-Naphthalene-Sulfonic Acid	25	g	1.502	17	mL	25	g
5-(4-Dimethylaminobenzylidene) Rhodamine	10	g	1.368	7	mL	10	g
8-Hydroxyquinoline	1,900	g	1.034	1,838	mL	2	kg
Acetic Acid	0	g	1.049	0	mL	170	L
Acetic Anhydride	2,052	g	1.08	1,900	mL	34	L
Acetone	1,225	g	0.79	1,550	mL	252	L
Acrysol II-935			*	500	mL	1	L
Adogen 2382	180	g	0.898	200	mL	1	L

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill						Historic volume or mass used (1978 - 2013)	
Chemical Name	*Quantity*	*Unit*	*Density g/cm3*	*Volume*	*$1 cm^3$ ~1 mL*		*Quantity*	*Unit*
Adogen 283	898	g	0.898	1,000	mL		1	L
Adogen 382	359	g	0.898	400	mL		1	L
AF 9000			*	1,000	mL		1	L
Alamine 308			*	800	mL		8	L
Alamine 310			*	1,500	mL		8	L
Alcohol Solvent, Denatured	8,982	g	0.791	11,355	mL		40	L
Alcohol, Alfol 12LE	1,660	g	0.83	2,000	mL		1	L
Alcohol, n-Amyl	0	g		0	mL		1	L
Alcohol, Reagent	28	kg	0.79	35	L		4,156	L
Aliquat 336	1	g	0.88	1	L		1	L
Alizarin Red	25	g	1.06	24	mL		30	g
Alizarin Yellow	10	g	*				10	g
Aluminum 1000 mg/L	500	g	1	500	mL		7	L
Aluminum Chloride	800	g	2.44	328	mL		1	kg
Aluminum Hydroxide	500	g	2.4	208	mL		1.5	kg
Aluminum Metal, granular	750	g	2.7	278	mL		1	kg
Aluminum Nitrate Solution	104,099	g	1.1	25	gal		385	gal
Aluminum Nitrate, Nonahydrate	98,000	g	1.058	92,628	mL		100	kg
Aluminum Potassium Sulfate 12 Hydrate Crystal	500	g	1.757	285	mL		0.5	kg
Aluminum Powder	300	g	2.7	111	mL		5	kg
Aluminum Reagent 2			*	56	mL		0.06	L
Aluminum STD 5000 ppm	0	g		0	mL		5	L
Aluminum Sulfate Crystal	250	g	1.69	148	mL		1	kg
Aluminum Wire	400	g	2.7	148	mL		0.5	kg
Amberlite	500	g	1.02	490	mL		0.5	kg
AMCO Clear Turbidity 1.0 NTU	100	g	1	100	mL		16	L
AMCO Clear Turbidity 10 NTU	4,000	g	1	4,000	mL		16	L
AMCO Clear Turbidity 100 NTU	4,000	g	1	4,000	mL		16	L
AMCO Clear Turbidity 1000 NTU	4,000	g	1	4,000	mL		16	L
Ammonia Standard	0	g		0	mL		1	L
Ammonium 1-Pyrrolidine Carbodithioate	25	g	*				30	g
Ammonium Acetate	3,000	g	1.07	2,804	mL		3	kg
Ammonium Bicarbonate	11,150	g	1.586	7,030	mL		12	kg
Ammonium Bifluoride	4,536	g	1.5	3,024	mL		5	kg
Ammonium Chloride	5,268	g	1.52	3,466	mL		10	kg
Ammonium Fluoride	1,600	g	1.11	1,441	mL		2	kg

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
Chemical Name	*Quantity*	*Unit*	*Density g/cm3*	*Volume*	*1cm³ ~1 mL*	*Quantity*	*Unit*
Ammonium Hydroxide	38,165	g	0.898	42,500	mL	64	L
Ammonium Iodide	4,000	g	2.51	1,594	mL	4	kg
Ammonium Meta-Vanadate	650	g	2.32	280	mL	0.8	kg
Ammonium Molybdate-4-Hydrate Crystal	2,300	g	2.498	921	mL	3	kg
Ammonium Nitrate	11,022	g	1.72	6,408	mL	7.5	kg
Ammonium Oxalate	19,300	g	1.5	12,867	mL	33	kg
Ammonium Peroxy Disulfate	3,000	g	1.98	1,515	mL	3	kg
Ammonium Persulfate	2,100	g	1.98	1,061	mL	200	g
Ammonium Phosphate Monobasic	5	lbs	*			3	kg
Ammonium Sulfate	9,000	g	1.77	5,085	mL	42	kg
Ammonium Thiocyanate	20,100	g	1.3	15,462	mL	30	kg
Ammonium Vanadate	7,000	g	2.32	3,017	mL	1	kg
Anion Exchange Resin	450	g	0.7	643	mL	0.5	kg
Antimony Potassium Tartrate	500	g	2.6	192	mL	0.5	kg
Antimony Powder	5	g	6.69	1	mL	5	g
Arsenic 1000 mg/L	631	g	1.01	625	mL	5.5	L
Arsenic Trioxide	2,002	g	3.738	536	oz.	5,010	g
Ascarite	908	g	0.9	1,009	mL	10	kg
Barbituric Acid	100	g	1.455	69	mL	100	g
Barium 1000 mg/L	0	g	1.013	0	mL	0.125	L
Barium 5000 ppm STD	0	g		0	mL	2	L
Barium Chloranilate	20	g	*			25	g
Barium Chloride	6,800	g	3.856	1,763	mL	63	kg
Barium DiPhenyl amine sulfonate	10	g	*			5	g
Barium Hydroxide Monohydrate	454	g	3.743	121	mL	10	kg
Barium Nitrate	908	g	3.23	281	mL	1	kg
Barlene, 310 I	394	g	0.787	500	mL	0.5	L
Bentonite	2,500	g	2.4	1,042	mL	2.5	kg
Benzaldehyde	4,166	g	1.0415	4,000	mL	4	L
Benzoic Oxime	700	g	1.13	619	mL	1	kg
Beryllium 1000 mg/L			*	250	mL	250	mL
Beryllium Sulfate	113	g	2.443	46	mL	0.2	kg
Bismuth Powder	20	g	9.8	2	mL	20	g
Boron 1000 mg/L	0	g		0	mL	1	L
Boraxo	0	g	1.73	0	mL	25	kg
Boric Acid	30,000	g	1.435	20,906	mL	10	kg
Boron 1000 mg/L	0	g	1	0	mL	0.5	L

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm^3 ~1 mL***	***Quantity***	***Unit***
Brake Fluid	974	g	1.03	946	mL	1	L
Bromine			*	50	mL	0.1	L
Bromo Padap	5	g	1.39	4	mL	5	g
Bromo Thymol blue	60	g	1.25	48	mL	100	g
Bromocresol Green	5	g	0.981	5	mL	10	g
Bromophenol blue	68	g	0.954	71	mL	310	g
Bromothymol Blue	0	g		0	mL	40	g
Brucine Sulfate	10	g	*			10	g
buffer solution 1 PH	0	g		0	mL	158	L
buffer solution 1.65 PH	0	g		0	mL	10	L
buffer solution 10 PH	38,000	g	1	38,000	mL	158	L
buffer solution 12.45 PH	0	g		0	mL	2	L
Buffer Solution 2 pH	1,900	g	1	1,900	mL	147	L
Buffer Solution 4 pH	3,800	g	1	3,800	mL	210	L
Buffer Solution 7 pH	2,000	g	1	2,000	mL	194.5	L
Burco LAF- 180			*	400	mL	1	L
Burco LAF-6	400	g	1	400	mL	1	L
Cadmium 1000 mg/mL			*	500	0	0.5	L
Cadmium 5000 ppm STD	0	g		0	mL	2	L
Cadmium Metal	500	g	8.64	58	mL	0.5	kg
Cadmium Nitrate	454	g	2.455	185	mL	0.5	kg
Cadmium Powder	10	g	8.64	1	mL	0.5	kg
Calcium	25	g	1.54	16	mL	25	g
Calcium 1000 mg/L	300	g	1	300	mL	6.5	L
Calcium Acetate	453	g	1.5	302	mL	0.5	kg
Calcium Carbonate	24,100	g	2.93	8,225	mL	100	g
Calcium Chloride Dihydrate	2,500	g	1.71	1,462	mL	3	kg
Calcium Chloride, Anhydrous	1,500	g	1.086	1,381	mL	2	kg
Calcium Cyanide	1,000	g	1.853	540	mL	4	kg
Calcium Fluoride	950	g	3.18	299	mL	3	kg
Calcium Hydroxide	3,100	g	2.24	1,384	mL	10	kg
Calcium Nitrate	2,768	g	2.36	1,173	mL	3	kg
Calcium Oxide	4,268	g	3.3	1,293	mL	5	kg
Calcium Sulfite	3,000	g	2.5	1,200	mL	4	kg
Calumet 400-500 solvent	3,000	g	0.83	2	L	4	L
Carbons, Granular	16,500	g	0.95	17,368	mL	1	kg
Gwar Carboxy Methyl	720	g	*			1	kg
Carminic Acid	10	g	1.87	5	mL	10	g

Appendix O-1
Laboratory Chemical Inventory

Chemical Name	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
	Quantity	Unit	Density g/cm3	Volume	$1cm^3$ ~1 mL	Quantity	Unit
Caustlag	0	g		0	mL	3	kg
Ceric Ammonium Sulfate Dihydrate	2,020	g	*			3	kg
Ceric Sulfate	500	g	3.01	166	mL	3	kg
Cerium Oxalate	0	g		0	mL	1	kg
Cesium Nitrate	5	g	3.685	1	mL	5	g
Chem – FAC 100			*	250	mL	0.25	L
Chesterton Moisture Shield	397	g	0.8	496	mL	0.5	kg
Chloramine-T-Hydrate	10	g	1.4	7	mL	25	g
Chloride standard	0	g	1	0	mL	1	L
Chloroform	1,484	g	1.484	1,000	mL	1978	L
Chromium 1000 mg/L	70	g	1	70	mL	1.5	L
Chromium 5000 mg/L	100	g	1	100	mL	2	L
Chromium Cr 6 Standard	0	g	2.7	0	mL	0.125	L
Chromium Trioxide	100	g	2.7	37	mL	0.5	kg
Citric Acid Anhydrous	5,100	g	1.542	3,307	mL	10	kg
Citric Acid Monohydrate	0	g		0	mL	1	kg
Cobalt Chloride	250	g	3.35	75	mL	25	g
Cobalt Metal	600	g	1.03	583	mL	1	kg
Cobalt Nitrate 6-Hydrate	500	g	1.88	266	mL	0.5	kg
Cobalt Powder	5	g	8.9	1	mL	5	g
Compressed Gas (Argon)	6,000	cf	*			497,364	cf
Compressed Gas (Nitrogen)	5,500	cf	*			152,775	cf
Compressed Gas (Helium)	10,000	cf	*			30,583	cf
Compressed Gas (oxygen)	5	cf	*			1,600	cf
Compressed Gas (Ammonia Anhydrous)	8	cf	*			1,600	cf
Compressed Gas Acetylene	0	cf				1,600	cf
Compressed Gas Nitrous Oxide	0	cf				1,600	cf
Compressed Gas Propane	500	cf	*			17,829	cf
Conductivity Calibration Standard, NIST Traceable	927	g	1.03	900	mL	32	L
Conductivity Traceable 1,000 µS	9,500	g	1	9,500	mL	26	L
Conductivity Traceable 150,000 µS	1,000	g	1	1,000	mL	1	L
Conostan 75 base oil for AA diluent	0	g		0	mL	1	L
Contrad 70	21,200	g	1.06	20,000	mL	20	L
Copper	430	g	8.92	48	mL	1	kg
Copper 1000 mg/L	203	g	1.014	200	mL	3	L
Corn Starch	454	g	0.67	678	mL	5	lb

Appendix O-1
Laboratory Chemical Inventory

Chemical Name	Current Volume and Mass at the Mill: Quantity	Unit	Density g/cm3	Volume	1cm³ ~1 mL	Historic volume or mass used (1978 - 2013): Quantity	Unit
CP 1400P	300	g	*			0.1	kg
CP 2000P	50	g	*			0.1	kg
Crystal Violet	25	g	1.19	21	mL	25	g
Crystalline silica	0	g		0	mL	1	kg
Cupferron Crystal	2,600	g	*			23.8	kg
Cupric Sulfate 5-Hydrate	2,300	g	2.284	1,007	mL	3	kg
Cupric Sulfate Anhydrous	454	g	3.603	126	mL	0.5	kg
Curcumin Crystalline	10	g	1.279	8	mL	10	g
Cyanex 923	24	Kg	0.88	28	L	30	L
Cyclohexane	18,285	g	0.7781	23,500	mL	20	L
Decyl Alcohol 99%	1,230	g	0.82	1,500	mL	5	L
DEHPA	17,873	g	0.974	18,350	mL	1	L
DEHPA in Kerosene	974	g	0.974	1,000	mL	x	x
DF 53A			*	250	mL	0.25	L
DF-57-85-1			*	250	mL	0.25	L
D-Gluconic Acid	500	g	1.763	284	mL	0.5	kg
D-Gluconic Acid Calcium Salt 99%	0	g		0	mL	0.1	kg
Dialkyl Methyl amine	1,070	g	1.07	1,000	mL	1	L
Diaminocyclohexane	0	g	0.931	0	mL	0.5	kg
Diatamacious Earth	0	g	0.26	0	mL	100	kg
Dibenzoyl Methane 98%	50	g	1.138	44	mL	500	g
Dibutyl phosphate	529	g	1.058	500	mL	0.5	L
Digestion Solution for COD, (83% sulfuric acid, 1% mercuric sulfate)	0	g		0	mL	1	L
Dimethyl Sulfoxide	550	g	1.1	500	mL	0.5	L
Dinitrophenylazo	0			0	0	50	g
Dioctylsodium Sulfosuccinate	275	g	1.1	250	mL	1	kg
DiPhenyl amine 4 sulfuric Acid	10	g	*			110	g
Diphenyl-carbazone	1	g	1.19	1	mL	20	g
DiPhenylThioCarbazone	5	g	1.2	4	mL	20	g
Diphonix Resin	13,300	g	0.3	44,333	mL	2	kg
DiPyridal	5	g	1.106	5	mL	5	g
Disodium Ethylenediamine Tetraacetate	500	g	1.01	495	mL	0.5	kg
Ditex 1812C			*	1,000	mL	1	L
d-Tartaric Acid	10,300	g	1.8	5,722	mL	12	kg
Ecopol-LLDS	1,000	g	*	1,000	mL	1	kg

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					*Historic volume or mass used (1978 - 2013)*	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm^3 ~1 mL***	***Quantity***	***Unit***
Elan 6100 DRC Set up/ Stab/ Masscal Sol.			*	800	mL	2	L
Elan DRC Smart Tune			*	1,000	mL	12	L
Electrode filling solution (Ag/AgCl)	0	mL	*	0	mL	5	L
Electrode storage solution (KCl soln.)	0	g		0	mL	20	L
Empigen BS/FQ			*	500	mL	0.5	L
Eriochrome black	35	g	1.109	32	mL	10	g
Escaid 115			*	20,000	mL	20	L
Ethanol absolute	3,156	g	0.789	4,000	mL	4	L
Ether Anhydrous	2,854	g	0.7134	4,000	mL	10	L
Ethyl Acetate	9,471	g	0.902	10,500	mL	15	L
Ethylene Diamine Tetraacetic Acid	1,000	g	0.86	1,163	mL	3.1	kg
Ethylene Dinitrilo Tetraacetic acid	75	g	0.86	87	mL	0.1	kg
Ethylene Glycol Monobutyle Ether	0	g		0	mL	0.25	L
Ferric Ammonium Sulfate Dodecahydrate	0	g	1.71	0	mL	2	kg
Ferric chloride 6-Hydrate	1,800	g	1.82	989	mL	3.75	kg
Ferrous Ammonium Sulfate	5,000	g	1.86	2,688	mL	144	kg
Ferrous Chloride	1,000	g	3.16	316	mL	1	kg
Ferrous Sulfate	0			0	mL	5	kg
Ferrous Sulfate Heptahydrate	6,000	g	0.999	6,006	mL	43.5	kg
Elan 6100 DRC Wash Solution	0	g	1	0	mL	0.5	L
Flexane 94 liquid	908	g	*	1,000	mL	1	L
Floc 912 SH	0	g		0	mL	150	g
Floc 920 SH	0	g		0	mL	150	g
Floc Acrylamide Homopolymer	0	g		0	mL	50	g
Floc ChemTreat P-802E	0	lb		0	gal	18	kg
Floc DVS4F011			*	100	mL	100	mL
Floc Ethylene Oxide Polymer WSR 205 (2195)	0	g		0	mL	250	g
Floc Ethylene Oxide Polymer WSR Coagulant (2331)	0	g		0	mL	250	g
Floc Hycem AF 102	0	g		0	mL	20	g
Floc Hycem AF 104	0	g		0	mL	20	g
Floc Hycem AF 105	0	g		0	mL	20	g
Floc Hycem AF 205	0	g		0	mL	20	g
Floc Hycem AF 306	0	g		0	mL	20	g

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					*Historic volume or mass used (1978 - 2013)*	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm ^{3} ~1 mL***	***Quantity***	***Unit***
Floc Hycem AF 308	0	g		0	mL	20	g
Floc Hycem AF 311	0	g		0	mL	20	g
Floc Hycem NF 301	0	g		0	mL	20	g
Floc Hycem NF 305	0	g		0	mL	20	g
Floc Hyperfloc AF 104	0	g		0	mL	25	g
Floc Hyperfloc AF 208	50	g	*			50	g
Floc Hyperfloc AF 250	50	g	*			50	g
Floc Hyperfloc AF 302	100	g	*			100	g
Floc Hyperfloc AF 303	100	g	*			100	g
Floc Hyperfloc AF 304	100	g	*			100	g
Floc Hyperfloc AF 305	50	g	*			50	g
Floc Hyperfloc AF 306	50	g	*			50	g
Floc Hyperfloc AF 307	50	g	*			50	g
Floc Hyperfloc AF 308	50	g	*			50	g
Floc Hyperfloc AF 309	50	g	*			50	g
Floc Hyperfloc AF 312	50	g	*			50	g
Floc Hyperfloc AF 314	100	g	*			100	g
Floc Hyperfloc AF MG 653	100	g	*			23	kg
Floc Hyperfloc CB 478			*	90	mL	90	mL
Floc Hyperfloc CP 624			*	45	mL	45	mL
Floc Hyperfloc CP 757			*	10	gal	10	gal
Floc Hyperfloc CP 902 H	50	g	*			50	g
Floc Hyperfloc CP 903	50	g	*			50	g
Floc Hyperfloc MG 653	100	g	*			100	g
Floc Hyperfloc MG 655	40	g	*			40	g
Floc Hyperfloc MG 656	50	g	*			50	g
Floc Hyperfloc NF 201	40	g	*			40	g
Floc Hyperfloc NF 301	50	g	*			50	g
Floc Hysperse 1015	0	g		0	mL	0.1	L
Floc Hysperse 1016	0	g		0	mL	0.1	L
Floc Hysperse 1018	0	g		0	mL	0.1	L
Floc MagnaFloc 10	0	g		0	mL	80	g
Floc MagnaFloc 1011	0	g		0	mL	80	g
Floc MagnaFloc 156	0	g		0	mL	80	g
Floc MagnaFloc 333	0	g		0	mL	80	g
Floc MagnaFloc 336	0	g		0	mL	80	g
Floc MagnaFloc 338	0	g		0	mL	80	g
Floc MagnaFloc 342	0	g		0	mL	80	g

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					*Historic volume or mass used (1978 - 2013)*	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm³ ~1 mL***	***Quantity***	***Unit***
Floc MagnaFloc 351	0	g		0	mL	80	g
Floc MagnaFloc 358	0	g		0	mL	80	g
Floc MagnaFloc 371	0	g		0	mL	80	g
Floc MagnaFloc 455	0	g		0	mL	80	g
Floc MagnaFloc 7117	0	g		0	mL	80	g
Floc MagnaFloc 7692	0	g		0	mL	80	g
Floc MagnaFloc 919	0	g		0	mL	80	g
Floc Nalco DVS4F011	0	g		0	mL	250	mL
Floc NEO NS 4507	0	g		0	mL	20	g
Floc NEO NS 4525	0	g		0	mL	20	g
Floc NEO NS 6500	0	g		0	mL	20	g
Floc NEO NS 6501	0	g		0	mL	20	g
Floc NEO NS 6502	0	g		0	mL	20	g
Floc NEO NS 6502m	0	g		0	mL	20	g
Floc NEO NS 6511	0	g		0	mL	20	g
Floc NEO NS 6555	0	g		0	mL	20	g
Floc Non-ionic	0	g		0	mL	23	kg
Floc Percol 156	0	g		0	mL	50	g
Floc Percol 333	0	g		0	mL	50	g
Floc Percol 336	0	g		0	mL	50	g
Floc Percol 338	0	g		0	mL	50	g
Floc Percol 342	0	g		0	mL	50	g
Floc Percol 351	0	g		0	mL	50	g
Floc Percol 352	0	g		0	mL	50	g
Floc Percol 358	0	g		0	mL	50	g
Floc Percol 371	0	g		0	mL	50	g
Floc Percol 408	0	g		0	mL	50	g
Floc Percol 455	0	g		0	mL	50	g
Floc Percol 727	0	g		0	mL	50	g
Floc Percol 728	0	g		0	mL	50	g
Floc Percol 919	0	g		0	mL	50	g
Floc Percol E10	0	g		0	mL	50	g
Floc Ucarfloc Polymer 30x B-6070	0	g		0	mL	0.25	kg
Floc Ucarfloc Polymer 30x B-6107	0	g		0	mL	0.25	kg
Floc Ucarfloc Polymer 30x Batch 155836	0	g		0	mL	0.25	kg
Floc Ucarfloc Polymer 30x C-6076	0	g		0	mL	0.25	kg
Floc Ucarfloc Polymer 30x C-6102	0	g		0	mL	0.25	kg

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
Chemical Name	*Quantity*	*Unit*	*Density g/cm3*	*Volume*	*1cm^3 ~1 mL*	*Quantity*	*Unit*
Floc Ucarfloc Polymer 30x H-6049	0	g		0	mL	0.25	kg
Floc Ucarfloc Polymer 30x R-6046	0	g		0	mL	1	kg
Floc Ucarfloc Polymer 30x S-6045	0	g		0	mL	0.5	kg
Fluoride w/TISAB Std 1ppm			*	950	mL	5	L
Fluoride w/TISAB Std 10ppm			*	475	mL	5	L
Fluoride w/TISAB Std 100ppm			*	950	mL	5	L
Fluoride standard solution	425	g	1	425	mL	20.5	L
Formaldehyde	1,041	g	1.1	946	mL	1	L
Fritz EP-9LMwB	0	g		0	mL	0.1	L
Gallium Metal	1	g	5.904	0	mL	1	g
Gentian Violet	100	g	1.19	84	mL	200	g
Glacial Acetic Acid	11,020	g	1.0495	10,500	mL	40	L
Glycerin	126	g	1.2636	100	mL	12	L
Gold 1000 mg/L			*	125	mL	125	mL
Greatfloc 5410	0	g		0	mL	50	g
Greatfloc 5413	0	g		0	mL	50	g
Greatfloc 5420	0	g		0	mL	50	g
Hexanes	13,000	g	0.66	20	L	25	L
Hyamine, Hydroxide	467	g	0.933	500	mL	0.5	L
Hydrazine Sulfate	1,600	g	1.37	1,168	mL	5	kg
Hydrobromic acid 49%	10,200	g	1.49	6,846	mL	12	kg
Hydrochloric acid	39,100	g	1.15	34,000	mL	4,826	L
Hydrochloride (0.1N)			*	100	mL	30	L
Hydrochloride (1N)	13,800	g	1.15	12,000	mL	30	L
Hydroflouric Acid	2,500	g	1.25	2,000	mL	231	L
Hydrogen Peroxide	2,260	g	1.13	2,000	mL	92	L
Hydroiodic acid	1,000	g	1.96	510	mL	1	kg
Hydroquinone	600	g	1.32	455	mL	1	kg
Hydroxy Naphthol blue	26	g	2.13	12	mL	10	g
Hydroxylamine Hydrochloride	1,500	g	1.67	898	mL	19.5	kg
Hydroxylamine Sulfate	1,000	g	1.86	538	mL	1	kg
ICP-MS Internal Standard			*	500	mL	4	L
ICP-MS Interference Check Sol. #1			*	125	mL	125	mL
ICP-MS Interference Check Sol. #2			*	125	mL	125	mL
Iodine Monochloride Solution	1,060	g	1.06	1,000	mL	1	L
Iodine Solution 1N	500	g	1	500	mL	2.5	L
Iodine Sublimes	454	g	3.835	118	mL	1	kg
Ionquest 801			*	350	mL	1	L

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm³ ~1 mL***	***Quantity***	***Unit***
Iron 1000 mg/L	508	g	1.015	500	mL	6.5	L
Iron 5000 ppm STD	0	g		0	mL	1	L
Iron Metal	3,000	g	7.86	382	mL	1.2	kg
Iron Pyrites	5,436	g	5.1	1,066	mL	6	kg
Iron Sulfate Hydrate	2,500	g	3.097	807	mL	3	kg
Iso-Octane	40	Kg	0.692	58	L	1,304	L
Jet Fuel Type A	16	Kg	0.8	20	L	20	L
KP5000	0	g		0	mL	1	kg
Lanthanum 1000 mg/L	500	g	1	500	mL	1.25	L
Lanthanum Oxide	520	g	6.51	80	mL	6.1	kg
L-Ascorbic Acid	4,150	g	1.954	2,124	mL	5	kg
Lead (II) Acetate Trihydrate	500	g	2.55	196	mL	1	kg
Lead (II) Carbonate	500	g	6.14	81	mL	0.5	kg
Lead 1000 µg/mL	408	g	1.02	400	mL	2.5	L
Lead Metal	34,050	g	11.34	3,003	mL	100	lb
Lead Nitrate	454	g	4.53	100	mL	0.5	kg
Lead Oxide	2,400	g	9.53	252	mL	3	kg
Lithium 1000 µg/mL	0	g	1.03	0	mL	2.5	L
Lithium Fluoride	3,400	g	2.64	1,288	mL	4	kg
Lithium M-borate	100	g	1.4	71	mL	0.5	kg
Lithium borates (with Bromide)	19,000	g	*			25	kg
Lithium borates (with Iodide)	5,500	g	1.4	3,929	mL	20	kg
Lithium Chloride	500	g	2.068	242	mL	1	kg
Lithium Tetra borate	250	g	0.25	1,000	mL	1	kg
LIX 664N-LV			*	500	mL	0.5	L
LIX 984 N			*	500	mL	2	L
Magnesium 1000 mg/L	432	g	1.016	425	mL	7	L
Magnesium Carbonate	0	g		0	mL	0.1	kg
Magnesium Nitrate	200	g	0.889	225	mL	3.5	kg
Magnesium Nitrate Hexahydrate	1,000	g	1.63	613	mL	1	kg
Magnesium Oxide	479	g	3.58	134	mL	1	kg
Magnesium Perchlorate	500	g	2.21	226	mL	1	kg
Magnesium Sulfate	3,000	g	1.07	2,804	mL	9	kg
Manganese 1000 µg/ mL	0	g	1.015	0	mL	4	L
Manganese 5000 ppm STD	0	g		0	mL	1	L
Manganese Carbonate	2,350	g	3.12	753	mL	3	kg
Manganese Chloride	200	g	2.98	67	mL	0.2	kg
Manganese Dioxide	2,650	g	5.02	528	mL	3	kg

Appendix O-1
Laboratory Chemical Inventory

Chemical Name	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
	Quantity	Unit	Density g/cm3	Volume	$1cm^3$ ~1 mL	Quantity	Unit
Manganese Flake	0	g	7.3	0	mL	50	g
Manganese Sulfate	2,800	g	3.25	862	mL	0.5	kg
M-Cresol purple	26	g	1.37	19	mL	395	g
Mercuric Acetate	100	g	3.29	30	mL	0.1	kg
Mercuric Chloride	250	g	5.44	46	mL	0.25	kg
Mercuric Iodide	150	g	6.36	24	mL	400	g
Mercuric lithinate	0	g		0	mL	0.1	kg
Mercuric Nitrate (.1410 N)	35,120	g	4.39	8,000	mL	274	L
Mercuric Nitrate Monohydrate	1,500	g	4.3	349	mL	2	kg
Mercuric Sulfate	113	g	6.47	17	mL	0.2	kg
Mercury (II) Oxide	100	g	11.14	9	mL	0.1	kg
Mercury 1000 µg/mL		g	*	1,000	mL	1	L
Mercury Metal	8	lb	13.54	251	mL	10	kg
Methanol	7,515	g	0.791	9,500	mL	154	L
Methyl Red	2.5	g		0	mL	1	kg
Methyl Ethyl Ketone	3,220		0.805	4,000	mL	12	L
Methyl isobutyl ketone	18	g	0.802	23	mL	152	L
Methyl orange	195	g	0.987	198	mL	10	g
Methyl Red Hydrochloride	125	g	0.8	156	mL	10	g
Methyl Red Sodium Salt	60	g	0.791	76	mL	130	g
Methyl violet	100	g	*			5	g
Methylene blue	25	g	1	25	mL	200	g
Methylene Chloride	15,816	g	1.318	12,000	mL	100	L
Molybdenum 1000 mg/L	500	g	1	500	mL	4.5	L
Molybdenum Powder	100	g	10.3	10	mL	0.1	kg
Molybdenum STD 5000 ppm	0	g		0	mL	1	L
Molybdenum Trioxide	1,700	g	4.692	362	mL	2	kg
Molybdic Anhydride	453	g	4.692	97	mL	1	kg
Monoethanol Amine	1,018	g	1.018	1,000	mL	1	L
MS-811			*	500	mL	0.5	L
MSA-1 (New Resin)	0	g		0	mL	0.5	L
N-(1naphthyl) ethylene Diamine Dihydrochloride	50	g	*			50	g
n-Amyl Alcohol	398	g	0.8416	473	mL	1	L
n-Butyl Acetate	720	g	0.9	800	mL	1	L
n-Butyl-Phosphate	66,776	g	0.982	68,000	mL	289	L
n-Decanal	0	g		0	mL	1	L
NEA-96	1,218	g	2.435	500	mL	0.5	L

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					*Historic volume or mass used (1978 - 2013)*	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm ^{3} ~1 mL***	***Quantity***	***Unit***
Nesslers Reagent	1,600	g	1.28	1,250	mL	2.5	L
Nickel	110	g	8.9	12	mL	0.2	kg
Nickel 1000 mg/L	0	g	1.014	0	mL	3.5	L
Nickel 5000 mg/L	0	g		0	mL	1	L
Nickel Nitrate	3,000	g	2.05	1,463	mL	3	kg
Nickel Powder	10	g	8.9	1	mL	10	g
Niobium 1000 mg/L			*	105	mL	250	mL
Nitrate ISA	3,111	g	1.31	2,375	mL	2	L
Nitrate, nitrogen STD	2,500	g	1	2,500	mL	2	L
Nitrazine yellow	20	g	*			20	g
Nitric Acid	43,594	g	1.42	30,700	mL	3,109	L
Nitrobenzene	1,440	g	1.2	1,200	mL	15	L
NonEmulsifier 19N	460	g	0.92	500	mL	0.5	L
Nonoxynol – 4	0	g		0	mL	0.5	L
N-Phenylbenzohydroxamic Acid	50	g	1.27	39	mL	25	g
Octyl Acid Phosphate	1,000	g	1	1,000	mL	1	L
Oleic Acid (Solution)	4,923	g	0.895	5,500	mL	10	L
Oleic Acid (Solid)	3,000	g	1.09	2,752	mL	5	kg
Orform			*	5,750	mL	6	L
ORP Standard	200	g	1	200	mL	1	L
O-Tolidine Dihydrochloride	100	g	1.03	97	mL	100	g
Oxalic Acid	1,200	g	1.9	632	mL	5	kg
Oxicol	0	g		0	mL	10	g
P-802E Flocculent	0	g		0	mL	1	L
Paraffin	400	g	*			10	kg
PE Sciex Coolant			*	5,000	mL	25	L
Pentyl Acetate	1,000	g	0.876	1,142	mL	1	kg
Perchloric Acid	4,184	g	1.6736	2,500	mL	1,487	L
Phenanthroline	0			0	mL	0.25	kg
Phenol Red	25	g	1.477	17	mL	25	g
Phenolphtalein	226	g	1.299	174	mL	0.25	kg
Phosphoric Acid	49,820	g	1.88	26,500	mL	1,665	L
Phosphorus 1000 µg/mL	250	g	1	250	mL	5.5	L
Phosphorus 5000 ppm STD	0	g		0	mL	1	L
Polymer 300	0	g		0	mL	0.25	L
Polymer 302	0	g		0	mL	0.25	L
Polymer 304	1,000	g	*			0.25	L
Polyol	1,100	g	*			1	L

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					*Historic volume or mass used (1978 - 2013)*	
Chemical Name	*Quantity*	*Unit*	*Density g/cm3*	*Volume*	*1cm³ ~1 mL*	*Quantity*	*Unit*
Polyox	1,000		*			10	kg
Polyox WSR Coagulant	500	g	*			1	L
Polyox WSR-205	500	g	*			0.5	L
Potassium 1000 µg/mL	304	g	1.013	300	mL	8	L
Potassium 5000 µg/mL	0	g		0	mL	1	L
Potassium Acetate	250	g	1.57	159	mL	100	g
Potassium Bicarbonate	500	g	2.17	230	mL	0.5	kg
Potassium Biiodate	50	g	*			3	L
Potassium Biphthalate	1,800	g	1.64	1,098	mL	2	kg
Potassium Biphthalate Buffer	0	g	1.636	0	mL	2	L
Potassium Bromate	500	g	3.27	153	mL	0.5	kg
Potassium Bromide	5,600	g	3.119	1,795	mL	6	kg
Potassium Carbonate	400	g	2.43	165	mL	0.5	kg
Potassium Chlorate	2,250	g	2.32	970	mL	3	kg
Potassium Chloride	1,500	g	1.98	758	mL	10	kg
Potassium Chloride solution 4 M	296	g	1	10	oz	20	L
Potassium Chromate	200	g	2.732	73	mL	0.2	kg
Potassium Cyanide	454	g	1.52	299	mL	1	kg
Potassium dichromate	5,150	g	7.14	721	mL	6	kg
Potassium ferricyanide	1,100	g	1.85	595	mL	1	kg
Potassium Ferrocyanide trihydrate	500	g	1.85	270	mL	0.5	kg
Potassium Fluoride	600	g	2.48	242	mL	0.5	kg
Potassium Iodate	500	g	3.93	127	mL	0.5	kg
Potassium Iodide	16,140	g	1.32	12,227	mL	0.5	kg
Potassium Iodide-Iodate	0	g	1	0	mL	0.5	L
Potassium Nitrate	250	g	2.109	119	mL	100	g
Potassium Nitrite	250	g	1.92	130	mL	0.25	kg
Potassium Oxalate Monohydrate	5,000	g	2.127	2,351	mL	392	kg
Potassium Perchlorate	500	g	2.52	198	mL	3	kg
Potassium Permanganate	9,300	g	1.01	9,208	mL	50	kg
Potassium Permanganate Solution	3,000	g	1	3,000	mL	1	L
Potassium Perrhenate	10	g	4.887	2	mL	10	g
Potassium Persulfate	100	g	2.47	40	mL	0.2	kg
Potassium Phosphate	0	g	2.564	0	mL	50	g
Potassium pyrosulfate	500	g	2.28	219	mL	500	g
Potassium Sodium Tartrate 4-Hydrate	1,400	g	1.05	1,333	mL	1.5	kg
Potassium Sulfate	2,000	g	2.66	752	mL	1	kg

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
Chemical Name	**Quantity**	**Unit**	**Density g/cm3**	**Volume**	**1cm^3 ~1 mL**	**Quantity**	**Unit**
Potassium Thiocyanate	9,750	g	1.886	5,170	mL	4.5	kg
Primene	0	g		0	mL	8	L
Primene 81-R Amine	1,230	g	0.82	1,500	mL	1	L
Primene JM-T Amine	40,032	g	0.834	48,000	mL	100	L
Primene MD			*	100	mL	1	L
Primene TOA Amine	1,078	g	0.77	1,400	mL	1	kg
Propylether Chloride Guar Gum	330	g	1.3	254	mL	1	kg
Pyridine	7,855	g	0.9819	8,000	mL	47	L
Pyrogallate Absorption stable solution, (Potassium Hydroxide Solution)	0	g		0	mL	1	L
Quinhydrone	2,100	g	1.32	1,591	mL	5	kg
Quinoline	545	g	1.09	500	mL	0.5	L
Rantec KP5000	920	g	*			1	kg
Red Gaye Oil	0	g	0.826	0	mL	2	L
Rexyn 101	500	g	1.2	417	mL	0.5	kg
Rexyn 300	200	g	1.2	167	mL	1.5	kg
SAG 101	0	g		0	mL	0.5	L
Salt (kiln dried)	45	lb	1.199	17,024	mL	50	kg
Salt, Medium	270	g	1.199	225	mL	50	kg
Scandium 1000 mg/L			*	450	mL	0.5	L
Sea sand	10,000	g	2.6	3,846	mL	50	kg
Selenium 1000 µg/mL	0	g	1.02	0	mL	1.5	L
Selenium Oxide	10	g	4.81	2	mL	10	g
Silicon 1000 mg/L	485	g	0.97	500	mL	8	L
Silicon 5000 mg/L	0	g		0	mL	1	L
Silicon Carbide	0	g		0	mL	25	g
Silver 1000 µg/mL	125	g	1	125	mL	1	L
Silver Chloride	0	g		0	mL	4	L
Silver Nitrate (Solid)	2,600	g	4.35	598	mL	24.5	kg
Silver Nitrate (Solution)	69,600	g	4.35	16,000	mL	32	L
Silver sulfate	200	g	5.45	37	mL	0.5	kg
Smart Tune Solution			*	1,000	mL	12	L
Sodium 1000 mg/L	405	g	1.013	400	mL	5	L
Sodium Acetate Anhydrous	2,300	g	1.528	1,505	mL	37	kg
Sodium Acetate trihydrate	2,450	g	1.45	1,690	mL	36	kg
Sodium Ammonium Phosphate	950	g	1.54	617	mL	4	kg
Sodium Arsenite	500	g	1.87	267	mL	1.5	kg

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					*Historic volume or mass used (1978 - 2013)*	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm*** ^{3} ***~1 mL***	***Quantity***	***Unit***
Sodium Bicarbonate	11,200	g	2.16	5,185	mL	15	kg
Sodium Bisulfate	3,000	g	2.1	1,429	mL	10	kg
Sodium Borate	400	g	1.73	231	mL	1.5	kg
Sodium Carbonate, Anhydrous	8,500	g	2.53	3,360	mL	125.5	kg
Sodium Chlorate	6,555	g	2.49	2,633	mL	10	kg
Sodium Chloride	10,950	g	1.199	9,133	mL	96	kg
Sodium Chloride Solution	0	g	1	0	mL	10	L
Sodium Citrate	6,000	g	1.008	5,952	mL	15	kg
Sodium Cyanide	500	g	1.6	313	mL	4	kg
Sodium Diphenylamine	20	g	*			100	g
Sodium Diphenylamine-4-Sulfonate	25	g	*			60	g
Sodium Fluoride	10,050	g	1.02	9,853	mL	70.6	kg
Sodium Hydrosulfide	3,500	g	1.79	1,955	mL	1	kg
Sodium Hydroxide	5,791	g	1.53	1	gal	42	kg
Sodium Hydroxide (1N)	13,520	g	1.04	13,000	mL	256	L
Sodium Hydroxide (50%)	1,530	g	1.53	1,000	mL	32	L
Sodium Hydroxide pellets	12,000	g	1.515	7,921	mL	30	kg
Sodium m-Bisulfite	17,500	g	1.48	11,824	mL	25	kg
Sodium Molybdate	1,000	g	3.78	265	mL	1	kg
Sodium Nitrate	17,000	g	1.1	15,455	mL	20	kg
Sodium Nitrite	7,500	g	2.168	3,459	mL	10	kg
Sodium Oxalate	400	g	2.34	171	mL	1	kg
Sodium Peroxide	500	g	2.8	179	mL	3	kg
Sodium Persulfate	150	g	2.4	63	mL	0.5	kg
Sodium phosphate deca-hydrate	500	g	1.82	275	mL	0.5	kg
Sodium Phosphate Tribasic	1,350	g	1.62	833	mL	1	kg
Sodium Phosphate, Dibasic 12-Hydrate	750	g	1.52	493	mL	1	kg
Sodium Pyrophosphate Decahydrate P.A.	500	g	2.534	197	mL	0.25	kg
Sodium reconditioning solution	2,850	g	1	2,850	mL	3	L
Sodium Salicylate	400	g	0.35	1,143	mL	0.5	kg
Sodium Silicate	600	g	2.33	258	mL	1	kg
Sodium Sulfate, 12-Hydrate	0	g		0	mL	3	kg
Sodium Sulfate, Anhydrous	4,500	g	2.68	1,679	mL	10	kg
Sodium Sulfide	0	g		0	mL	0.2	kg
Sodium Sulfite, Anhydrous	12,000	g	2.63	4,563	mL	23	kg
Sodium Sulfonate	0	g	1	0	mL	0.5	L

Appendix O-1
Laboratory Chemical Inventory

	Current Volume and Mass at the Mill					*Historic volume or mass used (1978 - 2013)*	
Chemical Name	***Quantity***	***Unit***	***Density g/cm3***	***Volume***	***1cm^3 ~1 mL***	***Quantity***	***Unit***
Sodium Tartrate Dihydrate	1,050	g	1.82	577	mL	2	kg
Sodium Thiocyanate	3,850	g	1.295	2,973	mL	5	kg
Sodium Thiosulfate Anhydrous	14,680	g	1.01	14,535	mL	20	kg
Sodium tripoly phosphate	500	g	0.4	1,250	mL	0.5	kg
Sodium Tungstate, Dihydrate	400	g	4.179	96	mL	0.5	kg
Soltrol 220 (Aliphatic Hydrocarbene)	402	g	0.803	500	mL	1	L
Soluble Starch	40	g	1.5	27	mL	1	kg
Stannous Chloride, Dihydrate	2,700	g	2.71	996	mL	5	kg
Starch Solution	1,000	g	1	1,000	mL	1.5	L
Starch, soluble potato, powder	300	g	1.5	200	mL	3	kg
Stearic Acid	575	g	0.84	685	mL	25	g
Stilbene	1	g	1.14	1	mL	5	g
Strontium 1000 µg/mL	0	g	1	0	mL	0.125	L
Strontium Carbonate	450	g	3.7	122	mL	0.5	kg
Strontium Chloride	250	g	3	83	mL	0.25	kg
Succinic Anhydride	250	g	1.572	159	mL	0.25	kg
Sulfa salicylic Acid Dihydrate	4,620	g	0.8	5,775	mL	3	kg
Sulfa Ver 4 (sulfate reagent)	450	g	2.68	168	mL	0.5	kg
Sulfamic Acid	2,000	g	2.12	943	mL	23.5	kg
Sulfanilamide	100	g	1.08	93	mL	100	g
Sulfanilic Acid	100	g	1.485	67	mL	200	g
Sulfate Anion STD	0	g		0	mL	1	L
Sulfosalicylic Acid	0	g	1.705	0	mL	1	kg
Sulfur 1,000 ppm	100	g	1	100	mL	2.5	L
Sulfur Sublimed	500	g	2.36	212	mL	1	kg
Sulfuric Acid	28,600	g	1	28,600	mL	2,245	L
Sulfuric Acid (.1N)	17,000	g	1	17,000	mL	30	L
Sulfuric Acid (1N)	31,280	g	1.84	17,000	mL	63	L
Surfactant, Tergitol NP-7			*	1,010	mL	1.5	L
SX diluent (Conoco)	0	g		0	mL	0.2	L
SX Solvent Extraction Diluent	0	g		0	mL	0.5	L
TA-100 Sample			*	1,300	mL	0.5	L
Tannic Acid	1,400	g	2.129	658	mL	2	kg
Tantalum 1000 µg/mL			*	125	mL	2.6	L
TCHEM Defoamer 4110			*	200	mL	1	L
Tetrasodium (salt dihydrate)	800	g	*			1	kg
TFE Paste			*	118	mL	120	mL
Thalic Nitrate	25	g	*	125	mL	25	g

Appendix O-1
Laboratory Chemical Inventory

Chemical Name	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
	Quantity	Unit	Density g/cm3	Volume	1cm^3 ~1 mL	Quantity	Unit
Thallium Nitrate	1	g	5.55	1	mL	1	g
THAM (tris (Hydroxymethyl) Aminomethane) also TRIS	5,010	g	1.353	3,703	mL	10	kg
Tharin	0	g		0	mL	50	g
ThenoylTriFluoroacetone	50	g	*			50	g
Thio Acetamide	900	g	1.37	657	mL	5	kg
Thorin	15	g	*			15	g
Thorium 1000 mg/L	625	g	1	625	mL	1.5	L
Thymol blue	10	g	*			10	g
Tin Metal	500	g	7.3	68	mL	0.5	kg
TISAB Buffer Solution			*	6,000	mL	20	L
TISAB II w/CDTA	6,195	g	1.07	5,790	mL	8	L
TISAB III w/CDTA	1,017	g	1.07	950	mL	3	L
TISAB w/CDTA	0	g		0	mL	9	L
Titanic Oxide	500	g	4.26	117	mL	0.5	kg
Titanium 1000 mg/L			*	150	mL	1.5	L
Toluene	10,363	g	0.8636	12,000	mL	15	L
Trans – 1,2-DiAminocyclohexane Tetra Acetic Acid	0.5	g	*			10	g
Tricapryl Methyl Ammonium Chloride	0	g		0	mL	0.1	L
Trichloroethylene	18,375	g	1.47	12,500	mL	10	L
Triethanolamine	21,809	g	1.13	19,300	mL	3	kg
Triethanolamine	0	g	1.13	0	mL	255	L
Triethylamine	2,555	g	0.73	3,500	mL	16	L
Tri-N-Octylamine	2,754	g	0.81	3,400	mL	24	L
Trioctylphosphine Oxide	1,200	g	0.88	1,364	mL	3	kg
Turbidity Standard	4,500	g	1	4,500	mL	36	L
Uranium 1000 µg/mL	592	g	1.03	575	mL	10	L
Uranium Oxide	0	g	10.96	0	mL	2	kg
Uranyl Acetate	1,816	g	2.89	628	mL	10	kg
Urea	40,000	g	1.335	29,963	mL	407	kg
Vacuum Pump Oil	37	lb	0.9	5	gal	150	L
Vanadium 1000 µg/mL			*	500	mL	5	L
Vanadium 5000 µg/mL	0	g		0	ml	1	L
Vanadium Pentoxide	800	g	6.11	131	mL	100	g
Vanadyl Sulfate	250	g	2.5	100	mL	6.6	kg
Varsol 110 Solvent	3,699	g	0.822	4,500	mL	5	L

Appendix O-1
Laboratory Chemical Inventory

Chemical Name	Current Volume and Mass at the Mill					Historic volume or mass used (1978 - 2013)	
	Quantity	Unit	Density g/cm3	Volume	$1 cm^3 \sim 1$ mL	Quantity	Unit
Victawat 12	0	g		0	mL	10	L
Vinegar	0	g		0	mL	4	L
Viscocity Standard 100			*	3,000	mL	5	L
Viscocity Standard 1000			*	1,000	mL	3	L
Witbreak 770	1,020	g	1.02	1,000	mL	1	L
Witbreak DRI-9026			*	500	mL	0.5	L
Witbreak RTC-426	118	g	1.18	100	mL	1	L
Witconate P-1020Bust	250	g	1.05	250	mL	0.25	L
Witconol DNP-45	500	g	1.06	500	mL	0.5	L
Witconol NP-40	500	g	1.06	500	mL	0.5	L
YSl 3682 Zobell solution			*	0	mL	0.125	L
Zinc 5000 ppm STD	0	g		0	mL	1	L
Zinc Acetate	700	g	1.84	380	mL	1	kg
Zinc Metal	1,500	g	7.14	210	mL	1.5	kg
Zinc Sulfate	500	g	1.005	498	mL	1	kg
Zincon	2	g	*			2	g
Zirconium 1000 mg/L	102	g	1.02	100	mL	4	L
Zirconium Chloride	100	g	2.8	36	mL	1	L
Zirconium Oxide	453	g	5.89	77	mL	1	kg
Zirconium Sulfate	0	g		0	mL	0.1	kg
Zirconyl Chloride	0	g		0	mL	50	g

* Pursuant to Section I.E.9b) of the GWDP dated August 24, 2012, the Permittee shall provide "Determination of volume and mass of each raw chemical currently held in storage at the facility." Both mass and volume are provided when specific gravity data are available.
Laboratory chemicals are stored in the laboratory or in the laboratory storage areas adjacent to the laboratory.

Abbreviations:
lbs = pounds
gal = gallons
cf = cubic feet
ml = milliliters
g = grams
kg = kilograms
L = liters
oz = ounces

Appendix O-2
Current Mill Chemical Inventory

		Current Volume and Mass at the Mill[4]				*Historic volume or mass used (1978 - 2013)*	
Location	*Chemical Name*	*Quantity (lbs)*	*Specific Gravity or Bulk Density*		*Approximate Volume (gal)*	*Quantity*	*Unit*
Mill	Alamine 336 Drums	0	0.80	sp.g	0	1,538,782	lbs
	Alamine 336 Totes	30,600	0.80	sp.g	4,592	‡	lbs
Mill	Ammonia (East)	55,554	5.15	lb/gal	1,295	34,861,910	lbs
	Ammonia (West)	109,794	5.15	lb/gal	2,559	‡	
Mill	Ammonium sulfate (North)	53,787	65.00	lb/cu.ft	99	44,266,008	lbs
Mill	Ammonium sulfate (South)	50,248	65.00	lb/cu.ft	93	‡	lbs
Mill	Ammonium Sulfate Super Sacks	18,000	65.00	lb/cu.ft	33	‡	lbs
Mill	Caustic 50%	71,525	1.00	sp.g	8,586	42,332,116	lbs
Mill	De-Scaler (ChemSearch 150 or equivalent)	660	1.16	sp.g	68	3,960	lbs
Mill	Diatomaceous Earth Filter Aid	70,200	2.30	sp.g	3,664	1,000,000	lbs
Mill	Flocculant 655[1]	39,600	0.80	sp.g	5,942	1,149,225	lbs
Mill	Hydrogen Peroxide 50%	7,189	1.20	sp.g	722	537,973	lbs
Mill	Hyper Floc 757 Coagulant	0	0.80	sp.g	0	1,395	lbs
Mill	Kerosene	20,545	0.82	sp.g	3,026	15,067,139	lbs
Mill	Liquified Natural Gas	89,425	0.40	sp.g	26,838	23,371,465	lbs
Mill	Perlite Filter Aid	10,623	2.30	sp.g	554	604,158	lbs
Mill	Propane	23,605	0.50	sp.g	5,622	7,309,158	lbs
Mill	Salt	117,470	2.16	sp.g	6,529	63,111,955	lbs
Mill	Soda ash silo	61,328	0.99	sp.g	7,437	76,472,417	lbs
Mill	Soda ash Super Sacks	82,000	0.99	sp.g	9,943	‡	lbs
Mill	Sodium chlorate 1- 50%	19,825	6.13	lb/gal	388	30,978,629	lbs
Mill	Sodium chlorate 2- 50%	67,171	6.13	sp.g	1,315	‡	lbs
Mill	Sodium chlorate 3- 50%	0	6.13	sp.g	0	‡	lbs
Mill	Sodium Chlorate Super Sacks	46,000	1.32	sp.g	4,199	‡	lbs
Mill	Sulfuric Acid 94%	3,752,986	1.84	sp.g	244,858	757,297,581	lbs
Mill	Tri-decyl alcohol[3]	23,485	0.83	sp.g	3,397	967,383	lbs

[1]The Mill uses a number of comparable polymer flocculants depending on the specific feed.

[2] Current tertiary amine product name as purchased from BASF. Alternatively, the Mill has and may continue to use other tertiary amines with comparable chemical properties.

[3]Current alcohol used as modifier. Alternatively, the Mill has and may continue to use other secondary and tertiary alcohols, including isodecanol, among others, to improve tertiary amine/U/kerosene solubility.

[4] Pursuant to Section I.E.9b) of the GWDP dated August 24, 2012, the Permittee shall provide "Determination of volume and mass of each raw chemical currently held in storage at the facility." Both mass and volume are provided when specific gravity data are available.

‡ -Historic values reported are the total quantity used at all locations. The historic quantities are reported as a single total for the first location listed.

Abbreviations:
lbs = pounds
lb/gal - pounds per gallon
lb/cu.ft = pounds per cubic foot
sp.g = specific gravity

Appendix O-3
Cleaners and Maintenance/Miscellaneous Chemicals

		Current		*Historic volume or mass used (1978 - 2013)*	
Location	*Cleaners*	*Quantity*	*Units*	*Quantity*	*Unit*
MSW	#2 EP Grease Shell Retinax LXZ	796	lbs	3300	lbs
MSW	#5182 Pyroshield Grease / oil	4,560	lbs	21660	lbs
MSW	#74 AB compound	334	lbs	1587	lbs
MSW	150 Gear Oil	880	gal	4312	gal
MSW	15-40w Motor Oil	2,035	gal	8435	gal
MSW	220 Gear Oil	5,720	gal	26000	gal
MSW	2-cycle oil	5.25	gal	20	gal
MSW	2pH Buffer	38.6	gal	206	gal
MSW	30w motor oil Rotella T	660	gal	2805	gal
MSW	460 Gear Oil	1,540	gal	6718	gal
MSW	4pH Buffer	39.6	gal	211	gal
MSW	5w-30 synthetic blend oil	110	gal	421	gal
MSW	680 gear oil	4,015	gal	17514	gal
MSW	7pH Buffer	46	gal	245	gal
MSW	80-90w gear oil	110	gal	110	gal
MSW	Acetylene bottle	32,754	cf	141008	cf
MSW	Air tool lubricant	16.4	gal	67	gal
MSW	Ajax	164	gal	697	gal
CL	Ajax	4,257	ml	‡	
CL	Alconox	5,500	g	500	kilos
CL	Alcotabs	3,060	g	60	kilos
MSW	Alumina Desiccant	1,500	lbs	1,500	lbs
MSW	Aluminum spray paint	13	gal	61	gal
MSW	Anti-Freeze	990	gal	4,377	gal
MSW	Anti-seize lubricant	23	gal	109	gal
MSW	Argon mixed gas	15,226	cf	63,114	cf
MSW	Argon T-large	6,289	cf	27,074	cf
MSW	Auto Trans Fluid	220	gal	1,096	gal
CL	Baking Soda	5,235	g	60	kilos
MSW	Blue spray paint	20.98	gal	85	gal
MSW	Brake cleaner	75	gal	338	gal
MSW	Brake fluid	21	gal	101	gal
MSW	Bredel hose lubricant	583	gal	2,857	gal
CL	Chromerge	0	L	3	L
MSW	Cutting oil coolant	24	gal	104	gal
CL	Dawn (dish soap)	5,842	ml	300	L
MSW	Devcon Brushable Ceramic	2	lbs	2	lbs
MSW	Devcon Flexane Putty	92	lbs	437	lbs
MSW	Donax TC-50 Transmission Oil	550	gal	3,529	gal

Appendix O-3
Cleaners and Maintenance/Miscellaneous Chemicals

		Current		*Historic volume or mass used (1978 - 2013)*	
Location	*Cleaners*	*Quantity*	*Units*	*Quantity*	*Unit*
MSW	Dura pro cream	2	gal	2	gal
MSW	Electronic Instrument Componet Cleaner	4	gal	22	gal
MSW	Endurbond intermediate primer #2 red	65	gal	438	gal
MSW	Endurbond Primer #1 green	55	gal	438	gal
MSW	Endurbond Tack Cement #3 Black	150	gal	920	gal
MSW	Fantastik	444	gal	1,777	gal
CL	Fantastik	946	ml	‡	
MSW	Ferric Chloride	660	gal	660	gal
MSW	General Epoxey	0.31	gal	0	gal
MSW	glass bead blast media	35	gal	35	gal
MSW	Glossy black spray paint	248	gal	1,054	gal
MSW	Glossy white spray paint	320.6	gal	1,313	gal
MSW	Go-Jo hand cleaner	918	lbs	4,004	lbs
MSW	Gray primer spray paint	107	gal	438	gal
MSW	Grease tubes	2,320	lbs	6,874	lbs
MSW	Green Spray paint	8	gal	38	gal
MSW	Hydraolic jack oil	24	gal	117	gal
MSW	Hydraulic oil #68	4,455	gal	18,467	gal
MSW	Industrial Degreaser	3	gal	20	gal
MSW	Ingersol Rand Coolant	40	gal	40	gal
MSW	Iso Heat gas line	6	gal	20	gal
CL	Compound	454	g	100	g
MSW	Juvenile Gray paint	6	gal	6	gal
MSW	Laundry Soap	17,610	lbs	72,996	lbs
MSW	Liquid Flexane 94 Devcon	104	lbs	460	lbs
CL	Liqui-Nox Cleaner	0		200	L
MSW	Long term grease cart.	4	lbs	4	lbs
MSW	Lubriplate Polymer Grease Tube	2	gal	2	gal
CL	Lysol	1,500	ml	‡	
MSW	Lysol	390	gal	1,543	gal
MSW	Mask out paint - tan	1.22	gal	1	gal
MSW	Metal Set A4	4	lbs	16	lbs
MSW	Methyl Ethyl Ketone #366	605	gal	3,286	gal
MSW	Mop & Glo	74	gal	338	gal
CL	Mop & Glo	100	ml	‡	
MSW	Never wet spray coating kit	0.11	gal	0	gal
MSW	Oil absorbent floor dry	7,950	lbs	31,800	lbs

Appendix O-3
Cleaners and Maintenance/Miscellaneous Chemicals

		Current		*Historic volume or mass used (1978 - 2013)*	
Location	*Cleaners*	*Quantity*	*Units*	*Quantity*	*Unit*
MSW	Orange spray paint	27	gal	113	gal
MSW	Oxygen Cylinder TOX	75,900	cf	303,600	cf
MSW	paint marker	1	gal	7	gal
MSW	Pipe Dope	39	gal	156	gal
MSW	Plastic Epoxy	0.31	gal	0	gal
MSW	Pledge (Lemon)	18.2	gal	75	gal
CL	Pledge	2,124	g	‡	
MSW	Power Steering Fluid	80	gal	297	gal
CL	Professional Drain Cleaner	950	mL	4	L
MSW	PVC Cement #711	39	gal	158	gal
MSW	PVC primer #9-70 purple	30	gal	132	gal
MSW	Ridgid thread cutting oil	25	gal	109	gal
MSW	Safety Red Paint	52	gal	52	gal
MSW	Safety Yellow Paint	24	gal	24	gal
MSW	Safety Yellow spray paint	143	gal	609	gal
MSW	Scotch Kote, coating	1	gal	5	gal
MSW	Silicone Adhesive	3	gal	15	gal
MSW	Silicone Sealant	230	gal	955	gal
MSW	small propane cylinders	96	lbs	409	lbs
MSW	Spa Blue Paint	490	gal	1,182	gal
MSW	Spa Blue Spray Paint	96	gal	265	gal
MSW	Spraflex Lubricant	10	gal	46	gal
MSW	Starting fluid	90	gal	307	gal
MSW	Sullair Coolent	490	gal	2,259	gal
MSW	Sweeping compound oil base	7,350	lbs	29,066	lbs
MSW	T-Chlor liquid chlorine 12%	45	gal	96	gal
MSW	Tellas 32 Hydroaulic oil	385	gal	385	gal
MSW	The works bowl cleaner	21	gal	42	gal
MSW	Tidy pearl pink liquid soap	185	gal	787	gal
MSW	WD-40	150	gal	496	gal
MSW	White Metal Marker	2	gal	9	gal
MSW	Windex	240	gal	995	gal
CL	Windex	968	ml	‡	
MSW	Windshield washer fluid	251	gal	1,053	gal

‡ -Historic values reported are the total quantity used at all locations. The historic quantities are reported as a single total for the first location listed.

Abbreviations:
lbs = pounds

Appendix O-3
Cleaners and Maintenance/Miscellaneous Chemicals

		Current		*Historic volume or mass used (1978 - 2013)*	
Location	*Cleaners*	*Quantity*	*Units*	*Quantity*	*Unit*

gal = gallons
cf = cubic feet
ml = milliliters
g = grams
kilos = kilograms
L = liters

Appendix O-4
Historic/Formerly Used Chemicals

Chemicals Formerly Used at Mill/No Longer Used or Present on Site [1]					
Location of Storage or Use	*Chemical*	*Form*	*Time Period of Use*	*Total Quantity Used* [2]	*Current Status*
Leach circuit	Ammonium Bi-fluoride	Dry solid in SuperSaks	Several months during 1997 or 1998	No more than several thousand lbs.	None on site since 1998
Leach circuit	Hydrochloric Acid	Drummed liquid	Several months during 1997 or 1998	No more than 10,000 gallons	None on site since 1998 [3]
Uranium SX	J-Mt primary amine	Drummed Liquid	Several months during 1997 or 1998	No more than 2,000 gallons	None on site since 1998
Uranium SX	Tri octyl phosphine oxide ("TOPO")	Drummed liquid	Several months during 1997 or 1998	No more than 2,000 gallons	None on site since 1998

1. These reagents were used during processing of one alternate feed for 6 months in 1997/1998, and have not been used before or since.

2. Total quantities used are also the total quantities purchased over life of the alternate feed project, that is, total on site was this quantitiy or less.

3. Unused residual consumed from 1997 to 1999 for cleaning purposes.

1.0 INTRODUCTION

1.1 Background

Denison Mines (USA) Corp. ("Denison")Energy Fuels Resources (USA) Inc.[1] ("EFRI") operates the White Mesa Uranium Mill (the "Mill"), located approximately six miles south of Blanding, Utah, under State of Utah Ground Water Discharge Permit No. UGW 370004 (the "Permit" or "GWDP"). The Permit was originally issued by the Co-Executive Secretary of the Utah Water Quality Board on March 8, 2005, for 5 years, expiring on March 8, 2010, and was up for timely renewal in accordance with Utah Administrative Code ("UAC") R317-6-6.7. A renewal application was submitted September 1, 2009. At the request of the Director of the Utah Division of Radiation Control, Denison isEFRI submitted submitting thisan updated version of the September 1, 2009 renewal application on July 13, 2012. At the request of the Director of the Utah Division of Radiation Control, EFRI is submitting this updated version of the July 2012 renewal application.

Prior to July 1, 2012, the Director of the Utah Division of Radiation Control ("Director") was referred to as the Executive Secretary of the Utah Radiation Control and Board Co-Executive Secretary of the Utah Water Quality Board. Documents referenced in this Application, published prior to that date, refer to the Director, by one or both of these previous titles.

In accordance with R317-6-6.7, this is an updated application (the "Application") to the Director for renewal of the Permit for another 5-years under R313-6-6.7. In this Application, Denison is not proposing any modifications to the terms and conditions of the Permit.

The Mill is also subject to State of Utah Radioactive Materials License No. UT 1900479 (the "Mill License"), which was issued on March 31, 1997[2] for 10-years and is currently in the process of timely renewal under R313-22-36[3], and State of Utah Air Quality Approval Order DAQE-AN0112050018-11 (the "Air Approval Order") which was re-issued on March 2, 2011 and is not up for renewal at this time. While the Mill License is referred to in this Application from time to time in order to allow the Director to better understand Mill operations and compliance with applicable regulatory requirements, this is not an application for renewal of the Mill License or Air Approval Order.

1.2 Applicable Standards for Review and Approval of this Application

[1] Prior to July 25, 2012, Energy Fuels Resources (USA) Inc. was named "Denison Mines (USA) Corp ("Denison")". Prior to December 16, 2006, Denison was named "International Uranium (USA) Corporation."

[2] The Mill License was originally issued by the United States Nuclear Regulatory Commission ("NRC") as a source material license under 10 CFR Part 40 on March 31, 1980. It was renewed by NRC in 1987 and again in 1997. After the State of Utah became an Agreement State for uranium mills in August 2004, the Mill License was re-issued by the Executive Secretary as a State of Utah Radioactive materials license on February 16, 2005, but the remaining term of the Mill License did not change.

[3] A Mill License renewal application was submitted to the Executive Secretary on -February 28, 2007, pursuant to R313-22-36.

In accordance with discussions between Denison EFRI management and State of Utah Division of Radiation Control ("DRC") staff on March 12, 2009April 1, 2014, this Application includes the information required under R3137-6-6.3.

In accordance with R313R317-6-6.4C, the Director may issue (or renew) a ground water discharge permit for an existing facility, such as the Mill, provided:

a) The applicant demonstrates that the applicable class total dissolved solids ("TDS") limits, ground water quality standards and protection levels will be met;
b) The monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
c) The applicant utilizes treatment and discharge minimization technology commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology; and
d) There is no current or anticipated impairment of present and future beneficial uses of the ground water.

Since this is an application for renewal of the existing Permit, this Application will focus on any changes to currently permitted activities since the original date of issuance of the Permit, and on This Permit Application demonstrating demonstrates how existing facilities continue to meet applicable regulatory criteria and the monitoring strategies employed to prevent impairment of present and future beneficial uses of the groundwater. EFRI conducts various kinds of environmental monitoring at the White Mesa Mill including but not limited to groundwater, surface water, soil, sediment, tailings waste water, air, and vegetation. Specific groundwater monitoring activities employed are summarized below.

Energy Fuels' ground water monitoring program is comprehensive in that it includes all of the 72 monitoring wells at the facility, as described above, although not every well is sampled every quarter. Samples are taken and analyzed for a large number of groundwater contaminants including heavy metals, nutrients, general chemistry analytes, radiologics, and volatile organic compounds ("VOCs"). Exceedences of standards found during this monitoring program have been addressed as described throughout this GWDP Application.

Under the License, the Permit, and the Corrective Action Plans, EFRI has completed and is monitoring the 72 groundwater monitoring wells described below.

- 27 monitoring wells placed to detect any leaks from the cells. Because the leak detection systems for Cells 1, 2, and 3 utilized older, less sophisticated technology, the DRC required eight new wells be installed adjacent to the tailings cells in 2005. These wells were to be used as a first line of defense to detect any tailings cell leakage. These supplemented the original seven required by NRC. An additional 12 wells have been constructed in association with the construction of Cells 4A and 4B.
- 34 monitoring wells associated with characterizing the chloroform groundwater contamination.
- 12 monitoring wells associated with characterizing the nitrate groundwater

contamination.

The monitoring results for each well that is sampled are evaluated for compliance with standards for 38 different constituents and, regardless of whether standards are met, for trends in the data that may show a need for further action.

Four indicator parameters (chloride, uranium, fluoride, and sulfate) are used at the site to determine if there has been any cell leakage. These constituents were chosen because they are the most mobile and are expected to be seen first with any upward trend in consistent concentrations. If a cell were leaking, it is expected that all four parameters would show increasing trends within two years, based on Kd values and other transport characteristics for the contaminants and site.

During a DRC split sampling event in May, 1999, excess chloroform concentrations were discovered in monitoring well MW-4, which is located along the eastern margin of the site. Because these concentrations were above the Utah Ground Water Quality Standard of 70 µg/L, the DRC initiated enforcement action against EFRI on August 23, 1999 by issuing a Ground Water Corrective Action Order. The Order required completion of: 1) a contaminant investigation report to define and delineate boundaries for the contaminant plume, and 2) a groundwater corrective action plan to clean it up. Twenty new monitoring wells (since increased to 34 wells) were installed at the site as part of the investigation. Table 1.2-1 lists the 34 chloroform monitoring wells.

The Director and EFRI determined that the laboratory wastewater sent to sewage leach fields, and not potential leaking from tailings cells, was the most likely source of the chloroform plume.

As with every groundwater corrective action, the corrective action plan is developed based on assumptions about the source, and those assumptions are tested continuously with groundwater monitoring as corrective action proceeds.

With DRC concurrence, EFRI began to pump chloroform contaminated groundwater in April, 2003. Groundwater monitoring results show this initial remediation effort has been effective based on reduction of contaminant concentrations. Reductions of the contaminant concentrations indicates both that the pumping program is working and that there is no continuous source for the contaminants, as would be the case if the cells were leaking.

During a review of the EFRI April 30, 2008 New Wells Background Report and other EFRI reports, Nitrate + Nitrite (as N) (hereafter Nitrate) concentrations were observed above the Utah Ground Water Quality Standard (10 mg/L) in five monitoring wells in the mill site area.

After the Nitrate Plume was identified, the Executive Secretary and EFRI entered into a January 28, 2009 Stipulated Consent Agreement that required EFRI to complete a Contaminant Investigation Report to determine the potential sources of the Nitrate contamination. Nineteen additional wells were installed to determine the extent of the contamination; nine of these wells have since been abandoned. Table 1.2-2 lists the current and former nitrate wells installed as part of the nitrate corrective actions.

EFRI has submitted two reports to DRC regarding the elevated Nitrate concentrations. The reports identify the extent of the Nitrate plume but EFRI and DRC disagreed about what the reports indicated about the likely source of the plume. EFRI does not believe that the results adequately demonstrated an on-site source.

EFRI agreed to implement a corrective action plan to clean up the plume. EFRI completed and submitted the Nitrate Corrective Action Plan to the DRC on May 7, 2012. The Corrective Action Plan was approved following a public comment period, and was incorporated into a December 12, 2012 Stipulation and Consent Order, Docket Number UGW12-04. The approval is subject to conditions, stipulated penalties and timelines outlined in the Stipulation and Consent Order. The remediation plan requires EFRI to pump the groundwater and treat it by evaporation and/or use as process water. Pumping under the remediation plan began in January, 2013.

Groundwater monitoring results show this initial remediation effort has been effective based on reduction of the plume mass to date.

When the DRC began oversight of the Mill, it noted that ground water monitoring had showed elevated concentrations of metals, primarily uranium, in wells MW-3, MW-3A, MW-14, MW-15, MW-22 on the Mill site. The DRC was concerned about whether the observations meant that tailings cells were leaking. To address its concerns, the DRC commissioned the University of Utah to investigate the elevated concentrations in July 2007. The University completed its study and published a report in May 2008 (the "2008 University Report").

After review of the 2008 University Report, the DRC determined that downgradient wells with elevated total uranium concentrations (including well MW-22) were not being impacted by potentially leaking tailings cells. This conclusion was based on at least three lines of isotopic evidence:

1. Tritium Signature. Wells MW-3, MW-3A, MW-14, MW-15, MW-22 had tritium signatures in groundwater at or below the limit of detection of 0.3 Tritium Units (2008 University Report p. 26). These values are more than an order of magnitude below the corresponding surface water results found in either the tailings cells or the wildlife ponds. This means that the groundwater in these five downgradient wells is older than water in the tailings cells, and is of a different origin than the tailings wastewater.

2. Stable Isotopes of Deuterium and Oxygen-18 in Water. The Deuterium and Oxygen-18 content of the groundwater matrix and tailings wastewater matrix was tested in all of the water sources studied. The 2008 University Report results showed that wells MW-3, MW-3A, MW-14, MW-15, and MW-22, all downgradient wells with elevated uranium concentrations, had Deuterium and Oxygen-18 signatures that were almost twice as negative as any of the surface water results. (2008 University Report, p. 42.) This shows that groundwater in these downgradient wells had a different geochemical origin than the tailings cell wastewater.

3. Stable Isotopes on Dissolved Sulfate. The University Study evaluated two stable isotopes

found in sulfate minerals dissolved in the water samples, Oxygen-18 and Sulfur-34. The evaluation showed that the sulfate solutes in groundwater from downgradient wells MW-3, MW-3A, MW-14, MW-15, and MW-22 had a different isotopic signature than the sulfate minerals dissolved in the tailings wastewater. In the case of Oxygen-18 in sulfate, the downgradient wells showed more negative values than the tailings cells wastewater. For Sulfur-34, the results were inversed, with groundwater showing more positive values than the negative values seen in the tailings wastewater (2008 University Report p. 46.). This shows that the sulfate dissolved in the downgradient wells, with elevated uranium concentrations, has a different origin than the tailings wastewater.

In summary, the University Study concluded that wells with high concentrations of metals (MW-3, MW-14, MW-15, MW-18, and MW-22) bear very different isotopic fingerprints than those of the surface water sites (e.g. wildlife ponds, and tailings cells) (2008 University Report p. 58). Regarding uranium concentrations in well MW-22, the University Study stated that "...it does not appear that the elevated uranium values are the result of leakage from tailings cells...." (2008 University Report p. 45).

The 2008 University Report further theorized that the cause of the increasing contaminant concentrations on the site was artificial recharge from wildlife ponds constructed in 1995, described in Part 1.5.1. This recharge likely leached and mobilized natural uranium and other constituents as a result of new saturation of zones beneath the site that had previously been unsaturated. The Mill drained the wildlife ponds in 2012.

As a result, the Mill meets the requirements set out in R317-6-6.4(c).

~~Although Denison is not proposing any significant changes to the original Permit, t~~This Application has ~~nevertheless~~ been ~~performed~~ prepared under the direction, and bears the seal, of a professional engineer qualified to practice engineering before the public in the state of Utah and professionally registered as required under the Professional Engineers and Professional Land Surveyors Licensing Act rules (UAC 156-22).

1.3 Background Groundwater Reports and Re-opening of Permit

In the December 1, 2004 Statement of Basis (the "2004 Statement of Basis") prepared by DRC in connection with the original issuance of the Permit, three monitoring wells (MW-14, MW-15, and MW-17) located downgradient of the Mill's tailings cells were found to have long-term increasing concentration trends for total uranium. These three wells and downgradient well MW-3, had total uranium concentrations above the Utah Ground Water Quality Standard ("GWQS"), found in UAC R317-6-2 (see the 2004 Statement of Basis, pp. 6-7). These findings were of concern to the DRC because they appeared to indicate that the tailings cells had possibly discharged wastewater into the underlying shallow aquifer.

To resolve this concern, the Director required ~~Denison~~ EFRI to evaluate groundwater quality data from the thirteen existing wells on site, and submit a Background Ground Water Quality Report for Director approval. The existing wells are those wells which were installed prior to the issuance of the original GWDP on March 8, 2005 and include: MW-1, MW-2, MW-3, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-26 (formerly called TW4-

15 and installed as part of the chloroform corrective action order), and MW-32 (formerly called TW4-17 and installed as part of the chloroform corrective action order). It is important to note that MW-4 was installed prior to the issuance of the original permit; however, MW-4 is monitored under the chloroform program and was not included in the Existing Background Report. GWCLs have not been established for this well, and MW-4 is not a POC well under the GWDP. One of the purposes of ~~that~~ the background report was to provide a critical evaluation of historic groundwater quality data from the facility, and determine representative background quality conditions and reliable groundwater compliance limits ("GWCLs") for the Permit.

As required, ~~Denison~~ EFRI submitted the following reports:

- *Revised Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc. (the "Existing Well Background Report"); and

- *Revised Addendum: -- Evaluation of Available Pre-Operational and Regional Background Data, Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, November 16, 2007, prepared by INTERA, Inc. (the "Regional Background Report").

The Existing Well Background Report and the Regional Background Report included a detailed quality assurance evaluation of all existing groundwater quality data collected prior to the date of issuance for the thirteen existing wells, in accordance with criteria established by DRC and United States Environmental Protection Agency ("EPA") guidance. This resulted in a data~~-~~base suitable for statistical and other analyses. Based on an analysis of this updated data~~-~~base, the Existing Well Background Report and Regional Background Report concluded that there ~~have~~ had been no impacts to groundwater from Mill activities, based on a number of factors, including the following:

- There ~~are~~ were a number of exceedances of GWQSs in upgradient and far downgradient wells at the site, which cannot be considered to have been impacted by Mill operations to date. Exceedances of GWQSs in monitoring wells nearer to the site itself are therefore consistent with natural background in the area.

- There ~~are~~ were numerous cases of both increasing and decreasing trends in constituents in upgradient, far downgradient, and Mill site wells, which provide evidence that there are natural forces at work that are impacting groundwater quality across the entire site.

- In almost all cases where there ~~are~~ were increasing trends in constituents in wells at the site, there ~~are~~ were increasing trends in those constituents in upgradient wells. Furthermore, in no case ~~is~~ was there any evidence in the wells in question of increasing trends in chloride, which is very mobile and a good indicator of potential tailings cell leakage at the site.

See Section 2.11.2 below for a more detailed discussion of the Existing Well Background Report and Regional Background Report and their conclusions.

The Permit also required nine new monitoring wells to be installed around tailings Cells 1 and 2, followed by groundwater sampling and analysis, and later submittal of another Background Ground Water Quality Report to determine reliable background conditions and groundwater compliance limits for the new wells. The new wells are those wells which were installed after the issuance of the original GWDP on March 8, 2005 and include: MW-3A, MW-23, MW-24, MW-25, MW-27, MW-28, MW-29, MW-30, and MW-31. In response to this requirement, ~~Denison~~ EFRI installed the nine new wells, and submitted to the Director a *Revised Addendum: -- Background Groundwater Quality Report: New Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah,* April 30, 2008, prepared by INTERA, Inc. (the "New Well Background Report"), and together with the Existing Well Background Report and the Regional Background Report, are referred to as the "Background Reports").

The New Well Background Report concluded that the sampling results for the new wells confirm that the groundwater at the Mill site and in the region is highly variable naturally and has not been impacted by Mill operations and that varying concentrations of constituents at the site are consistent with natural background variation in the area. See Section 2.11.2 below for a more detailed discussion of the New Well Background Report and its conclusions.

During the course of discussions with ~~Denison~~ EFRI staff, and further DRC review, DRC decided to supplement the analysis provided in the Background Reports by commissioning the University of Utah to perform a geochemical and isotopic groundwater study at White Mesa. This resulted in the University of Utah completing a study entitled *Summary of work completed, data results, interpretations and recommendations for the July 2007 Sampling Event at the Denison Mines, USA, White Mesa Uranium Mill Near Blanding Utah*, May 2008, prepared by T. Grant Hurst and D. Kip Solomon, Department of Geophysics, University of Utah (the "University of Utah Study"). The purpose of the University of Utah Study was to determine if the increasing and elevated trace metal concentrations (such as uranium) found in the monitoring wells at the Mill were due to potential leakage from the on-site tailings cells. To investigate this potential problem, the study examined groundwater flow, chemical composition, noble gas and isotopic composition, and age of the on-site groundwater. Similar evaluations were also made on samples of the tailings wastewater and nearby surface water stored in the northern wildlife ponds at the facility. Fieldwork for the University of Utah Study was conducted from July 17 - 26 of 2007. The conclusions in the University of Utah Study supported ~~Denison's~~ EFRI's conclusions in the Background Reports

As stated above, ~~DUSA~~ EFRI prepared Background Reports that evaluated all historic data for the thirteen existing wells and nine new wells for the purposes of establishing background groundwater quality at the site and developing GWCLs under the GWDP. Prior to review and acceptance of the conclusions in these Background Reports, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the thirteen existing wells and the nine new wells based primarily on the conclusions and analysis in the Background Reports. It should be noted, however, that, because the GWCLs have been set at the mean plus second standard deviation, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

In addition to the thirteen existing wells and the nine new wells there are an additional 7 monitoring wells at the site which are included in the routine groundwater monitoring program~~-~~. Those 7 wells are: MW-20, MW-22, MW-33, MW-34, MW-35, MW-36, and MW-37.

The GWDP dated January 20, 2010 required the completion of eight consecutive quarters of groundwater sampling and analysis of MW-20 and MW-22, and later submittal of another Background Report to determine if wells MW-20 and MW-22 should be added as point of compliance ("POC") monitoring wells. Data from MW-20 and MW-22 were analyzed in the pre-operational and regional background addendum (INTERA 2007a); however there was not a complete data set at the time. Although wells MW-20 and MW-22 were installed in 1994, they were not sampled regularly until the second quarter of 2008. The eighth full round of sampling was completed during the first quarter of 2010, and ~~Denison~~ EFRI submitted to the Director the *Background Groundwater Quality Report for Wells MW-20 and MW-22 for Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah,* June 1, 2010, prepared by INTERA, Inc. (the "MW-20 and MW-22 Background Report"). DRC classified MW-20 and MW-22 as general monitoring wells, and ~~no~~ GWCLs have not been ~~calculated~~established for these wells. MW-20 and MW-22 are sampled semiannually.

Part I.H.6 of the ~~The~~ GWDP dated June ~~17~~21, ~~2012~~2010, ~~Part I.H.6~~ required the installation of three hydraulically downgradient wells adjacent to Tailings Cell 4B (MW-33, MW-34, and MW-35) prior to placement of ~~any potential~~ tailings and/or wastewater in Cell 4B. The purpose of these monitoring wells was to provide early detection of tailings cell contamination of shallow groundwater from Tailings Cell 4B. ~~Denison~~ EFRI installed MW-33, MW-34, and MW-35 as required. Of these three wells installed near tailings Cell 4B, only MW-35 was hydraulically acceptable, with five feet or more of saturated thickness. MW-35 ~~has been~~was sampled quarterly since fourth quarter 2010 to collect eight ~~consecutive quarters of~~statistically valid data points for the completion of the Background Report and calculation of GWCLs. MW-33 and MW-34 had insufficient water for sampling, with saturated thicknesses less than five feet. MW-33 is completely dry, and no samples or depth to water measurements are collected from this well. Quarterly depth to water is measured in MW-34, but no sampling or analysis is required.

Part I.H.4 of the February 15, 2011 GWDP required the installation of two wells hydraulically downgradient of Tailings Cell 4B as replacements for MW-33 and MW-34. ~~Denison~~ EFRI installed MW-36 and MW-37 as required. MW-36 and MW-37 ~~have been~~were sampled quarterly since third quarter 2011 to collect eight ~~consecutive quarters of~~statistically valid data points for the completion of the Background Report and calculation of GWCLs.

The Background Report for wells MW-35, MW-36, and MW-37 was submitted to the Director on May 1, 2014. The findings of the Background Analysis for wells MW-35, MW-36, and MW-37 support previous conclusions that the groundwater at the Mill is not being affected by any potential tailings cell seepage. At the time of this application, EFRI was awaiting a response from the Director regarding the Background Report for wells MW-35, MW-36, and MW-37.

1.4 Documents Referenced in This Application

The following documents are referenced in this Application. and are a part of this Application:

a) The following Permits, Licenses, Statement of Basis, Plans and Related Reports:

(i) State of Utah Ground Water Discharge Permit No. UGW370004 dated August 24, 2012, (the "Permit") and previous versions of the Permit dated January 10, 2010, June 21, 2010, February 15, 2011, and July 14, 2011.

(ii) State of Utah Radioactive Materials License No. UT 1900479 (the "Mill License");

(iii) *Statement of Basis For a Uranium Milling Facility at White Mesa, South of Blanding, Utah, Owned and Operated by International Uranium (USA) Corporation*, December 1, 2004, prepared by the State of Utah Division of Radiation Control (the "2004 Statement of Basis");

(iv) *Reclamation Plan White Mesa Mill Blanding, Utah, Source Material License No. SUA-1358 Docket No. 40-8681 Revision 4.03.2B*, November 2009January 14, 2011 (the "Reclamation Plan"); and

(v) *UMETCO Minerals Corporation: White Mesa Mill Drainage Report for Submittal to NRC*, January 1990;

b) The following Background Groundwater Quality Reports and Related Studies:

(i) *Revised Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc. (the "Existing Well Background Report");

(ii) *Revised Addendum: -- Evaluation of Available Pre-Operational and Regional Background Data, Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, November 16, 2007, prepared by INTERA, Inc. (the "Regional Background Report");

(iii) *Revised Addendum: -- Background Groundwater Quality Report: New Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah,* April 30, 2008, prepared by INTERA, Inc. (the "New Well Background Report" and together with the Existing Well Background Report and the Regional Background Report, the "Background Reports"); and

(iv) *Summary of work completed, data results, interpretations and recommendations for the July 2007 Sampling Event at the Denison Mines, USA, White Mesa Uranium Mill Near Blanding Utah*, May 2008, prepared by T. Grant Hurst and D.

Kip Solomon, Department of Geophysics, University of Utah (the "University of Utah Study");

(v) *Background Groundwater Quality Report for Wells MW-20 and MW-22 for Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah,* June 1, 2010, prepared by INTERA, Inc. (the "MW-20 and MW-22 Background Report");

(vi) *Background Groundwater Quality Report for Monitoring Wells MW-35, MW-36 and MW-37 White Mesa Mill Blanding, Utah,* May 1, 2014, prepared by INTERA, Inc. (the "MW-35, MW-36, and MW-37 Background Report".

c) The following environmental reports and analyses:

(i) *Environmental Report, White Mesa Uranium Project San Juan County, Utah,* January 30, 1978, prepared by Dames & Moore (the "1978 ER"); and

(ii) *Final Environmental Statement related to operation of White Mesa Uranium Project Energy Fuels Nuclear, Inc.*, May 1979, Docket No. 40-8681, prepared by the United States Nuclear Regulatory Commission (the "FES");

d) The following engineering, geological and hydrogeological reports:

(i) *Umetco Groundwater Study, White Mesa Facilities, Blanding, Utah*, 1993, prepared by Umetco Minerals Corporation (the operator of the Mill at the time) and Peel Environmental Services;

(ii) *Hydrogeological Evaluation of White Mesa Uranium Mill*, July 1994, prepared by Titan Environmental Corporation (the "1994 Titan Report");

(iii) *Evaluation of Potential for Tailings Cell Discharge – White Mesa Mill*, November 23, 1998, prepared by Knight-Piesold LLC;

(iv) ~~Update to report~~ *Investigation of Elevated chloroform concentrations in Perched Groundwater at the White Mesa Uranium Mill Near Blanding, Utah*, 2001, prepared by Hydro Geo Chem, Inc.;

~~(v) *Hydraulic Testing at the White Mesa Uranium Mill Near Blanding, Utah During July 2002*, August 22, 2002, prepared by Hydro Geo Chem, Inc.;~~

~~(vi)~~(v) Letter Report dated August 29, 2002, prepared by Hydro Geo Chem, Inc.;

~~(vii) *Perched Monitoring Well Installation and Testing at the White Mesa Uranium Mill April Through June 2005*, August 3, 2005, prepared by Hydro Geo Chem, Inc.;~~

(viii) *Site Hydrogeology and Estimation of Groundwater Travel Times In The Perched Zone White Mesa Uranium Mill Site Near Blanding, Utah*, August 27, 2009, prepared by Hydro Geo Chem, Inc.;

(ix)(vi) *Hydrogeology White Mesa Uranium Mill Site Near Blanding, Utah*, June 6, 2012, prepared by Hydro Geo Chem, Inc.;

(x) *Hydrogeology of the Perched Groundwater Zone and Associated Seeps and Springs Near the White Mesa Uranium Mill Site, Blanding Utah*, November 12, 2010, prepared by Hydro Geo Chem, Inc.; and

(xi)

e) The following plans and specifications relating to construction and operation of the Mill's tailings cells:

(i) *Engineers Report: Tailings Management System, White Mesa Uranium Project Blanding, Utah*, June 1979, prepared by D'Appolonia Consulting Engineers, Inc.;

(ii) *Engineer's Report: Second Phase Design – Cell 3 Tailings Management System, White Mesa Uranium Project Blanding, Utah*, May 1981, prepared by D'Appolonia Consulting Engineers, Inc.;

(iii) *Construction Report: Initial Phase – Tailings Management System, White Mesa Uranium Project Blanding, Utah*, February 1982, prepared by D'Appolonia Consulting Engineers, Inc.;

(iv) *Construction Report: Second Phase Tailings Management System, White Mesa Uranium Project*, March 1983, prepared by Energy Fuels Nuclear, Inc. (the operator of the Mill at the time);

(v) *Cell 4 Design, White Mesa Project Blanding, Utah*, April 10, 1989, prepared by Umetco Minerals Corporation (the operator of the Mill at the time);

(vi) *Construction Report: Tailings Cell 4A, White Mesa Uranium Mill – Tailings Management System*, August 2000, prepared by Denison (then named International Uranium (USA) Corporation (the operator of the Mill at the time));

(vii) *Cell 4A Lining System Design Report For The White Mesa Mill Blanding, Utah*, January 2006, prepared by GeoSyntec Consultants;

(viii) *Cell 4A Construction Quality Assurance Report, White Mesa Mill Blanding, Utah*, July 2008, prepared by Geosyntec consultants (disk only);

(ix) *Cell 4B Design Report, White Mesa Mill, Blanding, Utah*, December 8, 2007, prepared by Geosyntec Consultants; and

(x) *Cell 4B Construction Quality Assurance Report, Volumes 1-3*, November 2010, prepared by Geosyntec Consultants.

f) The following documents relating to the chloroform investigation at the site:

(i) *Preliminary Corrective Action Plan, White Mesa Mill Near Blanding, Utah*, August 20, 2007, prepared by Hydro Geo Chem, Inc.; and

(ii)

(iii)(i) *Contamination Investigation Report TW4-12 and TW4-27 Areas White Mesa Uranium Mill, Near Blanding Utah*, January 23, 2014 prepared by Hydro Geo Chem, Inc.;

g) The following documents relating to the nitrate and pH/ and other Out of Compliance investigations at the site:

g)

(i) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the First, Second, Third and Fourth Quarters of 2010 and First Quarter 2011*, June 13, 2011;

(ii) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Second Quarter of 2011*, September 7, 2011;

(iii) *Plan and Time Schedule for Assessment of pH Under Groundwater Discharge Permit UGW370004,* April 13, 2012 prepared by Hydro Geo Chem, Inc;

(iv) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Third Quarter of 2012*, December 13, 2012;

(v) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Fourth Quarter of 2012*, March 15, 2013;

(vi) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the First Quarter of 2013*, August 28, 2013;

(vii) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Second Quarter of 2013*, September 20, 2013;

(viii) *White Mesa Mill State of Utah Groundwater Discharge Permit UGW370004 Plan* *and Time Schedule Under part I.G.4 (d) for Violations of Part I.G.2 for Constituents in the Third Quarter of 2013*, December 5, 2013;

(ix) *Source Assessment Report, White Mesa Uranium Mill, Blanding Utah*, October 10, 2012 prepared by INTERA, Inc;

(x) *pH Report White Mesa Uranium Mill, Blanding Utah*, November 9, 2012 prepared by INTERA, Inc;

(xi) *Investigation of Pyrite in the Perched Zone, White Mesa Uranium Mill, Blanding Utah*, December 7, 2012 prepared by Hydro Geo Chem, Inc;

(xii) *Source Assessment Report for TDS in MW-29, White Mesa Uranium Mill, Blanding Utah*, May 7, 2013 prepared by INTERA, Inc;

(xiii) *Source Assessment Report for Selenium in MW-31, White Mesa Uranium Mill, Blanding Utah*, August 30, 2013 prepared by INTERA, Inc;

(xiv) *Source Assessment Report for Tetrahydrofuran in MW-01, White Mesa Uranium Mill, Blanding Utah*, December 17, 2013; prepared by INTERA, Inc.

(xv) *Source Assessment Report for Gross Alpha in MW-32, White Mesa Uranium Mill, Blanding Utah*, January 13, 2014 prepared by INTERA, Inc;

(xvi) *Source Assessment Report for Sulfate in MW-01 and TDS in MW-03A, White Mesa Uranium Mill, Blanding Utah*, March 19, 2014 prepared by INTERA, Inc;

h) The following documents relating to the nitrate investigations at the site:

(i) *Stipulated Consent Agreement Docket No. UGW12-03 between Denison Mines (USA) Corp. and the Director of the Division of Radiation Control*, July 12, 2012.

(ii) *Revised Tolling Agreement, Revision 3, between DUSA and the Director*, Revision 2, dated August 21, 2011.

(iii) *Revised Phase 1 (A through C) Work Plan and Schedule for Phase 1 A – C Investigation,* May 11, 2011, prepared by INTERA, Inc;

(iv) *Revised Phase 2 through 5 Work Plan and Schedule,* June 3, 2011, prepared by INTERA, Inc;

(v) *Revised Phase 2 QAP and Work Plan, Revision 2.0,* July 12, 2011; and

(vi) *Nitrate Corrective Action Plan,* May 7, 2012, prepared by Hydro Geo Chem, Inc;.

~~(vi)~~*(vii)* *Nitrate Contamination Investigation Report, December 30, 2009, prepared by*

INTERA, Inc.

2.0 INFORMATION PROVIDED IN SUPPORT OF THE APPLICATION

2.1 Name and Address of Applicant and Owner (R317-6-6.3.A)

The Applicant is Denison Mines (USA) Corp. ("Denison") and Mill Operator is Energy Fuels Resources (USA) Inc. ("EFRI"). Denison EFRI is the current holder of the Permit. The Mill is owned by Denison's EFRI's affiliate, Denison White MesaEFR White Mesa LLC ("DWMEFRWM").

The address for both Denison and DWM EFRI and EFRWM is:

1050 17th St. Suite 950225 Union Boulevard, Suite 600
Denver, CO 80265Lakewood, CO 80228
Telephone: 303-628-7798303-974-2140
Fax: 303-389-4130303-389-4125

Contacts at DenisonEFRI, all located at the foregoing aforementioned office:

Harold R. Roberts, Executive Vice President, US Operationsand Chief Operating Officer.
Direct telephone: 303-389-4160
hroberts@denisonminesenergyfuels.com

Frank J. Filas
Vice President, Permitting and Environmental Affairs
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Vice President, Regulatory Affairs and General Counsel
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Jo Ann TischlerKatherine A. Weinel
Director, Compliance and PermittingQuality Assurance Manager
Direct telephone: 303-389-41342
jtischler@denisonmines.comkweinel@energyfuels.com

2.2 Legal Location of the Facility (R317-6-6.3B)

The Mill is regionally located in central San Juan County, Utah, approximately 6 miles (9.5 km) south of the city of Blanding. The Mill can be reached by taking a private road for approximately 0.5 miles west of Utah State Highway 191. See Figure 1.

Within San Juan County, 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 T37S, R22E, and Sections 4, 5, 6, 8, 9, and 16 of T38S, R22E, Salt Lake Base and Meridian ("SLBM"). See Figure 2.

All operations authorized by the Mill License are conducted within the confines of the existing site boundary. The milling facility currently occupies approximately 50 acres, and the tailings disposal cells encompass another 250 acres. See Figure 2.

2.3 Name and Type of Facility (R317-6-6.3.C)

The name of the facility is the White Mesa Uranium Mill. The facility is a uranium milling and tailings disposal facility, which operates under a Radioactive Materials License issued by the Director of the Utah Division of Radiation Control under UAC R313-24. In addition to uranium in the form of U_3O_8, the Mill also produces vanadium, in the form of vanadium pentoxide ("V_2O_5"), ammonia metavanadate ("AMV") and vanadium pregnant liquor ("VPL"), from certain conventional ores and has produced other metals from certain alternate feed materials (specifically niobium and tantalum as authorized under NRC license amendment number 4, included as Appendix A). Alternate feed materials are uranium bearing materials other than conventionally mined ores.

Construction of the Mill was completed and first operations commenced in May 1980. The Mill does not have a set operating life, and can operate indefinitely, subject to available tailings capacity and license and permit renewals. The conceptual and permitted total capacity is for the quantity of Mill tailings produced from a 15-year operating period at a rate of 2,000 tons per day, operating 340 days per year. Since it commenced operations in 1980, the Mill has operated on a campaign basis, processing conventional ores and alternate feed materials as they become available and as economic conditions warrant.

2.4 A Plat Map Showing All Water Wells, Including The Status And Use Of Each Well, Drinking Water Source Protection Zones, Topography, Springs, Water Bodies, Drainages, And Man-Made Structures Within A One-Mile Radius Of The Discharge. (R317-6-6.3.D)

There are five deep wells within a one mile radius of the Mill, two of which supply the Mill facility. There are no Drinking Water Source Protection Zones or ordinances within this radius.

Routine groundwater monitoring wells have been established for monitoring under the Permit. These monitoring wells are depicted on Figure 104 and have been plotted on San Juan County, Utah plat maps in Appendix BA to this Application. The depth and purpose of each of these wells is as shown in Tables 1.2-1, 1.2-2, and 2.4-1.

See Section 2.9.1.3 below for a detailed description of the Mill's groundwater monitoring program.

The surface topography within this one mile zone is relatively flat, and man-made structures are limited to the Mill facilitiesshown on Figures presented in Appendix B. See Sections 2.5.4 and 2.5.7 below for a more detailed discussion on local topography and land use.

The Mill area has several dry drainages, and the only nearby natural water bodies within one mile are Westwater Creek, Corral Creek and Cottonwood Creek. In addition to these are Ruin Spring and several other springs and seeps located within a 1.5 mile radius of the Mill. See Sections 2.5.3 and 2.13 below for discussions relating to seeps and springs in the vicinity of the site and to surface water and drainages, respectively.

2.5 Geologic, Hydrologic, and Agricultural Description of the Geographic Area (R317-6-6.3.E)

2.5.1 Groundwater Characteristics

This Section is ~~excerpted from~~based on the Report entitled: ~~Site~~ *Hydrogeology of the White Mesa Uranium Mill, Blanding Utah ~~and Estimation of Groundwater Travel Times In The Perched Zone White Mesa Uranium Mill Site Near Blanding, Utah,~~* ~~July~~ June ~~106~~, ~~2012~~2014, prepared by Hydro Geo Chem, Inc. ("HGC") (the "~~2012~~ 2014 HGC Report" referred to as HGC, ~~2012b~~2014).

2.5.1.1 Geologic Setting

The Mill is located within the Blanding Basin of the Colorado Plateau physiographic province. Typical of large portions of the Colorado Plateau province, the rocks underlying the site are relatively undeformed. The average elevation of the site is approximately 5,600 ft (1,707 m) above mean sea level ("amsl").

The site is underlain by unconsolidated alluvium and indurated sedimentary rocks consisting primarily of sandstone and shale. The indurated rocks are relatively flat lying with dips generally less than 3°. The alluvial materials consist mostly of aeolian silts and fine-grained aeolian sands with a thickness varying from negligible to as much as 25 to 30 feet across the site. In some portions of the site the alluvium is underlain by a few feet to as much as 30 feet of Mancos Shale. In other areas, the Mancos Shale is absent. The alluvium and Mancos (where present) are underlain by the Dakota Sandstone and Burro Canyon Formation, which are sandstones having a combined total thickness ranging from approximately 55 to 140 feet (17 to 43 m). Beneath the Burro Canyon Formation lies the Morrison Formation, consisting, in descending order, of the Brushy Basin Member, the Westwater Canyon Member, the Recapture Member, and the Salt Wash Member. The Brushy Basin and Recapture Members of the Morrison Formation, classified as shales, are very fine-grained and have a very low permeability. The Brushy Basin Member is primarily composed of bentonitic mudstone, siltstone, and claystone. The Westwater Canyon and Salt Wash Members are primarily sandstones but are expected to have a low average vertical permeability due to the presence of interbedded shales. See Figure 3 for a generalized stratigraphic column for the region.

Beneath the Morrison Formation lies the Summerville Formation, an argillaceous sandstone with interbedded shales, and the Entrada Sandstone. Beneath the Entrada lies the Navajo Sandstone. The Navajo and Entrada Sandstones constitute the primary aquifer in the area of the site. The Entrada and Navajo Sandstones are separated from the Burro Canyon Formation by approximately 1,000 to 1,100 feet (305 to 355 m) of materials having a low average vertical permeability. Groundwater within this system is under artesian pressure in the vicinity of the site, is of generally good quality, and is used as a secondary source of water at the site.

2.5.1.2 Hydrogeologic Setting

The site is located within a region that has a dry to arid continental climate, with average annual precipitation of approximately 13.3 inches, and an average annual lake evaporation rate of approximately 47.6 inches. Recharge to the principal aquifers (such as the Navajo/Entrada) occurs primarily along the mountain fronts (for example, the Henry, Abajo, and La Sal Mountains), and along the flanks of folds such as Comb Ridge Monocline.

Although the water quality and productivity of the Navajo/Entrada aquifer are generally good, the depth of the aquifer (approximately 1,200 feet below land surface [ft bls]) makes access difficult. The Navajo/Entrada aquifer is capable of yielding significant quantities of water to wells (hundreds of gallons per minute [gpm]). Water in on-site wells completed within the Navajo/Entrada rises approximately 800 feet above the base of the overlying Summerville Formation.

The shallowest groundwater beneath the site consists of perched water hosted primarily by the Burro Canyon Formation. Perched water is used on a limited basis to the north (upgradient) of the site because it is much shallower and more easily accessible than the deep Navajo/Entrada aquifer.

2.5.1.3 Perched Zone Hydrogeology

Perched groundwater originates mainly from precipitation and local recharge sources such as unlined reservoirs (Kirby, 2008) and is supported within the Burro Canyon Formation by the underlying, fine-grained Brushy Basin Member. Perched groundwater at the site ~~has a generally low~~is generally of poor quality due to high total dissolved solids ("TDS") in the range of approximately 1,100 to 7,900 milligrams per liter ("mg/L"). ~~Generally~~ Its relatively poor quality is one reason that perched water is used primarily for stock watering and irrigation in areas upgradient (north) of the site. Figure 4 is a contour map showing the approximate elevation of the contact of the Burro Canyon Formation with the Brushy Basin Member, which essentially forms the base of the perched water zone at the site. Based on Figure 4, the Burro Canyon Formation/Brushy Basin Member contact generally dips to the south/southwest beneath the site.

Figure 5 is a perched groundwater elevation contour map for the first quarter, 201~~2~~4. Based on the contoured water levels, groundwater within the perched zone flows generally south to southwest beneath the site. Beneath the tailings cells, perched groundwater flow is generally to the southwest.

Perched groundwater discharges from outcrops of the Burro Canyon Formation in seeps and springs along Westwater Creek Canyon and Cottonwood Canyon (to the west-southwest of the millsite and tailings cells) and along Corral Canyon (to the east and northeast of the millsite and tailings cells). Known discharge points include ~~all~~ the seeps and springs shown in Figure 5 except Cottonwood Seep.

As discussed in (HGC, 2014), Cottonwood Seep is located more than 1,500 feet west of White Mesa in an area where the Dakota Sandstone and Burro Canyon Formation (which hosts the perched water system) are absent due to erosion, and at an elevation approximately 230 feet below the base of the perched zone defined by the contact between the Burro Canyon Formation and the underlying Brushy Basin Member. Cottonwood Seep occurs near the contact between the slope-forming Brushy Basin Member and the underlying Westwater Canyon (sandstone) Member.

Contact elevations shown in Figure 4 are based on perched monitoring well drilling and geophysical logs and surveyed land surface elevations, and the surveyed elevations of Westwater Seep and Ruin Spring. The elevations of Westwater Seep and Ruin Spring are included in the kriged contours because they occur at the contact between the Burro Canyon Formation and the underlying Brushy Basin Member (HGC, 2012a).

Groundwater elevations shown in Figure 5 include the surveyed elevations of all seeps and springs except Cottonwood Seep. As discussed above, no evidence exists to connect Cottonwood Seep to the perched water system. Although Cottonwood Seep may potentially receive some contribution from perched water, its occurrence near the contact between the Brushy Basin Member and the underlying Westwater Canyon Member indicates that its elevation is not representative of the perched water system.

The permeabilities of the Dakota Sandstone and Burro Canyon Formation at the site are generally low. No significant joints or fractures within the Dakota Sandstone or Burro Canyon Formation have been documented in any wells or borings installed across the site (Knight Piésold, 1998). Any fractures observed in cores collected from site borings are typically cemented, showing no open space.

Porosities and water contents of the Dakota Sandstone have been measured in samples collected during installation of former well MW-16 and well MW-17 (Figure 5). MW-16 was located immediately downgradient of tailings Cell 3 and MW-17 is located south of tailings Cell 4A at a location primarily cross-gradient with respect to perched water flow. Porosities of the Dakota Sandstone range from 13.4% to 26%, averaging 20%, and water saturations range from 3.7% to 27.2%, averaging 13.5%. The average volumetric water content is approximately 3%. The hydraulic conductivity of the Dakota Sandstone based on packer tests in borings installed at the site prior to 1994 ranges from 2.71 x 10^{-6} centimeters per second ("cm/s") to 9.12 x 10^{-4} cm/s, with a geometric average of 3.89 x 10^{-5} cm/s (TITAN, 1994).

The average porosity of the Burro Canyon Formation is similar to that of the Dakota Sandstone. Based on samples collected from the Burro Canyon Formation at former well MW-16 porosity ranges from 2% to 29.1%, averaging 18.3%, and water saturations of unsaturated materials range from 0.6% to 77.2%, averaging 23.4% (TITAN, 1994). These porosities are similar to those reported by MWH (MWH, 2010) for archived samples from borings MW-23 and MW-30.

Extensive hydrogeologic characterization of the saturated Burro Canyon Formation has occurred through hydraulic testing of perched monitoring wells and borings at the site. Hydraulic testing of MW-series wells located upgradient, cross-gradient, downgradient, and within the millsite and tailings cell complex, TW4-series wells located cross-gradient to upgradient of the millsite and tailings cells, TWN-series wells located primarily upgradient of the millsite and tailings cells, and DR-series piezometers, located downgradient of the tailings cells, indicate that the hydraulic conductivity of the perched zone ranges from approximately 3 2 x 10^{-8} to 0.01 cm/s.

TITAN (1994), reported that the hydraulic conductivity of the Burro Canyon Formation ranges from 1.9 x 10^{-7} to 1.6 x 10^{-3} cm/s, with a geometric mean of 1.01 x 10^{-5} cm/s, based on the results of 12 pumping/recovery tests performed in monitoring wells and 30 packer tests performed in borings prior to 1994. The range reported by TITAN (1994) is within the hydraulic conductivity range of approximately 2 x 10^{-8} to 0.01 cm/s reported by HGC (HGC, 2014).

In general the highest permeabilities and well yields are in the area of the site immediately northeast and east (upgradient to cross gradient) of the tailings cells. A relatively continuous, higher permeability zone (associated with poorly indurated coarser-grained materials in the general area of the chloroform plume) has been inferred to exist in this portion of the site. Analysis of drawdown data collected from this zone during long-term pumping of MW-4, MW-26 (TW4-15), and TW4-19 (Figure 5) yielded estimates of hydraulic conductivity ranging from approximately 4 x 10^{-5} to 1 x 10^{-3} cm/s (HGC, 2014). The decrease in perched zone permeability south to southwest of this area (south of TW4-4), based on tests at TW4-6, TW4-26, TW4-27, TW4-29 through TW4-31, and TW4-33 and TW4-34, indicates that this higher permeability zone "pinches out".

Relatively high conductivities measured at MW-11, located on the southeastern margin of the downgradient edge of tailings Cell 3, and at MW-14, located on the downgradient edge of tailings Cell 4A, of 1.4 x 10^{-3} cm/s and 7.5 x 10^{-4} cm/s, respectively, may indicate that this higher permeability zone extends beneath the southeastern portion of the tailings cell complex. However, based on hydraulic tests south and southwest of these wells, this zone of higher permeability does not appear to exist within the saturated zone downgradient (south-southwest) of the tailings cells.

Slug tests performed at groups of wells and piezometers located northeast (upgradient) of, in the immediate vicinity of, and southwest (downgradient) of the tailings cells indicate generally lower permeabilities compared with the area of the chloroform plume. The following results are based on analysis of automatically logged slug test data using the KGS solution available in AQTESOLVE (HydroSOLVE, 2000).

Testing of TWN-series wells installed in the northeast portion of the site as part of nitrate investigation activities yielded a hydraulic conductivity range of approximately 3.6 x 10^{-7} to 0.01 cm/s, with a geometric average of approximately 6 x 10^{-5} cm/s. The value of 0.01 cm/s estimated for TWN-16 is the highest measured at the site, and the value of 3.6 x 10^{-7} cm/s estimated for TWN-7 is one of the lowest measured at the site. Testing of MW-series wells MW-23 through MW-32 installed between and at the margins of the tailings cells in 2005 (and using the higher estimate for MW-23) yielded a hydraulic conductivity range of approximately 2 x 10^{-7} to 1 x 10^{-4} cm/s with a geometric average of approximately 2 x 10^{-5} cm/s. Hydraulic tests conducted at DR-series piezometers installed as part of the southwest area investigation downgradient of the tailings cells yielded hydraulic conductivities ranging from approximately 2 x 10^{-8} to 4 x 10^{-4} cm/s with a geometric average of 9.6 x 10^{-6} cm/s. The low permeabilities and shallow hydraulic gradients downgradient of the tailings cells result in average perched groundwater pore velocity estimates that are among the lowest on site (approximately 0.26 feet per year (ft/yr) to 0.91 ft/yr).

~~Hydraulic testing of wells MW-1, MW-3, MW-5, MW-17, MW-18, MW-19, MW-20, MW-22, MW-23, MW-25, MW-27, MW-28, MW-29, MW-30, MW-31, MW-32, MW-35, MW-36, and MW-37 (Figure 5), located upgradient, cross-gradient, downgradient, and within the area of the~~

tailings cell complex at the site, yielded hydraulic conductivities ranging from approximately 2 x 10^{-7} cm/s to 1 x 10^{-3} cm/s (HGC, 2002; HGC, 2005; HGC, 2010b; and HGC, 2011a) Hydraulic testing of MW-11 and MW-14 (located within and immediately downgradient of the tailings cell complex) yielded hydraulic conductivities of approximately 1 x 10^{-3} cm/s and 7 x 10^{-4} cm/s, respectively.

DR-series piezometers were installed in May, 2011 to investigate perched zone conditions southwest (downgradient) of the tailings cells (Figure 5). Hydraulic testing of DR-5, DR-8, DR-9, DR-10, DR-11, DR-13, DR-14, DR-17, DR-19, DR-20, DR-21, DR-23, and DR-24 (Figure 5) yielded hydraulic conductivity estimates (based on the KGS slug test analysis of automatically logged data) ranging from approximately 3 x 10^{-8} cm/s to 4 x 10^{-4} cm/s with a geometric average of approximately 1 x 10^{-5} cm/s.

27 temporary perched zone chloroform monitoring wells (TW4-series wells in Figure 5), and 19 temporary perched zone nitrate monitoring wells (TWN-series wells in Figure 5) have been installed to investigate elevated nitrate concentrations detected initially in MW-4 and some of the TW4-series wells. TW4-series wells are located northeast (upgradient) to east (cross-gradient) of the tailings cells and TWN-series wells extend to the northeast (upgradient) of the millsite and tailings cells.

Hydraulic testing of the TWN-series wells yielded hydraulic conductivities ranging from approximately 4 x 10^{-7} cm/s to 0.01 cm/s with a geometric average of approximately 5 x 10^{-5} cm/s (HGC, 2009). Testing of TW4-20, TW4-21, and TW4-22 (HGC, 2005) and TW4-23, TW4-24, and TW4-25 (HGC, 2007b) yielded hydraulic conductivities ranging from approximately 4 x 10^{-5} to approximately 2 x 10^{-4} cm/s. Testing of TW4-4 yielded a hydraulic conductivity of approximately 1.7 x 10^{-3} cm/s, and testing of TW4-6, TW4-26, and TW4-27 (located downgradient of TW4-4) yielded hydraulic conductivities ranging from approximately 7 x 10^{-7} cm/s to 2 x 10^{-5} cm/s (HGC, 2010a and HGC, 2011b). Analysis of the drawdown data collected during a long-term pumping test conducted at MW-4, TW4-19, and MW-26 using TW4-series wells as observation wells yielded hydraulic conductivity estimates ranging from approximately 4 x 10^{-5} cm/s to 1 x 10^{-3} cm/s (HGC, 2004).

Some of the coarser-grained and conglomeratic materials encountered within the perched zone during installation of the TW4-series wells are believed to be partly continuous with or at least associated with a relatively thin, relatively continuous zone of higher permeability (International Uranium [USA] Corporation [IUSA] and HGC, 2001). The higher permeability zone defined by wells completed in the zone is generally located east to northeast of the tailings cells at the site, and is hydraulically cross-gradient to upgradient of the tailings cells with respect to perched groundwater flow.

Based on analyses of pumping tests at MW-4 and drilling logs from nearby temporary wells, the hydraulic conductivity of this relatively thin coarser-grained zone was estimated to be as high as 2.5 x 10^{-3} cm/s. Relatively high conductivities measured at MW-11, located on the southeastern margin of the downgradient edge of tailings Cell 3, and at MW-14, located on the downgradient edge of tailings Cell 4A, of 1.4 x 10^{-3} cm/s and 7.5 x 10^{-4} cm/s, respectively (UMETCO, 1993), may indicate that this zone extends beneath the southeastern portion of the tailings cell complex.

~~However, based on hydraulic tests, this zone of higher permeability does not appear to exist within the saturated zone downgradient (south-southwest) of the tailings cells nor to the south of TW4-4. The apparent absence of the zone south of TW4-4 and south-southwest of the tailings cells suggests that it "pinches out" (HGC, 2007a).~~

~~The apparent pinching out of this zone is consistent with hydraulic tests at temporary wells TW4-6, TW4-26 and TW4-27 (located downgradient of TW4-4), and tests at DR-series piezometers (located downgradient of the tailings cell complex). As discussed above, the hydraulic conductivities of TW4-6, TW4-26 and TW4-27 ranged from approximately 7 x 10^{-7} to 2 x 10^{-5} cm/s, approximately two to three orders of magnitude lower than the conductivity at TW4-4 (approximately 2 x 10^{-3} cm/s). The hydraulic conductivities of the DR-series piezometers (based on analysis of automatically logged slug test data using the KGS solution) ranged from approximately 3 x 10^{-8} to 4 x 10^{-4} cm/s, (one to five orders of magnitude lower than at MW-11) with a geometric average of approximately 1 x 10^{-5} cm/s (two orders of magnitude lower than at MW-11). The effect of this transition from higher to lower permeability is to reduce the rate of perched water movement south of TW4-4 and south-southwest of tailings Cell 4A.~~

The extensive hydraulic testing of perched zone wells at the site indicates that perched zone permeabilities are generally low with the exception of the apparently isolated zone of higher permeability associated with the chloroform plume east to northeast (cross-gradient to upgradient) of the tailings cells. The geometric average hydraulic conductivity (approximately 1 x 10^{-5} cm/s) of the DR-series piezometers which cover an area nearly half the size of the total monitored area at White Mesa (excluding MW-22), is nearly identical to the geometric average hydraulic conductivity of 1.01 x 10^{-5} cm/s reported by TITAN (1994), and is within the range of 5 to 10 feet per year (ft/yr) [approximately 5 x 10^{-6} cm/s to 1 x 10^{-5} cm/s] reported by Dames and Moore (1978) [the 1978 ER] for the (saturated) perched zone during the initial site investigation.

Because of the generally low permeability of the perched zone beneath the site, well yields are typically low (less than 0.5 gpm), although sustainable yields of as much as 4 gpm (for example, at TW4-19, shown in Figure 5) are possible in wells intercepting the relatively large saturated thicknesses within the higher permeability zone located east to northeast (cross-gradient to upgradient) of the tailings cells at the site. Sufficient productivity can generally be obtained only in areas where the saturated thickness is greater, which is one reason that 1) some perched zone wells completed near the northern wildlife ponds are relatively productive and 2) the perched zone has been used on a limited basis as a water supply to the north (upgradient) of the site.

2.5.1.4 Perched Groundwater Flow

Perched groundwater flow at the site has historically been to the south/southwest. Figure 5 groundwater elevations indicate that beneath and south of the tailings cells, in the west central portion of the site, perched water flow is south-southwest to southwest. Flow on the western margin of White Mesa is generally south, approximately parallel to the mesa rim (where the Burro Canyon Formation [and perched zone] is terminated by erosion). On the eastern side of the site, perched water flow is also generally southerly. Near the wildlife ponds, flow direction ranges locally from westerly (west of the ponds) to easterly (east of the ponds) resulting in a generally north-south perched water divide along a line connecting the ponds. Cones of depression result from pumping of chloroform wells wells MW-4, TW4-4, TW4-19, TW4-20, and MW-26 and nitrate wells TWN-02, TW4-22, TW4-24, and TW4-25. These wells are pumped to reduce chloroform and nitrate mass in the perched zone east and northeast of the tailings cells.

In general, perched groundwater elevations have not changed significantly at most of the site monitoring wells since installation, except in the vicinity of the wildlife ponds and the pumping wells. For example, relatively large increases in water levels occurred between 1994 and 2002 at MW-4 and MW-19, located in the east and northeast portions of the site, as discussed in HGC (2007a). These water level increases in the northeastern and eastern portions of the site are the result of seepage from wildlife ponds located near piezometers PIEZ-1 through PIEZ-5 shown in Figure 5, which were installed in 2001 for the purpose of investigating these changes. The mounding associated with the wildlife ponds and the general increase in water levels in the northeastern portion of the site have resulted in a local steepening of groundwater gradients over portions of the site. Conversely, pumping of chloroform wells MW-4, TW4-4, TW4-19, TW4-20, and MW-26 and nitrate wells TWN-02, TW4-22, TW4-24, and TW4-25 has depressed the perched water table locally and reduced average hydraulic gradients to the south and southwest of these wells. At the request of DRC, water has not been delivered to the northern wildlife ponds since March, 2012. The perched water mound associated with recharge from these ponds is diminishing and is expected to continue to diminish, thereby reducing hydraulic gradients downgradient of the ponds, in particular to the south and southwest.

As discussed above, perched water discharges in springs and seeps along Westwater Creek Canyon and Cottonwood Canyon to the west-southwest of the site, and along Corral Canyon to the east of the site. The known discharge points located directly downgradient of the tailings cells are Westwater Seep and Ruin Spring. These features are located more than 2,000 feet west-southwest and more than 9,000 feet south-southwest of the tailings cells at the site as shown in Figure 5.

DR-8, located approximately 4,000 feet southwest of the tailings cells, is located near the mesa rim above Cottonwood Seep along a line between the tailings cells and Cottonwood Seep. Although tThere is no evidence to connect Cottonwood Seep to the perched water system as it is separated from the perched water by approximately 230 feet of low permeability shales and mudstones. However, under hypothetical conditions that Cottonwood Seep receives some contribution from perched water, perched water passing beneath the tailings cells would presumably pass by DR-8 before continuing on an unidentified potential pathway toward Cottonwood Seep.

Figure 6 75 shows perched water pathlines southwest of the tailings cells based on first quarter, 2012 2014 perched water level data. Paths 1 and 3 represent the shortest pathlines to discharge points Westwater Seep and Ruin Spring, respectively. Path 2 is the shortest pathline to DR-8, located near the edge of the mesa above Cottonwood Seep. A potential pathline is drawn from DR-8 to Cottonwood Seep. Although there is no evidence to connect Cottonwood Seep to the perched water system, this potential pathline is represented to allow for the possibility of an as yet unidentified connection. Westwater Seep is downgradient of tailings Cell 1 and the western portions of Cells 2, 3, and 4B. DR-8 is downgradient of tailings Cells 2, 3 and 4B. Ruin Spring is downgradient of Cell 4A, and the eastern portions of Cells 2, 3, and 4B.

2.5.1.5 Perched Zone Hydrogeology Beneath And Downgradient Of The Tailings Cells

The perched zone hydrogeology southwest (downgradient) of the tailings cells is similar to other areas of the site except that the saturated thicknesses are generally smaller, portions of the perched zone are dry, and hydraulic gradients and hydraulic conductivities are relatively low. The combination of shallow hydraulic gradients, relatively low permeabilities, and small saturated thicknesses, results in rates of perched water movement that are among the lowest on-site.

In the immediate vicinity of the tailings cells, perched water was encountered at depths of approximately ~~51~~ 53 to ~~115~~ 117 ft below the top of casing ("btoc") as of the first quarter of 2014~~2~~ (Figure 7). Beneath tailings Cell 3, depths to water ranged from approximately 6~~8~~7 feet in the eastern portion of the cell, to approximately ~~115~~ 117 ft btoc at the southwest margin of the cell. Assuming an average depth of the base of tailings Cell 3 of 25 feet below grade, this corresponds to perched water depths of approximately ~~43~~ 42 to ~~90~~ 92 feet below the base of the cell, and an average depth of approximately ~~67~~ 65 feet beneath the base of the cell.

Beneath tailings Cell 4B, depths to water ranged from approximately 106 ft btoc in the northeastern portion of the cell (at MW-5), to approximately 112 ft btoc at the southwest margin of the cell (at MW-35). Assuming an average depth of the base of tailings Cell 4B of 25 feet below grade, this corresponds to perched water depths of approximately 81 to 87 feet below the base of the cell, and an average depth of approximately 84 feet beneath the base of the cell.

The saturated thickness of the perched zone in the immediate vicinity of the tailings cells as of the first quarter of ~~2012~~ 2014 ranges from approximately ~~83~~ 80 feet to negligible (Figure 8). Beneath tailings Cell 3, the saturated thickness varies from approximately ~~59~~ 60 feet in the eastern portion of the cell to approximately 7 feet in the western portion of the cell. Beneath tailings Cell 4B, the saturated thickness varies from approximately 21 feet in the southeastern portion of the cell to negligible in the southwestern portion of the cell, where a dry zone, defined by MW-33 and former (historically dry) well MW-16, is present.

Saturated thicknesses in the southwest area of the site are affected by ~~a~~ the ridge-like high in the Burro Canyon Formation/Brushy Basin Member contact (see Figure 4). ~~The influence of this paleoridge is discussed in HGC (2012a).~~ As shown in Figures 5 and 8, dry ~~conditions or~~to low saturated thickness conditions are associated with this paleoridge.

South-southwest of the tailings cells, the saturated thickness ranges from negligible at MW-21 (historically dry) to approximately 25 feet at DR-9. Small saturated thicknesses (less than 3 feet) near DR-6, DR-7, and DR-9 (west and southwest of Cell 4B) result from ~~this~~ the paleoridge. The average saturated thickness based on measurements at MW-37, DR-13, MW-3, MW-20, and DR-21, which lay close to a line between the southeast portion of tailings Cell 4B and Ruin Spring, is approximately 8 feet. The average saturated thickness based on measurements at MW-35, DR-7, and DR-6, which are the points closest to a line between the southeast portion of tailings Cell 3 and Westwater Seep, is approximately 5 feet.

Perched zone hydraulic gradients currently range from a maximum of approximately 0.075 feet per foot ("ft/ft") east of tailings cell 2 (near the eastern portion of the chloroform plume) to approximately 0.0022 ft/ft in the northeast corner of the site (between TWN-19 and TWN-16). Hydraulic gradients in the southwest portion of the site are typically close to 0.01 ft/ft, but the gradient is less than 0.005 ft/ft west/southwest of tailings Cell 4B, between Cell 4B and DR-8. The overall average site hydraulic gradient, between TWN-19 in the extreme northeast to Ruin Spring in the extreme southwest, is approximately 0.011 ft/ft.

~~Site-wide, perched zone hydraulic gradients as of the first quarter of 20142 range from a maximum of approximately 0.07 feet per foot (ft/ft) east of tailings Cell 2 to approximately 0.001 ft/ft in the northeastern portion of the site (between TWN-15 and MW-1). Hydraulic gradients in the southwest portion of the site are typically close to 0.01 ft/ft, but the gradient is less than 0.005 ft/ft west/southwest of tailings Cell 4B, between Cell 4B and DR-8. The~~ A hydraulic gradient between the west dike of tailings Cell 3 and Westwater Seep is approximately 0.0122 ft/ft, and between the south dike of tailings Cell 4B and Ruin Spring, approximately 0.0118 ft/ft

2.5.2 Groundwater Quality

2.5.2.1 Entrada/Navajo Aquifer

The Entrada and Navajo Sandstones are prolific aquifers beneath and in the vicinity of the site. Water supply wells at the site are screened in both of these units, and therefore, for the purposes of this discussion, they will be treated as a single aquifer. Water in the Entrada/Navajo Aquifer is under artesian pressure, rising 800 to 900 ft above the top of the Entrada's contact with the overlying Summervillle Formation; static water levels are 390 to 500 ft below ground surface.

Within the region, this aquifer is capable of yielding domestic quality water at rates of 150 to 225 gpm, and for that reason, it serves as a secondary source of water for the Mill. Additionally, two domestic water supply wells drawing from the Entrada/Navajo Aquifer are located 4.5 miles southeast of the Mill site on the Ute Mountain Ute Reservation. Although the water quality and productivity of the Navajo/Entrada aquifer are generally good, the depth of the aquifer (>1,000 ft bls) makes access difficult.

Table 2.5.2.1-1 is a tabulation of groundwater quality of the Navajo Sandstone aquifer as reported in the FES and subsequent sampling. TDS ranges from 244 to 1,110 mg/liter in three samples taken over a period from January 27, 1977, to May 4, 1977. High iron (0.057 mg/liter) concentrations are found in the Navajo Sandstone. Because the Navajo Sandstone aquifer is isolated from the perched groundwater zone by approximately 1,000 to 1,100 ft of materials having a low average vertical permeability, sampling of the Navajo Sandstone is not required under the Mill's previous NRC Point of Compliance monitoring program or under the Permit. However, samples were taken at two other deep aquifer wells (#2 and #5) on site (See Figure 9 for the locations of these wells), on June 1, 1999 and June 8, 1999, respectively, and the results are included in Table 2.5.2.1-1.

2.5.2.2 Perched Groundwater Zone

Perched groundwater in the Dakota/Burro Canyon Formation is used on a limited basis to the north (upgradient) of the site because it is more easily accessible. The quality of the Burro Canyon perched water beneath and downgradient from the site is poor and extremely variable.

The concentrations of TDS measured in water sampled from upgradient and downgradient wells range between approximately 600 and 5,300 mg/1. Sulfate concentrations measured in three upgradient wells varied between 670 and 1,740 mg/l (Titan, 1994). The perched groundwater therefore is used primarily for stock watering and irrigation. The saturated thickness of the perched water zone generally increases to the north of the site. See ~~the~~ Section 2.11.2 below for a more detailed discussion of background ground water quality in the perched aquifer.

2.5.3 Springs and Seeps

As discussed in Section 2.5.1.4, perched groundwater at the Mill site discharges in springs and seeps along Westwater Creek Canyon and Cottonwood Canyon to the west-southwest of the site, and along Corral Canyon to the east of the site, where the Burro Canyon Formation outcrops. Water samples have been collected and analyzed from springs and seeps in the Mill vicinity as part of the baseline field investigations reported in the 1978 ER (See Table 2.6-6 in the 1978 ER).

During the period 2003-2004, ~~Denison~~ EFRI implemented a sampling program for seeps and springs in the vicinity of the Mill which had been sampled in 1978, prior to the Mill's construction. Four locations were designated for sampling, ~~which are~~as shown on Figure 9. These are Ruin Spring (G3R), Cottonwood Seep (G4R), west of Westwater Creek (G5R) and Corral Canyon (G1R). During the 2-year study period only two of the four locations ~~were able to~~could be sampled, Ruin Spring and Cottonwood Canyon. The other two locations, Corral Creek and the location west of Westwater Creek were not flowing (seeping), and samples could not be collected. With regard to the Cottonwood seep, while water was present, the volume was not sufficient to complete all determinations, and only organic analyses were conducted. ~~The results of the organic a~~Analysis of the Cottonwood Seep water samples did not detect any ~~detectable~~ organics.

Samples at Ruin Spring were analyzed for major ions, physical properties, metals, radionuclides, volatile and semi-volatile organic compounds, herbicides and pesticides, and synthetic organic compounds. With the exception of one chloromethane detection, all organic determinations were at less than detectable concentrations. The detection of chloromethane is not uncommon in groundwater and can be due to natural sources. In fact, chloromethane has been observed by ~~Denison~~ EFRI at detectable concentrations in field blank samples during routine groundwater sampling events. The results of sampling for the other parameters tested are shown in Table 2.5.3-1. The results of the 2003/2004 sampling did not indicate the presence of mill derived groundwater constituents and are representative of background conditions.

As required by Part I.E.6 of the Permit, the Mill has implemented a *Sampling Plan for Seeps and Springs*. Per Part I.E.6 -of the Permit, sampling of seeps and springs in required annually. A copy of the approved Sampling Plan for Seeps and Springs Revision 1~~0~~, dated ~~March 17, 2009~~June 10, 2011,- is included as Appendix ~~B~~ C to this Application. ~~Denison~~ EFRI submitted Revision 1.0 on June 10, 2011. Revision 1.0 is currently undergoing review by the Director. See Section 2.12.2 below for a more detailed description of the Plan. The first sampling under the Plan was completed in August, 2009. A summary of sampling results from the 2009~~, 2010, and 2011~~through -2013 sampling events, performed under the approved *Sampling Plan for Seeps and Springs*, is provided in Table 2.5.3-2 through Table 2.5.3-5.

2.5.4 Topography

The Mill site is located on a gently sloping mesa that, from the air, appears similar to a peninsula, as it is surrounded by steep canyons and washes and is connected to the Abajo Mountains to the north by a narrow neck of land. On the mesa, the topography is relatively flat, sloping at less than one (1) percent to the south and nearly horizontal from east to west. See also Figure 6.

2.5.5 Soils

The majority (99%) of the soil at the Mill site consists of the Blanding soil series (1978 ER, Section 2.10.1.1). The remaining 1% of the site is in the Mellenthin soil series. Because the Mellenthin soil occurs only on the eastern-central edge of the site (1978 ER, Plate 2.10-1), the FES (Section 2.8) concluded that it should not be affected by Mill construction and operation.

The Mill and associated tailings cells are located on Blanding silt loam, a deep soil formed from wind-blown deposits of fine sands and silts. Although soil textures are predominantly silt loam, silty-clay-loam textures are found at some point in most profiles (See Appendix ~~C~~ D to this Application – *Results of Soil Analysis at Mill Site*). This soil generally has a 4 to 5 inch reddish-brown, silt-loam A horizon and a reddish-brown, silt-loam to silty-clay-loam B horizon. The B horizon extends downward about 12 to 16 inches where the soil then becomes calcareous silt-loam or silty-clay-loam, signifying the C horizon. The C horizon and the underlying parent material are also reddish-brown in color.

The A and B horizon both are non-calcareous with an average pH of about 8.0, whereas the C horizon is calcareous with an average pH of about 8.5. Subsoil sodium levels range up to 12% in some areas, which is close to the upper limit of acceptability for use in reclamation work (1978 ER, Sect. 2.10.1.1). Other elements, such as boron and selenium, are well below potentially hazardous levels. Potassium and phosphorus values are high in this soil (1978 ER, Table 2.10-2) and are generally adequate for plant growth. Nitrogen, however, is low (1978 ER, Sect. 2.10.1.1) and may have to be provided for successful revegetation during final reclamation.

With well-drained soils, relatively flat topography (see Section 2.5.4), and limited annual precipitation (see Section 2.5.1.2), the site generally has a low potential for water erosion. However, the flows resulting from thunderstorm activity are nearly instantaneous and, without the Mill's design controls, could result in substantial erosion. When these soils are barren, they are considered to have a high potential for wind erosion. Although the soil is suitable for crops, the low percentage of available moisture (6 to 9%) is a limiting factor for plant growth; therefore, light irrigation may be required to establish native vegetation during reclamation.

2.5.6 Bedrock

Subsurface conditions at the Mill site area were investigated as part of the 1978 ER by drilling, sampling, and logging a total of 28 borings which ranged in depth from 6.5 to 132.4 ft. Of these borings, 23 were augured to bedrock to enable soil sampling and estimation of the thickness of the soil cover. The remaining 5 borings were drilled through bedrock to below the perched water table, with continuous in situ permeability testing where possible and selective coring in bedrock. The soils encountered in the borings were classified, and a complete log for each boring was maintained. See Appendix A of Appendix H of the 1978 ER.

Borings in the footprint of the existing tailings cells reported calcareous, red-brown sands and silts from the surface to a depth of 15 ft, averaging over 7 ft. Borings in the general area of the Mill site and the tailings cells reported calcareous, red-brown sands and silts from the surface to a depth of 14 ft, averaging over 9 ft. Downgradient of the tailings cells, calcareous sands and silts extend to a depth of 17 ft of the surface. The calcareous silts and sands of the near-surface soils grade to weathered claystones or weathered sandstones, inter-layered with weathered claystone and iron staining. At depth, the weathered claystone or weathered clayey sandstone grade into sandstone with inter-layered bands of claystone, gravel, and conglomerate. Some conglomerates are cemented with a calcareous matrix.

2.5.7 Agricultural and Land Use Description of the Area

Approximately 65.8% of San Juan County is federally owned land administered by the U.S. Bureau of Land Management, the National Park Service, and the U.S. Forest Service. Primary land uses include livestock grazing, wildlife range, recreation, and exploration for minerals, oil, and gas. Approximately 22% of the county is Native American land owned either by the Navajo Nation or the Ute Mountain Ute Tribe. The area within 5 miles of the Mill site is predominantly range land owned by residents of Blanding. The Mill site itself, including tailings cells, encompasses approximately 300 acres.

A more detailed discussion of land use at the Mill site, in surrounding areas, and in southeastern Utah, is presented in the FES (Section 2.5). Results of archeological studies conducted at the site and in the surrounding areas as part of the 1978 ER are also documented in the FES (Section 2.5.2.3).

2.5.8 Well Logs

Well/boring logs for wells MW-1, MW-2, MW-3, MW-4 (not a compliance well under the Permit), MW-5, MW-11, MW-12, MW-14, MW-15, MW-16 (not a compliance well under the Permit and abandoned during the construction of Tailings Cell 4B), MW-17, MW-18, and MW-19, are included as Appendix A to the 1994 Titan Report. A copy of the 1994 Titan Report was previously submitted under separate cover.

Lithologic and core logs for wells MW-3A, MW-23, MW-24, MW-25, MW-27, MW-28, MW-29, MW-30 and MW-31 are included as Appendix A to the Report: *Perched Monitoring Well Installation and Testing at the White Mesa Uranium Mill April Through June 2005*, August 3, 2005, prepared by Hydro Geo Chem, Inc. A copy of that Report was previously submitted under separate cover.

Lithologic and core logs for well MW-26 (previously named TW4-15) and well MW-32 (previously named TW4-17) are included as Appendix A to the *Letter Report dated August 29, 2002, prepared by Hydro Geo Chem, Inc.* and addressed to Harold Roberts.

Lithologic and core logs for well MW-33, MW-34 and well MW-35 are included as Appendix A to the *Installation and Hydraulic Testing of Perched Monitoring Wells MW-33, MW-34, and*

MW-35 at the White Mesa Uranium Mill Near Blanding Utah, prepared by Hydro Geo Chem, Inc. October 11, 2010. A copy of that Report was previously submitted under separate cover.

Lithologic and core logs for well MW-36 and well MW-37 are included as Appendix A to the *Installation and Hydraulic Testing of Perched Monitoring Wells MW-36 and MW-37 at the White Mesa Uranium Mill Near Blanding Utah, prepared by Hydro Geo Chem, Inc. June 28, 2011.* A copy of that Report was previously submitted under separate cover.

Installation logs for wells installed after 2011 are included in the As-Built Reports for each well.

2.6 The Type, Source, and Chemical, Physical, Radiological, and Toxic Characteristics of the Effluent or Leachate to be Discharged (R317-6-6.3.F)

The Mill is designed not to discharge to groundwater or surface waters. Instead, the Mill utilizes tailings and evaporation Cells for disposal or evaporation of Mill effluents as indicated below:

- Cell 1: —dedicated to evaporation of Mill waste solutions;
- Cell 2: ——contains Mill tailings, has an interim cover and is closed to future tailings disposal;
- Cell 3: —contains Mill tailings and is in the final stages of filling;
- Cell 4A: -receives Mill tailings and is used for evaporation of Mill solutions; and
- Cell 4B: -authorized to receives Mill tailings and but currently is used only for evaporation of Mill solutions.

See Sections 2.7.2 through 2.7.4 below for a more detailed discussion of the Mill's tailings cells.

The projected chemical and radiological characteristics of tailings solutions were assessed by Energy Fuels Nuclear, Inc., a predecessor operator of the Mill, and NRC in 1979 and 1980, respectively. In addition, early samples were assessed by D'Appolonia Engineering as the Mill started operations to further evaluate and project the character of the solutions. Samples of tailings after the Mill was fully operational were collected by NRC (1987), DenisonEFRI/UDEQ (2003), and Denison EFRI (2007 - 2013), Denison (2008) and Denison (2009). Samples collected in 2003 were obtained under the oversight of DRC personnel. The Samples collected in 2007 and 2008 were obtained by Denison EFRI on a voluntary basis as the then proposed *Tailings and Slimes Drain Sampling Plan* (the "Tailings Sampling Plan") had not been approved by the Director at that time. The 2009 samples were collected on August 6, 2009 under the approved Tailings Sampling Plan that was approved at that time. Subsequent annual sampling has been performed in August 2010, 2011, 2012 and 2011 2013 under an the approved Tailings Sampling Plan. As of this writing, Denison has submitted Revision 2.0 of the Tailings Sampling Plan, which is currently undergoing review by the Director. A copy of the currently approved Tailings Sampling Plan is included as Appendix L.

The chemical and radiological characteristics of the solutions held in the tailings cells, based on the sample results described above, are provided in the tables included in Appendix DE, which list the concentration of parameters measured in accordance with the Permit.

There is no active discharge from the tailings Cells; therefore, an estimation of the flow rate ("gpd") is not applicable in this instance. However, when operating at full capacity, the Mill discharges approximately 2000 tons per day of dry tailings and approximately 600 gpm of tailings solutions to the Mill's tailings cells.

2.7 Information Which Shows that the Discharge can be Controlled and Will Not Migrate Into or Adversely Affect the Quality of any Other Waters of the State (R317-6-6.3.G)

2.7.1 General

The Mill has been designed as a facility that does not discharge to groundwater or surface water. All tailings and other Mill wastes are disposed of permanently into the Mill's tailings system. Excess waters are disposed of in the tailings or evaporation cells, where they are subject to evaporation, or re-processed through the Mill circuit. See Section 2.6.

The Mill was also designed and constructed to prevent runon or runoff of storm water by a) diverting runoff from precipitation on the Mill site to the tailings cells; and b) diverting runoff from surrounding areas away from the Mill site.

The Permit therefore does not authorize any discharges to groundwater or surface water, but is intended to protect against potential inadvertent or unintentional discharges, such as through potential failure of the Mill's tailings system.

The Mill's tailings system is currently comprised of four tailings cells (Cells 2, 3 4A, and 4B) and one evaporation pond (Cell 1). Diagrams showing the Mill facility layout, including the existing tailings cells are included as Figures 10 and 11 to this Application. In addition, the Mill has a lined catchment basin, used for temporary storage of Mill process upset fluids, known as "Roberts Pond". Roberts Pond is about 0.~~40~~7 acres in size, and ~~found~~ located approximately 180 feet west of the Mill building and about 200 feet east of the northeast corner of Cell 1.

The following sections describe the primary Discharge Minimization Technology ("DMT") and Best Available Technology ("BAT") features of the Mill, which demonstrate that the wastes and tailings at the Mill can be controlled so that they do not migrate into or adversely affect the quality of any waters of the State, including groundwater and surface water.

2.7.2 Cells 1, 2 and 3

2.7.2.1 Design and Construction of Cells 1, 2 and 3

Tailings Cells 1, 2 and 3 were each constructed more than 25 years ago. Construction of Cell 2 was completed on May 3, 1980, construction of Cell 1 was completed on June 29, 1981, and construction of Cell 3 was completed on September 15, 1982.

Each of Cells 1, 2 and 3 are constructed below grade. Each has a single 30 ml PVC flexible membrane liner ("FML") constructed of solvent welded seams on a prepared sub~~-~~ base. A protective soil cover layer was constructed immediately over the FML with a thickness of 12-inches on the cell floor and 18-inches on the interior sideslope. The criterion for placement of the FML in Cells 1, 2 and 3 was a smooth sub base with no rocks protruding that could potentially damage the FML. The cells were excavated by ripping the in-place Dakota Sandstone with a large dozer. Where the rock could not be efficiently ripped, explosives were used to loosen the rock. The cell bottom was then graded to the final design contours and rolled with a smooth drum vibrating roller. The smooth drum roller effectively crushed the loose sandstone, filling in small holes, and allowed for a smooth surface suitable for liner placement. Due to the excavation methods (ripping and blasting) there were some areas that required little or no fill to meet final grades, while other areas required placement of additional crushed sandstone to meet the final grade. The cell bottom was sometimes re-worked several times to accomplish the desired result. The majority of the cell bottom is covered with a layer (1 to 6 inches) of crushed sandstone while the liner in some areas is placed directly on a smooth rolled surface of Dakota Sandstone with only a thin veneer of re-compacted sandstone. In places where the surface was rough or contained small holes, washed concrete sand was used to fill or smooth the imperfections, and the area was then rolled one last time before FML placement. Areas of crushed sandstone filled sub base versus areas with little or no crushed sandstone base were not documented during construction. Areas filled or smoothed with washed concrete sand is likely less than 0.1% of the cell bottoms.~~Immediately below the FML, each Cell has a nominal 6-inch thick layer of crushed sandstone that was prepared and rolled smooth as an FML sub-base layer.~~ Beneath this underlay, native sandstone and other foundation materials were graded to drain to a single low point near the upstream toe of the south cross-valley dike. Inside this layer, is an east-west oriented pipe to gather fluids at the upstream toe of the cross-valley dike. The crushed sandstone layer draining to the pipe at the upstream toe of the dike of the cell was intended to be a leak detection system for each cell. However, because the design of these leak detection systems does not meet current BAT standards, they are not recognized as leak detection systems in the Permit.

Each of Cells 2 and 3 also has a slimes drain collection system immediately above the FML, comprised of a nominal 12-inch thick protective blanket layer of soil or comparable material, on top of which is a network of PVC perforated pipe laterals on a grid spacing interval of about 50-feet. These pipe laterals gravity drain to a perforated PVC collector pipe which also drains toward the south dike and is accessed from the ground surface via a non-perforated access pipe. At cell closure, leachate head inside the pipe network will be removed via a submersible pump installed inside the access pipe

See Part I.D.1 of the Permit for a more detailed description of the design of Cells 1, 2 and 3.

After review of the existing design and construction and consultation with the State of Utah Division of Water Quality, the Director determined, in connection with the issuance of the Permit in 2005, that the DMT required under the groundwater quality protection rules (UAC R317-6-6.4(c)(3)) for Cells 1, 2 and 3 that pre-dated those rules will be defined by the current or existing disposal cell construction, with ~~a few~~ modifications that were included in the Permit (see page 25 of the 2004 Statement of Basis). These modifications focus on changes in monitoring requirements, and on improvements to facility closure. The goal of these improvements is to ensure that potential wastewater losses are minimized and local groundwater quality is protected. These modifications are described in Sections 2.7.2.2, 2.7.2.3 and 2.7.2.4 below.

2.7.2.2 Improved Groundwater Monitoring

Improvements were made to the Mill's groundwater monitoring network at the time of issuance of the Permit, to meet the following goals:

a) Early Detection

Three monitoring wells (MW-24, MW-27 and MW-28) were added immediately adjacent to Cell 1, in order to detect a potential release as early as practicable.

b) Discrete Monitoring

In order to individually monitor each tailings cell and to be able to pinpoint the source of any potential groundwater contamination that may be detected, the Permit required the addition of three monitoring wells (MW-29, MW-30 and MW-31) between Cells 2 and 3, in addition to the addition of wells MW-24, MW-27 and MW-28 immediately adjacent to Cell 1.

The addition of monitoring wells MW-24, MW-27, MW-28, MW-29, MW-30 and MW-31, together with the existing monitoring wells at the site provides a comprehensive monitoring network to determine any potential leakage from Cells 1, 2 and 3. See Figure 4 and Figure 10 for a map showing the locations of the existing compliance monitoring wells for the site.

2.7.2.3 Operational Changes and Improved Operations Monitoring

The Permit also required changes to disposal cell operation in order to increase efforts to minimize potential seepage losses, and thereby improve protection of local groundwater quality. Examples of these changes are:

c) Maximum Waste and Wastewater Pool Elevation

Part I.D.3 of the Permit requires that ~~Denison~~ EFRI continue to ensure that impounded wastes and wastewaters for all of the Mill's tailings Cells and Roberts Pond are held within an FML.

d) Slimes Drain Maximum Allowable Head

Part I.D.3(b) of the Permit requires that the Mill provide constant pumping efforts to minimize the accumulation of leachates over the FML in Cell 2, and upon commencement of dewatering activities, in Cell 3, and thereby minimize potential FML leakage to the foundation and groundwater. See the discussion in Section 2.15.2.2 below.

2.7.2.4 Evaluation of Tailings Cell Cover System Design

EFRI submitted an *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah*, November 2007, prepared by MWH Americas, Inc., in November, 2007. EFRI submitted a revised *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah*, March 2010 ("revised ICTM Report") in response to DRC comments. The March 2010 report is currently being reviewed in conjunction with the Reclamation Plan, Revision 5.0. DRC provided interrogatories for the revised ICTM Report in March 2012 ~~(DRC, 2012b)~~. EFRI provided responses to these interrogatories in May and September 2012 ~~(Denison,~~

2012b; EFRI, 2012b). DRC provided review comments on EFRI's May and September 2012 responses in February 2013 (DRC, 2013a).

On April 30, 2013, a meeting was held in Denver, Colorado to discuss specific issues identified in DRC's February 2013 review comments for Revision 5.0 of the Reclamation Plan and the revised ICTM Report. As noted in Section 2.19.2, included in the discussions at this meeting was DRC's request for site-specific tailings data. EFRI proposed a tailings investigation to address DRC's concerns. The tailings investigation was completed in October 2013 and subsequent laboratory testing of samples collected was completed in April 2014. A Tailings Data Analysis Report summarizing the results of the investigation is currently being prepared for submittal to DRC in June 2014. Submission of responses to DRC's February 2013 review comments on the revised ICTM Report are planned to be completed in 2014 after DRC's review of the Tailings Data Analysis Report. The results provided in the Tailings Data Analysis Report will be used to update technical analyses to address DRC's February 2013 review comments on the revised ICTM report. The responses will also incorporate decisions made at the April 30, 2013 meeting on key issues related to the revised ICTM Report. Denison submitted an *Infiltration and Contaminant Transport Modeling ("ICTM") Report, White Mesa Mill Site, Blanding, Utah,* prepared by MWH Americas, Inc., to the Director for review in November, 2007, in order to fulfill the requirements of Part I.H.11 of the Permit. That report has been reviewed by the Director, and comments were provided to Denison. Denison addressed those comments and prepared a revised version of the report submitted to the Director for review in March 2010. As of 2011, the Director had not provided comments on the revised version of the ICTM report. In 2011, Denison agreed to fund the Director's use of a consulting firm to review and comment on the revised ICTM Report. Denison received a first round of interrogatory comments from the Director in March 2012. Denison provided a partial response to the first round of comments in June 2012. The need for additional sampling, resulting from the first round of interrogatory comments, required that a portion of the responses be delayed for submittal after the receipt of additional data. The remainder of the responses to the first round of interrogatories will be submitted on August 15, 2012.

See Section 2.19 below for a more detailed discussion of post-closure requirements for the Mill.

2.7.3 Cell 4A

Construction of Cell 4A was completed on or about November 1989. Cell 4A was used for a short period of time after its construction for the disposal of raffinates from the Mill's vanadium circuit. No tailings waste or wastewater had been disposed of in Cell 4A since the early 1990s. This lack of waste disposal, and exposure of the FML to the elements, caused Cell 4A to fall into disrepair over the years.

Although the original design of Cell 4A was an improvement over the design of Cells 1, 2 and 3 (it had a one-foot thick clay liner under a 40 ml high density polyethylene ("HDPE") FML, with a more elaborate leak detection system), it was constructed in 1989 and did not meet today's BAT standards.

Cell 4A was re-lined in 2007-2008 and was re-authorized for use in November 2008. With the reconstruction of Cell 4A, BAT was required, as mandated by Part I.D.4 of the Permit and as stipulated by the Utah Ground Water Quality Regulations at UAC R317-6-6.4(A). With BAT for Cell 4A, there are also new performance standards that require daily leak detection system monitoring, weekly wastewater level monitoring, and slimes drain recovery head monitoring. The BAT monitoring results are required to be reported and summarized in the Routine DMT and BAT Performance Standard Monitoring Reports. See Section 2.15.3 below for a more detailed discussion relating to the BAT performance standards and monitoring requirements for Cell 4A.

Tailings Cell 4A Design and Construction was approved by the Director as meeting BAT requirements. The major design elements are set out in Part I.D.5 of the Permit and consist of the following:

e) Dikes – consisting of existing earthen embankments of compacted soil, constructed by a previous Mill operator between 1989-1990, and composed of four dikes, each including a 15-foot wide road at the top (minimum). On the north, east, and south margins these dikes have slopes of 3H to 1V. The west dike has a slope of 2H to 1V. Width of these dikes varies. Each has a minimum crest width of at least 15 feet to support an access road. Base width also varies from 89-feet on the east dike (with no exterior embankment), to 211-feet at the west dike.

f) Foundation – including existing subgrade soils over bedrock materials. Foundation preparation included excavation and removal of contaminated soils, compaction of imported soils to a maximum dry density of 90%. The floor of Cell 4A has an average slope of 1% that grades from the northeast to the southwest corners.

g) Tailings Capacity – the floor and inside slopes of Cell 4A encompass about 40 acres and have a maximum capacity of about 1.6 million cubic yards of tailings material storage (as measured below the required 3-foot freeboard).

h) Liner and Leak Detection Systems – including the following layers, in descending order:

   (i) Primary FML – consisting of an impermeable 60 mil HDPE membrane that extends across both the entire cell floor and the inside side-slopes, and is anchored in a trench at the top of the dikes on all four sides. The primary FML is in direct physical contact with the tailings material over most of the Cell 4A floor area. In other locations, the primary FML is in contact with the slimes drain collection system (discussed below).

   (ii) Leak Detection System – includes a permeable HDPE geonet fabric that extends across the entire area under the primary FML in Cell 4A, and drains to a leak detection sump in the southwest corner. Access to the leak detection sump is via an 18-inch inside diameter (ID) HDPE pipe placed down the inside slope, located between the primary and secondary FML liners. At its base this pipe is surrounded with a gravel filter set in the leak detection sump, having dimensions of 10 feet by 10 feet by 2 feet deep. In turn, the gravel filter layer is enclosed in an envelope of geotextile fabric. The purpose of both the gravel and geotextile fabric is to serve as a filter.

   (iii) Secondary FML – consisting of an impermeable 60-mil HDPE membrane found immediately below the leak detection geonet. This FML also extends across the entire Cell 4A floor, up the inside side-slopes and is also anchored in a trench at the top of all four dikes.

(iv) Geosynthetic Clay Liner – consisting of a manufactured geosynthetic clay liner ("GCL") composed of 0.2-inch of low permeability bentonite clay centered and stitched between two layers of geotextile.

i) Slimes Drain Collection System – including a two-part system of strip drains and perforated collection pipes both installed immediately above the primary FML, as follows:

(i) Horizontal Strip Drain System – is installed in a herringbone pattern across the floor of Cell 4A that drains to a "backbone" of perforated collection pipes. These strip drains are made of a prefabricated, two-part geo-composite drain material (solid polymer drainage strip) core surrounded by an envelope of non-woven geotextile filter fabric. The strip drains are placed immediately over the primary FML on 50-foot centers, where they conduct fluids downgradient in a southwesterly direction to a physical and hydraulic connection to the perforated slimes drain collection pipe. A series of continuous sand bags, filled with filter sand cover the strip drains. The sand bags are composed of a woven polyester fabric filled with well graded filter sand to protect the drainage system from plugging.

(ii) Horizontal Slimes Drain Collection Pipe System – includes a "backbone" piping system of 4-inch ID Schedule 40 perforated PVC slimes drain collection ("SDC") pipe found at the downgradient end of the strip drain lines. This pipe is in turn overlain by a berm of gravel that runs the entire diagonal length of the cell, surrounded by a geotextile fabric cushion in immediate contact with the primary FML. In turn, the gravel is overlain by a layer of non-woven geotextile to serve as an additional filter material. This perforated collection pipe serves as the "backbone" to the slimes drain system and runs from the far northeast corner downhill to the far southwest corner of Cell 4A where it joins the slimes drain access pipe.

(iii) Slimes Drain Access Pipe – consisting of an 18-inch ID Schedule 40 PVC pipe placed down the inside slope of Cell 4A at the southwest corner, above the primary FML. Said pipe then merges with another horizontal pipe of equivalent diameter and material, where it is enveloped by gravel and woven geotextile that serves as a cushion to protect the primary FML. A reducer connects the horizontal 18-inch pipe with the 4-inch SDC pipe. At some future time, a pump will be set in this 18-inch pipe and used to remove tailings wastewaters for purposes of de-watering the tailings cell.

j) North Dike Splash Pads – three 20-foot wide splash pads have been constructed on the north dike to protect the primary FML from abrasion and scouring by tailings slurry. These pads consist of an extra layer of 60 mil HDPE membrane that has been installed in the anchor trench and placed down the inside slope of Cell 4A, from the top of the dike, under the inlet pipe, and down the inside slope to a point 5-feet beyond the toe of the slope.

k) Emergency Spillway – a concrete lined spillway has been constructed near the southwestern corner of the west dike to allow emergency runoff from Cell 4A to Cell 4B. At this time, all stormwater runoff and tailings wastewaters not retained in Cells

2, 3, and 4A will be managed and contained in Cell 4B, including the Probable Maximum Precipitation and flood event.

l) BAT Performance Standards for Tailings Cell 4A – ~~Denison~~EFRI shall operate and maintain Tailings Cell 4A so as to prevent release of wastewater to groundwater and the environment in accordance with an Operations and Maintenance Plan, as currently approved by the Director, pursuant to Part I.H.19. At a minimum these performance standards shall include:
   (i) Maximum Allowable Daily Head – on the secondary FML,
   (ii) Maximum Allowable Daily Leak Detection System Flow Rate
   (iii) Slimes Drain Monthly and Annual Average Recovery Head Criteria – to be applied after the Mill initiates pumping conditions in the slimes drain layer.~~,~~
   (iv) ~~Maximum Daily Wastewater Level — to ensure compliance with the minimum freeboard requirements for Cell 4A, and prevent discharge of wastewaters via overtopping.~~

See Part I.D.5 of the Permit for a more detailed discussion of the design of Cell 4A. A copy of the Mill's *Cell 4A and 4B BAT Monitoring, Operations and Maintenance Plan* is attached as Appendix ~~E~~ F to this Application.

2.7.4 Cell 4B

Construction of Cell 4B was completed in November ~~2011~~2010.

Tailings Cell 4B Design and Construction was approved by the Director as meeting BAT requirements. The major design elements are set out in Part I.D.12 of the Permit and consist of the following:

a) Dikes – consisting of newly constructed dikes on the south and west side of the cell, each including a 20-foot wide road at the top (minimum). The exterior slopes of the southern and western dikes have slopes of 3H to 1V. The interior dikes have slopes of 2H to 1V. Limited portions of the Cell 4B interior sidelopes in the northwest corner and southeast corner of the cell (where the slimes drain and leak detection sump are located) have a slope of 3H to 1V. Width of these dikes varies. The base width of the southern dike varies from approximately 92 feet at the western end to approximately 190 feet at the eastern end of the dike, with no exterior embankment present on any other side of the cell.
b) Foundation – including existing subgrade soils over bedrock materials. Foundation preparation included excavation and removal of contaminated soils, compaction of imported soils to a maximum dry density of 90%. The floor of Cell 4B has an average slope of 1% that grades from the northwest to the southeast corner.
c) Tailings Capacity – the floor and inside slopes of Cell 4B encompass about 40 acres and the cell has a maximum capacity 1.9 million cubic yards of tailings material storage (as measured below the required 3-foot freeboard).
d) Liner and Leak Detection Systems – including the following layers, in descending order:
   (i) Primary FML – consisting of an impermeable 60 mil HDPE membrane that extends across both the entire cell floor and the inside side-slopes, and is anchored

in a trench at the top of the dikes on all four sides. The primary FML is in direct physical contact with the tailings material over most of the Cell 4B floor area. In other locations, the primary FML is in contact with the slimes drain collection system (discussed below).

(ii) Leak Detection System – includes a permeable HDPE geonet fabric that extends across the entire area under the primary FML in Cell 4B, and drains to a leak detection sump in the southeast corner. Access to the leak detection sump is via an 18-inch inside diameter ("ID") HDPE pipe placed down the inside slope, located between the primary and secondary FML liners. At its base this pipe is surrounded with a gravel filter set in the leak detection sump, having dimensions of 15 feet by 10 feet by 2 feet deep. In turn, the gravel filter layer is enclosed in an envelope of geotextile fabric. The purpose of both the gravel and geotextile fabric is to serve as a filter.

(iii) Secondary FML – consisting of an impermeable 60-mil HDPE membrane found immediately below the leak detection geonet. This FML also extends across the entire Cell 4B floor, up the inside side-slopes and is also anchored in a trench at the top of all four dikes.

(iv) Geosynthetic Clay Liner – consisting of a manufactured geosynthetic clay liner ("GCL") composed of 0.2-inch of low permeability bentonite clay centered and stitched between two layers of geotextile.

e) Slimes Drain Collection System – including a two-part system of strip drains and perforated collection pipes both installed immediately above the primary FML, as follows:

(i) Horizontal Strip Drain System – is installed in a herringbone pattern across the floor of Cell 4B that drains to a "backbone" of perforated collection pipes. These strip drains are made of a prefabricated two-part geo-composite drain material (solid polymer drainage strip) core surrounded by an envelope of non-woven geotextile filter fabric. The strip drains are placed immediately over the primary FML on 50-foot centers, where they conduct fluids downgradient in a southeasterly direction to a physical and hydraulic connection to the perforated slimes drain collection pipe. A series of continuous sand bags, filled with filter sand cover the strip drains. The sand bags are composed of a woven polyester fabric filled with well graded filter sand to protect the drainage system from plugging.

(ii) Horizontal Slimes Drain Collection Pipe System – includes a "backbone" piping system of 4-inch ID Schedule 40 perforated PVC slimes drain collection (SDC) pipe found at the downgradient end of the strip drain lines. This pipe is in turn overlain by a berm of gravel that runs the entire diagonal length of the cell, surrounded by a geotextile fabric cushion in immediate contact with the primary FML. In turn, the gravel is overlain by a layer of non-woven geotextile to serve as an additional filter material. This perforated collection pipe serves as the "backbone" to the slimes drain system and runs from the far northeast corner downhill to the far southeast corner of Cell 4A where it joins the slimes drain access pipe.

(iii) Slimes Drain Access Pipe – consisting of an 18-inch ID Schedule 40 PVC pipe placed down the inside slope of Cell 4B at the southeast corner, above the primary

FML. Said pipe then merges with another horizontal pipe of equivalent diameter and material, where it is enveloped by gravel and woven geotextile that serves as a cushion to protect the primary FML. A reducer connects the horizontal 18-inch pipe with the 4-inch SDC pipe. At some future time, a pump will be set in this 18-inch pipe and used to remove tailings wastewaters for purposes of de-watering the tailings cell.

f) North and East Dike Splash Pads – nine 20-foot wide splash pads have been constructed on the north and east dikes to protect the primary FML from abrasion and scouring by tailings slurry. These pads consist of an extra layer of 60 mil HDPE membrane that has been installed in the anchor trench and placed down the inside slope of Cell 4B, from the top of the dike, under the inlet pipe, and down the inside slope to a point 5-feet beyond the toe of the slope.

g) Emergency Spillway – a concrete lined spillway has been constructed near the southeastern corner of the east dike to allow emergency runoff from Cell 4A into Cell 4B. This spillway is limited to a 6-inch reinforced concrete slab, with a welded wire fabric installed within its midsection, set directly atop a cushion geotextile placed directly over the primary FML in a 4-foot deep trapezoidal channel. A 100-foot wide, 60-mil HDPE membrane splash pad is installed beneath the emergency spillway. No other spillway or overflow structure will be constructed at Cell 4B unless and until the construction of Cells 5A and 5B. At this time, all stormwater runoff and tailings wastewaters not retained in Cells 2, 3, and 4A will be managed and contained in Cell 4B, including the Probable Maximum Precipitation and flood event.

h) BAT Performance Standards for Tailings Cell 4B – ~~Denison~~EFRI shall operate and maintain Tailings Cell 4B so as to prevent release of wastewater to groundwater and the environment in accordance with the currently-approved Cell 4B BAT, Monitoring, Operations and Maintenance Plan. At a minimum these performance standards shall include:
   (i) Maximum Allowable Daily Head – on the secondary FML,
   (ii) Maximum Allowable Daily Leak Detection System Flow Rate
   (iii) Slimes Drain Monthly and Annual Average Recovery Head Criteria – to be applied after the Mill initiates pumping conditions in the slimes drain layer,
   (iv) Maximum Daily Wastewater Level – to ensure compliance with the minimum freeboard requirements for Cell 4B, and prevent discharge of wastewaters via overtopping.

See Part I.D.12 of the Permit for a more detailed discussion of the design of Cell 4B. A copy of the Mill's *Cell 4A and 4B BAT Monitoring, Operations and Maintenance Plan* is attached as Appendix ~~E~~ F to this Application.

2.7.5 Future Additional Tailings Cells

Future additional tailings cells at the Mill will require Director approval prior to construction and operation. ~~All f~~Future tailings cells at the Mill will be required to satisfy BAT standards at the time of construction.

2.7.6 Roberts Pond

Roberts Pond receives periodic floor drainage and other wastewaters from Mill process upsets, is frequently empty, and was re-lined with a new FML in May, 2002.

In order to minimize any potential seepage release from Roberts Pond, the Director has determined that an appropriate DMT operations standard would be two-fold, as required byrequired the following in Part I.D.3(e) of the Permit:

(i) EFRI "shall operate this wastewater pond [Roberts Pond] so as to provide a minimum 2-foot freeboard at all times. Under no circumstances shall the water level in the pond exceed an elevation of 5,624 feet amsl. In the event that the wastewater elevation exceeds this maximum level, the Permittee [EFRI] shall remove the excess wastewater and place it into containment in Tailings Cell 1 within 72-hours of discovery."A stipulation that the Mill maintain a minimal wastewater head in this pond based on a 2-foot freeboard limit and a 1-foot additional operating limit; and

(ii) At the time of Mill site closure, DenisonEFRI will excavate and remove the liner, berms, and all contaminated subsoils in compliance with an approved final reclamation plan under the Mill License.

2.7.7 Other Facilities and Protections

2.7.7.1 Feedstock Storage

In order to constrain and minimize potential generation of contaminated stormwater or leachates, Part I.D.11 of the Permit requires the Mill to continue its existing practice of limiting open air storage of feedstock materials to the historical storage area found along the eastern margin of the Mill site (as defined by the survey coordinates found in Permit Table 4). The intent of Section I. D.11, (based on the SOB for the 2009 GWDP), is to require that feedstock storage outside of the area specified in Table 4 shall meet the following requirements:; and one of the following three practices: 1) Store feedstock materials in water-tight contains, or 2) Place feedstock containers in water-tight overpack containers, or 3) place feedstock containers on a hardened surface that conforms to the requirements spelled out in the permit part I.D.11d) 1 through 5.

a) Feedstock materials will be stored at all times in water-tight containers, and aisle ways will be provided at all times to allow visual inspection of each and every feedstock container, or

b) Each and every feedstock container will be placed inside a water-tight overpack prior to storage, or

c) Feedstock containers shall be stored on a hardened surface to prevent spillage onto subsurface soils, and that conforms with the following minimum physical requirements:

1) A storage area composed of a hardened engineered surface of asphalt or concrete, and

2) A storage area designed, constructed, and operated in accordance with engineering plans and specifications approved in advance by the Director. All such engineering plans or specifications submitted shall demonstrate compliance with Part I.D.4.

3) A storage area that provides containment berms to control stormwater run-on and run-off, and

4) Stormwater drainage works approved in advance by the Director, or

5) Other storage facilities and means approved in advance by the Director.

The language Section D.11 is currently ambiguous. Accordingly, EFRI requests that Part I.D.11 of the renewed GWDP be revised as set out above.

2.7.7.2 Mill Site Reagent Storage

~~In order to prevent potential reagent tank spills or leaks that could release contaminants to site soils or groundwater, and to provide proper spill prevention and control~~, Part I.D.3(g) of the Permit requires the Mill to demonstrate that it has adequate provisions for spill response, cleanup, and reporting for reagent storage facilities~~,~~. ~~and to include these in a~~These provisions are detailed in the Stormwater Best Management Practices Plan, which is designed to prevent potential reagent tank spills or leaks that could release contaminants to site soils or groundwater, and to provide proper spill prevention and control. Contents of this plan are stipulated in Part I.D.8 of the Permit, and submittal and approval of the plan is required under Part I.H.17 of the Permit. For existing facilities at the Mill, secondary containment is required, although such containment may be earthen lined. For new facilities constructed at the Mill, or reconstruction of existing facilities, Part I.D.3(~~e~~g) requires ~~the~~ a higher standard of secondary containment that would prevent contact of any potential spill with the ground surface.

A copy of the Mill's *Stormwater Best Management Practices Plan*, Revision 1.~~3~~5: ~~June 12, 2008~~September 2012 is attached as Appendix ~~F~~ G to this Application.

2.7.7.3 New Construction

Part I.D.4 of the Permit requires submittal of engineering plans and specifications and Director approval ~~ensures that all~~ prior to the construction, modification, or operation of waste or wastewater disposal, treatment, or storage facilities~~ requires submittal of engineering plans and specifications and prior Director approval~~. In these plans and specifications, the Mill is required to demonstrate how BAT requirements of the Groundwater Quality Protection Rules have been met. After Director Approval, a construction permit may be issued, and the Permit modified.

2.7.7.4 Other

The *White Mesa Mill ~~Tailings Management System and~~ Discharge Minimization Technology (DMT) Monitoring Plan,* ~~2~~7/12 Revision: Denison-~~11.5~~12.1 (the "DMT Plan"), and the *White Mesa Mill Tailings Management System*, 7/2012 Revision 12.1 (the "Tailings Management Plan"), ~~a copiesy of which is~~ are attached as Appendix ~~G~~ H and Appendix I to this Application, respectively.~~,~~ ~~is are designed as~~These plans provide a systematic program for constant surveillance and documentation of the integrity of the tailings system, including monitoring the leak detection systems. The DMT Plan requires daily, weekly, quarterly, monthly and annual inspections and evaluations and monthly reporting to Mill management. See Section 2.15.2 below for a more detailed discussion of the requirements of the DMT Plan.

2.7.8 Surface Waters

The Mill has been designed as a facility that does not discharge to surface waters. ~~All t~~Tailings and other Mill wastes are disposed of permanently into the Mill's tailings system. Further, as mentioned above, the Mill was designed and constructed to prevent runon or runoff of storm water by a) diverting runoff from precipitation on the Mill site to the tailings cells; and b) diverting runoff from surrounding areas away from the Mill site. As a result, there is no pathway for liquid effluents from Mill operations to impact surface waters.

Under the Mill License, the Mill is required to periodically sample local surface waters to determine if Mill activities may have impacted those waters. The primary pathway would be from air particulates ~~from~~ generated during Mill operations that may have landed on or near surface waters, or that may have accumulated in drainage areas that could feed into surface waters. Sampling results since inception of Mill operations show no trends or other impacts of Mill operations on local surface waters. See the Mill's *Semi-Annual Effluent Report for the period July 1 to December 31, 201~~1~~3*, a copy of which has previously been provided to the Director.

2.7.9 Alternate Concentration Limits

The Mill does not discharge to groundwater or surface water, nor is it designed to do so. Therefore, no alternate concentration limits are currently applicable to the site.

2.8 For Areas Where the Groundwater Has Not Been Classified by the Board, Information of the Quality of the Receiving Ground Water (R317-6-6.3.H)

Groundwater classification was assigned by the Director in the Permit on a well-by-well basis after review of groundwater quality characteristics for the perched aquifer at the Mill site. A well-by-well approach was selected by the Director in order to acknowledge the spatial variability of groundwater quality at the Mill, and afford the most protection to those portions of the perched aquifer that exhibited the highest quality groundwater. These groundwater classifications are set out in Part I.A and Table 1 of the Permit.

The primary element used by the Director in determining the groundwater classification of each monitoring well at the site, is the TDS content of the groundwater, as outlined in UAC 317-6-3. Groundwater quality data collected by the Mill show the shallow aquifer at the Mill has a highly variable TDS content, with TDS averages ranging from about 1100 to over 7900 mg/L. Another key element in determination of groundwater class is the presence of naturally occurring contaminants in concentrations that exceed their respective GWQS. In such cases, the Director has cause to downgrade aquifer classification from Class II to Class III (see UAC R317-6-3.6). Using all available TDS data and background data, for 24 of the POC and general monitoring wells the Director determined that 4 of those wells exhibit Class II drinking water quality groundwater. The remaining 20 wells exhibited Class III or limited use groundwater at the site. The Director determined that MW-35 will be classified as having Class II drinking water quality groundwater until sufficient background data have been collected and the applicable Background Report is submitted. Wells MW-36 and MW-37 have not been classified at this time.

2.8.1 Existing Wells at the Time of Original Permit Issuance

The Director required ~~Denison~~EFRI to evaluate groundwater quality data from the thirteen existing wells on site, and submit a Background Ground Water Quality Report for Director approval. One of the purposes of that report was to provide a critical evaluation of historic groundwater quality data from the facility, and determine representative background quality conditions and reliable GWCLs for the Permit.

~~DUSA~~ EFRI (then Denison) prepared the Existing Well Background Report that evaluated all historic data for the thirteen existing wells for the purposes of establishing background groundwater quality at the site and developing ~~groundwater compliance limits~~ GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the Existing Well Background Report, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the thirteen existing wells, based primarily on the analysis performed in the Existing Wellls Background Report. It should be noted, however, that, because the GWCLs have been set at the mean plus ~~second~~ two standard deviations, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

2.8.2 New Wells Installed After the Date of Original Issuance of the Permit

Because the Permit called for installation of nine new monitoring wells around the tailings cells, background groundwater quality had to be determined for those monitoring points. To this end, the Permit required the Mill to collect at least eight quarters of groundwater quality data, and submit the New Well Background Report for Director approval to establish background groundwater quality for those wells.

~~DUSA~~ EFRI (then Denison) prepared the New Well Background Report that evaluated all historic data for the nine new wells for the purposes of establishing background groundwater quality at the site and developing ~~groundwater compliance limits~~ GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the New Well Background Report, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the nine new wells based primarily on the analysis performed in the New Well ~~b~~Background Report. It should be noted, however, that, because the GWCLs have been set at the mean plus second standard deviation, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

2.9 Sampling and Analysis Monitoring Plan (R317-6-6.3.I)

The groundwater monitoring plan is set out in the Permit. All groundwater monitoring at the site is in the perched aquifer. The following sections summarize the key components of the Mill's sampling and analysis plan.

2.9.1 Ground~~W~~water Monitoring to Determine Ground~~W~~water Flow Direction and Gradient, Background Quality at the Site, and the Quality of Ground~~W~~water at the Compliance Monitoring Point

2.9.1.1 Groundwater Monitoring at the Mill Prior to Issuance of the Permit

At the time of renewal of the Mill license by NRC in March, 1997 and up until issuance of the Permit in March 2005, the Mill implemented a groundwater detection monitoring program ~~to ensure compliance to 10 CFR Part 40, Appendix A~~, in accordance with 10 CFR Part 40, Appendix A and the provisions of then Mill License condition 11.3A. The detection monitoring program was implemented in accordance with the report entitled, *Points of Compliance, White Mesa Uranium Mill*, prepared by Titan Environmental Corporation, submitted by letter to the NRC dated October 5, 1994. Under that program, the Mill sampled monitoring wells MW-5, MW-11, MW-12, MW-14, MW-15 and MW-17, on a quarterly basis. Samples were analyzed for chloride, potassium, nickel and uranium, and the results of such sampling were included in the Mill's Semi-Annual Effluent Monitoring Reports that were filed with the NRC up until August 2004 and with the DRC subsequent thereto.

Between 1979 and 1997, the Mill monitored up to 20 constituents in up to 13 wells. That program was changed to the Points of Compliance Program in 1997 because NRC had concluded that:

- The Mill and tailings system had produced no impacts to the perched zone or deep aquifer; and
- The most dependable indicators of water quality and potential cell failure were considered to be chloride, nickel, potassium and natural uranium.

2.9.1.2 Issuance of the Permit

On March 8, 2005, the Director issued the Permit, which includes a groundwater monitoring program that superseded and replaced the groundwater monitoring requirements set out in Mill License Condition 11.3A. Condition 11.3A has since been removed from the Mill License. Groundwater monitoring under the Permit commenced in March 2005, the results of which are included in the Mill's Quarterly Groundwater Monitoring Reports that are filed with the Director.

On September 1, 2009, ~~Denison~~EFRI filed a Groundwater Discharge Permit Renewal Application. At the request of the Director of the Utah Division of Radiation Control, EFRI submitted an updated version of the September 1, 2009 renewal application on July 13, 2012. At the request of the Director of the Utah Division of Radiation Control, EFRI is submitting this updated version of the July 2012 renewal application.This document is an amendment and update of the Renewal Application, which is being submitted at the request of the Director. The Permit remains in timely renewal status awaiting completion of review of the Renewal Application by the Director.

2.9.1.3 Current Ground Water Monitoring Program at the Mill Under the Permit

The current groundwater monitoring program at the Mill under the Permit, which is used to determine ground water flow direction, and gradient, and quality of the ground water at the compliance monitoring points,. This program consists of monitoring at 25 point of compliance monitoring wells: MW-1, MW-2, MW-3, MW-3A, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, MW-31, MW-32, MW-35, MW-36, and MW-37. The locations of these wells are indicated on Figure 410. Depth to water is measured quarterly in MW-34, but due to limited water is not sampled for POC compliance. MW-33 is completely dry and is not sampled for POC compliance.

Part I.E.1.(d) of the Permit requires that each point of compliance well must be sampled for the constituents listed in Table 2.9.1.3-1.

Further, Part I.E.1.(d)1) of the Permit, requires that, in addition to pH, the following field parameters must also be monitored:

- Depth to groundwater
- Temperature
- Specific conductance,
- Redox potential ("Eh")

and that, in addition to chloride and sulfate, the following general organics must also be monitored:

- Carbonate, bicarbonate, sodium, potassium, magnesium, calcium, and total anions and cations.

Sample frequency depends on the speed of ground-water flow in the vicinity of each well. Parts I.E.1 (b) and (c) provide that quarterly monitoring is required for all wells where local groundwater average linear velocity has been found by the Director to be equal to or greater than 10 feet/year, and semi-annual monitoring is required where the local groundwater average linear velocity has been found by the Director to be less than 10 feet/year.

Based on these criteria, quarterly monitoring is required at MW-11, MW-14, MW-25, MW-26 and MW-30, and MW-31, and semi-annual monitoring is required at MW-1, MW-2, MW-3, MW-3A, MW-5, MW-12, MW-15, MW-17, MW-18, MW-19, MW-23, MW-24, MW-27, MW-28, MW-29 and MW-32.

Geochemical and indicator parameter analysis during the initial SAR in October of 2012 concluded that upgradient monitoring wells MW-1, MW-18, and MW-19 have not been impacted by Mill activities. At that time, EFRI proposed that these upgradient monitoring wells be sampled routinely but not subject to GWCLs. In a letter dated April 25, 2013, DRC approved this proposed change to take place at the time of the Permit renewal.

Wells MW-35, MW-36 and MW-37 are alsowere currently being sampled quarterly, to collect eight consecutive quarters of background data. The Background Report for wells MW-35, MW-36, and MW-37 was submitted to the Director on May 1, 2014. After review by DRC, to enable the -Director to will establish groundwater compliance levels for those wells and to determine their frequency of sampling.

Prior to the February 15, 2011 revision of the GWDP, DenisonEFRI collected quarterly groundwater samples from MW-20 and MW-22 for development of background values and potential GWCLs. Part I.E.1.c).3) in the currently approved July 2011August 24, 2012 revision of the GWDP now requires that MW-20 and MW-22 be monitored on a semi-annual basis as "General Monitoring Wells," but they are not subject to GWCLs.

2.9.1.4 Groundwater Flow Direction and Gradient

Part I.E.3 of the Permit requires that, on a quarterly basis and at the same frequency as groundwater monitoring required by Part I.E.1 and described in Section 2.9.1.3 above, the Mill shall measure depth to groundwater in the following wells and/or piezometers:

i) The point of compliance wells identified in Table 2 of the Permit, as described in Section 2.9.1.3 above;
j) Piezometers: P-1, P-2, P-3, P-4 and P-5;
k) Existing monitoring wells: MW-20, MW-22, and MW-34;
l) Contaminant investigation wells: - any well required by the Director as a part of a contaminant investigation or groundwater corrective action (at this time this includes all the chloroform and nitrate investigation wells); and
m) Any other wells or piezometers required by the Director.

While it is not a requirement of the GWDP, DenisonEFRI also measures depth to water in the DR piezometers which were installed during the Southwest Hydrogeologic Investigation. As a result of these measurements, tThe Mill uses these measurements to prepares groundwater isocontour maps each quarter that show the groundwater flow direction and gradient. The isocontour map for the first quarter of 2012 2014 is attached as Figure 5.

2.9.1.5 Background Quality at the Site

A significant amount of historic groundwater quality data had been collected by DenisonEFRI and previous operators of the Mill for many some wells at the facility. In some cases these data extend back more than 30 years to September 1979. A brief summary of some of the various studies that had been performed prior to the original issuance of the Permit is set out in Section 2.0 of the Regional Background Report.

However, at the time of original issuance of the Permit, the Director had not yet completed an evaluation of the historic data, particularly with regard to data quality, and quality assurance issues. Such an examination needed to include such things as justification of any zero concentration values reported, adequacy of minimum detection limits provided (particularly with respect to the corresponding GWQS), adequacy of laboratory and analytical methods used, consistency of laboratory units or reporting, internal consistency between specific and composite types of analysis (e.g., major ions and TDS), identification and justification of concentration outliers, and implications of concentration trends (both temporal and spatial).

As discussed in Section 2.11.2 below, the Director also noted several groundwater quality issues that needed to be resolved prior to a determination of background groundwater quality at the site. These were: 1) a number of constituents exceeded their respective GWQS (including nitrate in one well and manganese, selenium and uranium ~~each~~ in several wells); 2) long term trends in uranium in downgradient wells MW-14, MW-15 and MW-17; and 3) a spatial high of uranium in those three downgradient wells. See pages 5-8 of the 2004 Statement of Basis for a more detailed discussion of these points.

As a result of the foregoing, the Director required that the Background Reports be prepared to address and resolve these issues.

Further, because background groundwater quality at the Mill site had not yet been approved at the time of original Permit issuance, the Director was not able to determine if any contaminant is naturally occurring and therefore detectable or undetectable for purpose of selecting GWCLs in each well. Consequently, the Director initially assigned GWCLs as if they were "undetectable" (i.e., assuming that all natural background concentrations were less than a fraction of the respective GWQS).

As discussed in Section 1.3 above and 2.11.2 below, ~~Denison~~EFRI submitted the Background Reports to the Director. Both the Existing Well Background Report and the New Well Background Report provided GWCLs for all of the constituents in the existing wells and new wells, respectively, based on a statistical intra-well approach. The Director has approved the Background Reports.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the thirteen existing wells and the nine new wells based primarily on the analysis performed in the Background Reports. It should be noted, however, that, because the GWCLs have been set at the mean plus second standard deviation, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

2.9.1.6 Quality of Ground Water at the Compliance Monitoring Point

There are over 30 years of data for some constituents in some wells at the site, but not for all constituents ~~in any wells~~. However, with the exception of tin, which was added as a monitoring constituent in 2007, all currently required monitoring constituents have been sampled in ~~all~~ the wells that were in existence on the date of the original issuance of the Permit commencing with the first quarter of 2005. Further, all constituents in ~~all~~ the new compliance monitoring wells have been sampled upon installation of those wells, commencing either in the second or third quarters of 2005.

~~All of the~~The analytical results from this sampling are reported quarterly in Groundwater Monitoring Reports, which are filed with the Director pursuant to Part I.F.1 of the Permit.

2.9.2 Installation, Use and Maintenance of Monitoring Devices

Compliance monitoring at the Mill site is accomplished in three ways: the compliance well monitoring program; ~~monitoring~~ the leak detection monitoring system in Cells 4A and 4B; and various DMT monitoring requirements. Each of these are discussed below.

2.9.2.1 Compliance Well Monitoring

Compliance for tailings Cells 1, 2 and 3 and the remainder of the Mill site, other than Cells 4A and 4B, is accomplished by quarterly or semi-annual sampling of the network of compliance monitoring wells at the site. See Figure 10~~4~~ for a map that shows the compliance monitoring well locations, and Section 2.9.1.3 for a description of the monitoring program.

2.9.2.2 Leak Detection System in Cell 4A and Cell 4B

~~With the reconstruction of Cell 4A,~~ BAT was required, as mandated in Part I.D.4 of the Permit and as stipulated by UAC R317-6-6.4(a) for the reconstruction of Cell 4A and the construction of Cell 4B. Because tailings Cells 1, 2 and 3 were constructed more than 25 years ago, and after review of the existing design and construction, the Director determined that DMT rather than BAT is required for Cells 1, 2 and 3 (see the discussion in Section 2.7.2 above).

BAT for Cell 4A and Cell 4B included the construction of a modern leak detection system. See Sections 2.7.3 and 2.7.4 above for a description of the key design elements of Cell 4A and Cell 4B respectively, including ~~its~~ their leak detection systems. With BAT for Cell 4A and Cell 4B, there are new performance standards in the Permit that require daily leak detection system monitoring, weekly wastewater level monitoring, and slimes drain recovery head monitoring. The BAT monitoring results are required to be reported and summarized in the Routine DMT and BAT Performance Standard Monitoring Reports. See Sections 2.15.3 and 2.15.4 below for a more detailed discussion of the BAT monitoring requirements for Cell 4A and Cell 4B respectively.

Because Cell 4A and Cell 4B ~~has~~ have ~~a~~ modern leak detection systems, that meets BAT standards and ~~is~~ are monitored daily, the leak detection systems in Cell 4A and Cell 4B can be considered to be a point of compliance monitoring devices.

~~*2.9.2.3 Leak Detection System in Cell 4B*~~

~~BAT was required for Cell 4B, as mandated in Part I.D.4 of the Permit and as stipulated by UAC R317-6-6.4(a).~~

See Section 2.7.4 above for a description of the key design elements of Cell 4B, including its leak detection system. Performance standards for Cell 4B in the Permit require daily leak detection system monitoring, weekly wastewater level monitoring, and slimes drain recovery head monitoring. The BAT monitoring results are required to be reported and summarized in the Routine DMT and BAT Performance Standard Monitoring Reports. See Section 2.15.4 below for a more detailed discussion of the BAT monitoring requirements for Cell 4B.

Because Cell 4B has a modern leak detection system that meets BAT standards and is monitored daily, the leak detection system in Cell 4B can be considered to be a point of compliance monitoring device.

2.9.2.43 Other DMT Monitoring Requirements

In addition to the foregoing, the additional DMT performance standard monitoring discussed in detail in Section 2.15 below is required to be performed under the Permit

2.9.3 Description of the Compliance Monitoring Area Defined by the Compliance Monitoring Points

The compliance monitoring area at the site is the area covered by the groundwater compliance monitoring wells. Figure 4 10 shows the most current locations of the compliance groundwater monitoring wells at the site.

At the time of original Permit issuance, the Director reviewed the then recent water table contour maps of the perched aquifer. Those maps identified a significant western component to groundwater flow at the Mill site, which the Director concluded appeared to be the result of wildlife pond seepage and groundwater mounding (see page 23 of the 2004 Statement of Basis). As a consequence, new groundwater monitoring wells were required, particularly along the western margin of the tailings cells, in addition to the monitoring wells already in existence at that time. The Director also concluded that new wells were also needed for DMT purposes and to provide discrete monitoring of each tailings cell. This resulted in the addition of the following compliance monitoring wells to the then existing monitoring well network: MW-23, MW-24, MW-25, MW-26 (which was then existing chloroform investigation well TW4-15), MW-27, MW-28, MW-29, MW-30, MW-31 MW-32 (which was then existing chloroform investigation well TW4-17), MW-35, MW-36, and MW-37. As previously stated MW-33, and MW-34 were installed but are not currently sampled due to limited water and saturated thickness. MW-20 and MW-22 are not POC wells but are general monitoring wells and are sampled semiannually for information purposes only.

Based on groundwater flow direction and velocity, the compliance monitoring network, with the foregoing additional new wells, was considered to be adequate for compliance monitoring in the perched aquifer at the site.

Further, as mentioned in Section 2.9.2.2 and 2.9.2.3 above, the leak detection systems in Cell 4A and 4B can also be considered to be compliance monitoring areas for these cells.

2.9.4 Monitoring of the Vadose Zone

Monitoring is not performed in the vadose zone at the site~~, and there are no current intentions to perform any future monitoring in the vadose zone at the site~~.

2.9.5 Measures to Prevent Ground Water Contamination After the Cessation of Operation, Including Post-Operational Monitoring

2.9.5.1 Measures to Prevent Ground Water Contamination After the Cessation of Operation

Please see Section 2.19 below for a detailed discussion of the measures to prevent ground-water contamination after the cessation of operations.

2.9.5.2 Post-Operational Monitoring

Groundwater monitoring will continue during the post-operational phase through final closure until the Permit is terminated. ~~Denison~~EFRI understands that the final closure will take place and the Permit will be terminated upon termination of the Mill License and transfer of the reclaimed tailings cells to the United States Department of Energy pursuant to U.S.C. 2113. See Section 2.19.1.1 below.

2.9.6 Monitoring Well Construction and Ground Water Sampling Which Conform Where Applicable to Specified Guidance

2.9.6.1 Monitoring Well Construction

a) New Wells

All new compliance monitoring wells installed after the original issuance of the Permit were installed in accordance with the requirements of Part I.E.4 of the Permit. Part I.E.4 requires that ~~all~~ new groundwater monitoring wells installed at the facility ~~shall~~ comply with the following design and construction criteria:

a) Located as close as practical to the contamination source, tailings cell, or other potential origin of groundwater pollution;
b) Screened and completed in the shallow aquifer;
c) Designed and constructed in compliance with UAC R317-6-6.3(I)(6), including the EPA RCRA Ground Water Monitoring Technical Enforcement Guidance Document, 1986, OSWER-9950.1 (the "EPA RCRA TEGD"); and
d) Aquifer tested to determine local hydraulic properties, including but not limited to hydraulic conductivity.

As-built reports for all new groundwater monitoring wells were submitted to the Director for his approval, in accordance with Part I.F.6 of the Permit. Part I.F.6 requires those reports to include the following information:

a) Geologic logs that detail all soil and rock lithologies and physical properties of all subsurface materials encountered during drilling. Said logs were prepared by a Professional Geologist licensed by the State of Utah or otherwise approved beforehand by the Director ;

b) A well completion diagram that details all physical attributes of the well construction, including:

   1) Total depth and diameters of boring;
   2) Depth, type, diameter, and physical properties of well casing and screen, including well screen slot size;
   3) Depth intervals, type and physical properties of annular filterpack and seal materials used;
   4) Design, type, diameter, and construction of protective surface casing; and
   5) Survey coordinates prepared by a State of Utah licensed engineer or land surveyor, including horizontal coordinates and elevation of water level measuring point, as measured to the nearest 0.01 foot; and

c) Aquifer permeability data, including field data, data analysis, and interpretation of slug test, aquifer pump test or other hydraulic analysis to determine local aquifer hydraulic conductivity in each well.

Between April and June 2005, ~~Denison~~EFRI installed wells MW-23, MW-24, MW-25, MW-27, MW-28, MW-29, MW-30, and MW-31. On August 23, 2005, ~~Denison~~EFRI submitted a *Perched Monitoring Well Installation and Testing at the White Mesa Uranium Mill April through June 2005* Report, prepared by Hydro Geo Chem, Inc., that documented how these wells had been installed in accordance with requirements of the Permit. A copy of that Report was previously submitted under separate cover.

Between August 30 and September 2, 2010, ~~Denison~~EFRI installed wells MW-33, MW-34, and MW-35. On October 11, 2010, ~~Denison~~EFRI submitted *Installation and Hydraulic Testing of Perched Monitoring Wells MW-33, MW-34, and MW-35 at the White Mesa Uranium Mill Near Blanding Utah, prepared by Hydro Geo Chem, Inc.* that documented how these wells had been installed in accordance with requirements of the Permit. A copy of that Report was previously submitted under separate cover. _During the week of April 25, 2011, ~~Denison~~EFRI installed wells MW-36, and MW-37. On June 28, 2011, ~~Denison~~EFRI submitted *Installation and Hydraulic Testing of Perched Monitoring Wells MW-36, and MW-37 at the White Mesa Uranium Mill Near Blanding Utah, prepared by Hydro Geo Chem, Inc.* that documented how these wells had been installed in accordance with requirements of the Permit. A copy of that Report was previously submitted under separate cover.

b) Existing Wells

The Existing Wells, MW-1, MW-2, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-26 and MW-32 as well as wells MW-16, MW-20 and MW-22, which are not compliance monitoring wells, and piezometers P-1, P-2, P-3, P-4 and P-5, were all constructed and installed prior to original issuance of the Permit. Some of those wells date back to 1979.

During several site visits and four split groundwater sampling events between May 1999 and the date of original issuance of the Permit, and a review of available as built information, DRC staff noted the need for remedial construction, maintenance, or repair at several of these wells, including:

(i) 16 of the existing monitoring wells failed to produce clear groundwater in conformance with the EPA RCRA TEGD, apparently due to incomplete well development. Consequently, the Permit required that MW-5, MW-11, MW-18, MW-19, MW-26, TW4-16, and MW-32 be developed to ensure that groundwater clarity conforms to the EPA RCRA TEGD to the extent reasonably achievable;

(ii) The Permit required the Mill to install protective steel surface casings to protect the exposed PVC well and piezometer casings for piezometers P-1, P-2, P-3, P-4, and P-5 and wells MW-26 and MW-32; and

(iii) Several problems were observed with the construction of MW-3, including:

A. A review of the MW-3 well as-built diagram showed that no geologic log was provided at the time of well installation. Consequently, the Director was not able to ascertain if the screened interval was adequately located across the base of the shallow aquifer;

B. MW-3 was constructed without any filter media or sand pack across the screened interval;

C. An excessively long casing sump (a 9 or 10 foot long non-perforated section of well casing), was constructed at the bottom of the well; and

D. The well screen appeared to be poorly positioned, based on the low productivity of the well, ~~and~~ (there is no geologic log to verify proper positioning).

~~As a result, the Permit, required Denison to verify the depth to the upper contact of the Brushy Basin Member of the Morrison Formation in the immediate vicinity of well MW-3. The Permit also required that, in the event that the Director determined the well screen has been inadequately constructed, the Mill shall retrofit, reconstruct, or replace monitoring well MW-3.~~

The Mill developed the wells as required and installed the protective casings required. The Director concluded that ~~Denison~~EFRI had fulfilled the requirements and sent ~~Denison~~EFRI a Closeout Letter on August 5, 2008.

With respect to the concerns raised about MW-3, the Mill installed MW-3A approximately 10 feet southeast of MW-3, in order to verify the depth to the upper contact of the Brushy Basin Member of the Morrison Formation (the "UCBM"). After installation, the Director reviewed the geologic log for MW-3 and the as-built reports for both MW-3 and MW-3A and concluded that the well screen for MW-3A is 2.5 feet below the UCBM and the well screen for MW-3 is 4.5 feet above the UCBM. Therefore MW-3 is a partially penetrating well; whereas MW-3A is fully penetrating. The Director concluded that semiannual sampling must continue in both wells until sufficient data is available and the DRC can make a conclusion regarding the effects of partial well penetration and screen length. As a result, the GWDP was modified to require that MW-3A be completed with a permanent surface well completion according to EPA RCRA TEGD. EFRI completed MW-3A as required, and on August 5, 2008 the DRC sent EFRI a Closeout Letter. Both MW-3 and MW-3A are currently sampled semiannually.

Denison completed MW-3A as required, and on August 5, 2008 the DRC sent Denison a Closeout Letter.

Subsequent to original Permit issuance, on January 6, 2006, DRC staff performed an inspection of the compliance groundwater monitoring wells at the Mill. During the inspection, well MW-5 was found to have a broken PVC surface casing. The repair of MW-5 was added to the Permit compliance schedule to require the Mill to repair the broken PVC casing to meet the requirements of the Permit.

The Permit required DenisonEFRI to submit an As-Built report for the repairs of monitoring well MW-5 on or before May 1, 2008. DenisonEFRI submitted the required report, and on August 5, 2008 the DRC sent DenisonEFRI a Closeout Letter.

The groundwater monitoring program at the Mill has historically had numerous wells with elevated turbidity, turbidity levels which could not stabilize to within 10% Relative Percent Difference (10% RPD) or both. Identification of equipment problems and improvements to field sampling practices did not result in improvements to measured turbidities. Ongoing turbidity issues were the result of monitoring requirements which were most likely ill-suited to the site geology. It is suspected that many wells at the Mill might not be capable of attaining a turbidity of 5 NTU due to the natural conditions in the formation hosting the perched monitoring wells (the Burro Canyon Formation and Dakota Sandstone). Clay interbeds occur in both the Burro Canyon Formation and Dakota Sandstone, and friable materials occur within the Burro Canyon Formation. Saturated clays and friable materials will likely continue to be mobilized using standard purging techniques currently in use for the sampling program at the Mill. Mobilized kaolinite (a cementing material within the formation) is expected to be an additional continuing source of turbidity in perched wells. DenisonEFRI discussed the turbidity issues with DRC, and and, despite the fact that the available evidence demonstrated that turbidity issues are caused by the formation, Denison agreed to complete a redevelopment program for the appropriate selected wells at the Mill in a "good-faith" effort to reduce the turbidity level. Surging, bailing, and overpumping were determined to be the preferred well development techniques. The rationale for using surging and bailing followed by overpumping is consistent with U.S. Environmental Protection Agency ("EPA") guidance and guidance provided in other technical papers and publications.

Select, nonpumping, chloroform, nitrate and groundwater POC, wells were redeveloped during the period from fall 2010 to spring 2011 by surging and bailing followed by overpumping.

The results of the redevelopment are provided in the Report entitled: *Redevelopment of Existing Perched Monitoring Wells White Mesa Uranium Mill, Near Blanding Utah, prepared by Hydro Geo Chem, Inc. September 30, 2011* (the "Redevelopment Report"). The Redevelopment Report provides a qualitative description of turbidity behavior before and after redevelopment and provides a number of conclusions and recommendations. A copy of the Redevelopment Report was previously submitted under separate cover. The Redevelopment Report is currently underwas review by the Directorclosed out by the Director in a letter dated November 15, 2012. The closeout denied EFRI recommendations. However, due to other modifications to the sampling strategies, turbidity of the wells is no longer considered an issue.

As described above, all the existing wells have been reviewed by the Director, and repairs, modifications, retrofits, etc. have been made as required to conform those wells to the requirements of Part I.E.4 of the Permit, to the extent reasonably practicable.

2.9.6.2 Ground Water Sampling

Ground water sampling is performed in accordance with the requirements of Part I.E.5 of the Permit, which requires that all monitoring shall be conducted in conformance with the following procedures:

a) Grab samples shall be taken of the groundwater, only after adequate removal or purging of standing water within the well casing has been performed;
b) All sampling shall be conducted to ensure collection of representative samples, and reliability and validity of groundwater monitoring data. All groundwater sampling shall be conducted in accordance with the currently approved Groundwater Monitoring Quality Assurance Plan;
c) All analyses shall be performed by a laboratory certified by the State of Utah to perform the tests required;
d) If any monitor well is damaged or is otherwise rendered inadequate for its intended purpose, DenisonEFRI shall notify the Director in writing within five days of the discovery; and
e) Immediately prior to each monitoring event, DenisonEFRI shall calibrate all field monitoring equipment in accordance with the respective manufacturer's procedures and guidelines. DenisonEFRI shall make and preserve on-site written records of such equipment calibration in accordance with Part II.G and H of the Permit. Said records shall identify the manufacturer's and model number of each piece of field equipment used and calibration.

In accordance with the requirements of Part I.E.1(a) of the Permit, all groundwater sampling at the Mill is performed in accordance with the *White Mesa Uranium Mill Ground Water Monitoring Quality Assurance Plan (QAP)* (the "QAP"), which has been approved by the Director. The QAP complies with UAC R317-6-6.3(I) and (L) and by reference incorporates the relevant requirements of the *Handbook of Suggested Practices for Design and Installation of Ground-Water Monitoring Wells* (EPA/600/4-89/034, March 1991), *ASTM Standards on Ground Water and Vadose Investigations* (1996), *Practical Guide for Ground Water Sampling* EPA/600/2-85/104, (November 1985) and *RCRA Ground Water Monitoring Technical Enforcement Guidance Document* (1986), unless otherwise specified or approved by the Director, by virtue of his approving the QAP. A copy of the current version of the QAP, Date: 6-06-12 Revision 7.2, is included as Appendix HK.

2.9.7 Description and Justification of Parameters to be Monitored

The groundwater parameters to be monitored are described in Table 2.9.1.3-1. The process of selecting the groundwater quality monitoring parameters for the original Permit included examination of several technical factors. Each of these is discussedThese factors are listed below and discussed in detail in Section 4 on pages 9-19 of the 2004 Statement of Basis. , and include the following:

a) The number and types of contaminants that might occur in feedstock materials processed at the Mill;
b) Mill process reagents as a source of contaminants;
c) Source term abundance in the Mill's tailings cell solutions, based on limited historic wastewater quality sampling and analysis that had been done at the Mill's tailings cells; and
d) A consideration of contaminant mobility in a groundwater environment, based on site specific K_d information where available and lowest K_d values in the literature where site specific K_d information is not available.

Please see Section 4, pages 9-19, of the 2004 Statement of Basis for a more detailed discussion of the description and justification of parameters to be monitored.

One additional parameter, tin, was added to the list of groundwater monitoring constituents in 2007. Tin was not originally a required groundwater monitoring parameter in the Permit, and was omitted from the original Permit due to non-detectable concentrations reported by DenisonEFRI in three tailings leachate samples (2004 Statement of Basis, Table 5). With the addition of the alternate feed material from Fansteel Inc., tin was expected to experience an estimated to increase from 9 to 248 tons in the tailings inventory from 9 to 248 tons. The Director concluded that, with an estimated K_d of 2.5 to 5, tin is not as mobile in the groundwater environment as other metals; however, with the high acidic conditions in the tailings wastewater, tin could stay in solution and not partition on aquifer materials. As a result, tin was added as a monitoring constituent to Table 2 of the Permit.

2.9.8 Quality Assurance and Control Provisions for Monitoring Data

Part I.E.1(d) of the Permit sets out some special conditions for groundwater monitoring. Under those conditions, the Mill must ensure that all groundwater monitoring conducted and reported complies with the following:

a) Depth to groundwater measurements shall always be made to the nearest 0.01 foot;
b) All groundwater quality analyses reported shall have a minimum detection limit or reporting limit that is less than its respective GWCL concentration defined in Table 2 of the Permit; and
c) aAll gross alpha analysis reported with an activity equal to or greater than the GWCL shall have a counting variance that is equal to or less than 20% of the reported activity concentration. An error term may be greater than 20% of the reported activity concentration when the sum of the activity concentration and error term is less than or equal to the GWCL.

As mentioned in Section 2.9.6.2 above, Part I.E.1(a) of the Permit requires that all groundwater sampling shall be conducted in accordance with the currently approved QAP. The detailed quality assurance and control provisions for monitoring data are set out in the QAP, a copy of which is attached as Appendix H K to this Application.

2.10 Plans and Specifications Relating to Construction, Modification, and Operation of Discharge Systems (R317-6-6.3.J)

As discussed in Section 2.7.1 above, the Mill has been designed as a facility that does not discharge to groundwater or surface water. ~~All t~~Tailings and other wastes associated with Mill operations are designed to be permanently disposed of in the Mill's tailings cells. The Mill's tailings cells can therefore be considered the Mill's discharge system in that they permanently ~~dispose~~ contain ~~of~~ discharges from the Mill's process circuits and all other Mill tailings and wastes.

The following plans and specifications and as built reports relating to tailings Cells 1, 2, 3, 4A and 4B are referenced in this Application and were previously submitted on the dates noted below under separate cover:

a. *Engineers Report: Tailings Management System, White Mesa Uranium Project Blanding, Utah*, June 1979, prepared by D'Appolonia Consulting Engineers, Inc.;
b. *Engineer's Report: Second Phase Design – Cell 3 Tailings Management System, White Mesa Uranium Project Blanding, Utah*, May 1981, prepared by D'Appolonia Consulting Engineers, Inc.;
c. *Construction Report: Initial Phase – Tailings Management System, White Mesa Uranium Project Blanding, Utah*, February 1982, prepared by D'Appolonia Consulting Engineers, Inc.;
d. *Construction Report: Second Phase Tailings Management System, White Mesa Uranium Project*, March 1983, prepared by Energy Fuels Nuclear, Inc.;
e. *Cell 4 Design, White Mesa Project Blanding, Utah*, April 10, 1989, prepared by Umetco Minerals Corporation;
f. *Construction Report: Tailings Cell 4A, White Mesa Uranium Mill – Tailings Management System*, August 2000, prepared by ~~Denison~~EFRI (then named International Uranium (USA) Corporation);
g. *Cell 4A Lining System Design Report For The White Mesa Mill Blanding, Utah*, January 2006, prepared by GeoSyntec Consultants; and
h. *Cell 4A Construction Quality Assurance Report, White Mesa Mill Blanding, Utah*, July 2008 prepared by Geosyntec consultants ~~(disk only)~~.
i. *Cell 4B Design Report, White Mesa Mill, Blanding, Utah*, December 8, 2007, prepared by Geosyntec Consultants
j. *Cell 4B Construction Quality Assurance Report, Volumes 1-3*, November 2010, prepared by Geosyntec Consultants

2.11 Description of the Ground Water Most Likely to be Affected by the Discharge (R317-6-6.3.K)

2.11.1 General

The ground water most likely to be affected by a potential discharge from Mill activities is the perched aquifer.

The deep confined aquifer under White Mesa is found in the Entrada and underlying Navajo Sandstones, is hydraulically isolated from the perched aquifer, and is therefore extremely unlikely to be affected by any such potential discharges. The top of the Entrada Sandstone at the site is found at a depth of approximately 1,200 feet below land surface (see the discussion in Sections 2.5.1.1 and 2.5.1.2 above). This deep aquifer is hydraulically isolated from the shallow perched aquifer by at least two shale members of the Morrison Formation, including the Brushy Basin (approximately 295 feet thick) and the Recapture (approximately 120 feet thick) Members. Other formations geologic units are also found between the perched and deep confined aquifers, that also include many layers of thin shale interbeds that contribute to hydraulic isolation of these two groundwater systems, including: the Morrison Formation Westwater cCanyon (approximately 60 feet thick), and Salt Wash (approximately 105 feet thick) Members, and the Summerville Formation (approximately 100 feet thick). Artesion groundwater conditions found in the deep Entrada/Navajo Sandstone aquifer also reinforce this concept of hydraulic isolation from the shallow perched system. See the discussion on page 2 of the 2004 Statement of Basis.

2.11.2 Background Ground Water Quality in the Perched Aquifer

This Section describes the groundwater quality in the perched aquifer. See Sections 2.5.1.3, 2.5.1.4 and 2.5.1.5 above for a more detailed description of the perched aquifer itself, the depth to ground water, the saturated thickness, flow direction, porosity, hydraulic conductivity and flow system characteristics of the perched aquifer.

As mentioned in Section 2.9.1.5 above, a significant amount of historic groundwater quality data had been collected by DenisonEFRI and previous operators of the Mill for many wells at the facility.

However, at the time of original issuance of the Permit, the Director had not yet completed an evaluation of the historic data, particularly with regard to data quality, and quality assurance issues. The Director also noted several groundwater quality issues that needed to be resolved prior to a determination of background groundwater quality at the site, such as a number of constituents that exceeded their respective GWQS and long term trends in uranium in downgradient wells MW-14, MW-15 and MW-17, and a spatial high of uranium in those three downgradient wells.

As a result of the foregoing, the Director required that the Existing Well Background Report be prepared to address and resolve these issues. DUSA prepared the Existing Well Background Report that evaluated all historic data for the thirteen existing wells for the purposes of establishing background groundwater quality at the site and developing groundwater compliance limits GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the Existing Well Background Report, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the thirteen existing wells based primarily on the analysis performed in the Existing Well background Report. It should be noted, however, that, because the GWCLs have been set at the mean plus second standard deviation, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

As required by the Permit, the Existing Well Background Report addressed all available historic data, which includes pre-operational and operational data, for the compliance monitoring wells under the Permit that were in existence at the date of issuance of the Permit. The Regional Background Report focuses on all the pre-operational site data and all the available regional data to develop the best available set of background data that could not conceivably have been influenced by Mill operations. The New Well Background Report, which was required by the Permit, analyzed the data collected from the new wells, which were installed in 2005, to determine background concentrations for constituents listed in the Permit for each new well.

The purpose of the Existing Well Background Report and the New Well Background Report was were prepared to satisfy several objectives:. firstFirst, in the case of the Existing Well Background Report, to perform a quality assurance evaluation and data validation of the existing and historical on-site groundwater quality data in accordance with the requirements of the Permit, and to develop a database consisting of historical groundwater monitoring data for "existing" wells and constituents.

Second, in the case of the New Well Background Report, to compile a database consisting of monitoring results for new wells, which were collected subsequent to issuance of the Permit, in accordance with the Mill's QAP data quality objectives.

Third, to perform a statistical, temporal and spatial evaluation of the existing well and new well data bases to determine if there have been any impacts to groundwater from Mill activities. Since the Mill is an existing facility that has been in operation since 1980, such an analysis of historic groundwater monitoring data was required in order to ensure verify that the monitoring results to be used to determine background groundwater quality at the site and GWCLs have not been impacted by Mill activities.

Finally, since the analysis demonstrateds that groundwater has not been impacted by Mill activities, to develop a GWCL for each constituent in each well.

The Regional Background Report was prepared as a supplement to the Existing Well Background Report to provide further support to the conclusion that Mill activities have not impacted groundwater.

In evaluating the historic data for the existing wells, INTERA used the following approach:

- If historic data for a constituent in a well do not demonstrate a statistically significant upward trend, then the proposed GWCL for that constituent is accepted as representative of background, regardless of whether or not the proposed GWCL exceeds the GWQS for that constituent. This is because the monitoring results for the constituent can be considered to have been consistently representative since commencement of Mill activities or installation of the well; and
- If historic data for a constituent in a monitoring well represent a statistically significant upward trend or downward trend in the case of pH, then the data is further evaluated to

determine whether the trend is the result of natural causes or Mill activities. If it is concluded that the trend results from natural causes, then the GWCL proposed in the Existing Well Background Report will be appropriate.

After applying the foregoing approach, INTERA concluded that, other than some detected chloroform and related organic contamination at the Mill site, which is the subject of a separate investigation and remedial action, and that is the result of pre-Mill activities, and some elevated nitrate concentrations in certain wells which were considered to be associated with the chloroform plume, there have been no impacts to groundwater from Mill activities (See Section 2.16.1 below relating to the chloroform contamination and Section 2.16.2 relating to the nitrate contamination).

In reaching this conclusion, INTERA noted that, even though there are a number of increasing trends in various constituents at the site, none of the trends are caused by Mill activities, for the following reasons:

- ~~Chloride is unquestionably the best indicator parameter, and there are no significant trends in chloride in any of the wells;~~
- There are no noteworthy correlations between chloride and uranium in wells with increasing trends in uranium, other than in upgradient wells MW-19 and MW-18, which INTERA concluded are not related to any potential tailings seepage. INTERA noted that it is inconceivable to have an increasing trend in any other parameter caused by seepage from the Mill tailings without a corresponding increase in chloride;
- There are significant increasing trends upgradient in MW-1, MW-18 or MW-19 in uranium, sulfate, TDS iron, selenium, thallium, ammonia and fluoride and far downgradient in MW-3 in uranium and selenium, sulfate, TDS and pH (decreasing trend). INTERA concluded that this provides very strong evidence that natural forces at the site are causing increasing trends in these constituents (decreasing in pH) in other wells and supports the conclusion that natural forces are also causing increasing trends in other constituents as well; and
- On a review of the spatial distribution of constituents, it is quite apparent that the constituents of concern are dispersed across the site and not located in any systematic manner that would suggest a tailings plume.

INTERA concluded that, after extensive analysis of the data, and given the conclusion that there have been no impacts to groundwater from Mill activities, the GWCLs set out in Table 16 of the Existing Well Background Report are appropriate, and are indicative of background ground water quality. INTERA did advise, however, that proposed GWCLs for all the trending constituents should be re-evaluated upon Permit renewal to determine if they are still appropriate at the time of renewal. See Table 16 of the Existing Well Background Report for INTERA's calculation of background ground water quality as represented by the proposed GWCLs. See Section 6.0 of the Existing Well Background Report for a discussion of the statistical manner used to calculate each proposed GWCL.

Upon approval of the Existing Wells Background Report, the Director required that the New Well Background Report be prepared to address and resolve similar issues in the newer wells.

EFRI prepared the New Well Background Report that evaluated all historic data for the nine new wells for the purposes of establishing background groundwater quality at the site and developing GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the New Well Background Report, the GWCLs for the new wells were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.

In evaluating the new well data, INTERA used the same approach in the New Well Background Report that was used in the Existing Well Background Report for existing well data. In addition, INTERA compared the groundwater monitoring results for the new wells to the results for the existing wells analyzed in the Existing Well Background Report and to the pre-operational and regional results analyzed in the Regional Background Report. This was particularly important for the new wells because there is no historic data for any constituents in those wells ~~that goes~~dating back to commencement of Mill operations. A long-term trend in a constituent may not be evident from the available data for the new wells. By comparing the mean~~s~~ concentrations of ~~for~~ the constituents in the new wells to the results for the existing wells and regional background data, INTERA was able to determine if the constituent concentrations ~~of any constituents~~ in the new wells ~~are~~ were consistent with background at the site.

INTERA concluded that after applying the foregoing approach, there have been no impacts to groundwater in the new monitoring wells from Mill activities. INTERA concluded that the groundwater monitoring results for the new wells are consistent with the results for the existing wells analyzed in the Existing Well Background Report and for the pre-operational and regional wells, seeps and springs analyzed in the Regional Background Report. INTERA noted that there were some detections of chloroform and related organic contamination and degradation products and nitrate and nitrite in the new wells, which are now the subject of two separate investigations (see Sections 2.16.1 and 2.16.2), but that such contamination was the result of pre-Mill activities.

As a result, given the conclusion that there have been no impacts to groundwater from Mill activities, INTERA concluded that the calculated GWCLs for new wells set out in Table 10 of the New Well Background Report are appropriate, and are indicative of background ground water quality. Again, INTERA noted that GWCLs for trending constituents be re-evaluated upon Permit renewal to determine if they are still appropriate at the time of renewal. Additionally, the Flow Sheet states to "Consider an Alternate Approach" for determination of GWCLs in trending constituents. In its report, INTERA recommended, as an alternative, that GWCLs be set at the highest of a) the Flow Sheet approach, b) the highest historical value or c) the fractional approach; provided that in no event would the GWCL be less than mean plus 20% . This approach was rejected by the DRC in favor of the mean plus two standard deviation or equivalent. See Table 10 of the New Well Background Report for INTERA's calculation of background ground water quality as represented by the proposed GWCLs. See Section 2.2 of the New Well Background Report for a discussion of the statistical manner used to calculate each proposed GWCL.

~~As a result of the foregoing, the Director required that the New Well Background Report be prepared to address and resolve these issues. DUSA prepared the New Well Background Report that evaluated all historic data for the nine new wells for the purposes of establishing background~~

~~groundwater quality at the site and developing GWCLs under the GWDP. Prior to review and acceptance of the conclusions in the New Well Background Report, the GWCLs were set on an interim basis in the GWDP. The interim limits were established as fractions of the state GWQSs for drinking water, depending on the quality of water in each monitoring well at the site.~~

The University of Utah Study confirmed INTERA's conclusions in the Background Reports that groundwater at the site has not been impacted by Mill operations (see the discussion in Section 1.3 above).

The January 20, 2010 GWDP established GWCLs that reflect background groundwater quality for the nine new wells based primarily on the analysis performed during the New Well Background Report. It should be noted, however, that, because the GWCLs ~~have been~~were set at the mean plus ~~second~~ two standard deviations, or the equivalent, un-impacted groundwater would normally be expected to exceed the GWCLs approximately 2.5% of the time. Therefore, exceedances are expected in approximately 2.5% of all sample results, and do not necessarily represent impacts to groundwater from Mill operations.

Part I.G.2 of the Permit provides that out-of-compliance status exists when the concentration of a pollutant in two consecutive samples from a compliance monitoring point exceeds a GWCL in Table 2 of the Permit. Per the requirements of Part I.G.4(c) of the Permit, ~~Denison~~EFRI is required to prepare and submit written plans and time schedules, for Director approval, to fully comply with the requirements of Part I.G.4(c) of the Permit relating to any such out-of-compliance situation, including, but not limited to:

(i) submittal of a written assessment of the source(s);

(ii) submittal of a written evaluation of the extent and potential dispersion of said groundwater contamination; and

(iii) submittal of a written evaluation of any and all potential remedial actions to restore and maintain ground water quality at the facility, for the point of compliance wells and contaminants in question, to ensure that: 1) shallow groundwater quality at the facility will be restored and 2) the contaminant concentrations in said point of compliance wells will be returned to and maintained in compliance with their respective GWCLs.

~~Two~~ Seven ~~p~~Plans and ~~t~~Time ~~s~~Schedules and six Source Assessment Reports ("SARs") have been submitted to address consecutive exceedances other than pH which have been noted in wells since the establishment of the GWCLs in the January 20, 2010 GWDP. The Plans and ~~t~~Time ~~s~~Schedules and the SARs are included in Table 2.11.2-1~~the Initial Plan and Schedule and the Q2 2011 Plan and Schedule to address analytes other than pH in out-of-compliance status~~. ~~Those plans were submitted June 13, and September 7, 2011, respectively.~~ These Plans and Time Schedules and SARs were previously submitted under separate cover.

~~Those plans will be implemented concurrent with the pH investigation described below and described in the pH plan and Time schedule submitted to the Director on April 13, 2012. The plans were previously submitted under separate cover.~~

On July 12, 2012, ~~Denison~~EFRI and the Director entered into a Stipulated Consent Agreement relating to the implementation of ~~these~~ the June 13, 2011 Plan and Time Schedule and the September 7, 2011 Plan and Time Schedules ~~plans and schedules.~~. The Stipulated Consent Agreement required the completion of a SAR to meet the requirements of the June 13, 2011 Plan and Time Schedule and the September 7, 2011 Plan and Time Schedules.

Subsequent Plan and Time Schedules submitted to the Director have been approved by the Director in letters to EFRI. The submission dates and the associated DRC approval dates of the Plans and Time Schedules and the associated SARs are listed on Table 2.11.2-1.

Given the varied background groundwater quality at the site, previously identified rising trends in some wells and other factors, it cannot be assumed that consecutive exceedances of a constituent in a monitoring well means that contamination has been introduced to groundwater in that well. The exceedances may very well be the result of background influences. The approach in these Plans therefore is to first determine if the recent exceedances are the result of background influences. If they are determined to be the result of background influences, then no remedial actions are required. If, however, they are determined to not be the result of natural background influences, then further analyses will be required.

Based on the information available at this time, ~~Denison~~EFRI believes that the GWCL exceedances observed are the result of natural influences and reflect the need to adjust some of the GWCLs for the site.

2.11.3 GWCL Determination for Field pH

During the completion of the 4th Quarter 2010 Quarterly Groundwater Monitoring Report, ~~Denison~~EFRI noted eleven perched groundwater monitoring wells with pH measurements below the GWCLs. These wells are located upgradient, cross-gradient, and -downgradient of the Mill and tailings cells. Investigation into the eleven pH GWCLs in question indicated that the GWCLs for groundwater pH in all wells established in the January 20, 2010 GWDP were erroneously based on historic laboratory results instead of field measurements as contemplated by Table 2 of the GWDP. ~~Denison~~EFRI notified DRC that the existing GWCLs for groundwater pH were incorrectly based on laboratory results rather than field measurements and proposed to submit revised descriptive statistics for field pH to be used as revised pH GWCLs by the end of the second quarter 2011.

~~Denison~~EFRI received approval from DRC to proceed with the revision of the pH GWCLs based on field measurements. The data processing and statistical assessments necessary to revise the GWCLs based on historic field pH data were completed. The data processing and statistical assessments completed were based on the DRC-approved methods in the logic flow diagram included as Figure 17 of the New Well Background Report. Following the statistical evaluation of pH data, ~~Denison~~EFRI compared the Mill's groundwater pH data from the 2nd Quarter of 2011, including accelerated sampling results through June 2011, and noted that all of the June 2011 groundwater results, and many of the other results from the 2nd Quarter, were already outside the revised GWCLs to be proposed based on the logic flow diagram.

It was noted that the historical trend of decreasing pH, which was addressed in the Background Study Reports, appeared to be present in nearly all wells throughout the Mill site area, including upgradient, downgradient, and cross-gradient wells in the groundwater monitoring program. As of June 2011, all groundwater monitoring wells demonstrated a downward trend in the field pH data over time.

DenisonEFRI notified DRC that the 2nd Quarter 2011 data exceeded the recalculated GWCLs. DenisonEFRI advised DRC that, as a result of these findings, DenisonEFRI did not believe it was appropriate to continue with its efforts to reset the GWCLs for pH based on field pH data, as originally planned, but instead it appeared that it would be more appropriate to undertake a study to determine whether the decreasing trends in pH are due to natural influences and, if so, to determine a more appropriate way to determine GWCLs.

DenisonEFRI and DRC have agreed on further investigations to be completed, as well as the steps and milestone dates to be incorporated into a pH PlanReport. The procedures for investigating investigation into the decreasing site-wide pH trends is documented in the *Plan to Investigate pH Exceedances in Perched Groundwater Monitoring Wells White Mesa Uranium Mill Blanding, Utah,* Prepared by Hydro Geo Chem, Inc, April 13, 2012 (the "pH Plan and Time Schedule"). The pH Plan and Time Schedule describesd the pH investigation, which was incorporated into to pursuant to the July 12, 2012a Stipulated Consent Agreement referred to above. The pH Plan and Time Schedule was previously submitted under separate cover.

The Stipulated Consent Agreement of July 12, 2012 specified that a pH Report be completed as well as a separate investigation into the natural phenomenon that was causing the site-wide trend. As a result, two reports investigating and describing the causes of the pH trend were completed. These reports are the *pH Report*, dated November 9, 2012 (INTERA, 2012b) and the *Investigation of Pyrite in the Perched Zone, White Mesa Uranium Mill* ("Pyrite Report"), dated December 7, 2012 (HGC, 2012b).

The pH Report consists of a statistical and geochemical evaluation of the decline in pH in groundwater wells at the Mill. The primary conclusion from the pH Report was that the historical trend of decreasing pH, which was addressed in the Background Study Reports, appears to be present in nearly all wells throughout the Mill site area, including upgradient, downgradient, and crossgradient wells in the groundwater monitoring program, and there seems to be no abatement of the trend. The wide-spread nature of the decrease in pH in upgradient, downgradient, and crossgradient wells suggests that the pH decreases result from a natural phenomenon unrelated to Mill operations, which is also confirmed by the indicator parameter analysis conducted as part of the pH Report. As discussed in The Pyrite Report, the most likely cause of declining pH across the site appears at this time to be the oxidation of pyrite, possibly due to increasing water levels at the site attributed primarily to recharge of wildlife ponds and/or the introduction of oxygen into the perched water zone as a result of increased groundwater sampling frequency. Based on the conclusion that the pH trend was caused by natural phenomenon, the pH Report recalculated the Groundwater Compliance Limits ("GWCLs") for all compliance monitoring wells at the site.

The Pyrite Report evaluated and quantified the presence of pyrite throughout the Mill site, and identified and quantified the mechanism by which it contributes to the sitewide decline in pH. The results of the investigation support pyrite oxidation as the most likely mechanism to explain decreases in pH and increases in sulfate concentrations in site wells and indicates that pyrite must be considered in assessing perched water chemistry in the future. The complex interaction of the various naturally occurring factors identified at the site, including the presence of pyrite at varying concentrations, variable oxygen transport, and variable carbonate species concentrations, is expected to result in relatively large background variations in pH, sulfate (and therefore TDS) concentrations, as well as variations in background concentrations of pH sensitive analytes such as metals. The expected impact of these various factors on pH and analyte concentrations, all of which are unrelated to Mill operations, is generally consistent with site analytical results, suggesting that pyrite oxidation plays a significant role in perched water chemistry at the site.

The primary conclusion from the activities conducted to date and described above is that the pH trends are not due to potential tailings leakage or Mill activities, but to ~~the historical trend of decreasing pH, which was addressed in the Background Reports, appears to be present in nearly all wells throughout the Mill site area, including upgradient, downgradient, and crossgradient wells in the groundwater monitoring program, and there seems to be no abatement of the trend. The wide-spread nature of the decrease in pH in upgradient, downgradient and crossgradient wells, suggests that the pH decrease results from~~ a natural phenomenon unrelated to Mill operations.

In an effort to ~~determine~~ diminish any ~~if these~~ trends that may have resulted in whole or in part, from increasing water levels attributed to the Wildlife ponds at the Mill, ~~Denison~~EFRI ~~has committed to stop~~discontinued recharging the two most northern of these ponds, commencing in March 2012.

2.11.~~3~~4 Quality of Ground Water at the Compliance Monitoring Point

~~All of t~~The analytical results from groundwater sampling are reported quarterly in Groundwater Monitoring Reports, which are filed with the Director pursuant to Part I.F.1 of the Permit.

2.12 Compliance Sampling Plan (R317-6-6.3.L)

The Mill's plan for sampling groundwater compliance monitoring points is discussed in detail in Section 2.9.1.3 above, and the plan for sampling the leak detection systems in Cells 4A and 4B is discussed in Section 2.15.3 below. This ~~Section~~ section ~~2.12 will~~ addresses other sampling required under the Permit. As the Mill is designed not to discharge to ground-water, there are no flow monitoring requirements in the Permit.

2.12.1 Tailings Cell Wastewater Quality Sampling Plan

Part I.E.10 of the Permit requires that, on an annual basis, ~~Denison~~EFRI ~~must~~ collect wastewater quality samples from each wastewater source at each tailings cell at the facility, including wastewaters in surface impound~~ed~~ments ~~wastewaters~~, and slimes drain~~s wastewaters~~. ~~All such~~ The sampling ~~must be~~is conducted in August of each calendar year in compliance with an approved plan. The Tailings SAP (dated ~~November 21, 2008~~July 30, 2012) was approved by the Director on ~~March 3, 2009~~August 2, 2012. A copy of the approved *Tailings and Slimes Drain*

Sampling Program, Revision 02.1, November 20, 2008July 30, 2012 is attached as Appendix H IL to this Application. As of this writing, Denison has submitted Revision 2.1, which is undergoing review by the Director.

The purpose of the Tailings SAP is to characterize the source term quality of all tailings cell wastewaters, including impounded wastewaters or process waters in the tailings cells, and wastewater or leachates collected by internal slimes drains. The Revision 02.1, Tailings SAP requires:

- Collection of samples from the pond area of each active cell and the slimes drain of each cell that has commenced de-watering activities;
- Samples of tailings and slimes drain material will be analyzed at an offsite contract laboratory and subjected to the analytical parameters included in Table 2 of the Permit and general inorganics listed in Part I.E.1(d)(2)(ii) of the Permit, as well as semi-volatile organic compounds;
- A detailed description of all sampling methods and sample preservation techniques to be employed;
- The procedures utilized to conduct these analyses will be standard analytical methods utilized for groundwater sampling and as shown in Section 8.2 of the QAP;
- The contracted laboratory will be certified by the State of Utah in accordance with UAC R317-6-6.12A; and
- 30-day advance notice of each annual sampling event must be given, to allow the Director to collect split samples of all tailings cell wastewater sources.

The tailings and slimes drain sampling events will beare subject to the currently approved QAP, unless otherwise specifically modified by the Tailings SAP to meet the specific needs of this type of sampling. The QAP has been approved by the Director and satisfies the most appropriate applicable requirements of the following references, unless otherwise specified by the Director through his approval of the Tailings SAP:

- *Standard Methods for the Examination of Water and Wastewater, twentieth edition*, 1998; Library of Congress catalogue number: ISBN: 0-87553-235-7;
- *E.P.A. Methods for Chemical Analysis of Water and Wastes*, 1983; Stock Number EPA-600/4-79-020;
- *Techniques of Water Resource Investigations of the U.S. Geological Survey*, (1998); Book 9;
- Monitoring requirements in 40 CFR parts 141 and 142, 2000 ed., Primary Drinking Water Regulations and 40 CFR parts 264 and 270, 2000 ed.; and
- *National Handbook of Recommended Methods for Water-Data Acquisition*, GSA-GS edition; Book 85 AD-2777, U.S. Government Printing Office Stock Number 024-001-03489-1.

The currently approved Tailings SAP is attached to this Application. As previously stated, Denison has submitted Revision 2.1, which is undergoing review by the Director.

2.12.2 White Mesa Seeps and Springs Sampling Plan

The initial Permit required ~~Denison~~EFRI to submit a plan for groundwater sampling and analysis of all seeps and springs ~~("SSSP")~~ found downgradient or ~~lateral~~ cross gradient from the tailings cells for Director review and approval. The Director approved the plan on ~~on~~ March 17, 2009. A copy of the *Sampling Plan for Seeps and Springs in the Vicinity of the White Mesa Uranium Mill*, Revision: ~~0~~1, ~~March 17, 2009~~June 10, 2011, is attached as Appendix ~~B~~ C to this Application. As of this writing, ~~Denison has submitted~~ Revision 1.0~~, which~~ of this SAP is undergoing review by the Director.

Under the ~~SSSP~~Seeps and Springs SAP, ~~seeps and springs~~ sampling ~~will be~~is conducted on an annual basis between May 1 and July 15 of each year, to the extent sufficient water is available for sampling, at six identified seeps and springs near the Mill. The sampling locations were selected to correspond with those seeps and springs sampled for the initial Mill site characterization performed in the 1978 ER, plus additional sites located by ~~Denison~~EFRI, the United States Bureau of Land Management and Ute Mountain Ute Indian Tribe representatives.

Samples ~~will be~~are analyzed for all ground-water monitoring parameters found in Table 2 of the Permit. The laboratory procedures utilized to conduct the analyses of parameters listed in Table 2 ~~will be those~~are the same as utilized for groundwater sampling and as shown in Section 8.2 of the QAP. In addition to these laboratory parameters, the pH, temperature and conductivity of each sample will be measured and recorded in the field. Laboratories selected by ~~Denison~~EFRI to perform analyses of seeps and springs samples ~~will be~~are required to be certified by the State of Utah in accordance with UAC R317-6-6.12.A.

The seeps and springs sampling events ~~will be~~are subject to the currently approved QAP, unless otherwise specifically modified by the ~~SSSP~~ Seeps and Springs SAP to meet the specific needs of this type of sampling. The QAP has been approved by the Director and satisfies the ~~most appropriate~~applicable requirements of the references listed in Section 2.12.1 above, unless otherwise specified by the Director through his approval of the ~~SSSP~~Seeps and Springs SAP.

~~Please, see the attached copy of the SSSP for further details.~~

2.12.3 Monitoring of Deep Wells

Due to the fact that the deep confined aquifer at the site is hydraulically isolated from the shallow perched aquifer (see the discussion in Section 2.11.1 above) ~~no~~ monitoring of the deep aquifer is not required under the Permit.

2.13 Description of the Flooding Potential of the Discharge Site (R317-6-6.3.M)

2.13.1 Surface Water Characteristics

~~As discussed above, t~~The Mill site is located on White Mesa, a gently sloping (1% SSW) plateau that is physically defined by the adjacent drainages which have cut deeply into regional sandstone formations. There is a small drainage area of approximately 62 acres (25 ha) above the site that could yield surface runoff to the site. Runoff from the mesa is conveyed by the general surface topography to either Westwater Creek, Corral Creek, or to the south into an unnamed branch of Cottonwood Wash. Local porous soil conditions, topography and low average annual rainfall of 13.3 inches (reported as 11.8 by Dames and Moore in historic reports) cause these streams to be intermittently active, responding to spring snowmelt and local rainstorms (particularly thunderstorms). Surface runoff from approximately 624 acres of the Mill drains westward and is collected by Westwater Creek, and runoff from another 384 acres drains east into Corral Creek. The remaining 4,500 acres of the southern and southwestern portions of the site drain indirectly into Cottonwood Wash (1978 ER, p. 2-143). The site and vicinity drainages carry water only on an intermittent basis. The major drainages in the vicinity of the Mill are depicted in Figure 12 and their drainage areas are tabulated in Table 2.13.1-1. Total runoff from the mesa (total yield per watershed area) is estimated to be less than 0.5 inch annually (1978 ER, p. 2-143).

There are no perennial surface waters on or in the vicinity of the Mill site. This is due to the gentle slope of the mesa on which the site is located, the low average annual rainfall of 13.3 ~~(reported as 11.8 by Dames and Moore in historic reports)~~ inches per year at Blanding, local soil characteristics and the porous nature of local stream channels. Prior to Mill construction, three small ephemeral catch basins were present ~~on the site~~ to the northwest and northeast of the Mill site.

Corral Creek is an intermittent tributary to Recapture Creek. The drainage area of that portion of Corral Creek above and including drainage from the eastern portion of the site is about 5 square miles. Westwater Creek is also an intermittent tributary of Cottonwood Wash. The Westwater Creek drainage basin covers nearly 27 square miles at its confluence with Cottonwood Wash 1.5 miles west of the Mill site. Both Recapture Creek and Cottonwood Wash are similarly intermittently active, although they carry water more often and for longer periods of time due to their larger watershed areas. They both drain to the south and are tributaries of the San Juan River. The confluences of Recapture Creek and Cottonwood Wash with the San Juan River are approximately 18 miles south of the Mill site. The San Juan River, a major tributary for the upper Colorado River, has a drainage of 23,000 square miles measured at the USGS gauge to the west of Bluff, Utah (1978 ER, p. 2-130).

Storm runoff in these streams is characterized by a rapid rise in flow rates, followed by rapid recession primarily due to the small storage capacity of the surface soils in the area. For example, on August 1, 1968, a flow of 20,500 cubic feet per second was recorded in Cottonwood Wash near Blanding. The average flow for that day, however, was only 4,340 cfs. By August 4, the flow had returned to 16 cfs (1978 ER, p. 2-135). Monthly streamflow summaries as updated from Figure 2.4 of the FES are presented in Figure 13 for Cottonwood Wash, Recapture Creek and Spring Creek. Flow data are not available for the two smaller water courses closest to the Mill site, Corral Creek and Westwater Creek, because these streams carry water infrequently and only in response to local heavy rainfall and snowmelt, which occurs primarily in the months of April, August, and October. Flow typically ceases in Corral Creek and Westwater Creek within 6 to 48 hours after precipitation or snowmelt ends.

2.13.2 Flood Protection Measures

~~As mentioned above, t~~The Mill was designed and constructed to prevent runon or runoff of storm water by a) diverting runoff from precipitation on the Mill site to the tailings cells; and b) diverting runoff from surrounding areas away from the Mill site via three drainage ditches that have been constructed north (upslope) of the Mill facility.

See the *UMETCO Minerals Corporation: White Mesa Mill Drainage Report for Submittal to NRC*, January 1990, a copy of which accompanies this Application, for aA more detailed description of the flooding potential of the site, including the 6-hour probable maximum precipitation (which is more conservative than the 100-year flood plain), and applicable flood protection measures is provided in the *UMETCO Minerals Corporation: White Mesa Mill Drainage Report for Submittal to NRC*, January 1990.

In addition to the foregoing designed control features, the facility has developed a *Stormwater Best Management Practices Control Plan* which includes a description of the site drainage features and the best management practices employed to ensure appropriate control and routing of stormwater. A copy of the Mill's *Stormwater Best Management Practices Plan* is included as Appendix FG to this Application.

2.14 Contingency Plan (R317-6-6.3.N)

As required by Part I.H.15 of the Permit, the Mill currently has a *Contingency Plan* for regaining and maintaining compliance with the Permit limits and for re-establishing best available technology as defined in the Permit. A copy of the most current approved version of the Mill's *Contingency Plan* is included as Appendix JM to this Application.

2.15 Methods and Procedures for Inspections of the Facility Operations and for Detecting Failure of the System (R317-6-6.3.O)

Part I.D. of the Permit sets out a number of DMT and BAT standards that must be followed. Part I.E. of the Permit sets out the Ground Water Compliance and Technology Performance Monitoring requirements, to ensure that the DMT and BAT standards are met. These provisions of the Permit, along with the DMT Plan, *Cell 4A and Cell 4B BAT Monitoring Operations and Maintenance Plan* and other plans and programs developed pursuant to these Parts, set out the methods and procedures for inspections of the facility operations and for detecting failure of the system.

In addition to the programs discussed above, the following additional DMT and BAT performance standards and associated monitoring are required under Parts I.D and I.E. of the Permit

2.15.1 Existing Tailings Cell Operation

Part I.D.2 of the Permit provides that authorized operation and maximum disposal capacity in each of the existing tailings Cells, 1, 2 and 3 shall not exceed the levels authorized by the Mill License and that under no circumstances shall the freeboard be less than three feet, as measured from the top of the FML. Part I.E.7(a) of the Permit requires that the wastewater pool elevations in Cells 1 and 3 must be monitored weekly to ensure compliance with the maximum wastewater elevation criteria mandated by Condition 10.3 of the Mill License. However, a letter from the Director dated January 27, 2011, which approved the use of Cell 4B, and a subsequent letter dated March 14, 2011, stated that authorization of the use of Cell 4B and approval of the DMT and Cell 4A Operations and Maintenance ("O&M") Plans effectively eliminated the former freeboard elevation requirements for tailings Cell 3.

Part I.D.2 further provides that any modifications by DenisonEFRI to any approved engineering design parameter at these existing tailings cells requires prior Director approval, modification of the Permit and issuance of a construction permit.

2.15.2 Existing Facility DMT Performance Standards

Part I.D.3 of the Permit requires DenisonEFRI to operate and maintain certain Mill site facilities and the existing tailings disposal cells to minimize the potential for wastewater release to groundwater and the environment, including, but not limited to the following additional DMT measures:

2.15.2.1 DMT Monitoring Wells at Cells 1, 2 and 3

Parts I.D.3 (a) and (d) require that at all times DenisonEFRI must operate and maintain Cells 1, 2 and 3 to prevent groundwater quality conditions in any nearby monitoring wells from exceeding the GWCLs in Table 2 of the Permit. This is monitored for detecting failure of the system through tThe ground-water compliance monitoring program described in detail in Section 2.9.1.3, is designed to provide early detection of a system failure in these tailings cells. above.

2.15.2.2 Slimes Drain Monitoring

Part I.D.3(b)(1) of the Permit requires that DenisonEFRI must at all times maintain the average wastewater head in the slimes drain access pipe to be as low as reasonably achievable (ALARA) in each tailings disposal cell, in accordance with the approved DMT Plan. Compliance will beis achieved when the average annual wastewater recovery elevation in the slimes drain access pipe, determined pursuant to the currently approved DMT Plan, meets the conditions in Equation 1of specified in Part I.D.3(b)(3) of the Permit.

Part I.E.7(b) of the Permit requires that DenisonEFRI must monitor and record quarterly the depth to wastewater in the slimes drain access pipes as described in the currently approved DMT Plan at Cell 2, and upon commencement of de-watering activities, at Cell 3, in order to ensure compliance with Part I.D.3(b)(3) of the Permit. At this time, de-watering of Cell 3 has not commenced.

Quarterly measurements of the wastewater head in Cell 2 are reported in the quarterly DMT reports submitted to DRC pursuant to the requirements of Part I.F.1, Table 7 of the GWDP. The historic measurements for 2009 through 2013 are included in Appendix J. Annual compliance calculations pursuant to Part I.D.3(b)(3) of the GWDP are submitted to DRC on or before March 1 of the following year. The annual compliance calculations submitted to date for Cell 2 are summarized in Appendix J.

As noted in Appendix J, annual slimes drain compliance was not achieved for 2010, in accordance with Part I.D.3 of the Permit. As noted in correspondence with DRC, the monthly monitoring requirements specified in Part I.D.3(b)(2) of the February 2011 revision of the GWDP seriously interfered with EFRI's ability to comply with Parts I.D.3(b)(i) and I.D.3 (b)(3) of the GWDP. The monthly testing requirement resulted in the slimes drain pump being off (not pumping) an average of 6.42 days per month every month which is equivalent to 77 days (11 weeks) per year or 20 percent of the year for performance of the measurements.

The GWDP was amended in July 2011 to change the frequency of the slimes drain testing from monthly to quarterly. The average annual wastewater recovery elevation in the slimes drain pipe has been in compliance (that is, less than the previous year's running average) since the monitoring frequency changed from monthly to quarterly in July 2011.

2.15.2.3 Maximum Tailings Waste Solids Elevation

Part I.D.3(c) of the Permit requires that upon closure of any tailings cell, ~~Denison~~EFRI must ensure that the maximum elevation of the tailings waste solids does not exceed the top of the FML liner.

2.15.2.4 Wastewater Elevation in Roberts Pond

Part I.D.3(e) of the Permit requires that Roberts Pond be operated so as to provide a minimum 2-foot freeboard at all times, and that under no circumstances will the water level in the pond exceed an elevation of 5,624 feet above mean sea level. Part I.D.3(e) also provides that in the event the wastewater elevation exceeds this maximum level, ~~Denison~~EFRI must remove the excess wastewater and place it into containment in Cell 1 within 72 hours of discovery.

Part I.E.7(c) of the Permit requires that the wastewater level in Roberts Pond must be monitored and recorded weekly, in accordance with the currently approved DMT Plan, to determine compliance with the DMT operations standard in Part I.D.3(e) of the Permit;

2.15.2.5 Inspection of Feedstock Storage Area

Part I.D.3(f) of the Permit requires that open-air or bulk storage of all feedstock materials at the Mill facility awaiting Mill processing must be limited to the eastern portion of the Mill site (the "ore pad") described by the coordinates set out in that Part of the Permit, and that storage of feedstock materials at the facility outside of this defined area, must meet the requirements of Part I.D.11 of the Permit. Part I.D.11 requires ~~that Denison~~EFRI ~~must~~ to store and manage feedstock materials outside the defined ore storage pad in accordance with an approved Feedstock Management Plan. On June 20, 2008, ~~Denison~~EFRI submitted a *White Mesa Mill Containerized Alternate Feedstock Material Storage Procedure* for Director review and approval. A copy of that procedure is included as Appendix ~~K~~ N to this Application. The Director is currently reviewing that procedure.

Part I.E.7(d) of the Permit requires that ~~Denison~~EFRI inspect the feedstock storage areas weekly to:

a) Confirm that the bulk feedstock materials are maintained within approved feedstock storage defined by Table 4 of the Permit; and
b) Verify that all alternate feedstock materials located outside the feedstock storage area defined in Table 4 are stored in accordance with the requirements found in Part I.D.11.

Part I.E.7(d) further provides that DenisonEFRI must implement the Feedstock Material Storage Procedure immediately upon Director approval.

The Mill's Standard Operating Procedure procedure under the Mill License for inspection of the Mill's ore pad is contained in Section 3.3 of the DMT Plan, a copy of which is attached as Appendix G H to this Application.

2.15.2.6 Monitor and Maintain Inventory of Chemicals

Part I.D.3(g) of the Permit requires that for all chemical reagents stored at existing storage facilities and held for use in the milling process, DenisonEFRI must to provide secondary containment to capture and contain all volumes of reagent(s) that might be released at any individual storage area. This requirement applies to all chemical reagents stored at existing storage facilities and held for use in the milling process. Response to spills, cleanup thereof, and required reporting must comply with the provisions of an approved Emergency Response Plan as found in an the approved Stormwater Best Management Practices Plan, stipulated by Parts I.D.10 and I.D.3(g) of the Permit. Part I.D.3(g) further provides that for any new construction of reagent storage facilities, such secondary containment and control must prevent any contact of the spilled or otherwise released reagent or product with the ground surface.

Part I.E.9 of the Permit requires that DenisonEFRI must monitor and maintain a current inventory of all chemicals used at the facility at rates equal to or greater than 100 kg/yr. This inventory must is to be maintained on-site, and must include:

(i) Identification of chemicals used in the milling process and the on-site laboratory; and

(ii) Determination of volume and mass of each raw chemical currently held in storage at the facility.

A copy of the Mill's chemical Inventory is attached as Appendix L O to this Application.

A copy of the Mill's *Stormwater Best Management Practices Plan*, Revision 1.54; October 2011September 2012 is attached as Appendix F G to this Application.

2.15.3 BAT Performance Standards for Cell 4A

2.15.3.1 BAT Operations and Maintenance Plan

Part I.D.6 of the GWDP provides thatrequires DenisonEFRI must to operate and maintain Cell 4A so as to prevent release of wastewater to groundwater and the environment in accordance with a BAT Operations and Maintenance Plan., as approved by the Director, pursuant to Part I.H.19 of the Permit, and that at a minimum such plan must include the following performance standards:

a) The fluid head in the leak detection system shall not exceed 1 foot above the lowest point in the lower membrane liner;

b) The leak detection system maximum allowable daily leak rate shall not exceed 24,160 gallons/day;

c) After ~~Denison~~EFRI initiates pumping conditions in the slimes drain layer in Cell 4A, ~~Denison~~EFRI will provide continuous declining fluid heads in the slimes drain layer, in a manner equivalent to the requirements found in Part I.D.3(b) for Cells 2 and 3; and

d) Under no circumstances shall the freeboard be less than 3-feet in Cell 4A, as measured from the top of the FML.

The BAT Operations and Maintenance Plan required under Part ~~I.H.19~~I.D.6 was ~~submitted on September 16, 2008 and~~ approved by the Director on ~~September 17, 2008~~December 21, 2011. A copy of the most currently-approved *BAT Operations and Maintenance Plan* ~~Revision 2.3 dated July 2011,~~ is included as Appendix ~~E~~ F to this Application.

2.15.3.2 Implementation of Monitoring Requirements Under the BAT Operations and Maintenance Plan

Part I.E.8 of the Permit provides that, after Director approval of the Tailings Cell 4A BAT Operations and Maintenance Plan, ~~required by Part I.H.19 of the Permit, Denison~~EFRI must immediately implement all monitoring and recordkeeping requirements contained in the plan. At a minimum, such BAT monitoring shall include:

a) Weekly Leak Detection System (LDS) Monitoring - including:

(i) ~~Denison must provide~~ continuous operation of the leak detection system pumping and monitoring equipment, including, but not limited to, the submersible pump, pump controller, head monitoring, and flow meter equipment approved by the Director. Failure of any pumping or monitoring equipment not repaired and made fully operational within 24-hours of discovery shall constitute failure of BAT and a violation of the Permit;

(ii) ~~Denison must~~ measurement of the fluid head above the lowest point on the secondary FML by the use of procedures and equipment approved by the Director. Under no circumstance shall fluid head in the leak detection system sump exceed a 1-foot level above the lowest point in the lower FML on the cell floor. For purposes of compliance monitoring this 1-foot distance shall equate to 2.28 feet above the leak detection system transducer;

(iii) ~~Denison must~~ measurement of the volume of all fluids pumped from the leak detection system. Under no circumstances shall the average daily leak detection system flow volume exceed 24,160 gallons/day; and

(iv) ~~Denison must operate and maintain~~operation and maintenance of wastewater levels to provide a 3-foot Minimum of vertical freeboard in tailings Cell 4A. Such measurements must be made to the nearest 0.1 foot.

b) Slimes Drain Recovery Head Monitoring

Immediately after the Mill initiates pumping conditions in the Cell 4A slimes drain system, monthly recovery head tests and fluid level measurements ~~will be~~are to be made in accordance with the requirements of Parts I.D.3 and I.E.7(b) of the Permit and any plan approved by the Director.

2.15.4 BAT Performance Standards for Cell 4B

2.15.4.1 BAT Operations and Maintenance Plan

Part I.D.13 ~~provides~~ requires ~~that Denison~~EFRI ~~must~~ to operate and maintain Cell 4B so as to prevent release of wastewater to groundwater and the environment in accordance with a BAT Operations and Maintenance Plan, ~~as approved by the Director, pursuant to Part I.H.19 of the Permit,~~ and that at a minimum such plan must include the following performance standards:

e) The fluid head in the leak detection system shall not exceed 1 foot above the lowest point in the lower membrane liner;

f) The leak detection system maximum allowable daily leak rate shall not exceed 26,145 gallons/day;

g) After ~~Denison~~EFRI initiates pumping conditions in the slimes drain layer in Cell 4B, ~~Denison~~EFRI will provide continuous declining fluid heads in the slimes drain layer, in a manner equivalent to the requirements found in Part I.D.3(b) for Cells 2, 3 and 4A; and

h) Under no circumstances shall the freeboard be less than 3-feet in Cell 4B, as measured from the top of the FML.

As mentioned above, the BAT Operations and Maintenance Plan was ~~was submitted on September 16, 2008 and~~ approved by the Director on ~~September~~ December ~~17, 2008~~21, 2011. A copy of the most currently-approved *BAT Operations and Maintenance Plan,* ~~Revision 2.3 dated July 2011,~~ is included as Appendix ~~E~~F to this Application.

2.15.4.2 Implementation of Monitoring Requirements Under the BAT Operations and Maintenance Plan

Part I.E.12 of the Permit provides that ~~Denison~~EFRI must implement all monitoring and recordkeeping requirements contained in the Tailings Cell 4B BAT Operations and Maintenance Plan. At a minimum, such BAT monitoring includes:

c) Weekly Leak Detection System (LDS) Monitoring - including:

(i) ~~Denison must provide~~ continuous operation of the leak detection system pumping and monitoring equipment, including, but not limited to, the submersible pump, pump controller, head monitoring, and flow meter equipment approved by the Director. Failure of any pumping or monitoring equipment not repaired and made fully operational within 24-hours of discovery shall constitute failure of BAT and a violation of the Permit;

(ii) ~~Denison must~~ measurement of the fluid head above the lowest point on the secondary FML by the use of procedures and equipment approved by the Director. Under no circumstance shall fluid head in the leak detection system sump exceed a 1-foot level above the lowest point in the lower FML on the cell floor. For purposes of compliance monitoring this 1-foot distance shall equate to 2.25 feet above the leak detection system transducer;

(iii) ~~Denison must~~ measurement of the volume of all fluids pumped from the leak detection system. Under no circumstances shall the average daily leak detection system flow volume exceed 26,145 gallons/day; and

(iv) ~~Denison must operate and maintain~~operation and maintenance of ~~-~~wastewater levels to provide a 3-foot Minimum of vertical freeboard in tailings Cell 4B. Such measurements must be made to the nearest 0.1 foot.

d) Slimes Drain Recovery Head Monitoring

Immediately after the Mill initiates pumping conditions in the Cell 4B slimes drain system, monthly recovery head tests and fluid level measurements ~~will~~ are to be made in accordance with the requirements of Parts I.D.3 and I.E.7(b) of the Permit and any plan approved by the Director.

~~*2.15.4.3 Implementation of Monitoring Requirements Under the BAT Operations and Maintenance Plan*~~

~~Part I.E.12 of the Permit provides that, after Director approval of the Tailings Cell 4B Operations and Maintenance Plan, Denison must immediately implement all monitoring and recordkeeping requirements contained in the plan. At a minimum, such BAT monitoring shall include:~~

~~e) Weekly Leak Detection System (LDS) Monitoring including:~~

~~(i) Denison must provide continuous operation of the leak detection system pumping and monitoring equipment, including, but not limited to, the submersible pump, pump controller, head monitoring, and flow meter equipment approved by the Director. Failure of any pumping or monitoring equipment not repaired and made fully operational within 24 hours of discovery shall constitute failure of BAT and a violation of the Permit;~~

~~(ii) Denison must measure the fluid head above the lowest point on the secondary FML by the use of procedures and equipment approved by the Director. Under no circumstance shall fluid head in the leak detection system sump exceed a 1-foot level above the lowest point in the lower FML on the cell floor. For purposes of compliance monitoring this 1-foot distance shall equate to 2.25 feet above the leak detection system transducer;~~

~~(iii) Denison must measure the volume of all fluids pumped from the leak detection system. Under no circumstances shall the average daily leak detection system flow volume exceed 26,145 gallons/day; and~~

~~(iv) Denison must operate and maintain wastewater levels to provide a 3-foot Minimum of vertical freeboard in tailings Cell 4B. Such measurements must be made to the nearest 0.1 foot.~~

f) Slimes Drain Recovery Head Monitoring

Immediately after the Mill initiates pumping conditions in the Cell 4B slimes drain system, monthly recovery head tests and fluid level measurements will be made in accordance with the requirements of Parts I.D.3 and I.E.7(b) of the Permit and any plan approved by the Director.

2.15.5 Stormwater Management and Spill Control Requirements

Part I.D.10 of the Permit requires that DenisonEFRI will to manage all contact and non-contact stormwater and control contaminant spills at the facility in accordance with an approved stormwater best management practices plan. Such plan must include the following minimum provisions:

a) Protect groundwater quality or other waters of the state by design, construction, and/or active operational measures that meet the requirements of the Ground Water Quality Protection Regulations found in UAC R317-6-6.3(G) and R317-6-6.4(C);
b) Prevent, control and contain spills of stored reagents or other chemicals at the Mill site;
c) Cleanup spills of stored reagents or other chemicals at the Mill site immediately upon discovery; and
d) Report reagent spills or other releases at the Mill site to the Director in accordance with UAC 19-5-114.

The Mill's *Stormwater Best Management Practices Plan* dated June 12, 2008, was approved by the Director on July 1, 2008. A copy of the most recently approved Mill's *Stormwater Best Management Practices Plan* Revision dated 1.54 September 2012October 2011, is included as Appendix FG to this Application.

2.15.6 Tailings and Slimes Drain Sampling

Part I.E.10 of the Permit requires that on an annual basis, DenisonEFRI must to annually collect wastewater quality samples from each wastewater source at each tailings cell at the facility, including surface impounded wastewaters, the leak detection systems (if present) and slimes drain wastewaters. All such sampling must be conducted in August of each calendar year in compliance with the approved Tailings Cell Tailings Sampling Plan.

See Section 2.12.1 above for a more detailed description of this program.

The Mill's *Tailings and Slimes Drain Sampling Program* was approved by the Director. The most recently approved version is included as Appendix IL to this Application. As of this writing, Denison has submitted Revision 2.1, which is undergoing review by the Director.

2.15.7 Additional Monitoring and Inspections Required Under the Mill License

Under the Mill License daily, weekly, and monthly inspection reporting and monitoring are required by in accordance with NRC Regulatory Guide 8.31, *Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Recovery Facilities will be As Low As is Reasonable Achievable*, Revision 1, May 2002 ("Reg Guide 8.31"), by Section 2.3 of the Mill's

ALARA Program and by the Mill's *Environmental Protection Manual ("EPM")*. ; These requirements are over and above the inspections described above that are required under the Permit.

Denison recently submitted for Director approval, a revisedAdditional daily, weekly, monthly, quarterly, and annual inspection and reporting requirements are specified in the EFRI DMT Plan and Tailings Management System Procedure (Section 3.1 of the EPM) to separate the RML DMT requirements from the GWDP DMT requirements, into two separate documents. As of this writing, both of these plans are undergoing review by the Director. The DMT Plan and Tailings Management System are included as Appendix H and Appendix I to this Application, respectively.

2.15.7.1 Daily Inspections

Three types of daily inspections are performed at the Mill under the Mill License:

a) Radiation Staff Inspections

Paragraph 2.3.1 of Reg. Guide 8.31 provides that the Mill's Radiation Safety Officer ("RSO") or designated health physics technician should conduct a daily walk-through (visual) inspection of all work and storage areas of the Mill to ensure proper implementation of good radiation safety procedures, including good housekeeping that would minimize unnecessary contamination. These inspections are required by Section 2.3.1 of the Mill's ALARA Program, and are documented and on file in the Mill's Radiation Protection Office.

b) Operating Foreman Inspections

30 CFR Section 56.18002 of the Mine Safety and Health Administration regulations requires that a competent person designated by the operator must examine each working place at least once each shift for conditions which may adversely affect safety or health. These daily inspections are documented and on file in the Mill's Radiation Protection Office.

c) Daily Tailings Inspection

Section 3.1 of the Mill's EPM requires that during Mill operation, the Shift Foreman, or other person with the training specified in paragraph 2.4 of the Tailings Management Procedure, designated by the RSO, will perform an inspection of the tailings line and tailings area at least once per shift, paying close attention for potential leaks and to the discharges from the pipelines. Observations by the Inspector are recorded on the appropriate line on the Mill's Daily Inspection Data form.

2.15.7.2 Weekly Inspections

Three types of weekly inspections are performed at the Mill under the Mill License:

a) Weekly Inspection of the Mill Forms

Paragraph 2.3.1 of Reg. Guide 8.31 provides that the RSO and the Mill foreman should, and Section 2.3.2 of the Mill's ALARA Program provides that the RSO and Mill foreman, or their respective designees, shall, conduct a weekly inspection of all Mill areas to observe general radiation control practices and review required changes in procedures and equipment. Particular attention is to be focused on areas where potential exposures to personnel might exist and in areas of operation or locations where contamination is evident.

b) Weekly Ore Storage Pad Inspection Forms

Paragraph 3.3 of the DMT Plan and Part I.E.7.(d of the Permit requires that weekly feedstock storage area inspections will be performed by the Radiation Safety Department, to confirm that the bulk feedstock materials are stored and maintained within the defined area of the ore pad and that all alternate feed materials located outside the defined ore pad area are maintained in accordance with the requirements of the Permit. The results of these inspections are recorded on the Mill's Ore Storage/Sample Plant Weekly Inspection Report.

c) Weekly Tailings and DMT Inspection

Section 3.1 of the EPM requires that weekly inspections of the tailings area and DMT requirements be performed by the radiation safety department.

2.15.7.3 Monthly Reports

Two types of monthly reports are prepared by Mill staff:

a) Monthly Radiation Safety Reports

~~At least monthly, t~~The RSO reviews the results of daily and weekly inspections, including a review of all monitoring and exposure data for the month, and provides to the Mill Manager a monthly report containing a written summary of the month's significant worker protection activities (Section 2.3.4 of the ALARA Program).

b) *Monthly Tailings Inspection Reports*

Section 3.1 of the EPM, requires that a Monthly Inspection Data form be completed for the monthly tailings inspection. This inspection is typically performed in the fourth week of each month and is in lieu of the weekly tailings inspection for that week.

Mill staff also prepares a monthly summary of all daily, weekly, monthly and quarterly tailings inspections.

2.15.7.4 Quarterly Tailings Inspections

Section 3.1 of the EPM requires that the RSO or his designee perform a quarterly tailings inspection.

2.15.7.5 Annual Evaluations

The following annual evaluations are performed under the Mill License, as set out in Section 3.1 of the EPM.

a) Annual Technical Evaluation

An annual technical evaluation of the tailings management system must be performed by a registered professional engineer (PE), who has experience and training in the area of geotechnical aspects of retention structures. The technical evaluation includes an on-site inspection of the tailings management system and a thorough review of all tailings records for the past year. The Technical Evaluation also includes a review and summary of the annual movement monitor survey (see Section (b) below).

All tailings cells and corresponding dikes are inspected for signs of erosion, subsidence, shrinkage, and seepage. The drainage ditches are inspected to evaluate surface water control structures.

In the event tailings capacity evaluations were performed for the receipt of alternate feed material during the year, the capacity evaluation forms and associated calculation sheets will be reviewed to ensure that the maximum tailings capacity estimate is accurate. The amount of tailings added to the system since the last evaluation will also be calculated to determine the estimated capacity at the time of the evaluation.

As discussed above, tailings inspection records consist of daily, weekly, monthly, and quarterly tailings inspections. These inspection records are evaluated to determine if any freeboard limits are being approached and to identify any areas of potential concern. ~~Records will also be reviewed to summarize observations of potential concern.~~ The evaluation also involves discussion with the Environmental and/or Radiation Technician and the RSO regarding activities around the tailings area for the past year. During the annual inspection, photographs of the tailings area are taken. The training of individuals is also reviewed as a part of the Annual Technical Evaluation.

The registered engineer obtains copies of selected tailings inspections, along with the monthly and quarterly summaries of observations of concern and the corrective actions taken. These copies are then included in the *Annual Technical Evaluation Report*.

The *Annual Technical Evaluation Report* must be submitted by September 1st of every year to the Directing Dam Safety Engineer, State of Utah, Natural Resources.

b) Annual Movement Monitor Survey

A movement monitor survey is conducted by a licensed surveyor annually during the second quarter of each year. The movement monitor survey consists of surveying monitors along dikes 3-S, 4A-W, and 4A-S to detect any possible settlement or movement of the dikes. The data generated from this survey is reviewed and incorporated into the *Annual Technical Evaluation Report* of the tailings management system.

c) Annual Leak Detection Fluid Samples

Annually, the leak detection system fluids in Cells 1, 2, 3, 4A and 4B ~~will be~~are sampled when present as described in the Tailings Sampling Plan in Section 2.12.1.

2.16 Corrective Action Plan or Identification of Other Response Measures to be Taken to Remedy any Violation of Applicable Ground Water Quality Standards (R317-6-6.3.P)

There are two circumstances where applicable groundwater standards have been exceeded at the site that are not associated with natural background: chloroform contamination, and nitrate contamination. As discussed below, none of these circumstances appear to be related to discharges from milling activities. See Section 2.11.2 for a discussion of the current investigation into exceedances of GWCLs for certain constituents and decreasing pH trends at the site, which ~~Denison~~EFRI believes are associated with natural background.

2.16.1 Chloroform Investigation

In May, 1999, excess chloroform concentrations were discovered in monitoring well MW-4, ~~in~~ which is screened in the ~~the~~ shallow perched aquifer along the eastern margin of the Mill site. Because these concentrations were above the GWQS for chloroform, the Executive Secretary of the Utah Water Quality Board initiated enforcement action against the Mill on August 23, 1999 through the issuance of a Groundwater Corrective Action Order (UDEQ Docket No. UGO-20-01), which required completion of: 1) a contaminant investigation report to define and bound the contaminant plume, and 2) a groundwater corrective action plan to clean it up. Repeated groundwater sampling by both the Mill and DRC have confirmed the presence of chloroform in concentrations that exceed the GWQS along the eastern margin of the site in wells that are upgradient or cross gradient from the tailings cells. Other VOC contaminants and nitrate and nitrite have also been detected in these samples. After installation of 27 new monitoring wells at the site, groundwater studies appear to have defined the boundaries of the chloroform plume.

Based on the location of the plume and characterization studies completed to date, the contamination appears to have resulted from the operation of temporary laboratory facilities that were located at the site prior to and during construction of the Mill facility, and septic drainfields that were used for laboratory and sanitary wastes prior to construction of the Mill's tailings cells. Interim measures have been instituted in order to contain the contamination and to pump contaminated groundwater into the Mill's tailings cells. To that end, the Mill has equipped ~~5~~five of the wells (MW-4, TW4-4, MW-26 (previously named TW4-15), TW4-19 and TW4-20) with pumps to recover water impacted by chloroform and to dispose of such water in the Mill's tailings cells.

In the 2004 Statement of Basis, DRC noted on page 3 that, while the contaminant investigation and groundwater remediation plan are not yet complete, the DRC believes that additional time is available to resolve these requirements based on the following factors: 1) hydraulic isolation found between the shallow perched aquifer in which the contamination has been detected and the deep confined aquifers which are a source of drinking water in the area, 2) the large horizontal distance and the long groundwater travel times between the existing groundwater contamination on site and the seeps and springs where the shallow aquifer discharges at the edge of White

Mesa, and 3) lack of human exposure for these shallow aquifer contaminants along this travel path.

~~Denison~~EFRI submitted a *Preliminary Corrective Action Plan, White Mesa Mill Near Blanding, Utah*, August 20, 2007, prepared by Hydro Geo Chem, Inc., on August 21, 2007, and a *Preliminary Contamination Investigation Report, White Mesa Mill Near Blanding, Utah*, November 20, 2007, prepared by Hydro Geo Chem, Inc., on December 21, 2007. ~~Those documents are currently under review by the Director.~~ DRC has requested changes to the proposed plans. When a Corrective Action Plan is approved by the Director, it will be subject to public comments.

~~The objectives of the proposed Corrective Action Plan include the following:~~

~~Minimize or prevent further downgradient migration of the chloroform plume by a combination of pumping and reliance on natural attenuation;~~
~~Prevent chloroform concentrations exceeding the action level from migrating south or southwest of the tailings cells;~~
~~Monitor to track changes in concentrations within the plume and to establish whether the plume boundaries are expanding, contracting, or stable;~~
~~Provide contingency plans to address potential continued expansion of the plume and the need for additional monitoring and/or pumping points; and~~
~~Ultimately reduce chloroform concentrations at all monitoring locations to the action level or below.~~

~~To achieve these objectives, the proposed Corrective Action Plan proposes a phased approach. The first phase consists of a combination of "active" and "passive" strategies. The active strategy consists of removing chloroform mass as rapidly as practical by pumping areas that have (on a relative basis) both high chloroform concentrations, and high productivity. Continued monitoring within and outside the plume is considered part of the active strategy. The passive strategy consists of relying on natural attenuation processes to remove chloroform mass and reduce concentrations. Reductions in concentrations would be achieved by physical processes such as volatilization, hydrodynamic dispersion, and abiotic degradation, and through natural biological degradation of chloroform. These are essentially the same processes that have been relied upon in the interim action.~~

~~Natural attenuation is expected to reduce chloroform concentrations within the entire plume. However, within upgradient portions of the plume that occur in higher permeability materials, that are amenable to pumping, direct mass removal via pumping will be the primary means to reduce concentrations. In downgradient portions of the plume where permeabilities are low, chloroform migration rates are low, and mass removal by pumping is not practical because achievable pumping rates would be very low, natural attenuation will be the primary means to reduce concentrations.~~

~~The second phase relies on natural attenuation (without pumping) to reduce chloroform concentrations at all monitoring locations to action levels, once concentrations during Phase 1 are judged to be sufficiently low that Phase 2 will be effective.~~

As part of the active strategy in the first phase of the Corrective Action Plan, ~~Denison~~EFRI has operated a chloroform capture system, referred to as the "Long-term Pump Test" continuously since January 31, 2010. The purpose of the test is to serve as an interim action that will remove a significant amount of chloroform-contaminated water while gathering additional data on hydraulic properties in the area of investigation. Chloroform-contaminated water is captured by pumping six wells located within the identified chloroform plume, and transferred via an above-ground piping network to Tailings Cell 1 for disposal.

Effectiveness of the first phase of the Corrective Action is evaluated and documented in quarterly reports to the Director. ~~Denison~~EFRI estimates that, ~~to date~~as of the first quarter of 2014, ~~597~~ 699 lbs. of chloroform have been extracted through the capture system.

2.16.2 Nitrate Investigation

During review of the New Well Background Report and other reports, a Nitrate contaminant plume was identified by DRC staff in five monitoring wells in the Mill site area, including wells: MW-30, MW-31, TW4-22, TW4-24, and TW4-25. TW4-25 is located upgradient of the Mill's tailings cells. Elevated concentrations of chloride also appear to be associated with the nitrate plume.

On September 30, 2008, the Director issued a request for a voluntary plan and schedule for ~~Denison~~EFRI to investigate and remediate this Nitrate contamination. On November 19, 2008 ~~Denison~~EFRI submitted a plan and schedule prepared by INTERA, Inc., which identified a number of potential sources for the contamination, including several potential historic and offsite sources. On January 27, 2009, the Director and ~~Denison~~EFRI signed a Stipulated Consent Agreement ("SCA") by which ~~Denison~~EFRI agreed to conduct an investigation of the Nitrate contamination, determine the sources of pollution, and submit a report by January 4, 2010.

~~Denison~~EFRI submitted a Contaminant Investigation Report ("CIR") on December 30, 2009. On October 5, 2010 the Director issued a Notice of Additional Required Action ("NARA") letter that notified ~~Denison~~EFRI of the Director's determination that the 2009 CIR was incomplete.

On December 20, 2010 ~~Denison~~EFRI and the Director entered into Revision 0 of a Tolling Agreement, allowing a tolling period until April 30, 2011 in order to provide time for ~~Denison~~EFRI to prepare a Plan and Schedule for Director review addressing additional investigations to resolve open issues identified in the October 5, 2010 NARA, and to execute a revised SCA.

~~Denison~~EFRI submitted a Plan and Schedule on February 14, 2011 and a revised Plan and Schedule on February 18, 2011. ~~the~~The Director provided ~~his~~ comments on the revised Plan and Schedule on March 21, 2011. In an April 20, 2011 meeting, ~~Denison~~EFRI and the Director agreed that the Plan and Schedule to conduct additional nitrate investigations would be composed of four to five phases of study, including geoprobe drilling and soil sampling/analysis to investigate natural nitrate salt reservoir sources in the vadose zone beyond the Mill site, potential Mill sources, and other potential sources; groundwater sampling and analysis of existing monitoring wells for non-isotopic analytes; deep bedrock core sampling/analysis of possible natural nitrate reservoir and potential nitrate source locations; stable isotopic sampling/analysis of groundwater in existing monitoring wells; and stable isotopic sampling/analysis of soil/core samples, if needed.

On April 28, 2011, ~~Denison~~EFRI and the Director entered into Revision 1 of the Tolling Agreement to extend the Tolling Period through June 30, 2011 and adopt the agreements made on April 20, 2011. Under the Tolling Agreement Revision 1, ~~Denison~~EFRI agreed to submit a Revised Phase 1 (A through C) Work Plan on or before May 6, 2011 and a Revised Phase 2 through 5 Work Plan and Schedule on or before June 3, 2011.

~~Denison~~EFRI submitted a May 6, 2011 Revised Phase 1 Work Plan and Schedule for the Phase 1 A - C investigation for Director review. ~~Denison~~EFRI conducted field and laboratory work for the Phase l A-C study in May and June, 2011.

~~Denison~~EFRI submitted a Revised Phase 2 through 5 Work Plan and Schedule for Director review on June 3, 2011. The Director provided comments on this document on June 23, 2011 and advised ~~Denison~~EFRI that in order to revise the 2009 SCA to incorporate needed deliverables and timelines, the Phase 2 through 5 Work Plan would need to be expanded to the same level of detail as was provided for Phase 1 in Attachment 1 of the Revision 1 Tolling Agreement.

On June 30, 2011, ~~Denison~~EFRI and the Director entered into Revision 2 of the Tolling Agreement extending the Tolling Period to August 31, 2011, to facilitate the revision of the Phase 2 through 5 Work Plan to provide the required level of detail to construct a replacement SCA. ~~Denison~~EFRI submitted a separate July 1, 2011 detailed Revision 0 of the Work Plan and Quality Assurance Plan ("QAP") for the Phase 2 investigation. The Director provided comments on this document on July 7, 2011. ~~Denison~~EFRI provided a July 12, 2011 Revision 1.0 to the Phase 2 QAP and Work Plan, which DRC conditionally approved in a letter dated July 18, 2011. On August 1 and 2, 2011 ~~Denison~~EFRI submitted by email preliminary laboratory results for the Phase l A-C study to the Director.

On August 4, 2011, ~~Denison~~EFRI provided a Revision 1.0 to the Phase 2 - 5 Work Plan for Director review. The Director provided comments on the Phase 2-5 Work Plan, Revision 1.0 and the August 1, 2011 preliminary laboratory results on August 11, 2011. ~~Denison~~EFRI submitted Revision 2.0 of the Phase 2-5 Work Plan for Director review on August 11, 2011.

On August 25, 2011, the Director determined that based on review of the Revision 2.0 Phase 2-5 Work Plan, a finalized Plan and Schedule that meets the satisfaction of the Director, and which would allow the preparation of a replacement SCA, was not possible at that time; and that the development of a replacement SCA for continued contaminant investigation activities was not supported.

At a meeting on August 29, 2011, ~~Denison~~EFRI and DRC agreed that:

1. After more than two years of investigation it has been determined that there are site conditions that make it difficult to determine the source(s) of the contamination at the White Mesa site;

2. As a result, resources will be better spent in developing a CAP in accordance with UAC R317-6-6.15(D), rather than continuing with further investigations as to the source(s) of the contamination.

In discussions during October 2011, DenisonEFRI and the Director acknowledged that it has not been possible to date to determine the source(s), cause(s), attribution, magnitudes of contribution, and proportion(s) of the local nitrate and chloride in groundwater, and thereby cannot eliminate Mill activities as a potential cause, either in full or in part, of the contamination. As a result, DenisonEFRI and the Director agreed that resources will be better spent in developing a Corrective Action Plan in accordance with UAC R317-6-6.15(D), rather than continuing with further investigations.

On October 3, 2011 DenisonEFRI and the Director entered into a revised Stipulated Consent Agreement which required DenisonEFRI to submit a Corrective Action Plan for Director review which includes at least the following three phases of activitythat included plans to:

Phase I — to determine the physical extent of soil contamination observed at the Ammonium Sulfate Crystal Tanks, and provide a control measure consisting of either removal of the areal extent of contamination down to bedrock, or a Plan and Schedule for covering the areal extent of contamination with at least 6 inches of concrete, followed by removal action during or before site closure.

Phase II – to includeimplement near term active remediation of the nitrate contamination by pumping contaminated water into the Mill's tailings cells for disposal. This phase is to include development, implementation, operation, and monitoring for of a pumping well network to contain and hydraulically control the nitrate plume; monitoring of chloride concentrations; and any required increases to the Mill's surety for activities in this Phase.

Phase III – if necessary, to includedevelop, if necessary, a comprehensive long-term solution for the nitrate contamination at the Mill Site. This Phase is to be determined after public participation and Director approval, and may include continuation of Phase I and II activities alone or in combination with any of the following: monitored natural attenuation, additional remediation and monitoring, determination of additional hydrogeologic characterization, contaminant travel times, points of exposure to public or wildlife, risk analysis, cost/benefit analysis, and possible development and petietion of the Board for alternate Ccorrective action concentration limits.

DenisonEFRI submitted a Draft Corrective Action Plan on November 30, 2011. The Director provided comments on the Draft Corrective Action Plan on January 19, 2012. DenisonEFRI provided Revision 1.0 of the Corrective Action Plan on February 27, 2012, and received comments from the Director on March 19, 2012. Pursuant to the revised SCA, DenisonEFRI provided Revision 2.0 to the Director on May 7, 2012.

The Director prepared a draft Stipulation and Consent Order and a Statement of Basis on July 5, 2012.
On December 12, 2012, DRC signed the Stipulation and Consent Order ("SCO"), Docket Number UGW12-04, which approved the EFRI CAP, dated May 7, 2012. The SCO ordered

EFRI to fully implement all elements of the May 7, 2012 CAP.

Based on the schedule included in the CAP and as delineated and approved by the SCO, the activities associated with the implementation of the CAP began in January 2013. The reporting requirements specified in the CAP and SCO are included in the quarterly nitrate reports.The Statement of Basis and the Revised CAP will undergo a public review and comment period beginning July 18, 2012. Following the Director's final approval of Corrective Action Plan, Denison will initiate corrective actions consistent with the schedule provided in the Stipulation and Consent Order.

2.17 Other Information Required by the Director (R317-6-6.3.Q)

As discussed below, a chemical inventory report and a Hydrogeologic investigation report for the southwest portion of the Mill site have been completed at the request of the Director. No other information has been specifically required by the Director to be included in this Application at this time. EFRI will provide additional information as requested by the Director.

2.17.1 Chemical Inventory Report

Part I.H.1 of the Permit requires that DenisonEFRI complete a historical review and conduct an inventory of all chemical compounds or reagents stored, used, or currently in use at the facility. including the types of chemicals and the total volumes present, and historically used, as data is available. DenisonEFRI submitted a chemical inventory report on June 7, 2005, and submitted additional related information on November 17, 2006.

Part I.H.1 requires that at the time of Permit renewal, the Permittee shall submit an updated inventory report. Part I.E.9 requires that the -inventory address chemicals used in the milling process and the on-site laboratory. The updated inventory report is provided in Appendix L O of this Application.

2.17.2 Southwest Hydrogeological Investigation

Part I.H.6 of the Permit required that DenisonEFRI perform a detailed Southwest Hydrogeologic Investigation to define, demonstrate and characterize: 1) the hydraulic connection and local groundwater flow directions between the area near Tailings Cell 4B, and the westerm western margin of White Mesa, and 2) the full physical extent of the unsaturated area between former well MW-16, MW-33 and the western margin of White Mesa.

During 2011, DenisonEFRI installed 18 piezometers to demonstrate define the geologic and physical extent of the apparent unsaturated structural high between Tailings Cell 4B and the western margin of White Mesa, and to demonstrate the location and direction of groundwater flow paths between Tailings Cell 4B and Westwater and Cottonwood Seeps and Ruin Spring. Consistent with Part I.H.6.c) of the Permit, DenisonEFRI submitted an investigation report, the *Hydrogeology of the Perched Groundwater Zone in the Area Southwest of the Tailings Cells, White Mesa Uranium Mill Site* (the "Southwest Hydrogeology Report"), prepared by Hydro gGeo eChem, on January 12, 2012. The Director provided comments in a conference call during May 2012, and in a letter dated May 30, 2012. In an additional conference call following Denison's receipt of the May 30 letter, Denison and the Director agreed that Denison would respond to the letter by preparing a revision to the Southwest Hydrogeology Report by August 3, 2012. EFRI submitted a revised version of the Report on August 3, 2012 and agreed to repeat slug testing of piezometer DR-08. DRC's September 20, 2012 review Summary and RFI, specifically requested that EFRI:

- repeat slug testing of piezometer DR-08,
- recalculate hydraulic properties, and
- recalculate travel times if necessary based on new data.

The Second Revision to the Report, addressing the data and re-calculations resulting from retesting of piezometer DR-08, was submitted on November 7, 2012.

No other information has been specifically required by the Director to be included in this Application at this time. Denison will provide additional information as requested by the Director

2.18 This Application Performed Under the Direction of a Professional Engineer (R317-6-6.3.R)

This Application has been performed under the direction, and bears the seal, of Harold R. Roberts, Executive Vice President and Chief Operating Officer Executive Vice President, US Operations of DenisonEFRI. Mr. Roberts is a Registered Professional Engineer in the State of Utah, No. 165838.

2.19 Closure and Post Closure Management Plan Demonstrating Measures to Prevent Ground Water Contamination During the Closure and Post Closure Phases of Operation (R17-6-6.3.S)

2.19.1 Regulatory Requirements for Uranium Mills

2.19.1.1 Long Term Custodian

One unique feature of the regulatory scheme for uranium mill tailings is that Section 83 of the Atomic Energy Act of 1954, as amended by the Uranium Mill Tailings Radiation Control Act of 1978 ("UMTRCA") (the Atomic Energy Act of 1954 as so amended is referred to herein as the "AEA")[4] requires that, prior to license termination, title to uranium mill tailings (11e.(2) byproduct material) must be transferred to the United States Department of Energy ("DOE") or the State in which the activity occurred, if the State so elects, for custody and long term care. 10 CFR 40.28 provides a general license to DOE or the State for that purpose.

2.19.1.2 Responsibility For And Manner Of Clean Up

UMTRCA amended the AEA to require that all Title II facilities (i.e., active mills) will comply with the decontamination, decommissioning, and reclamation standards prescribed by the Commission[5] and to require that such facilities post reclamation bonds or surety[6].

[4] *See* 42 U.S.C. 2113.
[5] *See* 42 U.S.C. 2113.
[6] *See* 42 U.S.C. 2201.

Responsibility for reclamation of Title II facilitiesrests with the licensee. 10 CFR Part 40 Appendix A Criterion 6A requires the adoption of a Director-approved reclamation plan for the site, Criterion 9 requires that financial surety must be established to fund the cost of reclamation in accordance with such plan, and Criterion 10 requires that each licensee include in its financial surety an amount equivalent to $250,000 (1978 dollars) to cover the costs of long-term surveillance by the long-term government custodian (DOE). Criteria 6, 9 and 10 have been incorporated by reference into the Utah rules by UAC R313-24-4.

2.19.1.3 Surface

The reclamation plan adopted by the Mill at the outset, as required by 10 CFR Part 40, Appendix A, Criterion 9, ~~must~~ addresses the decontamination and decommissioning of the Mill and Mill site and reclamation of ~~any~~ tailings ~~or~~ and other waste disposal areas.

As is the case for most uranium mills, the Mill's reclamation plan ~~must~~ requires that, upon closure, all mill buildings, unsalvageable equipment, contaminated soils (impacted by Mill operations within the Mill site itself as well as surrounding areas that may be impacted by windblown radioactive dusts from milling operations) etc. ~~must~~ be deposited in the tailings cells and the tailings cells capped in place.

Appendix A, Criterion 6(6) sets the standard for determining when all impacted areas, other than the tailings impoundments have been adequately cleaned up. Criterion 6(6) provides that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the benchmark standard of 5pCi/g concentration of radium in the ~~surface~~ upper 15 cm (6 in) of surface soils and 15 pCi/g concentration of radium in the subsurface soils, and must be at levels which are ALARA. If more than one residual radionuclide is present, the sum of the ratios for each radionuclide present will not exceed "1" (unity). Further details on the NRC's approach to evaluating reclamation plans and release criteria for uranium mill sites, including the manner of modeling the release standard set out in Criterion 6(6), are contained in NUREG-1620, Rev 1, *Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act of 1978*, Final Report, June 2003 ("NUREG-1620").

2.19.1.4 Groundwater

Each uranium mill is required to have a groundwater monitoring program. In the case of the Mill, the Permit implements the applicable requirements of UAC R317-6. If there is groundwater contamination after cessation of operations, the requirements of UAC R317-6.15 must be satisfied.

2.19.1.5 License Termination

Section 83.7 of the AEA[7] provides that material and land transferred to the long term custodian must be transferred without cost to the long-term custodian other than administrative and legal

[7] *See* 42 U.S.C. 2113.

costs incurred in carrying out such transfer.

In order to cover the costs of long-term surveillance, Criterion 10 requires that a minimum charge of $250,000 (1978 dollars) must be paid by each mill operator to the general treasury of the United States or to an appropriate State agency prior to the termination of a uranium mill license.

In most cases if there is a groundwater contamination problem, the problem must be remediated prior to license termination, or an alternate corrective action concentration limit under R317-6-6.15.G must be ~~obtained~~achieved that is protective of public health and the environment~~, thereby resolving the problem~~. In some circumstances DOE may agree to take some additional actions after it takes title to the site, such as additional monitoring, if not onerous and provided adequate funding is provided.

Upon the Director and the NRCbeing satisfied that all regulatory requirements have been met and the site is reclaimed in a manner that satisfies all applicable standards, the Mill's license will be terminated upon transfer of the tailings to DOE. 10 CFR 40.28 provides a general license in favor of the long-term custodian for custody of and long-term care of the tailings impoundments and any surrounding lands transferred to it.[8] The surrounding areas not transferred to DOE would generally be free-released.

2.19.2 Current Reclamation Plan

The Mill's *Reclamation Plan*, Revision ~~4.0~~3.2B, was approved by DRC under the Mill License ~~in~~ on January 26, 2011. The *Reclamation Plan* sets out the requirements to be met by ~~Denison~~EFRI for the final reclamation and closure of the Mill facility, including the tailings cells and all impacted surrounding areas, in accordance with the requirements of 10 CFR Part 40, Appendix A (which have since been incorporated by reference into UAC R313-24). A copy of the Mill's *Reclamation Plan*, Revision 4.0 was previously submitted to the Director in November 2009 and is on file at the DRC.

EFRI submitted Revision 5.0 of the Reclamation Plan ~~(Denison, 2011)~~ in September 2011. DRC provided one round of interrogatories for this document in March 2012 ~~(DRC, 2012a)~~. EFRI provided responses to these interrogatories in May and August 2012 ~~(Denison, 2012a; EFRI, 2012a)~~. DRC provided review comments on EFRI's May and August 2012 responses in February 2013. ~~Denison submitted Revision 5.0 of the Reclamation Plan in September 2011. Denison is in the process of responding to the one round of interrogatories received to date. Submission of responses to all first round interrogatory questions will be completed by August 15, 2012~~

On April 30, 2013, a meeting was held in Denver, Colorado to discuss specific issues identified in DRC's February 2013 review comments, including, but not limited to, DRC's request for site-specific tailings data and a probabilistic seismic hazard analysis (PSHA) for the Mill site.

[8] In circumstances where the facility has a groundwater contamination plume, additional lands may be acquired by the licensee in order to bound the plume. In these circumstances these additional lands would be transferred along with the capped tailings impoundments, to DOE.

Representatives of DRC, DRC's consultant (URS Professional Solutions, LLC), EFRI, and EFRI's technical consultant (MWH Americas, Inc.) attended the meeting. During the meeting, EFRI proposed a tailings investigation to address the request for site-specific tailings data. A work plan for this investigation was provided to DRC on June 24, 2013, and DRC provided approval of the work plan verbally to EFRI on September 12, 2013 (EFRI, 2013). The tailings investigation was completed in October 2013, and subsequent laboratory testing of collected samples was completed in April 2014. A Tailings Data Analysis Report summarizing the results of the investigation is currently being prepared for submittal to DRC in June 2014. A PSHA for the Mill site is being prepared for submittal to DRC in June 2014 as well. Submission of responses to DRC's February 2013 review comments on Revision 5.0 of the Reclamation Plan are planned to be completed in 2014 after DRC's review of the Tailings Data Analysis Report and PSHA for the Mill site. The results provided in the Tailings Data Analysis Report and PSHA for the Mill site will be used to update technical analyses to address DRC's February 2013 review comments on Revision 5.0 of the Reclamation Plan. The responses will also incorporate decisions made at the April 30, 2013 meeting on key issues related to Revision 5.0 of the Reclamation Plan.

2.19.3 Provisions Included in the Permit Relating to the Mill's Reclamation Plan

The Mill License is currently in timely renewal. As part of the Mill License Renewal, DRC is re-examining the Mill's *Reclamation Plan* for content and adequacy. At the time of original issuance of the Permit, the Director had not completed his review of the Mill's *Reclamation Plan*. As a result, new requirements were added to the Permit to ensure that the final reclamation design approved by the Director on his re-examination of the *Reclamation Plan* will provide adequate performance criteria to protect local groundwater quality.

To this end, three requirements were included in Part I.D.8 of the Permit to ensure that the cover system for each tailings cell will be designed and constructed to:

a) Minimize the infiltration of water into the radon barrier and underlying tailings waste;
b) Prevent the accumulation of leachates within the tailings that might create a bathtub effect and thereby spill over the maximum elevation of the FML inside any disposal cell; thereby causing a release of contaminants to the environment; and
c) Protect groundwater quality at the compliance monitoring wells by ensuring that contaminant concentrations there do not exceed their respective GWQS or GWCL defined in Part I.C.1 and Table 2 of the Permit.

To provide consistency with the performance criteria stipulated by the Director at other 11e.(2) disposal operations, a 200-year minimum performance period was required for all three of these criteria.

In addition, Part I.D.9 was included in the Permit, which provides that upon commencement of decommissioning, DenisonEFRI will reclaim the Mill site and all related facilities, stabilize the tailings cells, and construct a cover system over the tailings cells in compliance with all engineering design and specifications in anof the approved reclamation plan. Part I.D.7 also provides that the Director reserves the right to require modifications to the Mill's *Reclamation Plan* for purposes of compliance with the Utah Ground Water Quality Protection Regulations, including but not limited to containment and control of contaminants, or discharges, or potential discharges to waters of the State.

Finally, Part I.D.9 was added to the Permit to provide the Director an opportunity to ensure that:

a) The post-closure performance requirements for the tailings cell cover system in Part I.D.8 is fully and adequately integrated into the Mill's *Reclamation Plan*. Part I.H.2 was also added to the Permit to require ~~Denison~~EFRI to complete an infiltration and contaminant transport model of the final tailings cell cover system to demonstrate the long-term ability of the cover to protect nearby groundwater quality. As a part of this cover system performance modeling required by Part I.H.2, the Director will determine if changes to the cover system are needed to ensure compliance with the Part I.D.8 performance criteria;

b) All other facility demolition and decommissioning activities outlined in the *Reclamation Plan* will be done in a manner adequate to protect local groundwater quality. Issues or concerns to be considered and resolved include:

   (i) Identification, isolation, and authorized disposal of any un-used chemical reagents held in storage at the Mill site at the time of closure;

   (ii) Demolition, excavation, removal, and authorized disposal of all contaminated man-made structures, including, but not limited to: buildings, pipes, power lines, tanks, access roads, drain fields, leach fields, fly-ash disposal ponds, feedstock storage areas, Mill site wastewater storage ponds, solid waste disposal landfills, and all related appurtenances; and

   (iii) Excavation, removal, and authorized disposal of all contaminated soils found anywhere outside of the tailings cells at the facility.

Through this process, the Director will be able to ensure that DMT has been adequately established for both the final tailings cell cover system and reclamation of the facility.

EFRI submitted an *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah*, November 2007, prepared by MWH Americas, Inc., in November, 2007. EFRI submitted a revised *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah*, March 2010 ("revised ICTM Report") in response to DRC comments. The March 2010 report is currently being reviewed in conjunction with the Reclamation Plan, Revision 5.0. DRC provided interrogatories for the revised ICTM Report in March 2012 ~~(DRC, 2012b)~~. EFRI provided responses to these interrogatories in May and September 2012 ~~(Denison, 2012b; EFRI, 2012b)~~. DRC provided review comments on EFRI's May and September 2012 responses in February 2013.

On April 30, 2013, a meeting was held in Denver, Colorado to discuss specific issues identified in DRC's February 2013 review comments for Revision 5.0 of the Reclamation Plan and the revised ICTM Report. As noted in Section 2.19.2, included in the discussions at this meeting was DRC's request for site-specific tailings data. EFRI proposed a tailings investigation to address DRC's concerns. The tailings investigation was completed in October 2013 and subsequent laboratory testing of samples collected was completed in April 2014. A Tailings Data Analysis Report summarizing the results of the investigation is currently being prepared for submittal to DRC in June 2014. Submission of responses to DRC's February 2013 review comments on the revised ICTM Report are planned to be completed in 2014 after DRC's review of the Tailings Data Analysis Report. The results provided in the Tailings Data Analysis Report will be used to update technical analyses to address DRC's February 2013 review comments on the revised ICTM report. The responses will also incorporate decisions made at the April 30, 2013 meeting on key issues related to the revised ICTM Report.~~Denison submitted an *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah*, November 2007, prepared by MWH Americas, Inc., in November, 2007. Denison submitted a revised *Infiltration and Contaminant Transport Modeling Report, White Mesa Mill Site, Blanding, Utah*, March 2012 in response to DRC comments. The March 2012 report is currently being reviewed in conjunction with the Reclamation Plan, Revision 5.0.~~

2.19.4 Post-Operational Monitoring

Monitoring will continue under the Permit after cessation of operations, during reclamation and after reclamation has been completed until such time as the Mill License and Permit are terminated and the reclaimed tailings impoundments are transferred to the Department of Energy for perpetual care and maintenance.

3.0 CONCLUSIONS

This Application describes the key monitoring and DMT performance standard requirements and other protections contained in the Permit.

~~Denison~~EFRI believes that with this Application, the accompanying Background Reports and other documentation, the Director has been provided sufficient information to determine that:

a) ~~Denison~~EFRI has demonstrated that the applicable class TDS limits, ground water quality standards and protection levels will be met;
b) The monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
c) ~~Denison~~EFRI utilizes treatment and discharge minimization technology at the Mill commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology; and
d) There is no current or anticipated impairment of present and future beneficial uses of the ground water.

~~Denison would be pleased to provide any further information required by the Director.~~

4.0 SIGNATURE AND CERTIFICATIONS

This Application is dated ~~July 13, 2012~~ June 6, 2014 and is being submitted by ~~Denison Mines (USA) Corp~~Energy Fuels Resources (USA) Inc.

~~Denison Mines (USA) Corp~~Energy Fuels Resources (USA) Inc..

By:

____

~~David C.~~
Frank J. Filas
Vice President, Permitting and Environmental Affairs
~~Frydenlund~~
~~Vice President, Regulatory Affairs and General Counsel~~

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

____

Frank J. Filas
Vice President, Permitting and Environmental Affairs ~~David C. Frydenlund~~
~~Vice President, Regulatory Affairs and General Counsel~~

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER

I hereby certify that the foregoing Application has been prepared under my direction, that I have reviewed this Application, that I am familiar with the Mill facilities, and attest that this Application has been prepared in accordance with good engineering practices.

____

Harold R. Roberts

Registered Professional Engineer
State of Utah No. 165838

(seal)

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