ENERGY FUELS

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VIA EMAIL AND OVERNIGHT DELIVERY

Received
JUN 2013
Division of
Radiation Control

"DRC-2013-002482"

June 14, 2013

Mr. Rusty Lundberg
Director of the Utah Division of Radiation Control
State of Utah Department of Environmental Quality
195 North 1950 West
P.O. Box 144850
Salt Lake City, UT 84116-4850

Re: White Mesa Uranium Mill – RML UT1900479
April 27, 2011 Request to Amend Radioactive Materials License to Allow Processing of Alternate Feed Materials from Dawn Mining Company's Midnite Mine Water Treatment Plant ("WTP")
Response to January 22, 2013 and January 23, 2013 Utah Division of Radiation Control Requests for Information

Dear Mr. Lundberg:

This letter responds to the Division of Radiation Control's ("DRC's") two Requests for Information ("RFIs") dated January 22, and 23, 2013 regarding Energy Fuels Resources (USA) Inc.'s. ("EFRI's") April 27, 2011 Request to Amend (the "April 2011 Amendment Request") the White Mesa Mill's (the "Mill's") Radioactive Materials License UT1900479 (the "RML" or the "License") to allow processing of alternate feed material from Dawn Mining Company (the "Uranium Material"). DRC provided one general comment and 17 specific comments in the RFI dated January 22, 2013, and one additional specific comment in the RFI dated January 23, 2013. This letter addresses the comments from both RFIs. For ease of review, each of DRC's comments is provided verbatim below in italics, followed by EFRI's response.

General Comment 1

Specific comments stated below address the Applicant's repeated statements that the Uranium Material proposed to be processed in the White Mesa Mill has characteristics that are within the envelope of material characteristics previously authorized to be processed at the Mill.

Once the specific comments stated below have been addressed, please review and evaluate the correctness of conclusions stated throughout the text of the amendment application that previously accepted or authorized analyses, plans, programs, procedures, practices, equipment, etc. need not be extended or revised. Justify each new conclusion. To the extent necessary, extend or revise previously accepted or authorized analyses, plans, programs, procedures, practices, equipment, etc. and submit them for the Division's consideration and approval.

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EFRI Response to General Comment 1

EFRI has reviewed the data provided in the April 2011 Amendment Request, the supplemental submittal of filter press test information, and supplemental data provided in, or as attachments to, the responses included herein. Based on this review, EFRI maintains that the Uranium Material does not pose substantially different or greater hazards than other feed materials already approved, and in most instances poses significantly less hazards than other materials handled safely at the Mill for the reasons discussed below.

All data and additional evaluations continue to indicate that the Uranium Material is simpler and more benign in chemical and radiological composition than many previously approved alternate feed materials that the Mill has processed, as described in the April 2011 Amendment Request. All the constituents in the Uranium Material have either been reported to be, or can be assumed to be, already present in the Mill's tailings system or were reported in other licensed alternate feed materials, at levels comparable to or higher than those reported in the Uranium Material. The focus of the analysis in the April 2011 Amendment Request is on any difference that may necessitate changes to the existing approved programs. The storage and processing of the Uranium Material will not introduce new constituents or new constituent forms (dissolved, particulate or gaseous) or create significantly new human or environmental exposure risks that have not already been addressed by previous submittals and approvals by appropriate authorities (US Nuclear Regulatory Commission ("NRC") or DRC).

Based on this review, and because the Uranium Material does not pose substantially different or greater hazards than other feed materials already approved, as addressed in the application and the enclosed responses to these comments, EFRI maintains that the Mill can safely handle the Uranium Material in accordance with existing Mill controls and standard operating procedures. Additionally, EFRI maintains that the existing monitoring programs are adequate and no new monitoring procedures are required.

Previously accepted or authorized analyses, plans, programs, procedures, practices, equipment, etc. include (but are not necessarily limited to) the following:

> *a. ". . . there will be no incremental public health, safety or environmental impacts over and above previously licensed activities" stated on Page 11 of the Amendment Request.*

EFRI General Response to General Comment 1a

Please review the responses to comments listed below. The discussions, data and calculations in the April 2011 Amendment Request and the responses to these comments demonstrate that:

- No new hazardous constituents will be introduced to the Mill, the tailings system, groundwater or air (RMPR, response to Specific Comment 2),
- There will be no additional environmental or worker safety impacts due to increased levels of constituents previously introduced into the Mill (response to Specific Comments 6, 7, 8, 10)
- There will be no additional transportation impacts (response to General Comment 1b)
- The Uranium Material requires no special handling and will create no additional impacts on the

ore pad (response to General Comment 1c),

- The Uranium Material:
    - Produces no additional impacts to surface water (response to General Comment 1d)
    - Produces no additional impacts to groundwater (response to General Comment, 11)
    - Produces no additional risks to air (response to General Comment 1e)
    - Produces no increased radiation hazard (responses to General Comments 1f, g, h, Specific Comments 1, 3, 4)
    - Produces no impacts or changes to Decontamination and Decommissioning, or to Reclamation (response to General Comment 1k)

Therefore, based on review of the April 2011 Amendment Request and supplemental information in this response letter, EFRI maintains that the statements in the April 2011 Amendment Request, that there will be no incremental public health, safety or environmental impacts over and above previously licensed activities is justified.

> b. *". . . it is not expected that transportation impacts associated with the movement of the Uranium Material by truck from the Midnite Mine WTP facility to the mill will be significant."*

EFRI Response to General Comment 1b.

The transportation considerations assessed for shipping the Uranium Material are presented in Section 4.2 of the April 2011 Amendment Request. Two aspects of transportation are considered, radiological matters and traffic matters. As stated in Section 4.2.1 of the application, the estimated range of truck shipments would be from 2 to 73 trucks per year, with the highest number of trucks expected in the two years of construction of the Remedy. This equates to a maximum of two trucks in any given week on average. Section 4.2.2(a) of the April 2011 Amendment Request addresses radiological considerations. Specifically, the April 2011 Amendment Request states the following.

> *"The transport of radioactive materials is subject to limits on radiation dose rate measured at the transport vehicle as specified in the US Code of Federal Regulations. The external radiation standards for these shipments are specified in 10 CFR 71.47 sections (2) and (3) as less than 200 millirems per hour ("mrem/hr") at any point on the outer surface of the vehicle, and less than 10 mrem/hr at any point two meters from the outer lateral surfaces of the vehicle. All exclusive use trailer trucks will be scanned by Dawn Mining Company prior to departure from the Midnite Mine Water Treatment Plan ("WTP") facility to ensure that these limits are satisfied."*

In addition, the application commits that;

> *"All applicable requirements of 49 CFR Part 172 and Part 173 will be met, and the selected transport company will have all the required training and emergency response programs and certifications in place."*

Therefore, the shipment of the Uranium Material will comply with all applicable federal safety standards for transportation of Class 7 radiological materials. As such, EFRI re-asserts that the transportation of the Uranium Material by truck from the Midnite Mine WTP facility to the Mill will have no significant transportation related radiological impacts.

The primary transportation corridors in Utah are illustrated in Figure 1 to this response letter. The Uranium Material will travel through Utah south on Highway 15, east on Highway 70 and then south to the Mill on Highway 191. Section 4.2.2(b) of the April 2011 Amendment Request addresses traffic impact considerations for this route. The analysis identifies that the original 1979 Final Environmental Statement (FES) and 1978 Environmental Report contemplated the transportation impacts associated with approximately 68 round trips on local highways by 30-ton ore trucks to the Mill per day. In addition, the FES contemplated approximately 183-275 truck shipments of yellowcake from the Mill per year, which equates to one truck every one to two days based on a seven day work week (one truck every day or so, based on a five-day work week).

Sections 4.2.2(b)(ii) and (iii) of the April 2011 Amendment Request assesses the current truck traffic on Interstate Highways 15, 70, and 191, which are the principal Utah roadways on which trucks carrying the Uranium Material would reach the Mill. These sections identify that, based on 2009 data from the Utah Department of Transportation (UDOT), an average of ten additional trucks per month traveling this route to the Mill from May to October represents an increased traffic load of less than 2 one hundredths of one percent (0.02%).

Further, based on the 2009 UDOT truck traffic information, an average of 10 additional trucks per month traveling this route to the Mill from May to October represents an increased traffic load of less than one half of one percent. This level of truck transportation volume is well below the level contemplated in the original FES and represents a minute fraction of the existing truck volume on the transportation route. Therefore, EFRI re-asserts that transportation impacts associated with the movement of the Uranium Material by truck from the Midnite Mine WTP facility to the Mill are not expected to be significant.

c. *"...the Uranium Material is stable under ambient environmental conditions and does not require any special handling...the TCLP data evidences that the material does not readily leach and does not exhibit hazardous waste characteristics when exposed to more severe conditions than would be anticipated on the ore storage pad" stated on page 13 of the Amendment request.*

EFRI Response to General Comment 1c.

As demonstrated by the testing results presented in Attachment 4 of the April 2011 Amendment Request, the Uranium Materials passes the Toxicity Characteristic Leaching Procedure ("TCLP") test, which was designed to simulate the leaching of solids within a landfill environment. The pH conditions of the TCLP (pH between 3 and 5 S.U., depending on the material characteristics; EPA Method 1311) are set to be representative of acidic chemical conditions within landfills and tend to be as or more aggressive (lower pH) than, conditions experienced under ambient meteoric conditions to which the Uranium Material would typically be exposed during storage (typically pH ≥ 5.4; USGS, 2001).

Therefore, these test data support the statement that "the material does not readily leach and does not exhibit the hazardous waste characteristic of toxicity when exposed to more severe conditions than would be anticipated on the ore storage pad" stated on page 13 of the April 2011 Amendment Request. Additionally, the Uranium Material does not exhibit the hazardous characteristics of reactivity, ignitability or corrosivity, as determined by the specific test results reported in the Radioactive Material Profile Record ("RMPR") in Attachment 2 to the April 2011 Amendment Request.

Dawn Mining Company has produced and managed these materials for over a decade. This operational experience also provides a factual basis supporting the above assertion. The Affidavit signed by the Site Manager for Dawn Mining Company (provided as Attachment 2 to the April 2011 Amendment Request) provides testimony, based on these years of first-hand experience, that these materials "....will not yield water during shipping or during dry open air storage nor will the proposed alternate feed material flow when exposed to precipitation events or standard dust control measures by applying water through spray application, and is not prone to degrading to fine dust sized particles". Therefore, EFRI has provided quantitative and observational data to support this assertion and continues to maintain that, as stated in Section 4.3.2 of the application, "*the Uranium Material is stable under ambient environmental conditions and does not require any special handling*" and that "*The TCLP data evidences that the material does not readily leach and does not exhibit hazardous waste characteristics when exposed to more severe conditions than would be anticipated on the ore storage pad.*"

> *d. ". . . there will be no new or incremental risk of discharge to surface waters resulting from the receipt and processing of Uranium Material at the Mill or the disposition of the resulting tailings" stated on page 16 of the Amendment Request.*

EFRI Response to General Comment 1d.

Attachment 2 to the April 2011 Amendment Request provides a completed RMPR for the Uranium Material. Table 6 of Attachment 5 to the April 2011 Amendment Request presents a comparison of constituent concentrations in existing ores and other alternate feed materials processed at the Mill as well as the range of constituent concentrations in the Uranium Material. These data indicate that the Uranium Material constituents are present in concentrations within the range of ores and other alternate feed materials which are already permitted to be processed at the Mill under the existing license.

The modes of potential impact to surface waters from Uranium Material delivery, storage, processing and long-term disposal are from, 1) release of site surface runoff containing Uranium Material contaminants, 2) discharge of other process liquid effluents containing Uranium Material contaminants to surface water systems, and/or 3) airborne transport of Uranium Material particulates related to delivery, storage and processing of these materials. As stated in Section 4.7 of the April 2011 Amendment Request, protection of surface water from potential impacts related to receiving, storage and processing this Uranium Material will be accomplished through control of potential surface water discharges using the Mill's existing storm water and liquid effluent controls. Specifically, storm water runoff from the Mill and facilities, including the ore storage area where the Uranium Material will be received and stored, is directed to the tailings impoundments through approved storm water controls contained in the Stormwater Best Management Practices Plan for White Mesa Mill (EFRI, September 2012). These are the same controls used for storage of all other areas and alternate feed materials.

Since the Uranium Material is stable under ambient environmental conditions (see response to General Comment 1c) and will not provide substantially different input to the ore storage area storm water than is already contributed from conventional ores and other approved alternate feed materials, there is no reasonable mechanism for new or incremental risk of discharge to surface waters resulting from the receipt and processing of Uranium Material at the Mill or the disposition of the resulting tailings.

In addition, all other Mill process liquid effluents, laundry, and analytical laboratory liquid wastes that could carry potential Uranium Material contaminants will be discharged to the Mill's tailings impoundments for disposal using the existing appropriate and approved management systems as per Condition 10.2 of the RML. Further, though the Uranium Material does not have an observed propensity to generate dust (see Attachment 2 of the April 2011 Amendment Request, Affidavit Item 10), control of potential air transport of Uranium Material particulates from storage and handling will be performed using standard approved dust control and worker protective equipment practices (see April 2011 Amendment Request Section 4.10.2(d), p.17, Section 5.0, p.17,). Also, the Uranium Material will have a moisture content of approximately 25 to 45 percent (see Attachment 2 of the April 2011 Amendment Request), which is 6 to 11 times greater than the minimum moisture content currently contemplated for ores and feeds stored on the ore pad by the Mill's State of Utah Air Approval Order ("AO") for minimization of the potential dust generation. Given the factors above, EFRI maintains that wind transport of Uranium Material particulates have no new or incremental risk of constituent discharge or potential adverse impact to surface waters.

Therefore, EFRI has demonstrated and maintains that 1) the Uranium Material does not contain constituents outside the range of materials already processed at the Mill, 2) the Uranium Material does not exhibit leaching characteristics that will allow a significant potential to release constituents to site runoff (see response to General Comment 1c, above), 3) experience with outdoor storage and management of the Uranium Material establishes a reasonable basis for concluding storage on Mill site ore pads will not require special handling (see Attachment 2 of the April 2011 Amendment Request), and 4) that there are appropriate approved management systems for control site runoff and other liquid effluents to protect surface water resources.

> e. *"The existing air particulate monitoring program is equipped to handle all such ores" stated on Page 16 of the Amendment Request.*

EFRI Response to General Comment 1e.

As stated in the April 2011 Amendment Request, the Uranium Material has little potential for generating dust and particulates (Attachment 2 to the Amendment Request, Affidavit). The Mill's AO currently limits dust potential by requiring in Part II.B.I.c that dusts from the ore loading areas may not exceed 15% opacity. At the current time, Part II.B.4.h of the AO contemplates that the moisture content of materials handled by front-end loading operations and truck-dumping operations are not less than 4% by weight during these operations.

As stated in Section 4.3.1 and Section 4.7 of the application, the Uranium Material, like conventional ore, will be delivered by tarp-covered trucks, which will be unloaded onto the ore pad for temporary storage pending processing as is currently done for conventional ores and some alternate feed materials.

The Uranium Material will be unloaded and stored in a manner essentially identical to conventional ore. In addition, the Uranium Material will be relatively moist, with an average moisture content of approximately 25 to 45%, and has been thoroughly characterized (see Attachment 2 of the April 2011 Amendment Request). As mentioned in the response to General Comment 1d, above, this moisture content surpasses the current moisture requirement for ores and feeds in the Mill's AO by a factor of 6 to 11 times.

The existing environmental air monitoring system, required per License Condition 11.2 of the RML, and summarized in Section 5.5 of the Mill's License Renewal Application (UMETCO 1991) has been approved by the NRC and the State of Utah and meets the requirements identified in NRC regulatory Guide 4.14 (NRC, 1980; Section 2).

The monitoring program referenced above includes high volume air sampling devices collecting airborne radioparticulate data both upwind and downwind of the Mill. These environmental data are composited regularly and analyzed quarterly, with results being reported semi-annually. These data are assessed with respect to the 10 CFR 20, Appendix B, Table 2, Effluent Concentration Limits for unrestricted areas, to ensure that site operational practices for controlling particulate radionuclides and dust are protective of public health.

Similarly, the existing occupational health air monitoring program approved under License Condition 11.4 of the RML, and as described in the Technical Evaluation Report ("TER") for NRC License Amendment 7 (USNRC August 1998), meets the requirements for monitoring particulate radionuclides in uranium mills (NRC, 1979) and has been approved by DRC. The TER for the NRC License Amendment 7 is included as Appendix A to this letter.

EFRI has assessed many factors in developing this April 2011 Amendment Request including the adequacy of the existing stack emissions monitoring, fugitive emissions (dust) monitoring, and environmental air particulate monitoring program. Since the Uranium Material constituent concentrations are within the range of those for other ores and alternate feed materials already processed at the Mill (see response to General Comment 1d, above) and since this Uranium Material has no propensity to generate abundant dust sized particles (Attachment 2 of the April 2011 Amendment Request, Affidavit) and will be subject to routine dust control procedures during unloading, storage and processing, EFRI concluded and maintains that the existing air monitoring program is equipped to handle the Uranium Material.

f. ". . . the Uranium Material will therefore poses less of a gamma and radon hazard than other ores and alternate feed materials that have been processed or licensed for processing at the Mill" stated on Page 16 of the Amendment Request.

EFRI Response to General Comment 1f.

Attachment 2 of the April 2011 Amendment Request presents a complete RMPR for the Uranium Material. Table 1, below, summarizes the ranges of radionuclide activity concentrations of the Uranium Material as well as other alternate feed materials already approved for processing, and successfully processed at the Mill. These data demonstrate that the primary gamma emitting radionuclide content

(Uranium, Thorium and Radium) of the Uranium Material are below the maximum of the range of relevant radionuclide activity concentrations of conventional ores and already-approved alternate feed materials. Therefore, the gamma radiation and radon emissions from this Uranium Material will be correspondingly less than other conventional ores and alternate feed materials that have been processed or licensed for processing at the Mill. Consequently, EFRI maintains that the above references statement is correct and that these data are sufficient to support this assertion.

Table 1. Comparison of Radionuclide Activity Concentrations in Proposed Uranium Material and Previous Alternate Feeds

Radionuclide	Range of Uranium Material Radionuclide Activity Concentration[1] (pCi/g dry)[2]	Range of Colorado Plateau Ores and Alternate Feed Radionuclide Activity Concentrations[3],[4] (pCi/g dry)[2]	Source for Alternate Feed Information
Ra-226	22.8 to 25.7	2,000 avg; 10,400 max	W.R.Grace Application April 2000
Total Radium	36.6 to 41.0	1,190 max (Ra 228+Ra 226)	Heritage Application July 2000
Th-228	0.93 to 1.50	2,000 avg.; 3,222 max	W.R.Grace Application April 2000
Th-230	20.4 to 21.4	2,000 avg., 10,400 max.	W.R.Grace Application April 2000
Th-232	0.66 to 1.14	8,000 avg.; 31,500 max.	W.R.Grace Application April 2000
Pb-210	32.0 to 41.0	2,805 max.	Based on 1% U, conventional ores
Unat	15,000 mg/kg to 16,000 mg/kg	686,000 mg/kg Unat max[7]	Mill lab monthly assays Cameco UF$_4$
Gross Alpha	4310±690 to 5440±870	7,600 max. 22,400	Linde Application March 2005 conventional ores[5]
Gross Beta	4780±760 to 4870±780	3,800 max. 17,000	Linde Application March 2005 conventional ores[6]

[1] Attachment 2 of the April 2011 Amendment Request (Radioactive Material Profile Record, p.2 of 11 and associated tables)

[2] pCi/g unless otherwise noted

[3] Selected concentrations for constituents found in characterization data for other alternate feed materials licensed for processing at the Mill, for comparison purposes only.

[4] Mined ores range from 0.1% to higher than 1% Some Arizona strip ores have ranged as high as 2% U_3O_8 (1.7% U-nat). Abundance of uranium daughters can be estimated from the assumption that ores are in secular equilibrium.

[5] Estimated based on assumption of 1% U_3O_8 (0.85% U) at 2830 pCi/g and eight alphas in U-238 series, and neglecting the contribution from U-235.

[6] Estimated based on assumption of 1% U_3O_8 (0.85% U) at 2830 pCi/g and six betas in U-238 series and neglecting the contribution from U-235.

[7] Monthly average grade assays of Cameco UF4 have periodically been as high as 80.7% U_3O_8 (68.6% U).

g. *"Gamma exposure to workers will be managed in accordance with existing Mill standard operating procedures" stated on Page 17 of the Amendment Request.*

EFRI Response to General Comment 1g.

As described in the response to General Comment 1f above, the radionuclide activity of the primary gamma emitting radionuclides are below the maximum of the range of relevant radionuclide activity concentrations of already approved alternate feed materials. Therefore, the potential gamma emissions and potential worker exposure to gamma radiation will be within the range of those already appropriately managed and monitored at the Mill. Consequently, EFRI maintains that the existing standard operating procedures and controls are adequate to maintain all radiological exposures to protective levels and levels that are as low as reasonably achievable (ALARA).

> *h. "Radon exposures to workers will be managed in accordance with existing Mill standard operations" stated on Page 17 of the Amendment Request.*

EFRI Response to General Comment 1h.

Based on the information provided in the response to General Comment 1f, above, in which it is demonstrated that the Uranium, Radium, and Thorium activity concentrations of the Uranium Material are below the maximum range of previously approved conventional ores and alternate feed materials, the resulting radon levels are expected to be within the range for which the existing approved controls and monitoring programs are appropriate. Therefore, no change to the existing radon exposure controls or the radiological monitoring program is necessary.

> *i. "The Mill . . . can safely handle the Uranium Material in accordance with existing Mill standard operating procedures" stated on Page 17 of the Amendment Request.*

EFRI Response to General Comment 1i.

EFRI has reviewed the General Comments, the Specific Comments and all related responses included herein. Based on this review and because the Uranium Material does not pose substantially different or greater chemical or radiological hazards than conventional ores and other alternate feed materials already approved, and generally poses lower hazards than other previously-handled conventional ores and alternate feed materials, as addressed in the April 2011 Amendment Request and the enclosed responses to these comments, EFRI maintains that the Mill can safely handle the Uranium Material in accordance with existing Mill standard operating procedures.

> *j. "Existing monitoring programs are therefore adequate and no new monitoring procedures are required" stated on Page 18 of the Amendment Request.*

EFRI Response to General Comment 1j.

EFRI has reviewed the General Comments, the Specific Comments and all related responses included herein. Based on this review and because the Uranium Material does not pose substantially different or greater hazards than conventional ores and other alternate feed materials already approved, as addressed in the application and the enclosed responses to these comments, EFRI maintains that the existing monitoring programs are adequate and no new monitoring procedures are required.

> *k. ". . . there will be no decommissioning, decontamination or reclamation impacts associated with processing the Uranium Material, over and above previously licensed Mill operations" stated on Page 18 of the Amendment Request.*

EFRI General Response 1k.

As discussed in detail in the Mill's approved Reclamation Plan, the components of the decontamination and decommissioning phase and reclamation phase of Mill closure are:

- Demolition of buildings, structures, and facilities (including Cell 1)
- Decontamination to free release standards of any equipment to be released from the site
- Disposal of all demolished structures and equipment in the Mill's tailings cells
- Decontamination of environmental media (on site and off site soil) to levels committed in the Reclamation Plan
- Restoration of any potential groundwater contamination to groundwater compliance limits or approved Alternate Corrective Action Compliance Limits

The long term-impacts that an alternate feed material could potentially have on the decontamination and decommissioning phase, reclamation phase, or post-reclamation conditions are:

- Increase in volume of material in the tailings cells
- Addition of a new contaminant that cannot be managed or contained by the existing tailings reclamation design
- Increase in concentration of a contaminant to a level that cannot be managed or contained by the existing tailings reclamation design
- Contamination of soils or sediments requiring management at reclamation
- Change in nature of groundwater conditions requiring restoration at reclamation, to meet applicable groundwater quality standards.

As discussed in the April 2011 Amendment Request and in the specific responses below, the Uranium Material will produce none of these impacts because:

- The Uranium Material will not increase the volume of tailings. As discussed in the April 2011 Amendment Request, the Uranium Material will produce no greater volume of tailings than would be produced from processing the same volume of ore. Processing of the Uranium Material does not require the use of any new or modified equipment, hence no additional volume of demolition material would be added to tailings.

- The Uranium Material does not contain any constituents that have not already been introduced to the Mill's tailings system. The RMPR, analytical data, and technical memorandum in the April 2011 Amendment Request demonstrate that the sampling and analytical data are representative of the Uranium Material, and the Uranium Material contains no new constituents. Processing of the Uranium Material will not require the use of additional chemicals not already in use at the Mill. Therefore processing of the Uranium Material will not introduce any new chemical constituent that cannot be managed or contained by the existing tailings reclamation design.

- Processing of the Uranium Material will not increase the concentration of any contaminant to a level that cannot be managed or contained by the existing tailings reclamation design. All constituents present in the Uranium Material have already been introduced into the Mill at levels higher than the levels present in the Uranium Material. Anticipated increases in barium levels in tailings will have no effect on the integrity of the tailings liner.

- As discussed in the responses to general Comment 1e and Specific Comment 7, processing of the Uranium Material will produce no additional mechanism for, or significant increase in, airborne deposition in soils or sediments.

- As discussed in the response to Specific Comment 11, processing of the Uranium Material will produce no additional pathway for, or increase in, any potential effects to groundwater. Specifically, each constituent in the Uranium Material is either monitored under the Mill's approved Groundwater Discharge Permit (GWDP"), or represented by a constituent monitored in the GWDP, and the monitoring program required by the GWDP meets the requirements of NRC Reg. Guide 4.14 and Utah groundwater regulations. Hence, processing of the Uranium Material will not potentially change the nature of groundwater conditions in a way that requires additional groundwater restoration at or before reclamation.

References for General Comment 1 a through k

Dames and Moore, 1978. Environmental Report White Mesa Uranium Project, San Juan County, Utah.

Energy Fuels Resources (USA) Inc., 2012. Stormwater Best Management Practices Plan for White Mesa Mill.

United States Nuclear Regulatory Commission (NRC), 1979. Final Environmental Statement Related to Operation of White Mesa Uranium Project.

United States Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Method 1311, Revision 0, July 1992.

Utah Division of Air Quality 2011. Air Approval Order Number DAQE-AN0112050018-11

Specific Comment 1

Pages 6 and 7, Section 2.6.1 of the April 2011 DMC LAR: Please justify by providing documentation of the following parameter values stated in the narrative:

a. Uranium Material average uranium content of approximately 1.4% on a dry weight basis.

EFRI Response to Specific Comment 1a

a. Attachment 2 of the April 2011 Amendment Request includes a completed RMPR. Page 9 of the RMPR presents Uranium Material Analyses for RCRA Listed Hazardous Waste on a dry weight basis. The first line of this table presents total uranium concentrations in three representative samples of the Uranium Material from the 2010 treatment season (WTPS-1, -2, -3). Uranium (U-nat) results range from 15,000 mg/kg to 16,000 mg/kg with an average of 15,333 mg/kg on a dry weight basis.

Based on the following calculations, these test results establish that the average U-nat content of the Uranium Material is approximately 1.5% on a dry weight basis, rather than the 1.4% stated in the original submittal. Included as Appendix B to this response letter is a revised copy of the Amendment Request in redline format, including this correction.

$15{,}333 \text{ mg/kg} \div 1\text{x}10^6 \text{ mg/kg} = 0.0153 \text{ kg/kg or } 1.5\%$

b. *High grade Arizona Strip breccia pipe uranium ore content ranging from 0.4% to 2%* U_3O_8 *or higher.*

EFRI Response to Specific Comment 1b

Table 1 provides ore grade data on an annual basis for the Arizona 1 Mine as an example of a typical Arizona Strip breccia pipe mine. The range and mean ore grade data for all years of the Arizona 1 Mine operation (2010 to 2012) available at this time, is supplied in Table 1. Table 1 demonstrates that the ore grades have averaged 0.56% or higher every year during the life of mine for all data available to date, with maximum grades exceeding 2% every year during the life of mine for all data available to date.

Table 2
Summary of Arizona 1 Ore Grades
(Dry Weight Basis)

Year	Minimum (% U_3O_8)	Maximum (% U_3O_8)	Arithmetic Mean (% U_3O_8)
2010	0.18	2.4	0.56
2011	0.14	2.0	0.66
2012	0.22	2.8	0.62

c. *Estimated average Thorium-232 content 0.005% on a dry weight basis.*

EFRI Response to Specific Comment 1c

Attachment 2 to the April 2011 Amendment Request includes a completed RMPR. Page 10 of the RMPR presents Uranium Material Analyses for RCRA Listed Hazardous Waste in the top half of the table, and radionuclide data in the bottom half of the table. The second to last line of this table presents total Th-232 concentrations in three representative samples of the Uranium Material from the 2010 treatment season (WTPS-1, -2, -3). Thorium-232 results range from 0.66 ± 0.34 pCi/g to 1.14 ± 0.48 pCi/g with an average of 0.84 pCi/g on a dry weight basis.

Based on the following calculations, these test results establish that the average Th-232 content of the Uranium Material is approximately 0.00076% on a dry weight basis, rather than the 0.005% stated in the original submittal. Nonetheless, the statement that the Th-233 level in the Uranium Material is well below the levels the Mill has been licensed to process in the past is justified. Included as Appendix B to this response letter is a revised copy of the Amendment Request in redline format, including this correction.

Th-232 specific activity[1] $=1.1.\text{x}10^{-7}$ Ci/g ($1.1\text{x}10^{5}$ pCi/g)

0.84 pCi/g $\div$ $1.1\text{x}10^{5}$ pCi/g = 0.0000076 or 0.00076%

d. Radium-226, Thorium-230, and Lead-210 concentrations of 24.1 pCi/L, 20.7 pCi/L, and 33.3 pCi/L, respectively.

EFRI Response to Specific Comment 1d

Documentation has already been provided in the RMPR in Attachment 2 to the April 2011 Amendment Request. Page 10 of the RMPR presents Uranium Material Analyses for RCRA Listed Hazardous Waste. The lower half of this of this table presents total Ra-226, Th-230 and Pb-210 concentrations in three representative samples of the Uranium Material from the 2010 treatment season (WTPS-1, -2, -3). The far right hand column of this table presents the average concentrations of these three isotopes from analytical testing on a dry weight basis.

e. Radium-226, Thorium-230, and Lead-210 concentrations of 825 pCi/L each in Colorado Plateau ore with U_3O_8 content of 0.25%

EFRI Response to Specific Comment 1e

Per NRC Reg. Guide 3.59, the radionuclides in uranium ore are generally assumed to be in secular equilibrium with U-238. Radium-226, thorium-230, and lead-210 concentration can be approximated from U-nat content or ore grade, based on this assumption and the follow relationship:

Assuming the U-nat content is 84.8% of U_3O_8, and that the major contributor to activity is U-238, the activity concentration of natural ore is approximately 12,350 Bq/g U (or 12,350 Bq/g x 27.0 pCi/Bq = 333,800 pCi/g U).

0.25% U_3O_8 x 84.8%U-nat x 12,350 Bq/g x 27.0 pCi/Bq = 708 pCi/g for each of the isotopes in equilibrium with U-238.

This value is slightly lower than the approximate value of 825pCi/g (mistakenly typed as pCi/L) in Section 2.6.1 of the April 2011 Amendment request. Nonetheless, the statement in that section that the activities of Ra-226, Th-230 and Pb-210 of approximately 24.1 pCi/g, 20.7 pCi/g and 33.3 pCi /g

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[1] Argonne National Laboratory, EVS. Human Health Fact Sheet, August 2005 (http://www.evs.anl.gov/pub/doc/Thorium.pdf).

(on a dry basis) are well below the activities associated with Colorado Plateau ores with grades of 0.25% U_3O_8 is justified.

Specific Comment 2

Page 10, Section 3.3.3: Justify by furnishing additional documentation the assertion that "The five volatile organic compounds detected...in the Uranium Material have been attributed to laboratory contamination..."

EFRI Response to Specific Comment 2

Five Volatile Organic Compounds ("VOCs") were detected in the Uranium Material - four in the solids samples and one in the TCLP leachate sample. Additionally, all five VOCs were detected in the associated laboratory quality control blanks. Review of the site operational history, WTP processes, and chemical history for the Midnite Mine WTP site, did not identify any potential source of these constituents. There are no VOCs used in the mining processes or WTP processes and these chemicals have never been used on the Midnite Mine WTP site or stored at the Midnite Mine WTP site. The detections reported in the samples are not the result of Midnite Mine WTP site activities. The sample results and laboratory quality control samples were reviewed in detail to determine the source of the detections in the Uranium Material. Review of the analytical data indicated that the five VOCs were detected in the laboratory quality control blanks, as presented in Table 3 and discussed below.

The table below summarizes the VOC detections in the laboratory quality control blanks.

Table 3
VOC Detections In Laboratory QC Blanks

	Acetone ug/kg dry	Chloroform ug/kg dry	Methylene Chloride ug/kg dry	Toluene ug/kg dry	Trichloroethene ug/L
Matrix	Solid	Solid	Solid	Solid	TCLP Leachate
Reporting Limit	5	5	5	5	5
Laboratory Blank	5.07	0.2*	1.95	1.57	3.3 J

* This detection is slightly below the method detection limit but was noted by the laboratory in correspondence which was submitted in the April 2011 Amendment Request.

Acetone, chloroform, methylene chloride, toluene, and trichloroethene are common laboratory blank contaminants. Methylene chloride and toluene are used as solvents in other organic analyses within the laboratory (for example, toluene is used for herbicide analyses, and methylene chloride is used for semivolatile organic analysis). Acetone is commonly used as a solvent for standards preparation and as a cleaning agent for glassware. Chloroform is present in municipal water supplies and results from chlorination of drinking water. Trichloroethene contamination is the result of standard volatilization, cross-contamination from previous sample analysis, and contaminated laboratory chemicals used for sample preparation.

These contaminants are spread throughout the laboratory environment quickly and easily due to their extreme volatility. Because these solvents are ubiquitous in the laboratory environment they are often detected in the VOC blanks as well as in the associated samples due to contamination present in the laboratory environment.

The chloroform, methylene chloride, toluene and trichloroethene detections in the method blanks and the Uranium Materials are all below the laboratory Reporting Limit ("RL") and are flagged "J"; estimated values. The sample data, showing the "J" values for these four compounds, are included as Appendix C to this response letter. The values flagged as estimated or "J" values, are false positives, caused by laboratory contamination as evidenced by their presence in the laboratory method blanks. Method blank contamination is indicative of VOC presence in the laboratory.

The acetone detections reported in the blanks and the samples are not estimated and are reported at levels above the RL; however, because acetone is used frequently in the laboratory the detections are also indicative of laboratory contamination. The levels reported in the Uranium Material are reported at concentrations routinely seen as the result of laboratory contamination. Industry practice for blank contamination associated with common laboratory contaminants such as acetone is to consider sample detections as false positives if the sample concentrations are less than 10 times the blank result, particularly when interpreting data for VOCs for which there is no on-site source. In all of the Uranium Material samples the acetone concentrations are less than 10 times the blank concentration, indicating that the sample detections are the result of laboratory contamination.

Because there is no source for these VOCs at the Midnite Mine WTP site and because results associated with method blank contamination are considered questionable, EFRI reasserts that these data are false positives caused by laboratory artifacts.

Specific Comment 3

Page 17, Section 4.10.2(d): Estimate and document the range of "Derived Air Concentration" values that might result from processing the proposed Uranium Material. State and justify the impact this range of DACs might have on estimated worker exposures to airborne particulate matter.

EFRI Response to Specific Comment 3

The DACs for each Mill Area ("Circuit") involved in processing the proposed Uranium Material are provided in Table 4, below, and compared with those for conventional ores and a number of other alternate feed materials.

Section 4.1.2 of the Mill's approved Radiation Protection Manual addresses the factors taken into account in calculation of DACs for alternate feed materials. In order to apply the procedures set out in Section 4.1.2 of the Radiation Protection Manual to the calculation of specific DACs for specific alternate feed materials, the Mill has developed an Excel spreadsheet for the calculation of such

DACs. Appropriateness of the assumptions and accuracy of use of the spreadsheet are confirmed by an independent consultant as part of the Mill's ALARA audit process. The DACs listed in Table 4 result from use of the calculation spreadsheet and the following assumptions.

Conventional ores are assumed to have uranium daughter isotopes in secular equilibrium. Because most alternate feed materials have been processed in one form or another prior to receipt at the Mill, they are not assumed to have uranium daughter isotopes in secular equilibrium. As a result, DACs are calculated separately for each alternate feed material for each applicable part of the Mill. In process steps where conditions and material properties are the same for every feed (such as yellowcake precipitation and packaging), the conventional ore DACs are applied to every alternate feed material. Additional key assumptions are listed here:

- The DACs for inhalation of each radionuclide were taken from Appendix B of 10 CFR 20 for the indicated solubility class;
- The assigned solubility classes for airborne alpha activity assume:
    - conventional ores are insoluble,
    - that 50% of dust in the leach area is from the precipitation area and 50% is from ore (due to proximity),
    - uranium is in soluble form in CCD, SX and Precipitation areas, and,
    - yellowcake in the packaging area has mixed solubility based characteristics (from Kalkwarf (1979))
- The DAC for tailings is adjusted for the recovery efficiency, nominally assumed at 95% (i.e., 95% of uranium is recovered and the remaining 5% of the uranium and virtually all uranium daughters remain with tailings);
- Activity from the U-235 chain is not significant and can be, and is typically, ignored (see discussion below); and
- Concentrations of Th-232 and its decay products are negligible and can be ignored.

Table 4
Derived Air Concentrations for Ores and Selected Alternate Feed Materials

Mill Area ("Circuit")	Dawn Mining DAC	Conventional Ore (based on Arizona Strip)	UF_4	KF	Regen Material	Calcined Material	Heritage
Ore	2.6E-10	6.0E-11	2.1E-10	2.6E-10	4.2E-10	1.3E-11	4.4E-12
Leach	3.4E-10	1.10E-10	3.0E-10	3.4E-10	4.6E-10	2.5E-11	8.6E-12
CCD	3.9E-10	1.2E-11	2.9E-10	3.9E-10	4.2E-10	1.3E-11	4.4E-12
SX	3.9E-10	1.2E-11	2.9E-10	3.9E-10	4.2E-10	1.3E-11	4.4E12
Precipitation	5.0E-10	5.0E-10	5.0E-10	5.0E-10	5.0E-10	5.0E-10	5.0E-10
Packaging	2.2E-11	2.2E-11	2.2E-11	2.2E-11	2.2E-11	2.2E-11	2.2E-11
Tailings	2.0E-11	1.7E-11	1.7E-11	1.7E-11	1.7E-11	1.7E-11	8.4E-12

As indicated in the Table 4 above, the Mill has processed ores and/or alternate feeds with DACs which are lower (more restrictive) than the Dawn Mining Uranium Material by as much as two orders of magnitude, depending on the plant area to which the DAC applies.

As a result, the existing radiation protection measures and standard operating procedures developed for worker safety for the processing of natural ores and previous alternate feed materials are sufficient for the processing of the Uranium Material. No additional personnel protective measures or safety procedures will be required.

Specific Comment 4

Tab (Attachment) 2, Page 5 of 11: Provide historical testing results to demonstrate that the uranium content has averaged 0.18% on a wet basis.

EFRI Response to Specific Comment 4

Attachment 5 to the April 2011 Amendment Request provides a Technical Memorandum by Tetra Tech (April 27, 2011) titled *Review of Chemical Contaminants in Dawn Mining Company Midnite Mine (DMC) Uranium Material to Determine Worker Safety and Environmental Issues and Chemical Compatibility at the Denison Mines White Mesa Mill.* Table 3 of this Technical Memorandum submitted with the April 2011 Amendment Request presents historical total WTP uranium material testing data from 2003 through 2010.

These data show that natural uranium concentrations in the uranium material ranged from 19,000 mg/kg to 2,700 mg/kg on a wet weight basis. Historical analysis of the Uranium Material moisture content identifies that gravimetric moisture content has ranged from approximately 79% to 87% on a gravimetric basis and averaged 84.5% moisture (15.5% solids) between 2003 and 2008.

Table 3 of the April 2011 Amendment Request has been updated to show the measured moisture content of the Uranium Material as produced from 2003 through 2008. In addition, this table has been modified to present the maximum, minimum and average uranium concentration in the Uranium Materials for this period on a wet weight basis. The percent uranium on a wet weight basis is calculated by multiplying the dry weight uranium concentration by the percent solids as shown below:

Unat Conc. Dry Weight Basis (mg/Kg): 10,756 (2003-2008 Average)
Average Percent Solids (%): 15.5%

10,756 mg/kg x 0.155 = 1,667 mg/kg (wet weight basis)
1,667 mg/kg ÷ $1x10^6$ mg/kg = 0.0017
0.0017 x 100 = 0.17%
U Conc. Wet Weight Basis (%): 0.17%

The Uranium Material uranium concentration on a wet weight basis from 2003 through 2008 ranges from 0.39% to 0.04% with an average of 0.17%, rather than the stated 0.18%.

Appendix D and Appendix E of this letter include an updated Table 3 for Attachment 5 of the April 2011 Amendment Request and a replacement page for Attachment 2, of the April 2011 Amendment Request page 5 of 11 respectively.

Specific Comment 5

Tab 2, Page 7 of 11: Correct the discrepancies for Arsenic and Cadmium between values in the columns and the values stated as the "Max".

EFRI Response to Specific Comment 5

The requested corrections have been made to Attachment 2 of the April 2011 Amendment Request page 7 of 11 and a replacement page is included in Appendix F of this letter. In addition, Table 2 to Attachment 4 of the April 2011 Amendment Request has been updated and a replacement page is attached to this transmittal as Appendix G to this letter.

Specific Comment 6

Tab 2, Pages 8, 9, and 10 of 11: Add columns to each table indicating allowable concentrations for each analyte (e.g., TCLP threshold values), where applicable.

EFRI Response to Specific Comment 6

The TCLP method simulates liquid flow thorough a solid material over time, such as water through landfill material, waste rock, etc., which will result in leaching from the solid material into the liquid. The method calls for the liquid solution to be sampled for constituents of concern, which are leached from the solid. The resulting TCLP values are reported as concentration in the liquid leachate solution and are reported in mg/L. If the TCLP extract contains any one of the listed constituents in an amount equal to or exceeding the concentrations specified in 40 CFR 261.24, the waste possesses the characteristic of toxicity and may be a hazardous waste.

TCLP values specified in 40 CFR 261.24 have been added to the Attachment 2 of the April 2011 Amendment Request table on page 8 of 11 (Organics & Pesticides Analyses for RCRA Toxicity Characteristics (TCLP)) as requested. The revised table from Attachment 2 of the April 2011 Amendment Request is included as Appendix H to this letter. However, the TCLP threshold values have not been added to the Tables on pages and 9 and 10 of 11 (Uranium Material Analyses for RCRA Hazardous Waste (Total Analyses)) as these Tables present concentrations of constituents in the solid material and are reported in mg/kg. The TCLP threshold values (concentrations in leachates) are not comparable to the total constituent values present in the Uranium Material solids.

The requested column indicating the TCLP threshold values have also been added Table 3 in Attachment 4 of the April 2011 Amendment Request. The revised table has been included as Appendix I of this letter.

It should be noted that source material, byproduct material, and special nuclear material are excepted from the definition of hazardous waste, and are not subject to RCRA, even if they possess the characteristics of hazardous waste [40 CFR 261.4(a)(4)].

Specific Comment 7

Tab 2, summary tables and Tab (Attachment) 4, Table 4 of the April 2011 DAR LAR:

a. *Compare the range of concentrations of the following constituents that could occur in the Uranium Material with reported ranges of concentrations of the same constituents present in Colorado Plateau uranium ores typical of those that are accepted and processed at the Mill and/or are reported to be present in typical uranium mill tailings in the Utah region (e.g., Abdelouas 2006; Morrison 1991; Meisch 1963):*

    - *Barium (Ba); and*
    - *Beryllium (Be)*

    Information in Abdelouas 2006, based on data from Morrison 1991, allows the following comparison between the average chemical composition of uranium mill tailings from different locations in Utah (for acid-leached uranium ores) and the Dawn Mining Uranium Material:

Analyte	*Average Concentration in Utah area uranium mill tailings*	*Analytical Results of Dawn WTP Solids (p. 9 of 11 of Attachment 2 of LAR)*
Ba	*1,010 ug/g*	*7,200 – 8,100 ug/g* *(7,733 ug/g ave.)*
Be	*Not Reported*	*33 – 36 ug/g* *(35 ug/g ave.)*

Information in Miesch 1963 (Table 2) allows the following comparison between typical (mean) chemical compositions of uranium ore from a uranium mine deposit and mill pulp samples from over 200 mine sites on the Colorado Plateau and the Dawn Mining Uranium Material:

Analyte	*Average Concentration in Colorado Plateau Uranium Ores and Mill Pulp Samples*	*Analytical Results of Dawn WTP Solids (p. 9 of 11 of Attachment 2 of LAR)*
Ba	*550 - 750 ug/g*	*7,200 – 8,100 ug/g* *(7,733 ug/g ave.)*
Be	*~ 0.3 0- 0.4 ug/g*	*33 – 36 ug/g* *(35 ug/g ave.)*

The above information suggests that concentrations of beryllium and barium in the Dawn Mining Uranium Material appear to be somewhat elevated compared to Colorado Plateau-derived ores that may have been processed at the Mill and/or present in typical uranium mill tailings in the Utah area. The same situation may occur relative to one or

> *more other alternate feed materials previously accepted and processed at the Mill. The implications of elevated Be levels in the Dawn Mining Uranium Material compared to ores and other alternate feed materials previously processed at the Mill and with respect to potentially applicable and relevant personnel health criteria should be further assessed.*

EFRI Response to Specific Comment 7a

As identified in Attachment 5, Table 6, Column A of the April 2011 Amendment Request (Cell 3 Historical Mill Tailings Composition and Uranium Material Comparison), Ba and Be concentrations in alternate feed materials already approved and processed at the Mill have had concentrations higher than those measured in the Uranium Materials. Specifically, Be concentrations in previous alternate feed materials have ranged as high as 105 mg/kg (ppm) or three times higher than the upper range Be concentrations in the Midnite Mine Uranium Material of approximately 36 mg/kg. Similarly, alternate feed materials previously processed at the Mill have had Ba concentrations up to 43,000 mg/kg or an order of magnitude higher than the upper range Ba concentration in the Uranium Material of approximately 8,100 mg/kg. Therefore, there is no potential for a new or incremental increase in personnel exposure risk from these constituents.

Barium chloride is used to treat radium in the Midnite Mine WTP influent water. In waters where sulfate is present, radium is easily removed by addition of barium chloride: barium chloride dissolves and in the presence of sulfate, the dissolved barium immediately re-precipitates as barium sulfate due to its very low solubility (0.022 mg/L in cold water; Weast, 1987). Dissolved radium co-precipitates with the barium sulfate (NEA & IAEA, 2002). In Midnite Mine WTP solids, Ba is present as barium sulfate ($BaSO_4$). Once in the EFRI Mill circuit, barium sulfate will remain as barium sulfate due to its very low solubility in concentrated sulfuric acid (0.025 mg/L; Weast, 1987).

The Be in the Uranium Material is derived from Be in uranium ores that has dissolved into the local groundwater, which is then precipitated as part of the water treatment process described in the application and Attachments 4 and 5 of the April 2011 Amendment Request. Lime softening is used at the Midnite Mine WTP to precipitate heavy metals, including Be, with the metals precipitating in the hydroxide form (Hendricks, 2006). In MMWTP solids, Be is present as beryllium hydroxide, $Be(OH)_2$. $Be(OH)_2$ is insoluble in water but dissolves in sulfuric acid (NTP, 2011) forming beryllium sulfate, $BeSO_4$ (Wiberg *et al.*, 2001). Therefore, once in the EFRI Mill circuit, Be will be present as $BeSO_4$. $BeSO_4$ is readily soluble in water (37 to 42.5 g/100 mL) and has low solubility in concentrated sulfuric acid (solubility does not exceed 2.5% in the range of 88 to 98 wt% sulfuric acid) (Walsh, 2009). Analysis of tailings pore water in the Cell 2 slimes drain (MWH, 2010) indicates high sulfate concentrations (60,600-74,000 mg/L) and low pH (3.11-3.28) conditions, indicating that $BeSO_4$ solubility in the tailings will be more comparable to the above-reported solubility in sulfuric acid.

Beryllium Toxicity

The low concentrations of Be in the Uranium Material do not pose a significant health and safety hazard. The average measured Be concentration in the Uranium Material is between 33 and 36 parts per million (ppm) as identified in Attachment 5, Table 6, Column B of the April 2011 Amendment Request. The baseline Be concentration in the existing tailings is 0.5 ppm as identified in Attachment 5, Table 6, Columns F and I of the April 2011 Amendment Request. The maximum estimated Be concentration in mill tailings in Cell 4A during the ten year period evaluated would be 0.6 ppm as identified in Attachment 5, Table 6, Column 10L of the April 2011 Amendment Request. The incremental concentration attributable to the uranium material processing would be 0.1 ppm.

Beryllium is a toxic metal and a known carcinogen. The principal exposure pathways for beryllium from Uranium Material are inhalation, ingestion and dermal contact. Inhalation can cause irritation to the nose, throat, lungs and mucous membranes. In some individuals, possibly due to genetic factors, Be may cause chronic beryllium disease ("CBD"), a hypersensitivity or allergic conditions causing inflammation and fibrosis resulting in a restriction of the exchange of oxygen between the lungs and the bloodstream (Materion, 2011). Beryllium can also be taken into the body by ingestion of water and food or through the skin. Although skin absorption does not appear to be a major pathway, skin contact can cause an allergic dermal response in sensitive individuals and skin contact with Be dusts can result in sensitization (NIOSH, 2008). The solubility of the Be compound affects the toxicity. The more soluble Be salts can cause irritant and allergic contact dermatitis. Delayed hypersensitivity dermal granulomas may be caused by the less soluble forms of Be in contaminated wounds (Wambach, 2008).

The only potential complete exposure pathway at the Mill for members of the public is inhalation of airborne particulate matter from the tailings. Engineered and administrative controls limit public access at the Mill. The following analysis looks at public health limits from radioparticulates potentially derived from wind transport of tailings particulates and assumes those levels of particulate transport with the Be concentrations in the Uranium Material and subsequent tailings. These public exposure levels of airborne Be are compared to the EPA reference concentration ("RfC") to assess the potential for adverse public health impact from the Be in windblown tailings or uranium material.

The RfC, i.e., the concentration that is "*likely to be without an appreciable risk of deleterious effects during a lifetime*", for Be is 0.02 $\mu g/m^3$ (EPA, 2013). Assuming a Th-230 concentration in the tailings of 1,000 pCi/g and a 10 CFR 20 effluent limit of 2×10^{-14} µCi/ml, the maximum allowable offsite airborne particulate concentration attributable to tailings would be 40 $\mu g/m^3$. At the hypothetical maximum off-site airborne particulate concentration of 20 $\mu g/m^3$, the maximum concentration of Be attributable to the Uranium Material in those airborne particulates would be 2×10^{-6} $\mu g/m^3$ or a factor of 2,500 below the RfC. Therefore, processing the Uranium Material presents no significant risk to the general public from Be in airborne particulates at levels that are protective from radiological contaminants in all ores and tailings.

Occupational exposures might include skin, inhalation, and inadvertent ingestion. The concentrations of Be in the Uranium Material and tailings solution are 36 ppm (Attachment 5, Table 6, Column B of the April 2011 Amendment Request) and less than 1 ppm (Attachment 5, Table 6, Column 10L), respectively. The New Hampshire Department of Environmental Services Beryllium Health Information Summary notes that skin exposure to concentrated Be can result in allergic skin response (NHDES, 2010). Because of the very low concentrations in the Uranium Material and tailings, Be is not likely to cause an allergic response from skin contact. The reported adverse effects on skin are generally for the pure Be compounds or metal. In any case, the normally required personal protective equipment and safe work practices at the Mill facility would protect workers from direct contact with the Be in uranium material, tailings, and mill process solutions.

Inadvertent ingestion is not likely to result in an individual exceeding the reference dose ("RfD"). The RfD is an estimate of the daily oral intake for humans, including sensitive subgroups, that would not result in "*appreciable risk of deleterious effects during a lifetime*" (EPA, 2013). The oral RfD for Be is 0.002 mg/kg-day. Assuming a 70 kg adult worker and a Be concentration of 36 mg/kg in the uranium material (Attachment 5, Table 6, Column B of the April 2011 Amendment Request), a worker would have to "inadvertently" consume nearly 4 g of Uranium Material per day (0.002 mg/kg x 70kg adult ÷ 36 mg/kg Be concentration = 4 g). The amount of uranium in the 4 g of Uranium Material (16,000 mg/kg [Table 5 of Attachment 5] = 0.016 g/g x 4 g = 0.064 g = 64 mg Unat) far exceeds the regulatory intake limit of 10 mg U-nat per week. As such, normal uranium mill work rules and existing controls provide a reasonable assurance that neither the uranium nor the associated Be in the Uranium Material would be inadvertently ingested at levels likely to cause significant occupational health risk.

The concentration of Be in workplace air resulting from Uranium Material airborne dust would be below the OSHA Permissible Exposure Limit (PEL; 2 $\mu g/m^3$) as long as the regulatory limits on airborne uranium concentrations are met. The concentration of uranium material in airborne particulates that would meet the 10 mg/week regulatory limit on intake of soluble uranium would be approximately 13 mg/m^3 assuming a breathing rate of 1.2 m^3/hour, a normal 40 hour work week and a uranium concentration of 16,000 ppm. At 13 mg/m^3 of soluble uranium, the Be concentration in airborne particulates associated with the uranium material would be approximately 0.5 $\mu g/m^3$, a factor of 4 below the OSHA PEL of 2 $\mu g/m^3$. It is unlikely that a worker would be exposed to airborne particulate matter associated with the Uranium Material for 8 hours per day, 5 days per week. The concentration of Be in tailings attributable to processing of the Uranium Material is estimated to be 0.1 ppm (Attachment 5, Table 6, Column 9M of the April 2011 Amendment Request); therefore, inhalation of tailings dust would result in an even lower occupational exposure.

The above analysis demonstrates that there are no implications to potentially applicable and relevant personnel health criteria from Be levels in the Uranium Material as compared to ores and other alternate feed materials previously processed at the Mill. The existing controls and operating procedures that have proven to be effective in maintaining radiological and non-radiological exposures from ores and other alternate feed materials protective of public and occupational health will be equally effective for the proposed Uranium Material.

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b. Discuss and compare the range of concentrations of the constituents listed in Specific Comment a above in the Uranium Material to potentially applicable/relevant RCRA hazardous waste/characteristic waste limits, EPA-recommended Soil Screening Levels (SSLs), including updated recommended Risk-Based Concentration (RBC) levels (e.g., EPA 2012) for various types of soils issued by one or more EPA regional offices; relative to current, relevant "action levels" established for protecting workers from exposure to elevated levels of constituents in air, such as beryllium, etc...; and/or other criteria as may be appropriate.

EFRI Response to Specific Comment 7b

The RCRA characteristic hazardous waste concentrations are based on the TCLP, and the concentration thresholds in 40 CFR 261 Characteristic D List are TCLP values. The TCLP limit for barium is 100 mg/L. As described in the Technical Memorandum in Attachment 5 of the April 2011 Amendment Request, based on analytical testing, the Uranium Material does not exhibit the TCLP characteristic for barium as defined in Table 1 of 40 CFR Part 261.24(b) (Table 3). No TCLP limit has been established for beryllium.

The following table was extracted from the USEPA Pacific Southwest Region 9 Risk Screening Level ("RSL") Tables as updated in November 2012. (No comparable regulatory levels were identified for Region 8.) The Soil Screening Levels ("SSLs") presented are based on an assumption of a post-remediation industrial use scenario, carcinogenic target risk levels of 1 in one million ($1x10^{-6}$) and a non-cancer hazard index of 1. The assumption of industrial use is extremely over conservative for the Mill site which, in post-reclamation condition, will be transferred to the US Department of Energy for oversight in perpetuity.

No carcinogenic target risk levels have been proposed for barium. As shown in the table, barium is present in the Uranium Material at levels more than 20 times lower than the lowest SSL, that is, the SSL based on a non-carcinogenic hazard index of 1.

Beryllium is present in the Uranium Material at a level 190 times lower than the SSL associated with the acceptable chronic/cancer risk and approximately 55 times lower than the lowest SSL associated with an acceptable non-carcinogenic risk.

Table 5
EPA Soil Screening Levels

	Uranium Material (mg/kg)	**Ingestion SL TR=1.0E-6 (mg/kg)**	**Dermal SL TR=1.0E-6 (mg/kg)**	**Inhalation SL TR=1.0E-6 (mg/kg)**	**Carcinogenic SL TR=1.0E-6 (mg/kg)**	**Ingestion SL HQ=1 (mg/kg)**	**Dermal SL HQ=1 (mg/kg)**	**Inhalation SL HQ=1 (mg/kg)**	**Non-carcinogenic SL HI=1 (mg/kg)**
Barium	8,100 (8.1E+3)	No limit proposed	No limit proposed	No limit proposed	No limit proposed	2.0E+05	No limit proposed	3.0E+06	1.9E+05
Beryllium and Compounds	36 (3.6E+1)	No limit proposed	No limit proposed	6.9E+03	6.9E+03	2.0E+03	No limit proposed	1.2E+05	2.0E+03

The concentration of barium and beryllium relative to occupational exposure guidelines is discussed in detail in the response to Specific Comment 7a, above. As concluded in that response, no additional protective measures beyond those already in place at the Mill will be required.

c. *Assess radiological and non-radiological impacts of releases from the facility to other media (including release through air to adjacent uncontrolled lands) attributable to concentrations in Uranium Material in excess of those previously authorized for receipt and processing at the White Mesa mill. Demonstrate that the airborne effluent monitoring program is adequately designed and implemented to ensure that acceptability of airborne releases to adjacent areas will be known and reported.*

As discussed in the April 2011 Amendment Request and in these Responses to Comments there are no concentrations of in the Uranium Material of any constituent in excess of the concentrations in alternate feed materials previously licensed for receipt and processing at the Mill. The airborne effluent monitoring program which has been designed to comply with the requirements of Reg. Guide 4.14, and which has been in place during the processing of those previously approved alternate feed materials, are appropriate for the Uranium Material.

Specific Comment 8

Discuss any additional requirements, activities, or measures that would be implemented at the White Mesa Mill either during processing the Uranium Material, or following its processing, due to potentially elevated concentrations of barium, and beryllium) compared to applicable and relevant risk or health-based criteria (e.g., ACGIH 8-hr average TLVs or other recommended action levels, as applicable) and/or compared to concentrations typically present in uranium ores processed at the Mill and/or present in Utah-area uranium mill tailings (Abdelouas 2006; Morrison 1991; Meisch 1963). For example, evaluate and discuss: (i) the potential need for additional controls to limit individual exposures to elevated beryllium, etc... levels that may be present in dust that could be released from the Dawn Uranium Material prior to, during, or following its processing; and (ii) the possible need for implementing more aggressive air sampling and/or material surface sampling criteria for elements such as beryllium.

The concentration of barium and beryllium relative to occupational exposure guidelines is discussed in detail in the response to Specific Comment 7a, above. As concluded in that response, no additional protective measures beyond those already in place at the Mill will be required.

Specific Comment 9

Tab 4 and Tab 5: Provide credentials and summarize the experience of the author of these Technical Memoranda to demonstrate that the author is qualified to draw the conclusions and make the recommendations contained in Tab 4, Section 6 and on Tab 5, Pages 20 and 21. Provide documentation (signature) attesting that the author has issued these memoranda.

EFRI Response to Specific Comment 9

The resume of the author of these Technical Memoranda is attached as Appendix J to this letter. Also attached as Appendix K to this letter are copies of the memoranda signed by the author.

Specific Comment 10

Tab 5, Sections 4 .3 and 8.1 of the April 2011 DAR LAR on pages 16- 20:

a. Provide historical testing results to demonstrate that the stated ranges of concentrations of nitrates, chlorides, fluorides, sulfates, and ammonia have been introduced into the uranium circuit at the White Mesa Mill; and

EFRI Response to Specific Comment 10a

The following table summarizes levels of five specific constituents which have been introduced into the Mill with previous alternate feed materials.

Table 6
Chemicals Present in Alternate Feeds

Chemical	Value in Amendment Request Tab 5, Section 4.3 or 8.1	Supporting or Additional Information	Source
Nitrates	350,000 mg/kg	35% (350,000 mg/kg) in Cameco Regen Product alternate feed	Section II of Regen Product MSDS, in Appendix L of this letter.
Chloride	89,900 mg/kg	Maximum sample from Molycorp ponds alternate feed, 89,900 mg/kg	TTLC table (in Appendix M of this letter) from December 2000 Molycorp Amendment Request
Fluoride	460,000 mg/kg	Honeywell/Converdyne/Allied Signal alternate feed, up to 2% U, 98% calcium fluoride and fluoride impurities (48% or 480,000 mg/kg F based on all being as CaF_2)	MSDS for CaF_2 product, in Appendix N of this letter.
Sulfate in Mill (Section 4.3)	300,000 mg/kg	A 4.8 million pound (1.4 million gallon) inventory of 93% (930,000 mg/kg) sulfuric acid is introduced into the CCD and pre-leach steps during conventional ore processing. (These concentrations far exceed those identified in Tab 5, Sections 4 .3 and 8.1 of the April 2011 Amendment Request.)	Mill process description, 1991 RML renewal application and 2007 RML renewal application
Sulfate in Tailings (Section 8.1)	No value listed in Tab 5, Section 4.3 or Section 8.1.	64,900 to 267,000 mg/L in Cell 4A solutions. 119,000 to 134,000 mg/L in Cell 4B solutions.	2012 Annual Tailings Cells Wastewater Sampling Report, in Appendix O of this letter.
Ammonia	No value listed in Tab 5, Section 4.3 or Section 8.1.	A 108,000 pound (31,000 gallon) inventory of 100% anhydrous ammonia is used to prepare concentrated ammonia solutions introduced into the yellowcake precipitation area during conventional ore processing. Ammonia in this form is added far downstream of feed area and is never in contact with ores or feeds. (These concentrations far exceed those identified in Tab 5, Sections 4 .3 and 8.1 of the April 2011 Amendment Request.)	Mill process description, 1991 RML renewal application and 2007 RML renewal application

b. *For review/documentation purposes, please provide an updated geomembrane manufacturer's product performance sheet listing chemicals and their chemical*

> *compatibility criteria for an HDPE geomembrane liner that is representative of the HDPE liners installed in Cells 4A and 4B.*

EFRI Response to Specific Comment 10b

Tailings from processing the Uranium Material will be disposed in Cell 4A, 4b or newer cells that may be constructed during the period of processing. Cells 4A and 4B are constructed of 60 mil high density polyethylene ("HDPE") manufactured by GSE and installed by Geosyntec Inc. The manufacturer's material product performance information, including a chemical resistivity list, is provided in Appendix P. Manufacturers generally do not include specific metal cations in chemical resistivity lists since synthetic liners are generally compatible (resistive to) metals, metal halide salts, and many other metal salts in all proportions.

Specific Comment 11

Reference Section 4.6 and Section 8.1 of Attachment 5 to the LAR (Application by Denison Mines (USA) Corp. ('Denison') for an amendment to State of Utah Radioactive Materials License No. 1900479 for the White Mesa Mill (the "Mill") from Dawn Mining Corporation ("DMC") Midnite Mine to process an Alternate Feed Material (the "Uranium Material") dated April 27, 2011):

a. *Provide additional information, including reference citations, to justify and support the identification of an appropriate revised range of values of the distribution coefficient (K_d) for barium for representing conditions at the White Mesa Mill Site, including the tailings environment in particular. Provide a discussion of how such a revised range of barium K_ds impacts the potential for barium to negatively affect groundwater beneath/downgradient of the tailings cells into which processed Uranium Material residuals would be placed. State and justify how the range of pH observed and expected in White Mesa tailings might affect the range of K_d values for barium for the processed Uranium Material residuals introduced into the tailings.*

b. *Provide additional information and one or more reference citation(s) to support the statement included in this section indicating that barium would be sufficiently represented by monitoring (groundwater) for calcium.*

c. *Provide additional information regarding the need to add barium as an additional monitoring parameter in the facility's groundwater monitoring plan, especially given that, under acid conditions, some (otherwise) water-insoluble barium compounds (e.g., barium sulfate) may become soluble and move into groundwater (e.g., see US EPA, 1984), and given the Groundwater Quality Standard value of 2 mg/l included in UAC R317-006.*

   Section 4.6 of the Request to Amend Radioactive Materials License, Denison Mines USA Corp. White Mesa Uranium Mill, San Juan County, Utah, and Environmental Report includes a statement that the distribution coefficient (K_d) for barium is 100 to 150,000 L/kg for sandy to clayey soil types and that Denison therefore concludes that barium *would be less mobile in groundwater than calcium. No reference sources are cited to support either the* K_d *range stated or the conclusion made regarding the relative mobility of barium compared to calcium, for conditions occurring at the White Mesa tailings Cells 4A and 4B. Kennedy et al. (1992; Table 6.7), for example, lists a* K_d *value of 52 mL/g for barium. EPA 2012 (Section 4.11 and Exhibit C-4 of Appendix C) provides a range of recommended* K_d *values for barium as a function of pH (e.g.,* $K_d = 52$ *mL/g at pH = 8.0,* $K_d = 41$ *mL/g at pH = 6.8, etc..., with* K_d *values decreasing with decreasing pH; the* K_d *value at pH = 4.9 is listed as 11 mL/g.) Allison 2005 referenced several citations reporting soil/water* K_d *values of barium all less than 10 L/kg, and cited several risk assessment studies that used* K_d *values ranging from 11 to 52 L/kg. By comparison, the UDEQ Statement of Basis for the Groundwater Discharge Permit indicates assumes* K_d *values for calcium ranging from 5 to 100 L/kg (i.e., equal to or higher than those reported in the above references for barium).*

Additionally, EFR has not provided information to describe or substantiate how the mobilization behavior for barium that may be expected to occur in the (e.g., acidic) tailings and the near-field tailings embankment environment may differ from, or be similar to, that of calcium. EPA (1984), for example, reported that barium, when present in the form of barium sulfate in soils, is not expected to be very mobile because of the formation of water-insoluble salts and its inability to form soluble complexes with humic and fulvic materials, but noted, however, that, under acid conditions, some of the water-insoluble barium compounds (e.g., barium sulfate) may become soluble and move into groundwater.

EFRI Response to Specific Comment 11a, b, and c

Introduction of the Uranium Material into the Mill's tailings impoundments would substantially increase the amount of barium currently stored (See response to Specific Comment 7). Barium is present in Midnite Mine WTP solids at concentrations in the range of 7,200 - 8,100 ug/g with barium present primarily as barium sulfate. Barium sulfate is one of the most insoluble sulfate salts: the solubility of barium sulfate in cold water is 0.022 mg/L and in concentrated sulfuric acid only increases to 0.025 mg/L (Handbook of Chemistry and Physics, 68th Edition). Geochemical modeling with the PHREdoxEQulibrium ("PHREEQC") modeling tools using this solubility data and the geochemical conditions present in the Mill tailings (average tailings sulfate concentration of 65 g/L) predicts that barium from the Uranium Material will remain stable in the tailings impoundment as the solid phase barium sulfate, and would not be expected to dissolve. Given the low solubility of barium sulfate, especially in the presence of sulfate, there is, therefore, no reasonable potential for barium to migrate from the tailings into groundwater.

A search of available literature regarding barium distribution coefficients (K_d), including the references provided in DRC's comment, above, revealed that the barium K_d can range from 0.3 to 164,000 L/kg for a variety of geologic materials, with lower values (less than 2,800 L/kg) being more typical for soils and sediments, and lower K_d values measured with decreasing pH (Table 7).

EFRI's request to amend the RML (Denison, 2011) indicated barium K_d values in the range of 100-150,000 L/kg for sandy to clayey soils (Lintott and Tindall, 2007). Detailed review of this reference indicates that the high K_ds reported in this reference are for pure clay. K_ds on the order of 1-390 L/kg were measured for three sandy loams, and all tests were performed at a pH range of 7.7-8.3. Rai et al. (1984) provide a range in K_d for sediments from 530-2,800 mL/g at pH 8. The references provided by UDEQ (Kennedy et al., 1992, EPA, 2002 and Allison, 2005) all indicate barium K_ds in the range 1-52 mL/g, with K_d decreasing with decreasing pH. Thibault et al. (1990) reports K_ds in the range of 0.3-9.3 mL/g, also with K_d decreasing with decreasing pH.

Considering the low solubility of barium sulfate, there is no reasonable expectation that barium would be released from the tailings into groundwater. Further, the range in barium K_d has considerable overlap with the range in calcium K_d (as reported in the DRC Statement of Basis for the Groundwater Discharge Permit ("GWDP"): 5 – 100 L/kg). Given the comparable K_ds for calcium and barium, if a hypothetical change in geochemical conditions were to occur causing the groundwater barium concentration to increase, a concomitant increase in calcium concentration would also be expected to occur. Therefore, barium does not need to be added to the list of analytes that is to be monitored at the site and that groundwater calcium concentration can be used as an indicator of barium concentrations: if an increasing trend in calcium concentration is observed, analysis for barium may, at that time, be considered.

Further, the Mill monitors for a number of other dissolved constituents, such as chloride, fluoride, and sulfate, each of which is an anion that is expected to have a higher mobility in groundwater than a cation such as barium. These anions can be used as indicators of potential tailings cell seepage, and because of their mobility, as 'early warning' indicators for less mobile constituents such as barium. Chloride in particular is a conservative solute that is not retarded with respect to groundwater flow. As discussed in Davis and DeWiest (1966) "All chloride salts are highly soluble, so chloride is rarely removed from water by precipitation except under the influence of freezing or evaporation. Chloride is also relatively free from effects of exchange, adsorption, and biological activity. Thus, if water once takes chloride into solution, it is difficult to remove the chloride through natural processes."

Table 7. Literature Search of Barium K_ds

Material	pH	Kd	Reference
Clay	7.7-8.3	-1 – 164,000 L/kg	Lintott & Tindall, 2007
Sandy Loam	7.7-8.3	1-390 L/kg	Lintott & Tindall, 2007
Sediment	8	530-2,800 mL/g	Rai et al. (1984)
HFO	Not specified	1.8-3.7 mL/g	Allison et al. (2005); Table 7
Soil	Not specified	11-52 mL/g	Allison et al. (2005); Appendix A
Soil	Not Specified	52 mL/g	Kennedy et al. (1992)
Soil	4.9-8.0	11-52 L/kg	EPA (2002); Exhibit C-4*
Sand	4.8	0.4-0.5 mL/g	Thibault et al. (1990)
Smectite Clay	7.5-7.8	0.3-9.3 mL/g	Thibault et al. (1990)

* EPA (2002) provides pH-dependent K_d values; values shown in table are for the two extreme pHs provided.

REFERENCES:

Allison, J.D. and T.L. Allison. 2005. Partition Coefficients for Metals in Surface Water, Soil, and Waste. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC (EPN600/R-OS/074). July.

Davis, S.N. and R. J. M. DeWiest. 1966. Hydrogeology. John Wiley and Sons, 463 p.

Denison Mines (USA) Corp (Denison). 2011. Request to Amend Radioactive Materials License Denison Mines (USA) Corp. White Mesa Uranium Mill San Juan County, Utah and Environmental Report. Prepared for Utah Department of Environmental Quality. April.

Kennedy, W.E. and D.L. Strenge. 1992. Residual Radioactive Contamination from Decommissioning - Technical Basis for Translating Contamination Levels to Annual Total Effective Dose Equivalent. Final Report, NUREG/CR-SSI2, PNL-7794, Vol. 1. October.

Lintott, D. and M. Tindal. 2007. Estimation of a Generic Adsorption Coefficient Kd for Barium. Prepared for BC Upstream Petroleum Environmental Task Group. July 3.

Rai D, Zachara JM, Schwab AP, et al. 1984. Chemical attenuation rates, coefficients, and constants in leachate migration. Vol. I: A critical review. Palo Alto, CA: Electric Power Research Institute, 6-1 to 6-6. Report EA-3356.

Thibault, D.H., M.I. Sheppard and P.A. Smith. 1990. A Critical Compilation and Review of Default Soil Solid/Liquid Partition Coefficients, K_d, for use in Environmental Assessments. Atomic Energy of Canada AECL-10125.

United States Environmental Protection Agency (USEPA). 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.

Weast, R.C. (ed.). 1987. CRC Handbook of Chemistry and Physics, 68th edition.

Specific Comment 12

Filter Press Pilot Testing Report: The report should include a log of all tests and test results so that the Division can independently review and evaluate them.

EFRI Response to Specific Comment 12

The Filter Press Pilot Testing Report, which was included in the December 2012 Supplemental Information (the "Report"), was developed for the EPA to assess technologies to reduce the waste volumes trucked from the Midnite Mine to disposal facilities. In June 2010, a dewatering test was performed on the Midnite Mine WTP sludge using a bench-scale plate filter. In order to provide additional detail regarding topics such as the percent solids of final filter cake, sizing of the sludge steady head tank, and number of press cycles per day, a pilot-scale filter press was leased and operated and the resulting filter cake analyzed, as described in the Report.

All relevant data collected in the field and from the laboratory are included in the Report text or tables which were submitted in December 2012. The tables present the tests performed, the test conditions, parameters, durations and the results of those tests. As described in the Report, field determination of percent dry solids was performed using a Seiko Moisture Analyzer, model DSH-50-10. Because the analyzer directly reports the percent solids, little intermediate data (% moisture, tare weight, etc.) were recorded. The difference in analyses between the Seiko analyzer and the laboratory results is due to the much longer drying time specified by the laboratory analytical method. No additional logs or data are available or necessary to understand or review the tests performed.

Specific Comment 13

Filter Press Pilot Testing Report: Page 3: Please discuss the relationship between the equipment used to perform the pilot tests reported in the document reviewed and that to be used in producing the filter cake that will actually be shipped to the White Mesa Uranium Mill for processing as alternate feed material. Describe differences in equipment that might affect the physical or radiological [properties of the filter cake shipped for processing. Describe measures that will be taken and documentation that will be provided to ensure that characteristics of filter cake shipped to White Mesa will not diverge in a substantive way from those reported in the pilot testing report.

EFRI Response to Specific Comment 13

The tests presented in the Report develop a reasonable range of Uranium Material characteristics and properties (e.g., moisture, density, metals and radionuclide content) that encompass and reasonably bound the material variability expected due to differences in filter equipment between the pilot test and full scale operations. The Uranium Material density ranged from 1.16 g/cc (72.4 lb/ft^3) to 1.34 g/cc (83.6 lb/ft^3) and moisture content varied from 59.3% to 65.4%.

There are no significant differences between the pilot-testing equipment and full-scale equipment, with the exception of the equipment size. Both the pilot- and full-scale presses use membrane squeeze and similar pressures for the membrane squeeze and residual material slurry feed. It is estimated that approximately 10 filter press runs will be performed per each approximate 20 cubic yard shipment. A Seiko (or similar) field moisture analyzer will be used to test for moisture content of the filter cake.

Composite filter cake field moisture content will be measured on a minimum of three filter press runs per shipment. Grab samples from the selected filter press runs will be composited and an average moisture content determined for each shipment from this composite sample. The number of filter press run samples used for each composite sample and the measured moisture content will be recorded on the attached Filter Press Moisture Content log sheet and a copy of the sheet will provided with the shipping papers of each shipment. If significant variability in composite moisture content is observed (i.e., greater than 15% moisture content between filter press runs) or if the moisture content is greater than 70%, filter cake will be tested more frequently for moisture content prior to shipping.

Specific Comment 14

Filter Press Pilot Testing Report: Page 4: The meaning of the phrase "extremely competent" is not clear and should be revised to eliminate ambiguity and clearly communicate the characteristics of the cake that was tested.

EFRI Response to Specific Comment 14

The phrase "…extremely competent,…" on page 4 of the referenced report is intended to indicate that the materials are dry, hard, and difficult to break with hand pressure. It is proposed that this clarification is sufficient and that the Report not be re-issued with this minor modification.

Specific Comment 15

Filter Press Pilot Testing Report: Page 9, Table 3, and Laboratory Report: The contradictory results reported for Thorium-233 concentrations should be resolved (page 9 and Table 3 indicate the Th-233 concentration to be 2.7 pCi/g while the Laboratory Report (page 5 of 15) indicates 2.4 pCi/g

EFRI Response to Specific Comment 15

We believe that the Th-230 results are correct as stated in the report. The laboratory report on page 5 of the Report shows a Th-230 concentration of 2.7 pCi/g and a minimum detectable concentration of 2.4 pCi/g.

Specific Comment 16

Filter Press Pilot Testing Report: Laboratory Report, Table 3: Describe how the values of the parameter named "Solids – Calculated (Lab)" were determined. Provide calculations prepared for each value reported. Explain the significance of differences between values reported for "Solids – Calculated (Lab)" and for "Solids – Field (Avg)".

EFRI Response to Specific Comment 16

The values of the "Solids – Calculated (Lab)" were determined by taking 100% and subtracting the Percent Moisture (laboratory reported value). For example, Test #2, Table 3.0, the laboratory result for percent moisture was 63.5%, subtracting from 100, the percent solids would be 36.5%.

The calculations for each test on Table 3 are as follows:

- Test #2 100% - 63.5% (laboratory reported percent moisture) = 36.5% (calculated percent solids)
- Test #3 100% - 65.4% (laboratory reported percent moisture) = 34.6% (calculated percent solids)
- Test #5 100% - 59.3% (laboratory reported percent moisture) = 40.7% (calculated percent solids)
- Test #6 100% - 64.1% (laboratory reported percent moisture) = 35.9% (calculated percent solids)

As stated on page 4, second paragraph, "The difference in analyses between the Seiko analyzer and the laboratory results is due to the much longer drying time specified by the laboratory analytical method." The Seiko analyzer uses an automatic mode to determine when a sample is dry by measuring the difference in weight over a period of time. This automatic mode can be adjusted to allow a longer drying time.

Specific Comment 17

Filter Press Pilot Testing Report: Laboratory Report: Please provide documentation and other evidence that identify relevant laboratory certifications held by Energy Laboratories.

EFRI Response to Specific Comment 17

Attached to this letter as Appendix Q, are the following documents identifying relevant certifications held by Energy Laboratories related to testing performed for the Uranium Material studies.

- National Environmental Laboratory Accreditation Program (NELAP based on accreditation by State of Florida)
- EPA Region VIII, Drinking Water Contaminants
- Utah Environmental Laboratory Certification Program

Specific Comment 18

Tab (Attachment) 5, Table 6: Please verify the accuracy/correctness of calculations and/or explain as appropriate (in a revised updated version of Section 8.0 of Attachment 5) the significance of computational results listed for certain constituents in Table 6 of Attachment 5 to the April 27, 2011 Amendment Request. The projected percentages of the total mass in the tailings disposal cells after completion of processing of the Uranium Material (processing of shipments of the DMC Uranium Material periodically received over a 10-year period) contributed by some constituent inventories (e.g., barium, copper, manganese, silver, beryllium, calcium, etc...) appear to be relatively high.

EFRI Response to Specific Comment 18

Attachment 5, Table 6 of the April 2011 Amendment Request has been reviewed and the accuracy/correctness of the calculations have been verified. Although the projected percent total contributed to the tailings of the constituents mentioned by the reviewer are between 5 and 100 percent, the estimated mass contributed to the tailings from these constituents is less than 0.02% of the estimated mass in the tailings cell. Revised text for Section 8 of Attachment 5 of the April 2011 Amendment Request is included as Appendix R of this letter.

References

NRC, 1979 US Nuclear Regulatory Commission (NRC). Regulatory Guide 8.21, Health Physics Surveys for Byproduct Material at NRC Licensed Uranium Processing and Manufacturing Plants. Revision 1. October , 1979.

NRC, 1980 US Nuclear Regulatory Commission (NRC). Regulatory Guide 4.14, Radiological Effluent And Environmental Monitoring At Uranium Mills. Revision 1. April, 1980.

USGS, 2001 US Geological Survey, Environmental Canada Climate Information Branch, National Water Conditions. pH of Precipitation for November 26-December 23, 2001. http://water.usgs.gov/nwc/NWC/pH/html/ph.html

If you have any questions, please contact me at (303) 389-4132.

Yours very truly,

JoAnn Tischler

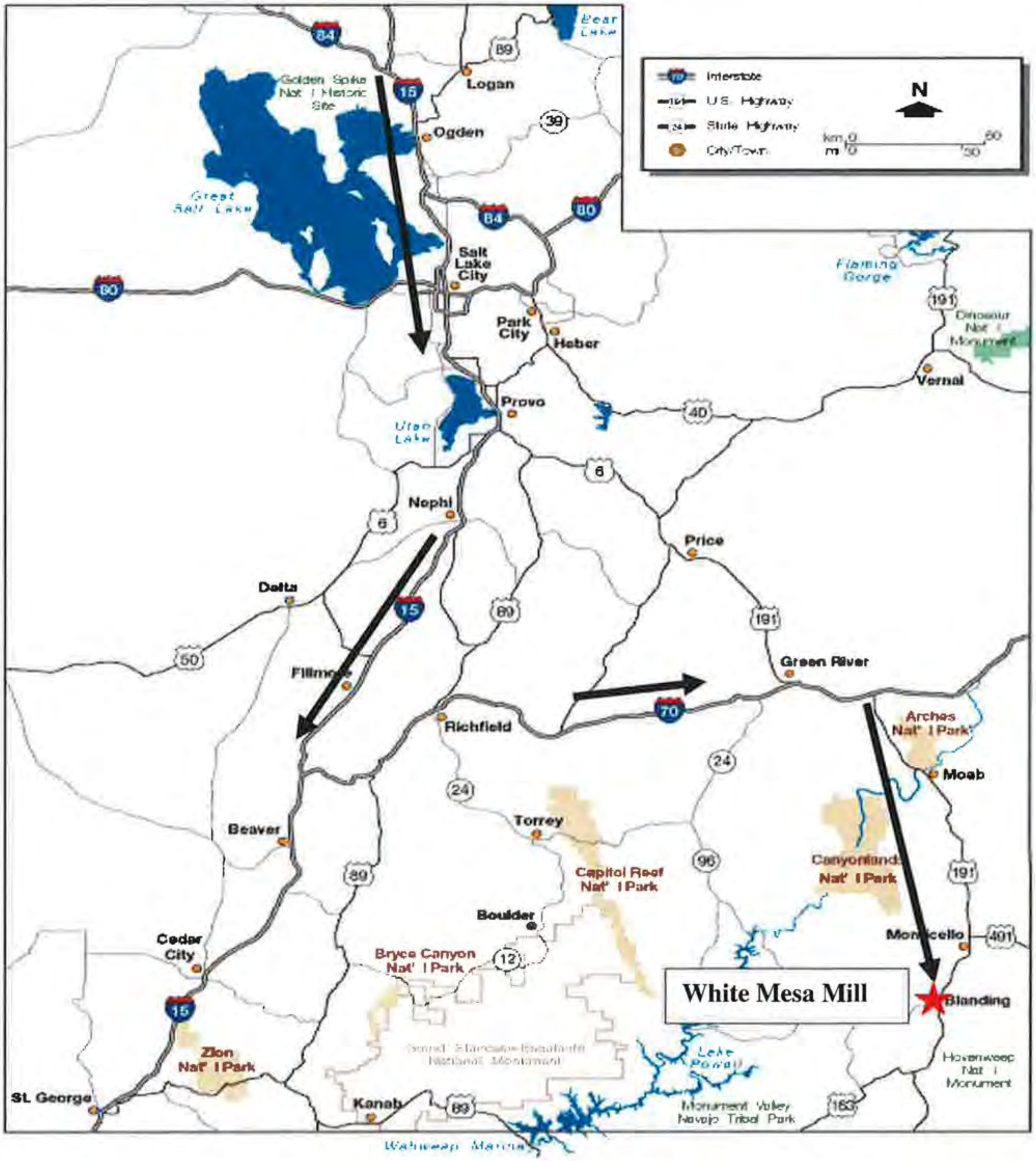
ENERGY FUELS RESOURCES (USA) INC.
Jo Ann Tischler
Manager, Compliance and Licensing

cc David C. Frydenlund
Phil Goble, Utah DRC
Dan Hillsten
Ryan Johnson, Utah DRC
Ronnie Nieves
Harold R. Roberts
David E. Turk
Kathy Weinel

Attachments

Figure

Figure 1. Primary Transportation Corridors in Utah



Uranium Material Transportation Route In Utah ➞

Appendix A

Technical Evaluation Report For NRC License Amendment 7

TECHNICAL EVALUATION REPORT

DOCKET NO. 40-8681 LICENSE NO. SUA-1358

DATE: August 21, 1998

LICENSEE: International Uranium (USA) Corporation

FACILITY: White Mesa Uranium Mill

PROJECT MANAGER: James Park

TECHNICAL REVIEWER: Duane Schmidt

SUMMARY AND CONCLUSIONS:

As part of its corrective actions taken in response to a Notice of Violation (NOV) issued by NRC on August 12, 1997, International Uranium (USA) Corporation (IUC) requested an amendment to Source Material License No. SUA-1358 for the White Mesa uranium mill. By letter dated December 3, 1997, IUC requested approval of a proposed modification to the in-plant air monitoring program committed to in its approved license application. IUC provided additional information by letter dated March 23, 1998, in response to comments received from the NRC staff.

The staff has reviewed IUC's proposal and found it acceptable with slight modifications. These modifications were discussed with IUC and agreed to in a telephone call on July 20, 1998.

DESCRIPTION OF LICENSEE'S AMENDMENT REQUEST:

By letter dated December 3, 1997, IUC requested an amendment to SUA-1358 to modify in-plant air monitoring commitments made in its approved license application. IUC's request was part of its corrective actions taken in response to an NOV issued by the NRC on August 12, 1997, as a result of the staff's routine inspection of the White Mesa mill on July 15-17, 1997. By letter dated March 23, 1998, IUC provided additional information in response to a February 13, 1998, written request from the NRC staff.

By its submittals, IUC proposed that License Condition 11.4 of SUA-1358 be revised, in part, to require that (1) annual air samples be taken, during operational periods, in routinely or frequently occupied areas and analyzed for gross alpha radioactivity, and (2) isotopic analyses of operational mill feed or production product be performed for natural uranium, thorium-230, radium-226, and lead-210 to assess the composition of air particulates.

Depending on the results of the isotopic analyses, derived air concentration (DAC) values would be determined for different mixtures of radionuclides, with the result that various areas in the mill would have a DAC value applied that is most appropriate for the radionuclide mixture likely to be present in air samples in that area. IUC considers that the mill site can be separated into four areas for this purpose: (1) the ore handling and storage area, where uranium and its progeny is expected to be in equilibrium; (2) the uranium precipitation circuit, where only soluble uranium is expected to be present; (3) the uranium drying, packaging, and calciner area, where only uranium in a moderately insoluble form would be present; and (4) the tailings area, where uranium and its progeny would be present in disequilibrium, as separation has been attained.

IUC stated that approval of its proposed modifications will result in the collection of more meaningful isotopic data than that currently collected, and at a reduced expense to the company.

TECHNICAL EVALUATION:

Currently, in its approved license application, IUC has committed to taking an annual eight-hour, in-plant airborne radioactivity sample and analyzing the sample for natural uranium, thorium-230, radium-226, lead-210, and polonium-210. In accordance with License Condition No. 11.4, IUC is authorized to eliminate this annual sample, during extended periods of mill standby, if routine airborne sampling show levels below ten percent of the appropriate 10 CFR Part 20 limits.

At issue in the licensee's proposal is an appropriate method for performing measurements to determine the isotopic composition of the airborne radioactive particulates in plant areas to which workers are, or may be, exposed. As a result of the uranium extraction process in the mill, the concentrations of the airborne radioactive particulates are expected to vary around the mill. Appropriate area-specific DACs (based on the mixture of radionuclides present) can be used (1) to determine whether measured air particulate concentrations (often gross alpha measurements) are acceptable, and (2) in the determination of worker radiation exposures. These determinations are necessary primarily for the licensee to ensure compliance with the worker dose limits of 10 CFR Part 20, Subpart C.

IUC believes that the ability to sample much larger quantities of the mill feed or product materials would provide at least as accurate information regarding the radionuclide composition of potential airborne contaminants as does the current air sampling method. The NRC staff agrees that the larger sample sizes possible with the proposed method should improve the validity of the results on radionuclide composition.

The staff also considers that the sampling of the mill feed materials should allow for the early identification of materials that are significantly different, in terms of radionuclide composition, from natural ores processed at the mill, an issue of some importance considering the processing of alternate feedstock materials. As a result, IUC would be able to evaluate the need for changes to DAC values for various areas of the plant commensurate with the material being processed. Thus, the NRC staff concludes that the proposed approach should be valid for the purpose of determining DAC values for the different areas of the mill. The staff cautions that the use of this approach depends on accurate determinations, in advance, of how the isotopic composition of the mill feed and product may impact the isotopic composition of air particulates in the different mill areas.

A second issue with the proposed license amendment is the appropriateness of the proposed approach for extended periods of mill standby. IUC did not specifically address this issue in its submittals. However, during mill standby, there would be no mill feed or product to sample. Thus, it appears to the NRC staff that, if isotopic results are needed for DAC or dose calculations during periods of standby, the licensee can make use of previously determined values, or base calculations on other knowledge of the likely airborne contaminants during standby conditions. Such an approach would generally be acceptable.

Finally, approval of this request will not impact the regular weekly and monthly in-plant radiation monitoring conducted by IUC.

Therefore, the staff finds IUC's proposed approach to be acceptable. However, the staff considers that an annual analysis of mill feed or product materials may not be frequent enough, in light of IUC's past and anticipated future processing of various alternate feed materials in addition to natural uranium ore. Therefore, the staff will require that IUC perform an isotopic analysis of mill feed or product materials any time a new feed material is introduced into the mill process. IUC agreed to this modification by telephone on July 20, 1998.

RECOMMENDED LICENSE CHANGE:

License Condition 11.4 of SUA-1358 will be modified, in part, as follows:

> Annually, the licensee shall collect, during mill operations, a set of air samples covering eight hours of sampling, at a high collection flow rate (i.e., greater than or equal to 40 liters per minute), in routinely or frequently occupied areas of the mill. These samples shall be analyzed for gross alpha. In addition, with each change in mill feed material or at least annually, the licensee shall analyze either the mill feed or production product for U-nat, Th-230, Ra-226, and Pb-210 and use the analysis results to assess the fundamental constituent composition of air sample particulates.
>
> [Applicable Amendment: 7]

ENVIRONMENTAL IMPACT EVALUATION:

Because this change in IUC's in-plant radiation monitoring program 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

Revised Amendment Request Text

REQUEST TO AMEND
RADIOACTIVE MATERIALS LICENSE
~~DENISON MINES (USA) CORP~~ENERGY FUELS RESOURCES (USA) INC.
WHITE MESA URANIUM MILL
SAN JUAN COUNTY, UTAH
AND
ENVIRONMENTAL REPORT

~~for Processing of~~
~~Alternate feed Material from~~
~~Sequoyah Fuels Corporation~~

Prepared for:

Utah Department of Environmental Quality
Division of Radiation Control
P.O. Box 144850
Salt Lake City, UT 84114-4850

Prepared by:

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~~April 2011~~May 2013

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Attachment 4	Review of Chemical Contaminants in Dawn Mining Company (DMC) Midnite Mine -Uranium Material to Determine the Potential Presence of RCRA Characteristic or RCRA Listed Hazardous Waste
Attachment 5	Review of Chemical Contaminants in Dawn Mining Company Midnite Mine (DMC) Uranium Material to Determine Worker Safety and Environmental Issues and Chemical Compatibility at the ~~Denison~~EFRI Mines White Mesa Mill

1.0 INTRODUCTION

1.1 White Mesa Mill

~~Denison Mines~~Energy Fuels Resources (USA) ~~Corp~~Inc. ("~~Denison~~EFRI") operates the White Mesa Uranium Mill (the "Mill") located approximately six miles south of Blanding, Utah. The Mill processes natural (native, raw) uranium ores and alternate feed materials. Alternate feed materials are uranium-bearing materials other than natural ores that meet the criteria specified in the United States Nuclear Regulatory Commission's ("NRC's") *Interim Position and Guidance on the Use of Uranium Mill feed Material Other Than Natural Ores* (November 30, 2000) (the "Alternate Feed Guidance"). Alternate feed materials are processed as "ore" at the Mill primarily for their source material content. As a result, all waste associated with this processing is 11e.(2) byproduct material.

1.2 Proposed Action

This is a request for an amendment to State of Utah Radioactive Materials License No. UT 1900479 to authorize receipt and processing of certain uranium containing materials. These materials are Water Treatment Plant ("WTP") solids resulting from treatment of natural uranium mine storm water and ground water collected from Pit 3 and Pit 4 at the Midnite Mine in Wellpinit, WA, an inactive uranium mine owned by the Dawn Mining Company ("DMC"). For ease of reference, the uranium bearing material that results from this water treatment process described further in Section 2, is referred to herein as "Uranium Material".

1.3 Purpose of Action

The Uranium Material contains greater than 0.05% uranium on both a wet and dry basis. A radioactive materials license issued by the Washington State Department of Health (WN-I0390-1) was held for the Midnite Mine WTP through December 31, 2008. After December 31, 2008, the license was terminated and the regulatory authority for the Midnite Mine WTP facility and the Uranium Material was transferred to the U.S. Environmental Protection Agency ("EPA") as part of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), also known as Superfund. Through December 31, 2008, the Uranium Materials were processed offsite as an alternate feed material at DMC's Uranium Mill near Ford Washington for its source material content. The processing facility at the Dawn Mill has been decommissioned and processing of the Uranium Material is no longer possible at that location. After December 31, 2008 the uranium material was and is currently accepted at the Dawn Mill tailings disposal facility for direct disposal as source material in accordance with the United States Nuclear Regulatory Commission (NRC) Guidance on Disposal of Atomic Energy Act Non-Section 11e.(2) Byproduct Material in Tailings Impoundments (November 2000). Following the 2010 operational season, direct disposal in the tailings impoundment is no longer an option.

~~Denison~~ EFRI has been requested by DMC to make this application to process the Uranium Material as an alternate feed material at the Mill and to dispose of the resulting tailings in the Mill's tailings impoundments as 11e.(2) byproduct material. Approval of this application will allow the recovery of valuable uranium, a resource that would otherwise be lost to direct disposal and will afford DMC a cost effective and productive mechanism for managing the material generated as part of the Midnite Mine reclamation.

1.4 Amendment Application and Environmental Report

This application is intended to fulfill the requirements of an application for an amendment to the Mill's Radioactive Materials License set out in Utah Administrative Code ("UAC") R313-22-38 and includes the Environmental Report required by UAC R313-24-3 to be contained in such an application.

2.0 MATERIAL COMPOSITION AND VOLUME

2.1 General

The Midnite Mine Superfund Site ("Site") is an inactive open-pit uranium mine that is currently administrated by EPA Region 10 under CERCLA, also known as Superfund. The Site EPA Identification Number is WA980978753. The Site is located on the Spokane Indian Reservation in eastern Washington State, approximately 48 air miles northwest of Spokane (Attachment 1). These lands are owned by the federal government and held in trust for the Spokane Tribe of Indians ("Tribe") and individual tribal members.

Uranium was discovered on the site in 1954. The prospectors and several tribal members subsequently formed Midnite Mines, Inc. and acquired the mining leases at the Site. Midnite Mines, Inc. subsequently joined with Newmont Mining Company ("Newmont") to create DMC, with Newmont Mining Company as the 51 percent shareholder and Midnite Mines, Inc. owning 49 percent. Newmont USA Limited is the corporate successor of Newmont Mining Company and continues to be the majority shareholder of DMC.

The mine operated from 1954 until 1965, providing uranium under contracts with the United States Atomic Energy Commission ("AEC"). The mine went into standby from 1965 and resumed mining in 1969. The ores were milled at the Dawn Mill site, located near Ford, Washington. Mining was suspended in 1981 due to decreases in uranium prices and never resumed. The Mine was regulated by several United States Department of the Interior ("USDOI") agencies, including the U.S. Geological Survey, U.S. Bureau of Mines, and U.S. Bureau of Land Management ("BLM") Minerals Management Service. The Bureau of Indian Affairs ("BIA") represented the Tribe and individual tribal allotment owners in matters related to leases and royalties.

An estimated 5.3 million tons of ore and proto-ore (i.e. low-grade mineralized rock) and 33 million tons of waste rock were removed from nine pits between 1955 and 1981. All but two of the mine pits have been backfilled. The last two pits to be mined consisted of Pit 3 and Pit 4, these pits were not backfilled and remain open. Several reclaimed waste rock piles remain on the mine property and an estimated 2.4 million tons of ore and proto-ore were stockpiled and currently remain on the Site.

In the late 1970s, seeps with dissolved ore-derived constituents were observed at the toe of the largest waste rock piles at the Midnite Mine. The BLM ordered DMC to construct a control pond (the Pollution Control Pond, or "PCP") in 1979 to capture the seeps for evaporation. Following the suspension of mining in 1981, DMC began pumping water from the PCP to the now inactive Pit 3 in response to growing quantities of water in the PCP and newly identified seeps at the base of the largest waste rock pile. Since cessation of mining operations, mine site surface runoff water has been collected in engineered channels and diverted to the inactive open mining pit, Pit 3. In addition, natural ground water from the ore zones of the pits has flowed into and accumulated in the two open mining pits, Pit 3 and Pit 4, at the site. In February of 1985, DMC applied to the EPA for a National Pollution Discharge Elimination System ("NPDES") permit to allow for the discharge of treated water from those pits and other waters collected on the site. In September of 1986, the EPA issued DMC an NPDES permit.

In 1987 a Compliance Order was issued by EPA under the Clean Water Act ("CWA") NPDES program requiring DMC to eliminate discharges of pollutants to waters of the United States in excess of the limits in the existing NPDES Permit. Subsequently, DMC developed a seep collection and pumpback program that collected water from Site drainages and returned them to the PCP and Pit 3. Existing seep and surface water collection occurs at six specific locations throughout the Midnite Mine Site as part of this seep collection and pumpback program including the PCP. Pit 3 water consists of mine site waters collected and pumped from the seep collection and pumpback program, direct precipitation and local mine surface runoff in the immediate area of Pit 3, and natural ground water inflow from the Pit 3 ore zones. The water that accumulates in Pit 4 consists of direct precipitation, groundwater inflow, and surface runoff in the immediate area of Pit 4. All waters collected in the seep collection and pumpback system are derived from seeps from waste rock piles or surface runoff at the Site. The seep collection and pumpback system does not collect water from any areas that have ever been known to contain or currently contain any listed hazardous wastes or from any operations other than the mining of natural uranium ores.

In 1988, a water treatment plant ("WTP") was constructed to treat the accumulating water in the open pits. The WTP began treating water in 1992. The Washington Department of Health ("WDOH"), under the authority of the Nuclear Regulatory Commission ("NRC") Agreement State Program, issued a Radioactive Materials License (WN-I0390-1) in 1992 for the Uranium Material, which contains greater than 0.05% uranium. This License was terminated by the State of Washington in December 31, 2008. Operation of the WTP since that time has been administrated by the EPA under CERCLA.

There are no shop areas, petroleum tanks, or other sources of hydrocarbons at the mine site, with the exception of a 300 gallon diesel fuel tank for the Pit 4 pump, and a 300 gallon tank of gasoline for WTP equipment. The diesel fuel tank and pump are located in secondary containment near Pit 4 with a maximum volume stored of 300 gallons and the 300 gallon gasoline tank is located next to the WTP. These fuels are stored and managed separately from the Uranium Material and have not impacted the Uranium Material in the past nor do they have a reasonable potential to do so in the future. The constituents precipitated from the WTP influent are derived from flow of natural precipitation through uranium mine waste rock and natural ore, collected surface runoff from natural materials, and natural ground water inflow from the ore zones into one of the two remaining open pits, Pit 3 and Pit 4 as discussed above.

In 1998, EPA performed an Expanded Site Investigation ("ESI") and scored the Site using the Hazard Ranking System ("HRS") to determine the eligibility of the Site for inclusion on the National Priorities List (NPL). A Record of Decision ("ROD") was signed on September 29, 2006, which established the Selected Remedy for the Site. Part of the Selected Remedy for Operable Unit 1 (Mined Area and the Mining Affected Area, which includes Pit 3 and Pit 4) included long-term treatment of contaminated seeps and pit water, with on-site discharge of treated water in compliance with interim discharge limits. The Dawn Mill tailings facility is scheduled for reclamation in the near future, and continued direct disposal of the Uranium Material at the Dawn Mill will not be allowed or possible beyond the 2010 operating season. DMC desires to recycle the Uranium Material at the Mill in lieu of direct disposal as a means to disposition of the material.

2.2 Historical Summary of Sources

The WTP is a conventional lime treatment high-density solids process in which the metals and uranium are precipitated out in the treatment process, and includes addition of barium chloride for radium removal. A polymer coagulant is added and the resultant slurry is settled and filtered to produce a solution free of solids for surface discharge under the CWA NPDES program and EPA CERCLA program. The precipitate is currently centrifuged, and the final solids contain on average 0.18 wet weight percent uranium (0.21 wet weight percent U_3O_8) at an average historical solids content of 15 percent. However, the centrifuges are to be replaced with a hydraulic filter press in 2011, increasing the percent solids of the final Uranium Material to between 25% and 45%, resulting in a proportional increase in weight percent uranium estimated to be between 0.3 and 0.55 wet weight percent uranium (0.35 and 0.63 wet weight percent U_3O_8). As uranium ores and alternate feed materials are typically evaluated on a dry percent U_3O_8 basis, the actual (dry) percent U_3O_8 of the Uranium Material is estimated to be approximately 1.45 percent U_3O_8.

The WTP is typically operational from early May through the end of October and operates 24 hours per day, four days per week. WTP influent is derived from approximately 400 gallons per minute ("gpm") influent from Pit 3 and approximately 50 gpm influent from Pit 4. The pit waters are pumped to the WTP using positive displacement pumps which are piped separately to the WTP through polyethylene piping. The WTP reagents are pre-mixed in individual mixing tanks prior to addition to the treatment stream. The hydrated lime and flocculent are pre-mixed using makeup water from Pit 4, while the barium chloride is mixed with potable water.

Barium chloride is added to the influent water stream, which is then mixed with approximately 90 gpm from the clarifier bottoms (clarifier underflow) to increase the overall final WTP solids density. Then hydrated lime is added for the precipitation of uranium and metals. Waters recovered from the dewatering process are also added back to the process stream at this point. An anionic water soluble polymer (Neo Solutions, NS-6852) is subsequently added as a coagulant to facilitate clarification.

This process stream is then sent to one of two clarifiers. The precipitated solids are drawn from the clarifier bottom and, as mentioned previously, approximately 20% of the clarifier underflow (approximately 90 gpm) is pumped back to the beginning of the process to increase overall WTP solids density. The liquid fraction of the remaining process stream (approximately 360 gpm) is decanted from the top of the clarifier for further treatment and discharge separately from the solids, while the remaining solids fraction from the clarifier underflow is sent to the centrifuge for dewatering. The centrifuge will be replaced for the 2011 operating season with a hydraulic filter press as discussed in more detail below. A more detailed description of this process is provided in the Technical Memoranda included in Attachment 4.

The dewatered solids are currently transferred from the centrifuge to the transport truck via a discharge conveyor. The transport truck is housed within the WTP building and remains in that location until it is hauled for final disposal, thereby eliminating any opportunity for other waste materials to be introduced into the Uranium Material.

The time period from 2001-2008 is the most representative of treatment volumes processed in the WTP. Before this time period, pit dewatering and other site activities increased the volumes treated. Therefore these are the years used for this analysis.

From 2001 through 2008 the WTP process produced between 164,000 dry lbs and 393,500 dry lbs per year (or 82 to 194 dry tons per year) of treatment solids (average 294,700 dry lbs or 147 dry tons). The maximum annual total volume of Pit water treated was approximately 76.5 million gallons for the period of 2001 through 2008. Volumes vary depending on how much precipitation the site receives in a given year.

The plant will be modified for the 2011 operational season, and the centrifuges currently used for Uranium Material dewatering will be replaced by a hydraulic filter press. It is expected that the same water soluble polymer will be used for coagulation; however the polymer application rate may be increased from the current rate to improve the dewatering characteristics of the solids. The Uranium Material solids percent is expected to increase from an average of 15 weight percent solids to between 25 and 45 percent. The total wet concentrations of the constituents present in the Uranium Material are expected to increase by 67 to 300 percent from the analytical values reported for the current Uranium Material as a result of decreased water content due to dewatering with the filter press.

In addition, a Remedial Investigation/Feasibility Study (RI/FS) was completed on 9/30/05 for the Midnite Mine. The Selected Remedy for the Site is Alternative 5a (Complete Pit Backfill with Passive Drains and Ex-Situ Water Treatment) of the FS. Based on the FS and issued in the Record of Decision (ROD) as the Selected Remedy ("Remedy), Pits 3 and 4 will be backfilled, waste rock and proto-ore will be moved and capped, and a new passive water collection system will be installed to capture groundwater from these and other backfilled pit areas. The surface water management will be designed to divert surface flows around sources of contamination and therefore minimize the volume of water to be treated after the Remedy is implemented. The existing WTP is located on a waste rock pile that must be removed for the Remedy. Therefore, a new water treatment plant will be built before construction of the Remedy begins. It is estimated that the construction will begin in the beginning of 2013 and will require approximately 2 years ending at the end of 2014, and the new WTP must be capable of treating water at a rate of 1,000 gpm year round for the construction phase. It is likely that the new WTP will be comparable to the current treatment employed using lime and barium addition for removal of constituents from the feed water. This higher design flow will allow for rapid dewatering of the pits during backfilling, as well as groundwater collection and surface water collection treatment. After construction, it is expected that the flows will be reduced to an ultimate annual value of 65 million gallons and will take an estimated 6 to 7 years to reach these reduced flows.

The water quality during construction is assumed to be the same composition as currently is captured and treated, and it is expected that the water quality after implementation of the Remedy will be improved from current water quality.

2.3 Quantity of Uranium Material

As discussed above, the WTP is expected to generate approximately 190 dry tons of Uranium Material per year. This is based on a total flow rate of 450 gpm, four days per week for 6 months of the year into the WTP, with an average dry concentration of 1.54 percent U_3O_8. On an annualized basis, this equates to approximately a 180 gpm continuous inflow rate into the WTP throughout the year. As part of the Remedy, a new water treatment plant will be constructed over the two-year period commencing in 2013[1]. During the two-year construction period, the new plant will treat water at a rate of 1,000 gpm continuously throughout each of the two years. This represents an increase in water flow from 180 gpm, on an annualized basis, to 1,000 gpm. Accordingly, during the two years of construction the amount of Uranium Material to be produced will increase proportionately from approximately 190 dry tons per year to approximately 1,000 dry tons per year, to accommodate drainage of Pits 3 and 4.

After the new plant has been constructed, the influent rates into the new plant are expected to revert to the pre-construction rates resulting in the generation of approximately 190 dry tons of Uranium Material per year. This annual amount is expected to be reduced annually over the next 6 to 7 years, ending in a steady state rate of generation of approximately 18.3 dry tons of Uranium Material per year, indefinitely. The following table summarizes the anticipated amounts of Uranium Material to be generated over the first ten year period.

Year	Anticipated Quantity of Uranium Material (tons)
1	190
2	190
3	996
4	996
5	190
6	155
7	121
8	87
9	52
10	18
10-year interim total	2995

Although the foregoing estimates are based on reasonable engineering calculations assumptions, experience has demonstrated that for excavation remediation projects, such estimates typically underestimate the amounts of materials ultimately produced. ~~Denison~~EFRI, therefore, considers it to be appropriate to increase the foregoing estimate by 50 percent, as was done for other alternate feed materials of this type.

Accordingly, this is a request for a license amendment to authorize the Mill to receive and process up to 4,500 dry tons of Uranium Material, and to dispose of the resulting tailings as 11e.(2) byproduct materials in the Mill's tailings impoundments.

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[1] This is not to be confused with the modifications being made to the existing WTP in 2011, when the current centrifuges will be replaced with a hydraulic filter press that is intended to reduce the water content of the Uranium Material.

2.4 Radiochemical Data

As noted, the process history demonstrates that the Uranium Material results from treatment of natural mine water that is accumulated in inactive mine pits created during uranium mining. DMC has estimated that the current Uranium Material has a uranium content of approximately 0.18 wet weight percent natural uranium (0.21 wet weight percent U_3O_8). The modifications to the WTP anticipated to occur in 2011 are estimated to increase the uranium content to between 0.3 and 0.55 percent natural uranium (wet weight basis) or 0.35 and 0.65 wet weight percent U_3O_8). As uranium ores and alternate feeds are typically evaluated on a dry percent U_3O_8 basis, the actual (dry) percent U_3O_8 of the Uranium Material is estimated to be approximately 1.~~4~~5 percent U_3O_8. These modifications to the WTP are expected to increase the constituent concentrations by 67 to 300 percent. Thorium 232 content will likely range from 0.0013 to 0.002 percent on a dry basis. A more detailed radiological characterization of the Uranium Materials is contained in the Radioactive Materials Profile Record ("RMPR") (Attachment 2). The radionuclide activity concentrations of the Uranium Material (on a dry basis) are consistent with higher-grade Arizona Strip breccia pipe ores and a number of alternate feed materials which the Mill is currently licensed to receive as previously approved by the NRC and Utah Division of Radiation Control ("DRC").

2.5 Physical and Chemical Data

Physically, the Uranium Materials are WTP solids with no free liquid, consisting of finely graded solids containing residual amounts of uranium and other metals. The Uranium Material will be relatively moist, with an average moisture content of approximately 55-75%. However, this moisture consists of chemically bound water of hydration, and a minor amount of moisture held in capillary tension. That is, the Uranium Material contains little or no moisture as free water or pore water. The water of hydration will remain chemically bound regardless of applied mechanical forces. Just as the proposed filter press will not release the bound water in the WTP, forces from subsequent handling, such as the pressure from vibration in transit or stacking on the ore pad, will not release the bound water in those settings. The generator's information in the RMPR in Attachment 2 also attests that there is no free water associated with these solids. Photo Number 1, attached to the RMPR, demonstrates the Uranium Material's ability to maintain integrity of form with no seepage of free water, at the moisture contents described above.

The chemical characterization data for the Uranium Materials is also set out in the RMPR (Attachment 2). As with the radionuclides and as discussed in more detail in Section 4.4 below, all the chemical constituents in the Uranium Material have either been reported to be, or can be assumed to be, already present in the Mill's tailings system or were reported in other licensed alternate feeds, at levels generally comparable to or higher than those reported in the Uranium Materials.

2.6 Comparison to Other Ores and Alternate Feed Materials Licensed for Processing at the Mill

2.6.1 Ores and Alternate Feed Materials With Similar Radiological Characteristics

With an average uranium content of approximately 1.45% U_30_8, on a dry weight basis the uranium content of the Uranium Material is comparable to a relatively high-grade Arizona Strip breccia pipe uranium ore, which typically range from approximately 0.4% to 2% or higher U_3O_8. However the uranium daughter products in the Uranium Material are generally lower than for comparable Arizona Strip ores, resulting in the Uranium Material generally having a lower radiological hazard.

The concentrations of Ra-226, Th-230 and Pb-210 are lower in the feed as a result of the lower concentrations in the feed water to the treatment plant. The concentrations of these daughter products are lower in the feed water than the concentrations typically found in ore due to the limited solubility in groundwater.

The estimated average content of Thorium 232 ("Th-232") is approximately ~~0.005~~0.00076% on a dry basis. This is well below the levels of Th-232 that the Mill has been licensed to process in the past. For example the average concentrations of Th-232 in the W.R. Grace, Heritage and Maywood alternate feed materials are approximately 7.27%, 1.08% and 0.88% respectively.

The activities of Ra-226, Th-230 and Pb-210 of approximately 24.1 pCi/L, 20.7 pCi/L and 33.3 pCi /L (on a dry basis) are all well below the corresponding activities of 825 pCi/L, for each of those radionuclides, typically associated with Colorado Plateau Ore of 0.25% U_3O_8.

2.6.2 Ores and Alternate Feed Materials With Similar Chemical/Metal Characteristics

The Uranium Material is simple and more benign in chemical composition than many previously approved alternate feed materials that the Mill has processed. As discussed in more detail in Section 4.5 below, all the constituents in the Uranium Material have either been reported to be, or can be assumed to be, already present in the Mill's tailings system or were reported in other licensed alternate feeds, at levels generally comparable to or higher than those reported in the Uranium Material.

3.0 REGULATORY CONSIDERATIONS

3.1 Alternate Feed Guidance

The Alternate Feed Guidance provides that if it can be determined, using the criteria specified in the Alternate Feed Guidance, that a proposed feed material meets the definition of "ore", that it will not introduce a hazardous waste not otherwise exempted (unless specifically approved by the EPA (or State) and the long term custodian), and that the primary purpose of its processing is for its source material content, the request can be approved.

3.2 Uranium Material Qualifies as "Ore"

According to the Alternate Feed Guidance, for the tailings and wastes from the proposed processing to qualify as 11e.(2) byproduct material, the feed material must qualify as "ore". NRC has established the following definition of ore: "Ore is 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 Uranium Material is an "other matter" which will be processed primarily for its source material content in a licensed uranium mill, and therefore qualifies as "ore" under this definition. Further, the uranium concentration of the Uranium Material is greater than 0.05 percent on both a wet and dry basis, thereby causing the Uranium Material to also meet the definition of source material.

3.3 Uranium Material Not Subject to RCRA

3.3.1 General

The Alternate Feed Guidance currently provides that if a proposed feed material contains hazardous waste, listed under Section 261.30-33, Subpart D, of 40 CFR (or comparable Resource Conservation and Recovery Act ("RCRA") authorized State regulations), it would be subject to EPA (or State) regulation under RCRA. However, the Guidance provides that if the licensee can show that the proposed feed material does not consist of a listed hazardous waste, this issue is resolved. NRC guidance further states that feed material exhibiting only a characteristic of hazardous waste (ignitable, corrosive, reactive, toxic) that is being recycled, would not be regulated as hazardous waste and could therefore be approved for extraction of source material, unless it is a residue from water treatment. The Alternate Feed Guidance concludes that if the feed material contains a listed hazardous waste or in the case of a water treatment residual, a characteristic hazardous waste, the licensee, can process it only if it obtains EPA (or State) approval and provides the necessary documentation to that effect. The Alternate Feed Guidance also states that NRC staff may consult with EPA (or the State) before making a determination on whether the feed material contains hazardous waste.

Subsequent to the date of publication of the Alternate Feed Guidance, NRC recognized that, because alternate feed materials that meet the requirements specified in the Alternate Feed Guidance must be ores, any alternate feed materials that contain greater than 0.05% source material are considered source material under the definition of source material in 10 CFR 40.4 and hence exempt from the requirements of RCRA under 40CFR 261.4(a)(4). See *Technical Evaluation Report Request to Receive and Process Molycorp Site Material* issued by the NRC on December 3, 2001 (the "Molycorp TER"). As a result, any such alternate feed ores are exempt from RCRA, regardless of whether they would otherwise have been considered to contain listed or characteristic hazardous wastes. Since the Uranium Material contains greater than 0.05% source material, it is exempt from RCRA, regardless of its process history or constituents, and no further RCRA analysis is required. Nevertheless, because the Alternate Feed Guidance has not yet been revised to reflect this position recognized by NRC in the Molycorp TER, ~~Denison~~ EFRI will demonstrate below that, even if the Uranium Material were not considered source material and as such exempt from RCRA, the Uranium Material would not, in any event, contain any RCRA listed or characteristic hazardous wastes, as required under the Alternate Feed Guidance as currently worded.

3.3.2 ~~DENISON~~EFRI/UDEQ Listed Hazardous Waste Protocol

In a February, 1999 decision regarding the Mill, the Atomic Safety and Licensing Board Presiding Officer suggested there was a general need for more specific protocols for determining if alternate feed materials contain hazardous components. In a Memorandum and Order of February 14, 2000, the full Commission of the NRC also concluded that this issue warranted further staff refinement and standardization. Cognizant at that time of the need for specific protocols to be used in making determinations as to whether or not any alternate feeds considered for processing at the Mill contained listed hazardous wastes, ~~Denison~~ EFRI took a proactive role in the development of such a protocol. Accordingly, ~~Denison~~ EFRI established a "Protocol for Determining Whether Alternate Feed Materials are Listed Hazardous Wastes" (November 22, 1999). This Protocol was developed in conjunction with, and accepted by, the State of Utah Department of Environmental Quality ("UDEQ") (Letter of December 7, 1999). Copies of the Protocol and UDEQ letter are provided in Attachment 3. The provisions of the protocol can be summarized as follows:

a) In all cases, the protocol requires that ~~Denison~~ EFRI perform a source investigation to collect information regarding the composition and history of the material, and any existing generator or agency determinations regarding its regulatory status;

b) The protocol states that if the material is known -- by means of chemical data or site history -- to contain no listed hazardous waste, ~~Denison~~ EFRI and UDEQ will agree that the material is not a listed hazardous waste;

c) If such a direct confirmation is not available, the protocol describes the additional chemical process and material handling history information that ~~Denison~~ EFRI will collect and evaluate to assess whether the chemical contaminants in the material resulted from listed or non-listed sources;

d) The protocol also specifies the situations in which ongoing confirmation/acceptance sampling will be used, in addition to the chemical process and handling history, to make a listed waste evaluation;

e) If the results from any of the decision steps indicate that the material or a constituent of the material did result from a RCRA listed hazardous waste or RCRA listed process, the material will be considered to have contained RCRA listed hazardous waste; and

f) The protocol identifies the types of documentation that ~~Denison~~ EFRI will obtain and maintain on file, to support the assessment for each different decision scenario.

The above components and conditions of the Protocol are summarized in a decision tree diagram, or logic flow diagram, included in Attachment 3, and hereinafter referred to as the "Protocol Diagram".

3.3.3 Application of the Listed Hazardous Waste Protocol

In independent chemical engineer from TetraTech, Inc. ("TetraTech") has conducted a RCRA evaluation of the Uranium Material and, specifically, applied the Listed Hazardous Waste Protocol to the Uranium Material. A copy of TetraTech's analysis is included as Attachment 4.

It was concluded that, based on the information that is available,

1. The Uranium Material is not a RCRA listed hazardous waste because it is an ore that has a natural uranium content of greater than 0.05 weight percent, is therefore source material under 10 CFR 40.4 and, as a result, is exempt from regulation under RCRA (40 CFR 261.4(a)(4)).

2. Even if the Uranium Material were not source material, it would not be a RCRA listed hazardous waste for the following additional reasons:
   a) It was generated from a known process under the control of the generator, who has provided the Affidavit, included in Attachment 2, declaring that the Uranium Material is not and does not contain RCRA listed hazardous waste. This determination is consistent with Boxes I and 2 and Decision Diamonds 1 and 2 in the ~~Denison~~EFRI/UDEQ Protocol Diagram;
   b) The five volatile organic compounds detected at very low concentrations in the Uranium Material have been attributed to laboratory contamination and are not actual contaminants in the Uranium Material; and
   c) None of the metals in the Uranium Material samples came from RCRA listed hazardous waste sources. This determination is consistent with Box 8 and Decision Diamonds 9 through 11 in the ~~Denison~~EFRI/UDEQ Protocol Diagram.

3.3.4 Analysis for RCRA Characteristic Waste

3. The Uranium Material does not exhibit any of the RCRA characteristics of ignitability, corrosivity, reactivity, or toxicity for any constituent, based on the Toxicity Characteristic Leaching Procedure ("TCLP") analysis summarized in Attachment 2.

3.3.5 Radioactive Material Profile Record

Furthermore, in order for ~~Denison~~EFRI to characterize the Uranium Material, DMC has completed ~~Denison~~EFRI's RMPR form, stating that the material is not RCRA listed waste. The certification section of the RMPR includes the following text:

> I certify that the material described in this profile has been fully characterized and that hazardous constituents listed in 10 CFR 40 Appendix A Criterion 13 which are applicable to this material have been indicated on this form. I further certify and warrant to ~~Denison~~EFRI that the material represented on this form is not a hazardous waste as identified by 40 CFR 261 and/or that this material is exempt from RCRA regulation under 40 CFR 261.4(a)(4).

3.3.6 Conclusion

Because the Uranium Material is an ore that contains greater than 0.05% source material, the Uranium Material is exempt from RCRA under 40 CFR 261.4(a)(4). In addition, based on the site history, the determinations by DMC, and the analysis of the independent chemical engineer from Tetra Tech, ~~Denison~~EFRI has also concluded that, even if not exempted from RCRA under 40 CFR 261.4(a)(4), based on the application of the Listed Hazardous Waste Protocol, the Uranium Material would not be listed hazardous waste subject to RCRA. Further, the Uranium material does not possess any of the RCRA characteristics of ignitability, reactivity, corrosivity, or toxicity for any constituent and therefore, were it not source material, it would not be a RCRA hazardous waste.

3.4 Uranium Material is Processed Primarily for its Source Material Content

In its Memorandum and Order, February 14, 2000, In the Matter of International Uranium (USA) Corp. (Request for Materials License Amendment), Docket No. 40-8681-MLA-4, the NRC Commission concluded that an alternate feed material will be considered to be processed primarily for its source material content if it is reasonable to conclude that uranium can be recovered from the Uranium Material and that the processing will indeed occur. The Uranium Material will be processed for the recovery of uranium at the Mill. Based on the uranium content of the Uranium Material, its physical and chemical characteristics, and ~~Denison~~EFRI's success in recovering uranium from a variety of different types of materials, including materials that were similar to the Uranium Materials, at the Mill, it is reasonable to expect that uranium can be recovered from the Uranium Material. As a result, the Uranium Material is an ore that will be processed primarily for the recovery of source material, and the tailings resulting from processing the Uranium Material will therefore be 11e.(2) byproduct material under the definition set out in 10 CFR 40.4.

4.0 ENVIRONMENT AFFECTED

4.1 General

The Mill is a licensed uranium processing facility that has processed to date approximately 4,000,000 tons of uranium-bearing conventionally mined ores and alternate feed materials primarily for the recovery of uranium, with the resulting tailings being permanently disposed of as 11e.(2) byproduct material in the Mill's tailings impoundments. Environmental impacts associated with such previously licensed Mill operations have been thoroughly evaluated and documented in the past (see, for example, the original 1979 Final Environmental Statement ("FES") for the Mill, Environmental Assessments ("EAs") for Mill license renewals dated 1985 and 1997, an EA for the Mill's reclamation plan dated 2000, EAs for alternate feed materials dated 2001 and 2002, in each case prepared by the NRC) and a Safety Evaluation Report prepared by UDEQ in connection with another alternate feed material. The Uranium Material will also be processed as an alternate feed material at the Mill for the recovery of uranium and the resulting tailings will be permanently disposed of in the Mill's tailings impoundments as 11e.(2) byproduct material, in a similar fashion to other conventionally mined ores and alternate feed materials that have been processed or licensed for processing at the Mill.

Accordingly, this Environmental Report will focus on the various pathways for potential radiological and non-radiological impacts on public health, safety and the environment and determine if the receipt and processing of the Uranium Material would result in any potential significant *incremental* impacts over and above previously licensed activities.

The pathways that are analyzed are the following:

a) potential impacts from transportation of the Uranium Material to the Mill;
b) potential impacts from radiation released from the Uranium Material while in storage at the Mill;
c) any chemical reactions that may occur in the Mill's process;
d) any potential reactions or inconsistencies with the existing tailings or tailings facilities;
e) potential impacts on groundwater;
f) potential impacts on surface water;
g) potential airborne radiologic impacts;
h) potential radon and gamma impacts; and
i) worker health and safety issues.

These potential pathways will be discussed in the following sections of this document. The findings below will demonstrate that, because all the constituents in the Uranium Material have either been reported to be, or can be assumed to be, already present in the Mill's tailings system or were reported in other licensed alternate feeds, at levels generally comparable to or higher than those reported in the Uranium Material, the resulting tailings will not be significantly different from existing tailings at the facility. As a result, there will be no incremental public health, safety or environmental impacts over and above previously licensed activities.

4.2 Transportation Considerations

4.2.1 Packaging and Mode of Transportation

The Uranium Material will be shipped in covered end- or side-dump haul trucks. The Uranium Material will be shipped as Radioactive LSA 1 (low specific activity) Hazardous Material as defined by DOT regulations. DMC will arrange with a materials handling contractor for the proper marking, labeling, placarding, manifesting and transport of each shipment of the Uranium Material. Shipments will be tracked by the shipping company from the Midnite Mine until they reach the Mill. DMC will ship approximately 25 trucks per year, or an average of one truck per week for the six month annual operating period. The number of trucks per year could vary depending on the Uranium Material production. The estimated range would be from 2 to 73 trucks per year, with the highest number of trucks expected in the two years of construction of the Remedy.

The trucks involved in transporting the Uranium Material to the Mill site will be surveyed and decontaminated, as necessary, prior to leaving the Midnite Mine for the Mill and again prior to leaving the Mill site.

4.2.2 Transportation Impacts

For the following reasons, it is not expected that transportation impacts associated with the movement of the Uranium Material by truck from the Midnite Mine WTP facility to the Mill will be significant:

a) Radiological Matters
The transport of radioactive materials is subject to limits on radiation dose rate measured at the transport vehicle as specified in the US Code of Federal Regulations. The external radiation standards for these shipments are specified in 10 CFR 71.47 sections (2) and (3) as less than 200 millirems per hour ("mrem/h") at any point on the outer surface of the vehicle, and less than 10 mrem/h at any point two meters from the outer lateral surfaces of the vehicle. All exclusive use trailer trucks will be scanned by DMC prior to departure from the Midnite Mine to ensure that these limits are satisfied. All conveyances will be covered by tarpaulins or similar cover to prevent any migration of ore dust while in transit. From a radiologic standpoint, the Uranium Material is within the bounds of other ores and alternate feed materials licensed for processing at the Mill. The Uranium Material will be transported in covered end or side dump haul trucks, in a similar fashion to other conventional ores, and as a result there will be no significant incremental radiological impacts associated with transportation of Uranium Material to the Mill, over and above other previously licensed ores and alternate feed materials at the Mill or from licensed activities at other facilities in the State of Utah. All applicable requirements of 49 CFR Part 172 and Part 173 will be met, and the selected transport company will have all the required training and emergency response programs and certifications in place.

b) Traffic Volume Matters
(i) *Comparison to Licensed Mill Operations*
Section 4.8.5 of the 1979 FES for the Mill noted that when area mining was at expected full operational levels, approximately 68 round trips on local highways would be made by 30-ton ore trucks to the Mill per day (see the 1978 Dames and Moore Environmental Report for the Mill, p. 5-34). In addition, based on a licensed yellowcake capacity of 4,380 tons per year (Mill license condition 10.1) a maximum of 8,760,000 pounds of yellowcake would require shipment from the Mill to conversion facilities. This would require approximately 183-275 truck shipments from the Mill per year (based on 40-60 drums per truck, 800 lbs per drum), or one truck every one to two days based on a seven day work week (one truck every day or so, based on a five-day work week). In contrast, on average, 25 truck loads will be transported yearly from the Midnite Mine to the Mill during the period when the Water Treatment Plant is operating (May to October), or at an approximate frequency of one truck per week from May to October. In addition, the amount of yellowcake to be produced from processing the Uranium Material is expected to be transported in approximately one truck load per year. This frequency is well within the estimated yellowcake transport frequency at licensed capacity. During the period of transportation of the Uranium Material to the Mill, ~~Denison~~EFRI does not expect that ore deliveries from all other sources would, in total, exceed a small fraction of the truck transportation associated with licensed capacity.

(ii) *Comparison to Existing Truck Traffic on Interstate Highways 15 and 70*
Based on information provided by the State of Utah Department of Transportation ("UDOT") on July 14, 2010, on average during 2009, 2350 multi-unit trucks traveled south daily on Interstate 15 from Idaho into Utah. On average between 740 and 6,518 multi-unit trucks traveled south daily on Interstate 15, across Interstate 50 to Interstate 70. Based on the 2009 UDOT truck traffic information, an average of five additional trucks per month traveling this route to the Mill from May to October represents an increased traffic load of less than 1/100 of one percent. For the foregoing reasons, the truck traffic to the Mill from this project is expected to be an insignificant portion of existing truck traffic through the state, and well within the level of truck traffic expected from normal Mill operations.

(iii) *Comparison to Existing Truck Traffic on Highway 191*

Based on information provided by the State of Utah Department of Transportation ("UDOT") on July 14, 2010, on average during 2009, 1,628 multi-unit trucks traveled south on State Road 191 from Moab across the Grand County line each day. On average between 285 and 610 multi-unit trucks per day traveled the stretch of State Road 191 south of Monticello, UT toward Blanding, UT. Based on the 2009 UDOT truck traffic information, an average of five additional trucks per month traveling this route to the Mill from May to October represents an increased traffic load of less than one quarter of one percent. For the foregoing reasons, the truck traffic to the Mill from this project is expected to be an insignificant portion of existing truck traffic in the area, and well within the level of truck traffic expected from normal Mill operations.

4.3 Storage

4.3.1 Manner of Storage

Trucks arriving at the Mill site will be received according to existing Mill procedures. The trucks will be unloaded onto the ore pad for temporary storage of the Uranium Material pending processing. The Uranium Material will be stored in a manner similar to conventional ore. Tarped haul trucks will enter the site, roll back the tarp covering and dump their loads onto the ore pads as with conventional ore deliveries. The haul truck will then be cleaned and scanned for free release as per approved Mill standard operating procedures.

4.3.2 Environmental Impacts Associated With Storage

Because the Uranium Material will be temporarily stored on the ore pad awaiting processing and because the Uranium Material does not significantly differ in radiological activity from other ores and alternate feed materials, gamma radiation and radon emanation from the Uranium Material will be minimal and within the levels associated with other ores and alternate feed materials handled at the Mill on a routine basis. Experience at the Dawn Mill Site has determined that the Uranium Material is stable under ambient environmental conditions and does not require any special handling (item 10 of the Affidavit (Attachment 2)). The TCLP data evidences that the material does not readily leach and does not exhibit hazardous waste characteristics when exposed to more severe conditions than would be anticipated on the ore storage pad.

4.4 Process

The Uranium Material will be introduced to the process circuit either in the main circuit mixed with conventional ore, or in the Mill's alternate feed circuit alone. If processed in the main circuit, the material will be processed through the Mill's existing conventional ore acid leach, counter-current decantation and solvent extraction circuits for the recovery of uranium values. The leaching process will begin in Pulp Storage with the addition of sulfuric acid. The solution will be advanced through the remainder of the Mill circuits with no significant modifications to either the circuits or the recovery process anticipated. If processed through the Mill's alternate feed circuit, no significant changes to that circuit would be required. .Since no significant physical changes to the Mill circuits will be necessary to process this Uranium Material, no significant construction impacts beyond those previously assessed will be involved. Recovery of additional contained metals is not anticipated at this time.

The effects of introducing the Uranium Material into the Mill's process and tailings were reviewed by the independent chemical process engineer from Tetra Tech. Tetra Tech's Technical Memorandum is included as Attachment 5. Table 5 in the Technical Memorandum provides comparisons of the concentrations of all known constituents of the Uranium Material to the tailings and other previously processed ores and alternate feeds.

4.5 Compatibility with ~~Denison~~EFRI Mill Tailings

4.5.1 Physical Compatibility

The Uranium Material will be received as a precipitated solid from lime treatment of the WTP influent water. A portion of this material may be insoluble in the acid leach process at the Mill and therefore, the discharge sent to tailings may contain some solid material ("sand"). The remainder of the Uranium Material will be soluble and therefore be contained in the liquid phase after processing in the acid leach system. The solids will be sent to an active tailings cell at the Mill, e.g., Cell 4A, or Cell 4B. The solutions from the Uranium Material tailings will be recirculated through the mill process for reuse of the acidic properties in the solution. The sands will be only a portion of the total mass of Uranium Material sent to the Mill from the Midnite Mine site. However, assuming a worst case scenario that all of the solid material ends up as sand in the tailings, it is estimated that for the main processing circuit, the additional load to the tailings is minimal (Attachment 5, Table 5). It is expected that the percent increase to the system is less than one percent for all components.

For the analysis presented in Attachment 5, it is assumed that the chemical composition of each active cell, Cell 4A or Cell 4B, is represented by the composition of Cell 3 from the Statement of Basis for the Utah Groundwater Discharge Permit for the Mill (November 29, 2004).

Cell 4A has a High-Density Polyethylene ("HDPE") liner. Cell 4A went into service in October of 2008 and contains conventional ore tailings sands. Solutions from the Mill, starting in July 2009, have also been sent to Cell 4A. Cell 4B was recently constructed, with an HDPE liner system similar to Cell 4A and is expected to ultimately receive the same materials as Cell 4A. It is currently expected that future tailings cells will have similar construction.

The constituents in the sands and liquids resulting from processing the Uranium Material are not expected to be significantly different from those in the conventional ores either in composition or in concentration of constituents. Attachment 5, Table 5 indicates that based on a comparison of the Uranium Material to the tailings, all of the metal constituents found in the Uranium Material are currently processed in the Mill's main circuit and are all natural components of uranium ore with the exception of barium.

The constituents that would be added to the Mill process from processing the Uranium Material are similar to conventional ores, absent of organic materials, and also contain additional calcium, barium, and polymer due to the addition of these constituents in the WTP process. Tetra Tech identified that these components are not expected to have any adverse effect on the Mill processing system or to the tailings Cells. As described in Attachment 5, it is expected that most of the metal and non-metal constituents entering the leach system with the Uranium Material will be converted to sulfate salts, precipitated, and eventually discharged to the tailings system.

Every metal and non-metal cation and anion component in the Uranium Material already exists in the Mill's tailings system. A summary of the tailings composition before and after the Uranium Material is processed is presented in Attachment 5, Table 6.

Every component in the Uranium Material has been:

1. detected in analyses of the tailings cells liquids;
2. detected in analyses of tailings cells solids;
3. detected in analyses of alternate feed materials licensed for processing at the Mill; or
4. detected in process streams or intermediate products when previous alternate feeds were processed at the Mill;

at concentrations that are generally comparable to the concentrations in the Uranium Material. Due to the small annual quantities of the Uranium Material, an increase in the concentration of any analyte in the Mill's tailings is not expected to be significant.

The constituents in the Uranium Material, are expected to produce no incremental additional environmental, health, or safety impacts in the Mill's tailings system beyond those produced by the Mill's processing of natural ores or previously approved alternate feeds.

4.5.2 Capacity and Throughput

The amount of tailings that would potentially be generated is substantially smaller than the volume that would be generated from processing an equivalent volume of conventional ore, as the Uranium Material consists of soluble salts and minimal insoluble solids. Midnite Mine, as described above, may be expected to ship on average approximately 300 dry tons per year of Uranium Material to the Mill. As the Mill's design capacity is approximately 2,000 dry tons per day, the total *annual* throughput of Uranium Material is a small fraction of one day's Mill capacity. This volume is well within the maximum annual throughput rate and tailings generation rate for the Mill of 680,000 dry tons per year. Additionally, the expected annual amount of uranium in the Material of approximately 84,000 lbs (4,2 tons) of U_3O_8 is well within the Mill's licensed yellowcake capacity of 4,380 tons per year of U_3O_8.

~~Denison~~EFRI proposes that, as has been the case for recent alternate feed license amendments approved by the NRC and DRC, a condition should be added to the license amendment to the effect that the Mill shall not accept any Uranium Material at the site unless and until the Mill's Safety and Environmental Review Panel ("SERP") has determined that the Mill has sufficient licensed tailings capacity to permanently store:

a) all 11 e.(2) byproduct material that would result from processing all the Uranium Material,
b) all other ores and alternate feed materials on site; and
c) all other materials required to be disposed of in the Mill's tailings impoundments pursuant to the Mill's reclamation plan.

4.6 Groundwater

In the 1997 EA, NRC staff concluded that, for a number of reasons, groundwater beneath or in the vicinity of the Mill site will not be adversely impacted by continued operation of the Mill. Additionally, the design of the existing impoundments has previously been approved by Utah DRC (Cells 4A and 4B), and ~~Denison~~EFRI 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 should it occur.

Because the Mill's tailings cells are not impacting groundwater, the receipt and processing of Uranium Material at the Mill will not have any incremental impacts on groundwater.

In any event, ~~Denison~~EFRI has a groundwater monitoring program for the Mill. With the exception of barium, all constituents identified in the Uranium Material are included in the groundwater monitoring program.

Barium will be introduced to the Mill's tailings cells with disposal of the tailings from the processing of the Uranium Material. The chemistry of the tailings cells would limit the mobility of barium due to the abundance of sulfate in the tailings cells. The insolubility of barium in the presence of sulfate is generally consistent regardless of the liquid medium. That is, the solubility of barium sulfate in cold water is 0.022 mg/L and in concentrated sulfuric acid is 0.025 mg/L (Handbook of Chemistry and Physics, 68th Edition). At the listed concentrations of sulfate in the tailings solutions (67,600 mg/L to 87,100 mg/L in Cell 4A), a change in the ambient barium concentration in the tailings solutions (0.02 mg/L) would be negligible. Therefore, given the strong tendency of barium to partition to solids, especially in the presence of sulfate, there is no reasonable potential for barium to migrate to ground water from the tailings cells at the Mill in the unlikely event of a leak in the tailings cells. Calcium K_d value in UDEQ Statement of Basis for the permit (December 1, 2004) contains published K_d values for calcium of 5 to 100 L/kg for sandy to clayey soils. The K_d for barium is 100 to 150,000 L/kg for the same soil types indicating less mobility in groundwater and Tetra Tech has therefore concluded that barium is sufficiently represented by monitoring for calcium and has identified no technical reason to add barium to the list of constituents monitored in ground water in the vicinity of the tailings cells.

Excluding barium, chemical and radiological make-up of the Uranium Material is similar to other ores and alternate feed materials processed at the Mill, and their resulting tailings will have the chemical composition of typical uranium process tailings, for which the Mill's tailings system was designed. As a result, the existing groundwater monitoring program at the Mill will be adequate to detect any potential future impacts to groundwater.

As a result, there will be no incremental impacts over and above previously licensed activities.

4.7 Surface Water

There will be no discharge of Mill effluents to local surface waters. All Mill process effluents, laundry, and analytical laboratory liquid wastes will be discharged to the Mill's tailings impoundments for disposal by evaporation. Runoff from the Mill and facilities is directed to the tailings impoundments. Sanitary wastes are discharged to State-approved leach fields. As a result, there is no plausible pathway for Uranium Material to impact surface water. Further, as indicated in Semi-Annual Effluent Reports filed by the Mill to date, there is no indication of the Mill impacting surface waters. There will therefore be no incremental impact to surface waters from any airborne particulates associated with processing the Uranium Material.

Uranium Material will be transported to the Mill in covered exclusive-use trucks. Upon introduction into the Mill circuit, the Uranium Material will be processed in a similar fashion as other ores and alternate feed materials. The Uranium Material will be relatively moist, with an average moisture content of approximately 55-75%. This moisture is bound water of hydration, and a minor amount of moisture held in capillary tension, that is not driven off by the high pressure filter press. As attested to by the generator (Attachment 1), there is no free water associated with these solids. This will minimize any potential for dusting while the Uranium Material is introduced into the Mill process. In addition, standard procedures at the Mill for dust suppression will be employed if necessary. There will therefore be no new or incremental risk of discharge to surface waters resulting from the receipt and processing of Uranium Material at the Mill or the disposition of the resulting tailings.

Finally, as the chemical and radiological make-up of the Uranium Material are sufficiently similar to natural ores and the tailings resulting therefrom, the existing surface water monitoring program at the Mill will be adequate to detect any potential impacts to surface water. As a result, there will be no incremental impacts over and above previously licensed activities.

4.8 Airborne Radiological Impacts

The chemical and radiological make-up of the Uranium Material will not be significantly different from natural ores that have been processed at the Mill in the past. The existing air particulate monitoring program is equipped to handle all such ores.

4.9 Radon and Gamma Impacts

As discussed in Section 2.5.1 above, the concentration of uranium in the Uranium Material is comparable to the concentration of uranium in conventionally mined Arizona Strip breccias pipe ores. However, the Radon-222 activity is much lower, being less than that associated with low-grade Colorado Plateau ores. In addition, the concentration of Th-232 in the Uranium Material is low, and is lower than the concentration of Th-232 in a number of other alternate feed materials that have been licensed for processing at the Mill. As a result, the Uranium Material contains comparable concentrations of radium and other gamma-emitting radionuclides as natural ores and other alternate feed materials licensed for processing at the Mill. The Uranium Material will therefore pose less of a gamma and radon hazard than other ores and alternate feed materials that have been processed or licensed for processing at the Mill.

4.10 Safety Measures

4.10.1 General

During unloading of the Uranium Material onto the ore pad, while the Uranium Material is being stored on the ore pad pending processing, while feeding Uranium Material into the Mill process and while processing the Uranium Material and disposing of and managing the resulting tailings, the Mill will follow its standard operating procedures for occupational and radiological safety.

4.10.2 Radiation Safety

a) Existing Radiation Protection Program at the Mill

The radiation safety program which exists at the Mill, pursuant to the conditions and provisions of the Mill's Radioactive Materials License, and applicable State Regulations, is adequate to ensure the maximum protection of the worker and environment, and is consistent with the principle of maintaining exposures of radiation to individual workers and to the general public to levels As Low As Reasonably Achievable ("ALARA"). Employees will be provided with personal protective equipment including full-face respirators, if required. In addition, all workers at the Mill are required to wear personal TLD badges or the equivalent to monitor their exposure to gamma radiation.

b) Gamma Radiation

Gamma radiation levels associated with the Uranium Material are expected to be within levels of gamma radiation associated with other ores and alternate feed materials processed or licensed for processing at the Mill in the past. Gamma exposure to workers will be managed in accordance with existing Mill standard operating procedures.

c) Radon

Radon levels associated with the Uranium Material are within levels of radon associated with other ores and alternate feed materials processed or licensed for processing at the Mill in the past. Radon exposures to workers will be managed in accordance with existing Mill standard operating procedures.

d) Control of Airborne Contamination

The Uranium Material is a fine-grained solid currently containing an average moisture content of approximately 85%. After modification of the hydraulic filter press at the Midnite Mine Water Treatment Plant in 2011, the moisture content will decrease to 55% to 75%. Dust suppression techniques will be implemented, if required, while the Uranium Material is being introduced into the Mill process, although this may be unnecessary due to the relatively high moisture content of the Uranium Material. Once in the Mill process, the Uranium Material will be in a dissolved form, and no special dust suppression procedures will be required. As is the practice at the Mill for other alternate feed materials, the Derived Air Concentration ("DAC") to be used in any analysis of airborne particulate exposure to workers will be developed specifically for the Uranium Material, based on applicable regulations and Mill procedures, in order to take into account the specific radionuclide make-up of the Uranium Material. The Mill has safely received and processed alternate feed materials with higher concentrations of each of the radionuclides contained in the Uranium Material, under previous license amendments, and can safely handle the Uranium Material in accordance with existing Mill standard operating procedures.

4.10.3 Occupational Safety

The primary focus of safety and environmental control measures will be to manage potential exposures from radionuclide particulates. Response actions and control measures designed to manage particulate radionuclide hazards will be more than sufficient to manage chemical hazards from the metal oxides (see the conclusions of Tetra Tech in Attachment 5).

4.10.4 Vehicle Scan

As stated in Section 4.2.1 above, the shipments of Uranium Material to and from the Mill will be dedicated, exclusive loads. Radiation surveys and radiation levels consistent with applicable DOT regulations will be applied to the exclusive use vehicles. For unrestricted use, radiation levels will be in accordance with applicable values contained in the NRC Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material, U.S. NRC, May, 1987. If radiation levels indicate values in excess of the above limits, appropriate decontamination procedures will be implemented.

4.11 Long Term Impacts

The Uranium Material is comprised of similar chemical and radiological components as already exist in the Mill's tailings cells. Existing monitoring programs are therefore adequate, and no new monitoring procedures are required. As a result, there will be no decommissioning, decontamination or reclamation impacts associated with processing the Uranium Material, over and above previously licensed Mill operations.

4.12 Other Information

4.13 Added Advantage of Recycling

DMC has expressed its preference for use of recycling and mineral recovery technologies for the Uranium Material for three reasons: 1) for the environmental benefit of reclaiming valuable minerals; 2) for the added benefit of reducing radioactive material disposal costs; and 3) for the added benefit of minimizing or eliminating any long term contingent liability for the waste materials generated during processing.

DMC has noted that the Mill has the technology necessary to process materials for the extraction of uranium and to provide for disposal of the 11e,(2) byproduct material, resulting from processing the Uranium Material primarily for the recovery of uranium, in the Mill's existing tailings impoundments. As a result, DMC will contractually require ~~Denison~~EFRI to recycle the Uranium Material at the Mill primarily for the recovery of uranium.

4.14 Consideration of Alternatives

This application is in response to a request by DMC for disposal/processing options in connection with the clean up of the Midnite Mine. The Mill is a facility that has been requested to provide these services, because it is licensed to process materials that are similar to the Uranium Materials for the recovery of uranium and is licensed to create, possess and dispose of the resulting byproduct materials. Given that a decision to dispose of the Uranium Material at an offsite facility is required, the only options are as to which offsite facility the Uranium Materials will ultimately be sent for disposal. There are a limited number of facilities that are licensed to receive, store, process or dispose of the Uranium Material. Alternatives to processing/disposal at the Mill would be direct disposal or processing at one of these other facilities. If direct disposal is utilized, the value of the recoverable uranium in the Uranium Material would not be realized.

5.0 SIGNATURE

This document was prepared by ~~Denison~~EFRI Mines (USA) Corp. on ~~April 27~~ May 20, 201~~1~~3.

~~DENISON MINES~~Energy Fuels Resources (USA) ~~CORP~~INC.

By:

Jo Ann S. Tischler
~~Director~~Manager, Compliance and ~~Permitting~~Licensing

6.0 REFERENCES

United States Nuclear Regulatory Commission; Interim Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments, November 2000.

Utah Division of Radiation Control Ground Water Quality Discharge Permit Statement of Basis for a Uranium Mining Facility at White Mesa, South of Blanding, Utah, November 29, 2004.

Appendix C

VOC Data

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1021118

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: SW 8260
Batch: EVO/2793 (HBN: 52359)
Analyzed By: Christopher Q. Coleman

Blank

MB: 174305
Analyzed: 08/10/2010 14:17

Units: ug/Kg

Analyte	Result	MDL	RL
Chloromethane	ND	0.312	5
Acetone	*5.07	2.61	5
Methylene chloride	1.95	0.502	5
2-Butanone	ND	1.56	5
Tetrahydrofuran	ND	1.97	5
Chloroform	ND	0.291	5
Carbon tetrachloride	ND	0.36	5
Benzene	ND	0.256	5
Toluene	1.57	0.199	5
m,p-Xylene	ND	0.516	10
o-Xylene	ND	0.258	5
Naphthalene	ND	0.382	5

Laboratory Control Sample

LCS: 174306
Analyzed: 08/10/2010 12:48

Units: ug/Kg

Analyte	Result	Target	% Recovery	QC Limits	
Chloromethane	49.1	50	98.2	54.7	134.3
Acetone	39.2	50	78.3	24.3	187.3
Methylene chloride	54.2	50	108	72.5	125.5
2-Butanone	41.5	50	83.1	54.5	158.2
Tetrahydrofuran	48.3	50	96.7	53.8	146.8
Chloroform	50.7	50	101	75.8	123.9
Carbon tetrachloride	54.1	50	108	60.1	138.3
Benzene	48.8	50	97.6	78.7	123.4
Toluene	47.4	50	94.7	76.1	122.5
m,p-Xylene	99.9	100	99.9	76.3	125.4
o-Xylene	46.3	50	92.5	73.9	123.2
Naphthalene	50.4	50	101	45.2	137.4

Symbols and Definitions
* - See Comments section for more information
▲ - Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected
QC results are not adjusted for moisture correction, where applicable.

Quality Control Sample
Batch Report

Analysis Information

Workorder: **1021118**

Limits:	Historical/Performance	**Preparation:**	NA	**Analysis:**	SW 8260
Basis:	ALS Laboratory Group	**Batch:**	NA	**Batch:**	EVO/2793 (HBN: 52359)
		Prepared By:	NA	**Analyzed By:**	Christopher Q. Coleman

Matrix Spike - Matrix Spike Duplicate

Sample: 1021118001 **Analyzed:** 08/10/2010 14:39 **Units:** ug/Kg		**MS:** 174308 **Analyzed:** 08/10/2010 18:24					**MSD:** 174309 **Analyzed:** 08/10/2010 18:46				
Analyte	**Result**	**Result**	**Target**	**% Rec**	**QC Limits**		**Result**	**% Rec**	**RPD**	**QC Limits**	
Chloromethane	ND	56	50	112	54.7	134.3	58.5	117	4.42	0	20
Acetone	5.9	64.8	50	118	24.3	187.3	65.7	119	1.34	0	20
Methylene chloride	1	52.6	50	105	72.5	125.5	52.4	105	0.53	0	20
2-Butanone	ND	60.3	50	121	54.5	158.2	61.1	122	1.23	0	20
Tetrahydrofuran	ND	42.7	50	85.5	53.8	146.8	43.8	87.7	2.54	0	20
Chloroform	0.47	55.4	50	111	75.8	123.9	57.5	115	3.79	0	20
Carbon tetrachloride	ND	71.1	50	* 142	60.1	138.3	81.3	* 163	13.3	0	20
Benzene	ND	59.3	50	119	78.7	123.4	58	116	2.27	0	16.4
Toluene	0.61	68.3	50	* 137	76.1	122.5	52.4	105	* 26.3	0	26.2
m,p-Xylene	ND	131	100	* 131	76.3	125.4	115	115	12.8	0	20
o-Xylene	ND	57.3	50	115	73.9	123.2	53.1	106	7.53	0	12.9
Naphthalene	ND	39.4	50	78.9	45.2	137.4	34.9	69.7	12.3	0	20

Surrogate Recoveries

Surrogate	1,2-Dichloroethane-d4			Toluene-d8			4-Bromofluorobenzene		
QC Limits	62.5	135.4		61.1	136.7		52.4	149.8	
Units	ug/Kg			ug/Kg			ug/Kg		
Lab ID	**Result**	**Target**	**% Recovery**	**Result**	**Target**	**% Recovery**	**Result**	**Target**	**% Recovery**
174305-MB	61.5	50	123	47.1	50	94.3	52.3	50	105
174306-LCS	55.6	50	111	51.8	50	104	51.9	50	104
1021118001	53.7	50	107	54.5	50	109	51	50	102
174308-MS	47.6	50	95.1	60	50	120	50.2	50	100
174309-MSD	61	50	122	48.8	50	97.7	53.1	50	106
1021118002	55	50	110	50.6	50	101	53.8	50	108
1021118003	56.5	50	113	50.4	50	101	52.2	50	104
1022255001	59.5	50	119	54.5	50	109	57.9	50	116
1022255002	57.2	50	114	52.6	50	105	59.1	50	118
1022255003	58.5	50	117	52	50	104	55.4	50	111
1022255004	59.2	50	118	52	50	104	57.3	50	115
1022255005	61.7	50	123	55.5	50	111	65.4	50	131

Comments

None

Symbols and Definitions

* - See Comments section for more information

▲ - Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.

Quality Control Sample Batch Report

Analysis Information

Workorder: **1021118**

Limits: Historical/Performance
Basis: ALS Laboratory Group

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: SW 8260
Batch: EVO/2793 (HBN: 52359)
Analyzed By: Christopher Q. Coleman

QC Data Approved and Reviewed by

Christopher Q. Coleman	Thomas J. Masoian	8/12/2010
Analyst	**Peer Review**	**Date**

Symbols and Definitions

* - See Comments section for more information
▲ - Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected
QC results are not adjusted for moisture correction, where applicable.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

ANALYTICAL REPORT

Report Date: August 12, 2010

Jeff Kujawa
ALS Laboratory Group
225 Commerce Drive
Fort Collins, CO 80524

Phone: (970) 490-1511
Fax: (970) 490-1522
E-mail: jeff.kujawa@alsglobal.com

Workorder: **1021118**
Project ID: **Midnite Mine WTP Sludge 073010**
Purchase Order: NA

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
WTPS-1	1021118001	07/28/10	07/30/10	Midnite Mine WTP Slu
WTPS-2	1021118002	07/28/10	07/30/10	Midnite Mine WTP Slu
WTPS-3	1021118003	07/28/10	07/30/10	Midnite Mine WTP Slu

Client: ALS Laboratory Group (Fort Collins)
Project Manager: Kevin W. Griffiths

Analytical Results

Workorder: **1021118**

Sample ID: **WTPS-1**
Lab ID: 1021118001
Sampling Site: Midnite Mine WTP Slu
Matrix: Soil/Solid/Sediment
Media: 4 oz Glass Jar Wide Mouth
Sampling Parameter: NA
Collected: 7/28/2010
Received: 7/30/2010

Analysis Method - SW 8260

Preparation: Not Applicable
Analysis: SW 8260C, Soil
Batch: EVO/2793 (HBN: 52359)
Analyzed: 8/10/2010 2:39:00 PM
Instr ID: 5973-Z
Percent Solids: 27.3
Report Basis: Dry

Analyte	ug/Kg	MDL	RL	Dilution	Qual.
Chloromethane	ND	1.1	18	1	U
Acetone	**22**	9.6	18	1	B
Methylene chloride	3.8	1.8	18	1	JB
2-Butanone	ND	5.7	18	1	U
Tetrahydrofuran	ND	7.2	18	1	U
Chloroform	1.7	1.1	18	1	J
Carbon tetrachloride	ND	1.3	18	1	U
Benzene	ND	0.94	18	1	U
Toluene	2.2	0.73	18	1	JB
m,p-Xylene	ND	1.9	37	1	U
o-Xylene	ND	0.95	18	1	U
Naphthalene	ND	1.4	18	1	U

Sample ID: **WTPS-2**
Lab ID: 1021118002
Sampling Site: Midnite Mine WTP Slu
Matrix: Soil/Solid/Sediment
Media: 4 oz Glass Jar Wide Mouth
Sampling Parameter: NA
Collected: 7/28/2010
Received: 7/30/2010

Analysis Method - SW 8260

Preparation: Not Applicable
Analysis: SW 8260C, Soil
Batch: EVO/2793 (HBN: 52359)
Analyzed: 8/10/2010 3:02:00 PM
Instr ID: 5973-Z
Percent Solids: 26.6
Report Basis: Dry

Analyte	ug/Kg	MDL	RL	Dilution	Qual.
Chloromethane	ND	1.2	19	1	U
Acetone	**29**	9.8	19	1	B
Methylene chloride	3.7	1.9	19	1	JB
2-Butanone	ND	5.9	19	1	U
Tetrahydrofuran	ND	7.4	19	1	U
Chloroform	2	1.1	19	1	J
Carbon tetrachloride	ND	1.4	19	1	U
Benzene	ND	0.96	19	1	U
Toluene	1.9	0.75	19	1	JB
m,p-Xylene	ND	1.9	38	1	U
o-Xylene	ND	0.97	19	1	U
Naphthalene	ND	1.4	19	1	U

ANALYTICAL REPORT

Client: ALS Laboratory Group (Fort Collins)
Project Manager: Kevin W. Griffiths

Analytical Results

Workorder: **1021118**

Sample ID: **WTPS-3**	Matrix: Soil/Solid/Sediment	Collected: 7/28/2010
Lab ID: 1021118003	Media: 4 oz Glass Jar Wide Mouth	Received: 7/30/2010
Sampling Site: Midnite Mine WTP Slu	Sampling Parameter: NA	

Analysis Method - SW 8260

Preparation: Not Applicable	**Analysis:** SW 8260C, Soil	**Instr ID:** 5973-Z
	Batch: EVO/2793 (HBN: 52359)	**Percent Solids:** 27.4
	Analyzed: 8/10/2010 3:24:00 PM	**Report Basis:** Dry

Analyte	ug/Kg	MDL	RL	Dilution	Qual.
Chloromethane	ND	1.1	18	1	U
Acetone	33	9.5	18	1	B
Methylene chloride	5.8	1.8	18	1	JB
2-Butanone	ND	5.7	18	1	U
Tetrahydrofuran	ND	7.2	18	1	U
Chloroform	1.2	1.1	18	1	J
Carbon tetrachloride	ND	1.3	18	1	U
Benzene	ND	0.93	18	1	U
Toluene	1.3	0.73	18	1	JB
m,p-Xylene	ND	1.9	36	1	U
o-Xylene	ND	0.94	18	1	U
Naphthalene	ND	1.4	18	1	U

Report Authorization

Analysis Method - SW 8260

Christopher Q. Coleman	Thomas J. Masoian
Analyst	**Peer Review**

Analysis Method - Solids/Moisture Determination

Ilse J. Ovalle	Christopher Winter
Analyst	**Peer Review**

ANALYTICAL REPORT

Client: ALS Laboratory Group (Fort Collins)
Project Manager: Kevin W. Griffiths

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by the State of Utah, Bureau of Laboratory Improvement under NELAP for specific fields of testing as documented in its current scope of accreditation (ID# DATA1) which is available by request or on the internet at http://health.utah.gov/lab/labimp/labcert/envlabcert.html. The quality systems implemented in the laboratory apply to all methods performed by ALS regardless of this current scope of accreditation which does not include performance based methods, modified methods and methods applied to matrices not listed in the methods.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Appendix D

Updated Table 3 for Attachment 5 of the April 2011 Amendment Request

Table 3. Historical Total WTP Uranium Material Testing Data

Date	Initial Composite Sludge Sample			Annual Composite Sample	
	U-nat (mg/kg)	Ra-226 (pCi/g)	Moisture (%)	U-nat (mg/kg)	Ra-226 (pCi/g)
4/1/2003	11,100	5.7	83.6	9,700	5.3
4/1/2004	9,060	7.6	87.0	8,600	2.4
4/1/2005	12,900	14	86.4	19,000	11
4/1/2006	5,200	4.3	86.3	11,200	9.1
4/2/2007	2,700	4.7	84.3	12,000	24.2
4/9/2008	19,000	5.1	79.4	13,500	10.8
5/20/2009		8.7			
4/13/2010	15,333				
Count:	7	7	6	6	6
Max:	**19,000**	**14**	**87.0**	**19,000**	**24**
Min:	**2,700**	**4.3**	**79.4**	**8,600**	**2**
Avg:	**10,756**	**7.2**	**84.5**	**12,333**	**10**

	Avg	Avg. % Solids	Max	Measured % Solids	Min	Measured % Solids
U Conc. Dry Weight Basis (mg/Kg)	10,756		19,000		2,700	
U Conc. Wet Weight Basis (mg/Kg)	1,667.2	15.5%	3,914	20.6%	424	15.7%
U Conc. Wet Weight Basis (%)	0.17%		0.39%		0.04%	

% solids = 100% - % Moisture

U Conc. Wet Weight Basis (mg/Kg) = U Conc. Dry Weight Basis x % solids

Appendix E

Replacement Page for Attachment 2 of the April 2011 Amendment Request

B.1. PHYSICAL DATA: Soluble salts will not have solids characteristics in the mill process or in the tailings. As shipped, these materials will be dry, coarse, granular solids (see attached photos). No grain size data is available.

B.5. MOISTURE CONTENT: 25% to 45% solids by weight, will pass paint filter test (ASTM 9095, Paint Filter Test, found in EPA document EPA SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods; Third Edition, September, 1986, as revised, December, 1987.) Solids are soluble under acidic conditions and will not have solid density\moisture content characteristic properties as a component of the tailings.

B.6. DESCRIPTION OF MATERIAL: The Uranium Material is light grey to light brown in color and odorless. The material is consolidated chemical precipitates, no grain sized distribution data are available. The material is a relatively dense pressed filter cake and does not exhibit free moisture or drainage of retained liquid. Photo 1 at the bottom of these attachments depicts a sample of the Uranium Material develop from pilot filter press tests on the WTP solids.

C.1 RADIOLOGICAL EVALUATION

Uranium is present in the thousands of pCi/g and Thorium is present in the range of 10's of pCi/g, based on eight years of historical anlyses (2002-2009) of the WTP solids for uranium and the testing of three samples collected in 2010 (WTPS-1, -2, -3) for the other radionuclides (Gross Alpha, Gross Beta, Pb-210, Ra-226, Th-228, Th-230, Th-232). The measured radionuclide activity concentrations for the uranium material at 15% solids have been used to describe the range of concentrations expected for the uranium materials at 25% to 45% solids developed the new filter press to be installed for the 2011 operating season. Uranium values present representative values from the last 8 years of testing. See analytical data presented in response to Item D.1, below.

D. CHEMICAL AND HAZARDOUS CHARACTERISTICS

D.1 DESCRIPTION AND HISTORY OF MATERIAL

The plant feed is a combination of water pumped from two uranium mine pit lakes from the inactive Midnite Mine. Water from the pit lakes, which contain primarily metals, sulfate, and uranium, are pumped into the WTP at a rate of approximately 450 gallons per minute. The WTP is a conventional lime treatment ~~high density~~ sludge process in which the metals and uranium are precipitated out in the lime treatment process. Historically, the final WTP solids has contained on average 0.17~~8~~ wet weight percent uranium (0.~~21~~ 20 wet weight percent U_30_8) at an average historical solids content of 15.5 percent when produced using centrifuges for dewatering. However, the centrifuges are to be replaced with a hydraulic filter press in 201~~1~~3, increasing the percent solids of the final Uranium Material to between 25% and 45% resulting in a proportional increase in weight percent uranium estimated to be between 0.3 and 0.55 wet weight percent uranium (0.35 and 0.65 wet weight percent U_30_8).

The plant is typically operational from early May through the end of October and operates 24 hours per day, four days per week. Barium chloride is added to the influent water upstream of the neutralization tanks for removal of radium. The lime slurry is added to the second of three neutralization tanks for metals precipitation. At the discharge of the third neutralization tank, an anionic water soluble polymer (Neo Solutions NS-6852) is added as a coagulant during clarification. The stream is sent to one of two clarifiers and the sludge drawn from

Appendix F

Replacement Page for Attachment 2 of the April 2011 Amendment Request

Uranium Material Metals Analysis for RCRA Toxicity Characteristics (TCLP)

Sample ID	Sample Date	Arsenic mg/L	Barium mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L	Mercury mg/L	Selenium mg/L	Silver mg/L
	2002	<0.05	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2003	<0.5	<10	0.2	<0.5	<0.5	<0.02	<0.1	<0.5
	2004	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2005	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2006	<0.5	<10	0.25	<0.5	<0.5	<0.02	<0.1	<0.5
	2007	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2008	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	5/20/2009	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	9/17/2009	<0.06	0.083	<0.005	<0.01	<0.04	<0.0002	<0.06	<0.01
	9/19/2009	<0.04	0.16	0.019	<0.01	<0.04	<0.0002	<0.04	<0.01
	9/23/2009	<0.04	0.12	0.011	<0.01	<0.04	<0.0002	<0.04	<0.01
	10/6/2009	<0.1	0.066	0.03	0.03	<0.08	<0.0002	0.2	<0.02
WTPS-1	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.051	<0.1
WTPS-2	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.054	<0.1
WTPS-3	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.054	<0.1
Count		15	15	15	15	15	15	15	15
Min		<0.04	0.066	<0.005	<0.01	<0.03	<0.0002	<0.04	<0.01
Max		<0.5~~1~~	<10	~~<~~0.~~0~~25	<0.5	<0.5	<0.02	0.2	<0.5
40 CFR Part 261.24		5	100	1	5	5	0.2	1	5
PASS?		Yes	Yes	Yes	Yes	Yes	Yes	Yrs	Yes

Appendix G

Replacement Page for Table 2 of Attachment 4 of the April 2011 Amendment Request

TETRA TECH

Table 2. Uranium Material Metals Analysis for RCRA Characteristics (Updated 2/28/13)

Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	2002	<0.05	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2003	<0.5	<10	0.2	<0.5	<0.5	<0.02	<0.1	<0.5
	2004	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2005	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2006	<0.5	<10	0.25	<0.5	<0.5	<0.02	<0.1	<0.5
	2007	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2008	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	5/20/2009	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	9/17/2009	<0.06	0.083	<0.005	<0.01	<0.04	<0.0002	<0.06	<0.01
	9/19/2009	<0.04	0.16	0.019	<0.01	<0.04	<0.0002	<0.04	<0.01
	9/23/2009	<0.04	0.12	0.011	<0.01	<0.04	<0.0002	<0.04	<0.01
	10/6/2009	<0.1	0.066	0.03	0.03	<0.08	<0.0002	0.2	<0.02
WTPS-1	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.051	<0.1
WTPS-2	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.054	<0.1
WTPS-3	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.054	<0.1
Count		15	15	15	15	15	15	15	15
Min		<0.04	0.066	<0.005	<0.01	<0.03	<0.0002	<0.04	<0.01
Max		<0.5~~1~~	<10	~~<0.05~~0.25	<0.5	<0.5	<0.02	0.2	<0.5
40 CFR Part 261.24		5	100	1	5	5	0.2	1	5
PASS?		Yes	Yes	Yes	Yes	Yes	Yes	Yrs	Yes

Appendix H

Replacement Page for Attachment 2 of the April 2011 Amendment Request

Uranium Material Organics and Pesticides Analyses for RCRA Toxicity Characteristics (TCLP)

		Results			
Target Analyte	**Units**	Maximum TCLP	**WTPS-1**	**WTPS-2**	**WTPS-3**
Organochlorine Pesticides - Method SW8081A - TCLP Leachate					
Gamma-BHC (Lindane)	mg/L	0.4	<0.0001	<0.0001	<0.0001
Heptachlor	mg/L	See Next Row	<0.00015	<0.00015	<0.00015
Heptachlor Epoxide	mg/L	0.008	<0.000079	<0.000079	<0.000079
Gamma-Chlordane	mg/L	0.03	<0.000078	<0.000078	<0.000078
Alpha-Chlordane	mg/L	0.03	<0.00009	<0.00009	<0.00009
Endrin	mg/L	0.02	<0.000096	<0.000096	<0.000096
Methoxychlor	mg/L	10.0	<0.00039	<0.00039	<0.00039
Toxaphene	mg/L	0.5	<0.0051	<0.0051	<0.0051
Chlordane	mg/L	0.03	<0.0011	<0.0011	<0.0011
Chlorinated Herbicides - Method SW8151A - TCLP Leachate					
2,4-D	µg/L	10.0	<1.6	<1.6	<1.6
Silvex	µg/L	1.0	<0.12	<0.12	<0.12
GC/MS Semivolatiles - Method SW8270D - TCLP Leachate					
Pyridine	mg/L	5.0	<0.02	<0.02	<0.02
1,4-Dichlorobenzene	mg/L	7.5	<0.02	<0.02	<0.02
2-Methylphenol (o Cresol)	mg/L	200	<0.02	<0.02	<0.02
3+4-Methylphenol (m+p Cresol)	mg/L	200	<0.02	<0.02	<0.02
Hexachloroethane	mg/L	3.0	<0.02	<0.02	<0.02
Nitrobenzene	mg/L	2.0	<0.02	<0.02	<0.02
Hexachlorobutadiene	mg/L	0.5	<0.02	<0.02	<0.02
2,4,6-Trichlorophenol	mg/L	2.0	<0.02	<0.02	<0.02
2,4,5-Trichlorophenol	mg/L	400	<0.02	<0.02	<0.02
2,4-Dinitrotoluene	mg/L	0.13	<0.02	<0.02	<0.02
Hexachlorobenzene	mg/L	0.13	<0.02	<0.02	<0.02
Pentachlorophenol	mg/L	100	<0.043	<0.043	<0.043
GC/MS Volatiles - Method SW8260_25B - Leachate					
Vinyl Chloride	µg/L	0.2	<0.83	<0.83	<0.83
1,1-Dichloroethene*	µg/L	0.7	<0.83	<0.83	<0.83
2-Butanone (Methyl Ethyl Keytone)	µg/L	200	<8.3	<8.3	<8.3
Chloroform	µg/L	6.0	<0.83	<0.83	<0.83
Carbon Tetrachloride	µg/L	0.5	<0.83	<0.83	<0.83
1,2-Dichloroethane	µg/L	0.5	<0.83	<0.83	<0.83
Benzene	µg/L	0.5	<0.83	<0.83	<0.83
Trichloroethene*	µg/L	0.5	2.7 B,J	1.5 B,J	<0.83
Tetrachloroethene*	µg/L	0.7	<0.83	<0.83	<0.83
Chlorobenzene	µg/L	100	<0.83	<0.83	<0.83
Inorganics - Method SW 846_7.3.1 (Cyanide) & _7.3.2 (Sulfide), SW9045C (pH)					
Reactive Cyanide	mg/kg	N/A	<0.1	<0.1	<0.1
Reactive Sulfide	mg/kg	N/A	<50	<50	<50
Solid pH in Water @ 25°C	pH	N/A	9.09	9.19	9.26
Ignitability - Method SW1010A					
Ignitability - 95°C	°C	N/A	U	U	U

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Appendix I

Replacement Page for Attachment 4 of the April 2011 Amendment Request

Table 3. Uranium Material Organics and Pesticides Analyses for RCRA Toxicity Characteristics (TCLP) (Updated 2/28/13)

		Results			
Target Analyte	**Units**	**Maximum TCLP**	**WTPS-1**	**WTPS-2**	**WTPS-3**
Organochlorine Pesticides - Method SW8081A - TCLP Leachate					
Gamma-BHC (Lindane)	mg/L	0.4	<0.0001	<0.0001	<0.0001
Heptachlor	mg/L	See Next Row	<0.00015	<0.00015	<0.00015
Heptachlor Epoxide	mg/L	0.008	<0.000079	<0.000079	<0.000079
Gamma-Chlordane	mg/L	0.03	<0.000078	<0.000078	<0.000078
Alpha-Chlordane	mg/L	0.03	<0.00009	<0.00009	<0.00009
Endrin	mg/L	0.02	<0.000096	<0.000096	<0.000096
Methoxychlor	mg/L	10.0	<0.00039	<0.00039	<0.00039
Toxaphene	mg/L	0.5	<0.0051	<0.0051	<0.0051
Chlordane	mg/L	0.03	<0.0011	<0.0011	<0.0011
Chlorinated Herbicides - Method SW8151A - TCLP Leachate					
2,4-D	µg/L	10.0	<1.6	<1.6	<1.6
Silvex	µg/L	1.0	<0.12	<0.12	<0.12
GC/MS Semivolatiles - Method SW8270D - TCLP Leachate					
Pyridine	mg/L	5.0	<0.02	<0.02	<0.02
1,4-Dichlorobenzene	mg/L	7.5	<0.02	<0.02	<0.02
2-Methylphenol (o Cresol)	mg/L	200	<0.02	<0.02	<0.02
3+4-Methylphenol (m+p Cresol)	mg/L	200	<0.02	<0.02	<0.02
Hexachloroethane	mg/L	3.0	<0.02	<0.02	<0.02
Nitrobenzene	mg/L	2.0	<0.02	<0.02	<0.02
Hexachlorobutadiene	mg/L	0.5	<0.02	<0.02	<0.02
2,4,6-Trichlorophenol	mg/L	2.0	<0.02	<0.02	<0.02
2,4,5-Trichlorophenol	mg/L	400	<0.02	<0.02	<0.02
2,4-Dinitrotoluene	mg/L	0.13	<0.02	<0.02	<0.02
Hexachlorobenzene	mg/L	0.13	<0.02	<0.02	<0.02
Pentachlorophenol	mg/L	100	<0.043	<0.043	<0.043
GC/MS Volatiles - Method SW8260_25B - Leachate					
Vinyl Chloride	µg/L	0.2	<0.83	<0.83	<0.83
1,1-Dichloroethene*	µg/L	0.7	<0.83	<0.83	<0.83
2-Butanone (Methyl Ethyl Keytone)	µg/L	200	<8.3	<8.3	<8.3
Chloroform	µg/L	6.0	<0.83	<0.83	<0.83
Carbon Tetrachloride	µg/L	0.5	<0.83	<0.83	<0.83
1,2-Dichloroethane	µg/L	0.5	<0.83	<0.83	<0.83
Benzene	µg/L	0.5	<0.83	<0.83	<0.83
Trichloroethene*	µg/L	0.5	2.7 B,J	1.5 B,J	<0.83
Tetrachloroethene*	µg/L	0.7	<0.83	<0.83	<0.83
Chlorobenzene	µg/L	100	<0.83	<0.83	<0.83
Inorganics - Method SW 846_7.3.1 (Cyanide) & _7.3.2 (Sulfide), SW9045C (pH)					
Reactive Cyanide	mg/kg	N/A	<0.1	<0.1	<0.1
Reactive Sulfide	mg/kg	N/A	<50	<50	<50
Solid pH in Water @ 25°C	pH	N/A	9.09	9.19	9.26
Ignitability - Method SW1010A					
Ignitability - 95°C	°C	N/A	U	U	U

Appendix J

Resume of the Technical Memorandum Author

J. HUDSON, PE

Chemical Engineer

EDUCATION

BS, Chemical Engineering and Petroleum Refining, Colorado School of Mines, 1998
MS, Chemical Engineering, Washington State University, 2003

REGISTRATIONS/CERTIFICATIONS

Professional Engineer: Colorado (2009)
Professional Engineer: Wyoming (2009)
Professional Engineer: Montana (2009)

EXPERIENCE SUMMARY

Ms. Hudson has over 14 years of professional experience in process design engineering with a focus on process design and water and waste water treatment design and remediation. Ms. Hudson has worked extensively in the area of water treatment for mining, industrial, and municipal clients. She has experience with feasibility studies, design and implementation of bench-scale and pilot-scale studies, and full scale water treatment design and operation with the focus on water treatment technologies for metals removal for hard rock mining related waters. She has experience with passive technologies such as in-situ bioreactor treatment, conventional technologies including lime precipitation, clarification, and filtration, as well as mechanical filtration and ion exchange processes. Her background includes an emphasis on plant and unit process design for conventional mining as well as in-situ recovery operations.

PROJECT EXPERIENCE

- ***Feasibility Study for Potash Mine, Arizona.*** Process engineer for feasibility study for a Potash Mine to determine the viability of the project. This project includes development of the bench-scale mine testing, development of the front-end mine process preliminary design including process flow diagrams and process and instrumentation diagrams and equipment specifications and sizing. In addition process and domestic water treatment will be evaluated and preliminary design information developed along with a site-wide water balance for the facility.

- ***In-Situ Recovery - Mining of Uranium, Cameco, North Butte and Highlands, Wyoming.*** Lead process design engineer for a satellite uranium ion exchange recovery process plant design and support engineering for uranium processing from in-situ recovery operation. Responsibilities included generation of P&IDs, equipment sizing and specifications, preparation of bid documents, procurement support and continued support to chosen contractor during construction activities.

- ***Bench-Scale Study for Mine Dewatering Treatment, Montana.*** Design engineer for a bench-scale study using a High Recovery Membrane (HRM) system in conjunction with a proprietary and proven Interstage Precipitation Reactor (IPR) process capable maximizing water recovery (>99%) and for realizing stringent surface water quality discharge requirements in the state of Montana. With successful water treatment, the discharge permit sought will be the first since these stringent surface water quality discharge requirements were put into place in 1996.

- ***Feasibility Study for Uranium Mine Expansion, Cameco Resources, Saskatchewan, Canada.*** Design engineer for the mine operational and contingency dewatering systems, development and review of process flow diagrams and process and instrumentation diagrams, generation of required equipment and ancillary piping and development cost estimate.

- ***Corrosion Control Plan and System Design, Crazy Mountain Ranch, Montana.*** Lead engineer for development of corrosion control plan for control of lead under the EPA's Lead and Copper Rule in employee drinking water supply in compliance with the Montana Department of Environmental Quality drinking water program. Oversight and review of system design based on the accepted plan was also provided on this project.

- ***Drinking Water Treatment System Design, Hardin Rest Area, Montana.*** Lead engineer for development and design of public water supply system at the Hardin, Montana Rest Area in compliance with the Montana Department of Environmental Quality's drinking water regulation. Cost Estimate, procurement assistance, contractor support and construction oversight were provided for implementation of treatment system.

- ***Design of Chemical Feed System for Solution Mining Application, NGS Energy, Mississippi.*** Design engineer for the chemical feed systems, including tank and piping sizing, system layout and chemical distribution for a 3 MGD microfiltration system to treat brine solution from mining activities.

- ***Pilot Study for Removal of Uranium for an Acid Mine Water Treatment Facility, Superfund Site, Washington State.*** Design engineer for the design, fabrication, and operation of a 1.6 gpm pilot scale water treatment system for removal of concentrated uranium from a former uranium mine site for determination of design parameters for full scale operation.

- ***Operations, Maintenance, and Monitoring (OM&M) Manual for Lime Treatment of Acid Mine Drainage, Superfund Site, Washington State.*** Project engineer for the development of an OM&M Manual for the continued operation for a lime treatment system for acid mine drainage as required by the US EPA.

- ***Feasibility Study and Cost Analysis for Passive Bioreactor Treatment for Acid Mine Drainage, New World Mining District, Cooke City, Montana.*** Lead Engineer for the investigation of alternative treatment technologies for a remote abandoned mine site near Cooke City, Montana. Report included evaluation of liquid and solid substrate bioreactors and cost analysis for pilot scale and full scale design and implementation.

- ***Reverse Osmosis Acid Mine Water Treatment Facility, Beal Mountain, Anaconda, Montana.*** Design engineer for the execution of the design and startup operations of a 0.5 MGD fully automated reverse osmosis water treatment plant for an abandoned cyanide heap leach for the United States Forest Service. Specific project experience involved equipment design and system procurement, process installation, startup, troubleshooting and continued operations and maintenance support.

- ***Review of Ceramic Microfiltration System, Montana Department of Environmental Quality, Helena, Montana.*** Lead engineer for technical review of a ceramic microfiltration system for a mine site for the Upper Blackfoot Mining Complex (UBMC) east of Lincoln, Montana, including treatment feasibility and design considerations as well as review of existing infrastructure to support proposed plant and plant Operations and Maintenance Manual.

- ***Spill Prevention Control and Countermeasures Plan, Solix Biofuels, Fort Collins, Colorado.*** Lead engineer for development of Spill Prevention Control and Countermeasures Plan as it applies to production and control of non-native algae growth systems

- ***Drinking Water Reverse Osmosis Treatment Plant, Town of Milliken, Milliken, Colorado.*** Design engineer for design of a 500 gallon per minute groundwater treatment plant for potable water using reverse osmosis technology. Design involved fully automated process control of all equipment and instrumentation, piping design, construction observation, plant startup and troubleshooting, operator training and ongoing instrumentation calibration and maintenance.

- ***Acid Cheese Whey Treatment, Sinton Dairy, Colorado Springs, Colorado.*** Design engineer for research and implementation of a solution for COD and TSS reduction in an acid cheese whey waste stream. Design will save client over $300,000 per year in treatment costs currently paid to the POTW.

- ***Process Water Discharge Permit, Sterling Ethanol, LLC., Sterling, Colorado.*** Lead Engineer for obtaining discharge permit for ethanol plant discharge water as required by the NPDES program. Project includes interaction with state and local agencies as necessary and coordination with client and contractors to obtain information pertinent to discharge.

- ***Processed Water Treatment Facility, Wellington Water Works, Wellington, Colorado.*** Design engineer for treatment of oil produced water for surface water discharge. Project included dissolved air flotation and ceramic microfiltration technologies for removal of constituents of concern from deep non-tributary groundwater pulled for oil production. The water will be used for augmentation in Northern Colorado.
- ***Feasibility Study and Ground Water Modeling of Nitrates, National Hog Farms, Kersey, Colorado.*** Lead engineer for the development of a groundwater model in 3-D ModFLOW for nitrate movement across a 28-square mile property in Northern Colorado. Project required investigation into feasibility and cost implications of remediation alternatives for removal of groundwater nitrate.
- ***Potable Water Distribution, Northern Colorado Water Association, Wellington, Colorado.*** Design engineer for potable water treatment and distribution system, including installation of new $3 million transmission main project, which will provide approximately 1,000 new and existing customers with drinking water.

PROFESSIONAL EMPLOYMENT HISTORY

Water Treatment Engineer, Tetra Tech, 2007 to Present
Entrepreneur, Hudson Photography, 2006 to 2007
Chemical Engineer, Stewart Environmental Consultants, Inc., 2003 to 2007
Graduate Research Assistant, Washington State University, 2000 to 2003
Associate Process Design Engineer, Merrick & Company, 1998 to 2000

AWARDS

2000: Fellow, National Science Foundation
2001: Fellow, Inland Northwest Research Alliance
2000: Team Quality Achievement Award for Los Alamos National Laboratory's Isotope Production Facility, Los Alamos National Laboratory

Jennifer Hudson 2/28/13

Appendix K

Signed Technical Memorandum

TETRA TECH

Technical Memorandum

To: Jo Ann Tischler

Company: Denison Mines (USA) Corp.

Re: Review of Chemical Contaminants in Dawn Mining Company Midnite Mine (DMC) Uranium Material to Determine Worker Safety and Environmental Issues and Chemical Compatibility at the Denison Mines White Mesa Mill

From: Jen Hudson

Date: June 14, 2013

Jennifer Hudson

Project #: 114-181850/300

Introduction

This report summarizes the assessment of the Dawn Mining Company's ("DMC") water treatment plant ("WTP") solids ("Uranium Material") to be transported from the DMC Midnite Mine, Wellpinit, Washington to determine whether processing the Uranium Material at the Denison Mines (USA) Corp. ("Denison") White Mesa Mill (the "Mill") may pose any worker safety or environmental hazards, or may be incompatible with the Mill's existing tailings system. The results will provide information to Denison to determine the requirements, if any, for changes to worker safety practices, or potential incompatibilities to the White Mesa Uranium Mill for the processing of this Uranium Material as an alternate feed material. This report will also provide comparison of constituents of the Uranium Material and the Denison groundwater ("GW") monitoring program to identify any constituents which are not covered under the Denison GW monitoring program and whether these additional parameters need to be added to the sampling requirements.

The following questions were considered for the evaluation of potential safety and environmental hazards and compatibility with the Mill's tailings system and GW monitoring requirements:

1) Will any constituents of the Uranium Material volatilize at the known conditions on the Mill site or in the Mill circuits? If so, will they create any potential environmental, worker health, or safety impacts?
2) Will the Uranium Material or any of its constituents create a dust or off-gas hazard at the known conditions on the Mill site or in the Mill circuit? If so, will they create any potential environmental, worker health, or safety impacts?
3) Will any constituents of the Uranium Material react with other materials in the Mill circuits?
4) Will any constituents of the Uranium Material create any impacts on the tailings system?

5) Does the Uranium Material contain any constituents that are not present in the current Mill GW monitoring program and not sufficiently represented by the Mill's groundwater monitoring analyte list and need to be added to the analyte list?
6) What, if any, limitations on feed acceptance criteria or added operational controls are recommended in connection with processing the Uranium Material at the Mill?

An evaluation of the regulatory status of the Uranium Material relative to the Resource Conservation and Recovery Act ("RCRA") regulations is provided in a separate technical memorandum.

1.0 Basis and Limitations of this Evaluation

The Uranium Material to be processed at the Mill consists solely of the Uranium Material produced from the existing DMC WTP. The Uranium Material was assessed to determine if it was, or contained, a listed Hazardous Waste under RCRA. In addition, historical Uranium Material data were reviewed and three solids samples were recently analyzed for the following RCRA characteristic hazardous waste properties: total uranium, total mercury, total metals, toxicity characteristic leaching procedure ("TCLP") metals and mercury, Lead-210, isotopic thorium, total alpha emitting radium, volatile organic compounds ("VOCs"), semi-volatile organic compounds ("SVOCs"), pesticides, herbicides, inorganics (reactive cyanides and reactive sulfides), and ignitibility.

Information presented in Table 1 details potential incompatibilities and chemical hazards associated with constituents within the Uranium Material. The historic water quality results of the WTP influent are presented in Table 2. Historic Uranium Material Total concentration data for uranium and radium-226 are presented in Table 3. Table 4 presents historic and current Uranium Material Metals Toxicity Characteristic Leaching Procedure ("TCLP") analysis for evaluation of RCRA characteristics; Table 5 includes Uranium Material Total analyses for evaluation of RCRA listed hazardous waste properties; the comparison of the Uranium Material and Mill tailings composition for Cell 4A or 4B is included in Table 6.

The following contamination evaluation is based on:

1. Current Midnite Mine WTP Uranium Material analytical data
2. Material Safety Data Sheet ("MSDS") for polymer in Midnite Mine Uranium Material (Attachment 1)
3. Historic Midnite Mine Water Quality and Uranium Material analytical data
4. Radioactive Material Profile Record ("RMPR") for the DMC Midnite Mine Uranium Material
5. Denison estimated composition data for tailings
6. Current technical literature from the internet and other sources on performance of liner materials

2.0 Site History and Background

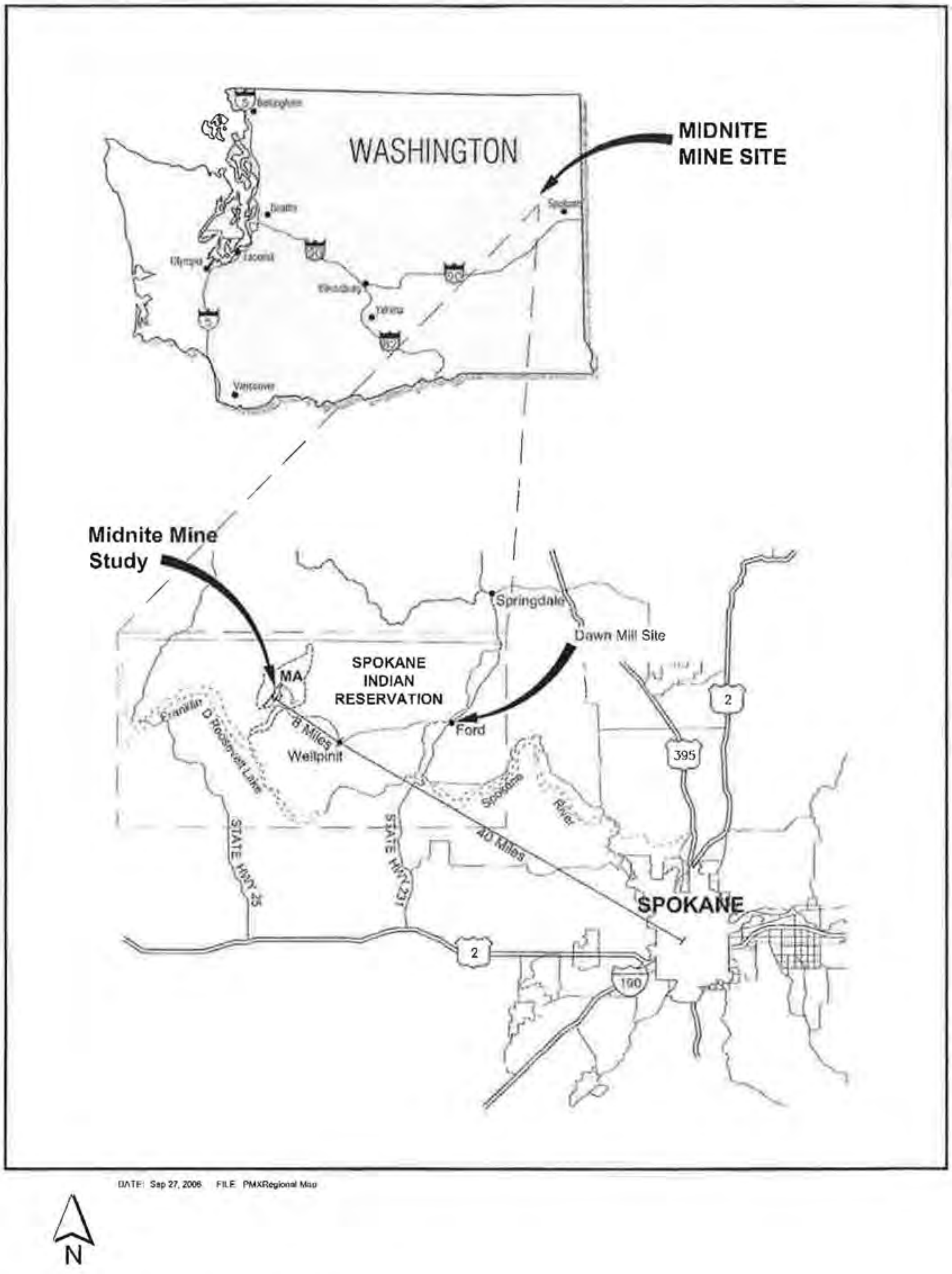
The Midnite Mine Superfund Site ("Site") is an inactive open-pit uranium mine that is currently administrated by the Environmental Protection Agency ("EPA") Region 10 under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), also known as Superfund. The Site EPA Identification Number is WA980978753.

The Site is located on the Spokane Indian Reservation in eastern Washington State, approximately 48 air miles northwest of Spokane (Figure 1). These lands are owned by the federal government and held in trust for the Spokane Tribe of Indians ("Tribe") and individual tribal members.

Uranium was discovered on the site in 1954. The prospectors and several tribal members subsequently formed Midnite Mines, Inc. and acquired the mining leases at the Site. Midnite Mines, Inc. then joined with Newmont Mining Company ("Newmont") to create the DMC, with Newmont Mining Company as the 51 percent shareholder and Midnite Mines, Inc. owning 49 percent. Newmont USA Limited is the corporate successor of Newmont Mining Company and continues to be the majority shareholder of DMC (EPA, 2006).

The mine operated from 1954 until 1965, providing uranium under contracts with the United States Atomic Energy Commission ("AEC"). The mine went into standby from 1965 and resumed mining in 1969. The ores were milled at the DMC Mill site, located near Ford, Washington. Mining was suspended in 1981 due to decreases in uranium prices and never resumed. The Mine was regulated by several United States Department of the Interior ("USDOI") agencies, including U.S. Geological Survey, U.S. Bureau of Mines, and U.S. Bureau of Land Management ("BLM") Minerals Management Service. The Bureau of Indian Affairs ("BIA") represented the Tribe and individual tribal allotment owners in matters related to leases and royalties.

An estimated 5.3 million tons of ore and proto-ore (i.e., low-grade mineralized rock) and 33 million tons of waste rock were removed from nine pits between 1955 and 1981. All but two of the mine pits have been backfilled using waste rock. The last two pits to be mined consisted of Pit 3 and Pit 4. These pits were not backfilled and remain open (EPA, 2006). Several reclaimed waste rock piles remain on the mine property and an estimated 2.4 million tons of ore and proto-ore were stockpiled and currently remain on Site.



DATE: Sep 27, 2006 FILE: PMXRegional Map

Figure 1. Midnite Mine Site Location

Seep and Surface Water Collection System

In the late 1970s, seeps with dissolved ore-derived constituents were observed at the toe of the largest waste rock piles at the Midnite Mine. The BLM ordered DMC to construct a control pond (the Pollution Control Pond, or "PCP") in 1979 to capture the seeps for evaporation. Following the suspension of mining in 1981, DMC began pumping water from the PCP to the now inactive Pit 3 in response to growing quantities of water in the PCP and newly identified seeps at the base of the largest waste rock pile. Since cessation of mining operations, mine site surface runoff water has been collected in engineered channels and diverted to the inactive open mining pit, Pit 3. In addition, natural ground water from the ore zones of the pits has flowed into and accumulated in the two open mining pits, Pit 3 and Pit 4, at the site. In February of 1985, DMC applied to the EPA for a National Pollution Discharge Elimination System ("NPDES") permit to allow for the discharge of treated water from those pits and other waters collected on the site. In September of 1986, the EPA issued DMC an NPDES permit.

In 1987 a Compliance Order was issued by EPA under the Clean Water Act ("CWA") NPDES program requiring DMC to eliminate discharges of pollutants to waters of the United States above the limits in the existing NPDES Permit. Subsequently, DMC developed a seep collection and pumpback program that collected water from Site drainages and returned them to the PCP and Pit 3. Existing seep and surface water collection occurs at six specific locations throughout the Midnite Mine Site as part of this seep collection and pumpback program including the PCP. Pit 3 water consists of mine site waters collected and pumped from the seep collection and pumpback program, direct precipitation and local mine surface runoff in the immediate area of Pit 3, and natural ground water inflow from the Pit 3 ore zones. The water that accumulates in Pit 4 consists of direct precipitation, groundwater inflow, and surface runoff in the immediate area of Pit 4. All waters collected in the seep collection and pumpback system are derived from seeps from waste rock piles or surface runoff at the Site. The seep collection and pumpback system does not collect water from any areas that have ever been known to contain or currently contain any listed hazardous wastes or from any operations other than the mining of natural uranium ores.

In 1988, DMC built a water treatment plant at the Site to treat the accumulating water in the open pits. In 1991, the BLM issued an order requiring DMC to dewater the open pits for compliance with the NPDES permit issued in 1986, and in 1992 the WTP began treating pit water. These waters contain primarily metals, sulfate, and uranium.

There are no shop areas, petroleum tanks, or other sources of hydrocarbons at the mine site with the exception of a 300 gallon diesel fuel tank for the Pit 4 pump, and a 300 gallon tank of gasoline for WTP equipment. The diesel fuel tank and pump are located in secondary containment near Pit 4 with a maximum volume stored of 300 gallons and the 300 gallon gasoline tank is located next to the WTP. These fuels are stored and managed separately from the Uranium Material and have not impacted the Uranium Material in the past, nor do they have a reasonable potential to do so in the future. The constituents precipitated from the WTP influent are derived from flow of natural precipitation through uranium mine waste rock and natural ore, collected surface runoff from natural materials, and natural ground water inflow from the ore zones into one of the two remaining open pits, Pit 3 and Pit 4 as discussed above.

Water Treatment Plant Process Description

The WTP is a conventional lime treatment high-density solids process in which the metals and uranium are precipitated out in the treatment process, and includes addition of barium chloride for radium removal. A polymer coagulant is added and the resultant slurry is settled and filtered to produce a solution free of solids for surface discharge under the CWA NPDES program and EPA CERCLA program. The precipitate is currently centrifuged and the final solids contain on average 0.18 wet weight percent uranium (0.21 wet weight percent U_3O_8) at an average historical solids content of 15 percent. However, the centrifuges are to be replaced with a hydraulic filter press in 2011, increasing the percent solids of the final Uranium Material to between 25% and 45% resulting in a proportional increase in weight percent uranium estimated to be between 0.3 and 0.55 wet weight percent uranium (0.35 and 0.63 wet weight percent U_3O_8). As uranium ores are typically evaluated on a dry percent U_3O_8 basis, the actual (dry) percent U_3O_8 of the Uranium Material is estimated to be approximately 1.4 percent U_3O_8.

The WTP is typically operational from early May through the end of October and operates 24 hours per day, four days per week. WTP influent is derived from approximately 400 gallons per minute ("gpm") influent from Pit 3 and approximately 50 gpm influent from Pit 4. The pit waters are pumped to the WTP using positive displacement pumps which are piped separately to the WTP through polyethylene piping. The WTP reagents are pre-mixed in individual mixing tanks prior to addition to the treatment stream. The hydrated lime and flocculent are pre-mixed using makeup water from Pit 4 while the barium chloride is mixed with potable water.

Barium chloride is added to the influent water stream, which is then mixed with approximately 90 gpm from the clarifier bottoms (clarifier underflow) to increase the overall final WTP solids density. Then hydrated lime is added for the precipitation of uranium and metals. Waters recovered from the dewatering process are also added back to the process stream at this point. An anionic water soluble polymer (Neo Solutions, NS-6852) is subsequently added as a coagulant to facilitate clarification.

This process stream is then sent to one of two clarifiers. The precipitated solids are drawn from the clarifier bottom and, as mentioned previously, approximately 20% of the clarifier underflow (approximately 90 gpm) is pumped back to the beginning of the process to increase overall WTP solids density. The liquid fraction of the remaining process stream (approximately 360 gpm) is decanted from the top of the clarifier for further treatment and discharge separate from the solids, while the remaining solids fraction from the clarifier underflow is sent to the centrifuge for dewatering. The centrifuge will be replaced for the 2011 operating season with a hydraulic filter press as discussed in more detail below.

The dewatered solids are currently transferred from the centrifuge to the hauling truck via a discharge conveyor. The transport truck is housed within the WTP building and remains in that location until it is hauled for final disposal, thereby eliminating any opportunity for other waste materials to be introduced into the Uranium Material.

The time period from 2001-2008 is the most representative of treatment volumes processed in the WTP. Before this time period, pit dewatering and other site activities increased the volumes treated. Therefore these are the years used for this analysis.

From 2001 through 2008 the WTP process produced between 164,000 dry lbs and 393,500 dry lbs per year (82 to 194 dry tons per year) of treatment solids (average 294,700 dry lbs or 147 dry tons). The maximum annual total volume of Pit water treated was approximately 76.5 million gallons for the period of 2001 through 2008. Volumes vary depending on how much precipitation the site receives in a given year.

The plant will be modified for the 2011 operational season, and the centrifuges currently used for Uranium Material dewatering will be replaced by a hydraulic filter press. It is expected that the same water soluble polymer will be used for coagulation; however the polymer application rate may be increased from the current rate to improve the dewatering characteristics of the solids. The Uranium Material solids percent is expected to increase from an average of 15 weight percent solids to between 25 and 45 percent. The total wet concentrations of the constituents present in the Uranium Material are expected to increase by 67 to 300 percent from the analytical values reported for the current Uranium Material as a result of decreased water content due to dewatering with the filter press. The dry concentrations should not change.

In addition, a Remedial Investigation/Feasibility Study (RI/FS) was completed on 9/30/05 for the Midnite Mine. The Selected Remedy for the Site is Alternative 5a (Complete Pit Backfill with Passive Drains and Ex-Situ Water Treatment) of the FS. Based on the FS and issued in the Record of Decision (ROD) as the Selected Remedy ("Remedy), Pits 3 and 4 will be backfilled, waste rock and proto-ore will be moved and capped, and a new passive water collection system will be installed to capture groundwater from these and other backfilled pit areas. The surface water management will be designed to divert surface flows around sources of contamination and therefore minimize the volume of water to be treated after the Remedy is implemented. The existing WTP is located on a waste rock pile that must be removed for the Remedy. Therefore, a new water treatment plant will be built before construction of the Remedy begins It is estimated that the construction will begin in the beginning of 2013 and will require approximately 2 years ending at the end of 2014, and the new WTP must be capable of treating water at a rate of 1,000 gpm year round for the construction phase. The new WTP will be comparable to the current treatment employed using lime and barium addition for removal of constituents from the feed water. This higher design flow will allow for rapid dewatering of the pits during backfilling, as well as groundwater collection and surface water collection treatment. After construction, it is expected that the flows will be reduced to an ultimate annual value of 65 million gpm and will take an estimated 6 to 7 years to reach these reduced flows.

The water quality during construction is assumed to be the same composition as currently is captured and treated, and it is expected that the water quality after implementation of the Remedy will be improved from current water quality.

The estimated production of dry Uranium Material before during and after the Remedy is implemented is projected to range from 996 tons per year during the two year construction phase down to 2.8 tons after the remedy has become effective .

3.0 Assumptions Regarding White Mesa Mill Processing of the Uranium Material

This evaluation was based on the following process assumptions:

a) The Mill will process the Uranium Material either in the main circuit mixed with conventional ore or in the alternate circuit alone.
b) The Uranium Material will be delivered to the Mill in conventional covered end or side dump haul trucks, which will be unloaded onto the Mill's ore pad. It will be temporarily stored on the ore pad, similar to conventional ores, pending processing.
c) If the Uranium Material is processed in the Mill circuit, it will be added in a manner similar to that used for the normal processing of conventional ores and other alternate feed materials. It will either be dumped into the ore receiving hopper and fed to the SAG mill, run through an existing trommel before being pumped to Pulp Storage, or may be fed directly to Pulp Storage.
d) If the Uranium Material is processed in the alternate circuit, it will be dumped to the filter cake acid tank.
e) The Mill does not anticipate any significant modifications to the leaching circuit or recovery process areas for the processing of the Uranium Material.
f) The Uranium Material may be processed in combination with other approved alternate feed materials.
g) Tailings from processing of the Uranium Material will be sent to Cell 4A, or Cell 4B, or potentially to subsequently-constructed tailings cells.
h) Tailings from the Mill circuit historically disposed of in Cell 3 will be sent to Cell 4A or Cell 4B, and thereafter to subsequently-constructed tailings cells.

4.0 Chemical Composition of the Uranium Material

The characterization data and the RMPR provided include historical WTP influent water quality data, historical Uranium Material analysis, and analysis of representative Uranium Material samples in 2010. The 2010 Uranium Material analyses included three WTP solid samples analyzed for radionuclides, recoverable metal values, RCRA regulated organic and inorganic contaminants, diesel and gas range organics ("DRO" and "GRO") as well as for RCRA hazardous waste characteristics. Radionuclide analyses included Lead-210, isotopic thorium, gross alpha and beta, and total alpha emitting radium. Additional parameters including nutrients (ammonia and nitrate/nitrite), and other non-metals were included in the analysis to assess compatibility with existing tailings and process chemicals at the White Mesa Mill. The total uranium values from the 2010 sampling results indicate average uranium concentration in the sludge to be 15,333 mg/kg (1.5 percent Uor 1.8 percent U_3O_8) on a dry basis and are consistent with the historical uranium values for the Uranium Material.

The TCLP results, RCRA characteristic test results, and the total constituent values of the Uranium Material were evaluated and presented in *Technical Memorandum: Review of Chemical Contaminants in Dawn Mining Company (DMC) Midnite Mine Uranium Material to Determine the Potential Presence of RCRA Characteristic or RCRA Listed Hazardous Waste* (Tetra Tech, 2011).

As a result of the RCRA characteristic waste evaluation, it was concluded that the Uranium Material does not exhibit any of the RCRA characteristics of ignitability, corrosivity, reactivity, or toxicity for any constituent. The sampling results of the RCRA characteristic evaluation are consistent with the constituents found in the total constituent evaluation.

The historical water quality data indicates that influent water parameters are relatively consistent over the WTP operational history (Table 2). Based on process history of the source of the Uranium Material organic constituents of any are not expected to be present and have not historically been analyzed in the WTP influent, or the final Uranium Material; however, comprehensive laboratory analysis of recent Uranium Material samples, including analyses for organic compounds, is included in this report. The Uranium Material test results presented herein are taken to be representative of the range of material characteristics of the Uranium Material. As a result, these studies provide sufficiently representative characterization to assess the regulatory status, worker safety environmental hazards, and chemical and processing properties of the Uranium Material.

The list of constituents sampled for in the Uranium Material, included in Table 5 were generated from the parameters in the White Mesa Mill groundwater permit and annual tailings characterization program as appropriate to the Uranium Material.

4.1 Organic Constituents

The sampling results for the total volatile organic compounds in Table 5 indicate that acetone, methylene chloride, and toluene were reported at very low concentrations in the three samples for total analysis. Acetone was reported at concentrations ranging from 22 milligrams per kilogram ("mg/kg") to 33 mg/kg with an average value of 28 mg/kg. Methylene chloride was reported at concentrations ranging from 3.7 mg/kg to 5.8 mg/kg with an average value of 4.4 mg/kg. Toluene was reported at concentrations ranging from 1.5 mg/kg to 2.7 mg/kg with an average value of 2.1 mg/kg. However all of these constituents were also detected in the method blanks for the coinciding sample runs. Chloroform was detected in the three samples just above the method detection limit ("MDL"). The method blank samples did indicate low levels of total chloroform; however the detection of chloroform in the blank was below the MDL and was therefore not reported by the laboratory, as stated in the email from laboratory personnel Jeff Kujawa (Attachment 2). As indicated; chloroform, methylene chloride, and toluene were therefore present due to laboratory interferences, and not present in the Uranium Material.

Trichloroethene (or trichloroethylene) was reported at very low concentrations from the TCLP testing of only two of the Uranium Material samples with concentrations ranging from 1.5 micrograms per liter ("µg/L") to 2.7. µg/L with an average concentration of 2.1 µg/L However, trichloroethene was detected in the leachate method blank at 3.3 ug/L which was above the MDL, but below the reporting limit ("RL"). Two of the three associated samples had detectable amounts less than the RL and less than 10 times the amount found in the method blank, so the samples were qualified as "U", raising the concentration to the RL (5 ug/L).

Review of the site operational history, WTP processes and chemicals, as well as sample collection, preservation and shipping methods did not identify any source of potential sample contamination for these constituents.

Since these compounds were present in the method blank and there are no known sources for these constituents from the Site or from the sampling preservation or shipping methods, their detection is apparently due to laboratory influences, and does not indicate they are present in the Uranium Material. These are common laboratory solvents and there are multiple laboratory pathways that could introduce them during analytical processes, including the use of methylene chloride for extraction of SVOCs in other analytical procedures.

The sampling results for the total herbicides and total organochlorine pesticides (Table 5) indicate that there was no detection of any of the constituents tested.

The sampling results for the total semi-volatile organic compounds in Table 5 indicate that there was no detection of any of the constituents tested for. Therefore the results of the VOC and SVOC analyses for the Uranium Material indicate that there are no volatile or semi-volatile components present in the Uranium Material to be shipped to the White Mesa Mill.

DRO and GRO were analyzed to ensure that these components were not present in the Uranium Material; test results are included in Table 5. The DRO and GRO results indicate no detection of these constituents.

4.2 Inorganic Constituents

4.2.1 Non-Metal Inorganic Compounds

Five non-metal inorganic constituents were identified in the Uranium Material: ammonia, nitrate/nitrite, fluoride, chloride, and sulfate. It was determined in the RCRA analysis that these constituents are not hazardous compounds as contained in the Uranium Material.

The constituent with the highest concentrations in the Uranium Material was sulfate with a concentration of 17,000 mg/kg in all three samples. All other constituents were present at much lower levels with concentrations ranging from approximately 3 mg/kg to around 40 mg/kg.

4.2.2 Metals

The three Uranium Material samples were analyzed for total metals, total alkali metals, and total alkaline earth metals. According to the sampling results, of the 20 non-radioactive metals and metalloids analyzed in the Uranium Material, 14 were present including: barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, silver, and zinc. These constituents can be categorized based on their elemental characteristics and chemical properties as follows:

Class	Component of the Uranium Material
Alkaline Earths	Barium, Beryllium, Calcium
Transition Metals	Cadmium, Chromium, Cobalt, Copper, Iron, Manganese, Nickel, Silver, Zinc
Other Metals	Lead
Metalloids	Selenium

With the exception of barium, the metal species presented above are natural constituents in uranium ores and surface and ground waters in contact with these ores at the Site. The source for the barium is the barium chloride added to the water treatment process for removal of radium from the influent water. Calcium is a natural constituent in the influent water to the treatment system; however, additional calcium is introduced into the Uranium Material by addition of lime for metals precipitation.

The Uranium Material samples were not analyzed for their actual mineral composition. As a result, their exact compound forms have not been identified. Assumptions regarding their form, based on process knowledge and prior experience with leached metal tailings, are discussed below.

It should be noted that the chemical properties and reactvities discussed below for apply to metals, hydroxides, or oxides in pure or high concentrations in dry or "neat" form, not to precipitated salts or sludges in a wet matrix. These properties are discussed below for completeness and conservatism of the assessment.

4.2.3 Potential Effects in Mill Process

The metals in the Uranium Material are expected to be in the form of metal hydroxides and metal sulfates. The overall maximum mass contribution of 197 dry tons per year of Uranium Material is not expected to have a significant effect on the concentrations of constituents in the impoundments. Historical data for Cell 3 in 2004 at the White Mesa Mill are presented in the Statement of Basis for the Utah Groundwater Discharge Permit for the Mill. The mass in Cell 3 at that time was estimated to be 1,769,000 dry tons of tailings material. Cell 3 is full and is no longer able to accept process residuals from the Mill. The tailings from the Uranium Material to be processed will be sent to either Cell 4A or Cell 4B or to a subsequently-constructed tailings cell. It is assumed that the composition of the Cell 4A and Cell 4B tailings material will be similar to Cell 3. Therefore the compositional data from Cell 3 has been used to determine the impact of the Uranium Material to the tailings cells in the future. Table 5 presents the comparison of estimated Mill tailings composition before and after processing of the Uranium Material. The analysis assumed for the first two years, the treatment plant will be operated under the existing historical conditions at an estimated 76.5 million gallons (MG) of water to be treated with a sludge production of 29 dry tons of Uranium Material. The construction of the Remedy is anticipated to begin in Year 3 and last for two years. The estimated volume treated and sludge produced for Years 3 and 4 are 405 MG and 154 tons of dry Uranium Material produced. Once construction is complete, it is estimated that treated flows will decrease from the current value of 76.5 MG (yielding 29 dry tons per year of solids) to an ultimate value of 65 MG (yielding less than 25 tons per year of solids) over a 6 year period. For the current analysis as detailed in Table 5, years 5-10 were estimates based on a reduction of 20 percent per year of the difference between the existing flow (76.5 MG) and the ultimate flow (65 MG) annually.

The analysis compares the tailings composition before and after processing of the Uranium Material on an annual basis for ten years. It is estimated that either Cell 4A or 4B will take approximately this long to fill to capacity. The results indicate that the impact to the tailings cell for the metals contained in the Uranium Material is minimal when comparing the overall quantity to be processed. Over the ten year period, it is estimated that tailings from approximately 283 dry tons of Uranium Material in total will be added to the estimated total of 2.15 million tons of tailings from current operations, which is equivalent to less than 1/100th of one percent of the total or the equivalent of a few hours of conventional ore production, that is, the contribution of the Uranium Materials to the tailings system will be negligibly small.

All sampled metals have been introduced into the milling process and impoundments at the Mill. All analyzed radio-isotopes have already been introduced into the milling process at the Mill as a result of processing uranium ores as presented in the historic data from cell tailings. All constituents analyzed and detected in the Uranium Material except barium are natural constituents in the mining and processing of uranium ores and therefore are expected to be present at the Mill as a result of processing of uranium ores.

Most of the metal species resulting from natural ores in the Uranium Material are present at parts per million ("ppm") levels or lower (or at percent levels in the highest case). The concentrations of these constituents will be further reduced by introduction into the leach circuit, where they will be present at fractional ppm levels or lower in large volumes of aqueous acid solution. These constituents will be processed in the same manner as natural uranium ores processed at the Mill and will be discharged to the Mill tailings system just as the uranium ores currently are.

In addition to these constituents, barium chloride is added to the WTP feed water for radon removal, calcium is added in the form of lime for metals precipitation of the WTP feed water, and an anionic water-soluble polymer is added during the metals precipitation process at the DMC WTP site and are discussed below.

The majority of the metal hydroxides, hydrates, and other mineral salts will be converted to sulfate salt forms in the leach system. The insoluble forms will be precipitated with the solids removed from the alternate feed circuit.

All the known Uranium Material components in their anticipated oxidation or mineral states are compatible with aqueous sulfuric acid, which will be used for leaching the Uranium Material, and all other chemicals and materials to which they may be exposed in the Mill.

Since the metals, hydroxides, hydrates and other salts are expected to be converted to insoluble sulfates, it can be assumed that the non-uranium constituents that enter the leach system will leave the leach system, proceed no further than the CCD step or Tank 11A or 11B, and be discharged from the circuit to the tailings.

Barium chloride is added to the WTP feed water to remove radium from the stream. The average barium concentration in the feed is 7,733 ppm and is expected to be in the form of barium sulfate. The data from Cell 3 indicate that barium has already been introduced into the Mill process from other alternate feed materials, and the assumption is that barium will also be present in the Cell 4A and 4B tailings from such other sources. Barium concentrations as high as 43,000 ppm have been processed to date at the Mill with no adverse process, environmental, or safety issues. Incompatible materials listed for barium sulfate include phosphorous and aluminum. The barium will not be exposed to these materials, and the addition of sulfuric acid at the Mill will not create any additional worker safety or environmental hazards.

Some of the metals and metal hydroxides, in dry forms or at high concentrations , are known to decompose at high temperatures, breaking down into volatile oxide forms (such as As_2O_5 decomposing to a trioxide). However, as described above, the metals and metal hydroxides will be short-lived in the process, as they will be converted into aqueous sulfates in the leach acid. The metals and their hydroxides will not be exposed to any conditions that can produce gaseous byproducts. The sulfate forms are stable and non-reactive and will be precipitated from the circuit in post-leach steps and discharged to the tailings system.

The polymer added for coagulation of the metal precipitates in the DMC sludge production process is NeoSolution NS-6852. The polymer is a stable compound and in its pure form may result in generation of heat upon addition of a strong oxidizing agent according to the MSDS (Attachment 1). The polymer will be introduced to the circuit not as pure polymer, but primarily bound within the precipitated solids from the WTP. Since there are no strong oxidizers in the milling process, and the Uranium Material containing the polymer will be introduced immediately into aqueous solutions in the leach circuit, the polymer will not cause any adverse reactions or polymerization as a result of processing at the Mill. It is expected that the polymer will be broken down into smaller inert organic molecules by the addition of acid, and will have the same fate as other anionic polymers used in the Mill's clarifiers with no adverse effects to the Mill process.

4.2.4 Alkaline Earth Metals

Metal oxides are more reactive in an acid leach system than metal hydroxides or metal sulfates. Although the metal compounds will be primarily metal hydroxides and metal sulfates, the chemical reactivity discussed below is focused on the reactivity of the metal oxides to provide conservatism for the worker safety evaluation. Although in some circumstances, the introduction of oxides of alkaline earths in sufficient quantities into an acid leach circuit has the potential to result in unwanted excess chemical reactivity, this situation will not result from processing the Uranium Material at the Mill for the reasons described below.

Manufacturer's MSDS and National Institute for Occupational Safety and Health ("NIOSH") safety hazard information indicate that in pure form or high concentration the alkaline earths: barium, beryllium, and calcium are reactive with water resulting in an exothermic (heat generating) reaction if they are present as a pure or high concentration product (percent levels or more).

The historical tailings data for Cell 3 indicate that barium has been introduced into the tailings system, and it is assumed that tailings similar to the tailings historically sent to Cell 3 will now be sent to Cell 4A and 4B, and barium concentrations in Cell 4A and 4B will be comparable to Cell 3. For this analysis, historical Cell 3 barium concentrations were used. During processing of the Uranium Material, calcium may be present at 15,667 ppm and barium and beryllium may be present at 7,733 ppm and 35 ppm, respectively, in the ore feed area to the circuit (Table 6). These constituents have been introduced to the Mill process in other feed materials in concentrations as high as 217,000 ppm for calcium, 43,000 ppm for barium, and 105 ppm for beryllium. The resulting increase in concentration to the tailings is 21.9 ppm for calcium, 0.049 ppm for beryllium, and 10.8 ppm for barium, or increases of 22.7 and 11.2 percent for calcium and barium, and an imperceptible 0.051 percent increase for beryllium, based on the concentrations in Cell 3. These low levels will not pose a heat of reaction hazard with the water rates in the dust control system. Any water reactivity will also be quenched immediately by the large volume of sulfuric acid solution in the leach system. Pure or high concentrations of these hydroxides in dry form can also decompose under heat to generate hazardous byproduct gases. However, these materials will not be exposed to heating conditions during processing at the Mill. As discussed above, the metals and metal oxides are expected to be converted into metal sulfate salts in the acid leach system and be precipitated with solids removed from the post leach thickeners in the CCD circuit. These metals will be removed from the Mill process in the CCD thickeners and then discharged to the tailings, and therefore will not be exposed to the elevated temperatures further in processing of the uranium.

4.2.5 Transition Metals

Chemical behavior and incompatibilities for the transition metals vary, so they are discussed individually in this section.

Although in some circumstances, the introduction of oxides of the transition metals in sufficient quantities into an acid leach circuit has the potential to result in unwanted excess chemical reactivity, this situation will not occur from processing the Uranium Material at the Mill for the reasons described below.

Cadmium oxide is reactive with pure product magnesium and decomposes at elevated temperature to release cadmium fumes. The metal compounds will be present as hydroxides and sulfates and therefore there will be no pure metal magnesium for reaction with cadmium oxide. Cadmium oxides are insoluble in water and soluble in and compatible with acids and alkalis. They will be converted into sulfates in the acid leach system and will be precipitated and discharged into the tailings and will not be subject to elevated temperatures during processing. They do not pose any incompatibility hazards in the Mill process.

Chromium oxides are oxidizers themselves and are incompatible with combustible organic materials due to the potential for ignition. However, chromium oxides will not be present and the metal hydroxides will be precipitated and discharged into the tailings before the aqueous streams are contacted with organic hydrocarbons in subsequent uranium concentration steps, eliminating any contact with organic materials.

Cobalt oxides are insoluble in water and slightly soluble in and compatible with acids and alkalis. They will be converted into sulfates in the acid leach system and will be precipitated and discharged into the tailings. Cobalt oxides do not pose any incompatibility hazards in the Mill process.

Cupric oxides are insoluble in water and soluble in acids, and toxic metal fumes may form when heated to decomposition. However cupric oxides are only present at trace levels and will be converted into sulfates in the acid leach system and discharged into the tailings and will not be subject to elevated temperatures during processing. They do not pose any incompatibility hazards in the Mill process.

Iron oxides are reactive with calcium hypochlorite, carbon monoxide gas, and hydrogen peroxide. The Uranium Material will not be in contact with any of these materials at any time in the Mill process.

Other compounds of iron, (i.e. chlorides and sulfates) are compatible with the solutions in the leach circuit. They will be precipitated as sulfates or other insoluble salts, and discharged to the tailings. They do not pose any incompatibility hazards in the Mill process.

Manganese and its oxides are not soluble in water but are soluble in strong acids. They will be converted to sulfates in the acid leach system, and will be precipitated and discharged to the tailings. They do not pose any incompatibility hazards in the Mill process.

Nickel and its oxides are reactive and incompatible with gaseous iodine and hydrogen sulfide. The Uranium Material will not be in contact with either of these materials at any time in the Mill process and therefore do not pose any incompatibility hazards.

Silver oxide in pure or high concentration poses a fire and explosion risk in contact with organic materials and ammonia. Silver oxides will not be in contact with organic materials or ammonia at any time in the Mill process. Insoluble salts of silver will be precipitated with solids removed from the post-leach thickeners in the alternate feed circuits and will be discharged to the tailings and will proceed no further with the uranium through subsequent processing steps. Although the Uranium Material contains trace amounts of ammonia, the concentrations are not sufficiently high to create instability within the Uranium Material as delivered to the Mill. Also, within the processing at the Mill, concentrated uranium brines are precipitated with ammonia at this later phase, the insoluble silver salts will already have been removed from the process and the solids sent to the tailings prior to the ammonia precipitation of uranium, and silver oxides will not come into contact with the ammonia.

Zinc and its oxides are stable and insoluble in water, but soluble in most acids and bases at ambient temperatures. They will be converted to sulfates in the acid leach system, and will be precipitated and discharged to the tailings. They do not pose any incompatibility hazards in the Mill process.

4.2.6 Other Metals

Although in some circumstances, the introduction of oxides of lead in sufficient quantities into the acid leach circuit has the potential to result in unwanted excess chemical reactivity, this situation will not result from processing the Uranium Material at the Mill for the reasons described below.

Manufacturers' MSDS and NIOSH safety hazard information indicate that lead and its oxides are incompatible with strong oxidizers, halogen gases, and some acids.

Oxidants are sometimes added to the leaching system at the Mill to improve uranium recovery from some types of feeds. Sodium chlorate, the typical oxidizing agent used in the Mill's leach circuit is a moderately effective oxidizer, but not considered a strong oxidizer. It is introduced in a relatively dilute aqueous solution in the leach system. Lead is present in low concentrations in the Uranium Material with an average value of 18 ppm. As a result, hazards associated with reactions between lead oxides with strong oxidizers are not applicable to the processing of the Uranium Material.

The Uranium Material will not be in contact with halogen gases at any time in the Mill process. Lead oxides react strongly with strong mineral acids such as nitric and sulfuric acids. The sulfuric acid added to the acid leach system is relatively dilute and not an oxidizing acid. These oxides will be converted into sulfates in the acid leach system and precipitated with the solids removed to the tailings.

4.2.7 Metalloids

Although in some circumstances, the introduction of selenium oxides in sufficient quantities into the acid leach circuit has the potential to result in unwanted excess chemical reactivity, this situation will not result from processing the Uranium Material at the Mill for the reasons described below.

Manufacturers' MSDS and NIOSH safety hazard information indicate that selenium and its oxides are incompatible with strong acids, organic materials, and ammonia.

Selenium oxides in pure form or high concentrations pose a fire and explosion risk in contact with organic materials and ammonia. Selenium oxides will not be in contact with organic materials or ammonia at any time in the Mill process. Insoluble salts of selenium will be precipitated with solids removed from the post-leach thickeners in the alternate feed circuit and will be discharged to the tailings and will proceed no further with the uranium through subsequent processing steps. Although the Uranium Material contains trace amounts of ammonia, the concentrations are not sufficiently high to create instability within the Uranium Material as delivered to the Mill. Also, within the processing at the Mill, concentrated uranium brines are precipitated with ammonia at this later phase, the insoluble selenium salts will already have been removed from the process and the solids sent to the tailings prior to the ammonia precipitation of uranium, and selenium oxides will not come into contact with the ammonia.

4.3 Non-Metals

Nitrates have been introduced into the Mill's circuit with natural ores and alternate feeds at levels as high as 350,000 mg/kg. The average nitrate concentration in the Uranium Material is 3.1 mg/kg. The Mill has handled nitrate compounds in the Mill circuit and tailings system with no adverse process, environmental, or safety issues.

Chlorides have been introduced into the Mill's circuit with natural ores and alternate feeds at levels as high as 89,900 mg/kg. The average chloride concentration in the Uranium Material is 40 mg/kg. The Mill has handled chloride compounds in the Mill circuit and tailings system with no adverse process, environmental, or safety issues.

Fluorides have been introduced into the Mill's circuit with natural ores and alternate feeds at levels as high as 460,000 mg/kg. The average fluoride concentration in the Uranium Material is 39 mg/kg. The Mill has handled fluoride compounds in the Mill circuit and tailings system with no adverse process, environmental, or safety issues.

Sulfates have been introduced into the Mill's uranium circuit with natural ores and alternate feeds at levels as high as 300,000 mg/kg. Sulfates are also generated by the reaction of sulfuric acid with other metal cations in the acid leach system. The Mill has handled sulfate compounds in the Mill circuit and tailings system with no adverse process, environmental, or safety issues.

Ammonia was reported at very low levels, with an average value of 8.0 mg/kg. Anhydrous ammonia gas in high concentrations of ammonium hydroxide solutions are incompatible with strong oxidizers, halogen gases, acids, and salts of silver and zinc. Ammonia is present as low concentration aqueous ammonium salts (chlorides and sulfates) and as mineral complexes, and will not be present as anhydrous ammonia gas or high concentration ammonium hydroxide.

The ammonium compounds will not contact halogen gases at any time in the Mill process. While ammonia may be present in the reactive form (ammonium hydroxide) it will be at concentrations too low to react with the silver and zinc already present in the Mill tailings, or with the moderate oxidizer that may be added in the Mill acid leach circuit.

4.4 Organic Compounds

As discussed in Section 4.1, there was no detection of any organic compounds sampled for with a reasonable degree of accuracy. Although the polymer added to the feed water in the water treatment system is organic, analytical results indicate that there are no organic compounds present in the Uranium Material as analyzed, and therefore there will be no effect on the Mill processing as a result of organic compounds. The organic polymer is expected to decompose in the Mill processing and will have no affect on the on the Mill processing.

5.0 Potential Worker Safety Issues

According to manufacturers' MSDS and the NIOSH literature (2007), the primary worker health hazards from the metal oxides are associated with inhalation of dusts and fines. If inhaled in pure or high concentrations in dry form, the oxide dusts of the lower metals are as hazardous as those of uranium. However, the Uranium Material is expected to have an average moisture content of approximately 25 to 45 percent, which will minimize the potential for dusting, and which ensures that all metal oxides will be present in the Uranium material in hydrated, not dry, form. If required, normal dust controls, such as water sprays, can be implemented to minimize any worker exposure to dusts from unloading operations. In addition, normal operations in this area require the use of worker personal protective equipment for prevention of dust inhalation and skin exposure; therefore, normal worker protections already in place will be sufficient to prevent exposure to any additional metal oxides, sulfates, or nitrates during processing of the Uranium Material.

6.0 Radiation Safety

The Uranium Material is derived from natural uranium ores, or through contact of surface or groundwater with these ores. The Uranium Material contains the same radionuclides as natural ores; however the concentrations of the uranium daughters are much lower. The concentrations of Ra-226, Th-230 and Pb-210 are lower in the feed as a result of the low concentrations in the feed water to the treatment plant. The concentrations of these daughter products in the feed water are lower than the concentrations typically found in ore due to the limited solubility in groundwater. The derived air concentrations, radiation protection measures, and emissions control measures used for the ores and alternate feeds at the Mill are sufficiently protective for the processing of the Uranium Material.

7.0 Potential Air Emissions Impacts

The introduction of a solid powder like the Uranium Material to any process may produce two potential forms of air emissions: fugitive dusts, and/or hazardous gases. Discussions in the previous sections demonstrate that engineering controls already in place at the Mill will prevent the generation or dispersion of both of these types of emissions. The Uranium Material will have a moisture content of approximately 25 to 45 percent, which will minimize dusting of finely divided and powdered alternate feed materials. In addition, the impurities will almost immediately be converted from volatile oxides to sulfates or other stable aqueous ionic forms, which are non-volatile and produce no off gases.

Because the metals and ions in the Uranium Material are present at trace levels, they are not expected to generate a significant increase in load on the existing bag-house system and air pollution control devices even if they reach the air control system as solids from spills in the pre-leach area.

In sum, the air emissions impacts from processing the Uranium Material will not be different in any significant way from processing conventional ores at the Mill.

8.0 Potential Effects on Tailings System

8.1 Tailings Cell Liner Material Compatibility

The Uranium Material will be received as a precipitated solid from lime treatment of the WTP influent water. A portion of this material may be insoluble in the acid leach process at the Mill and therefore, the discharge sent to tailings may contain some solid material ("sand"). The remainder of the Uranium Material will be soluble and therefore be contained in the liquid phase after processing in the acid leach system. Tailings from processing the Uranium Material will be sent to one of two tailings cells at the Mill, Cell 4A or Cell 4B or a subsequently-constructed cell. The solutions from the Uranium Material tailings will be recirculated through the mill process for reuse of the acidic properties in the solution. The sands will be only a portion of the total mass of Uranium Material sent to the Mill from the Site. However, assuming a worst case scenario that all of the solid material ends up as sand in the tailings, it is estimated that for the main processing circuit, the additional load to the tailings will be minimal (Table 6).

Cell 4A and 48 both have high-density polyethylene ("HDPE") liners. Cell 4A went into service in October of 2008 and contains conventional ore tailings sands. Solutions from the Mill, starting in July 2009, are also sent to this Cell. Cell 4B was constructed and placed in to operation in February of 2011 and is expected to receive the same type of materials as Cell 4A when operational.

The constituents in the sands and liquids resulting from processing the Midnite Mine Uranium Materials are not expected to be significantly different from those in the conventional ores either in composition or in concentration of constituents. Table 6 indicates that when comparing the Uranium Material to the tailings, all of the constituents found in the Uranium Material are currently processed in the Mill's main circuit and/or the alternate feed circuit in other ores and alternate feed materials with the exception of copper. No information on the concentration of copper in the ores or alternate feeds is currently available but copper is analyzed under the groundwater monitoring program.

The constituents that will be added to the Mill process are similar to conventional ores, and contain calcium, barium, and polymer due to the addition of these constituents in the WTP process. These components are not expected to have any adverse effect on the Mill processing system or to the tailings cells. According to Gulec, et al. (2005), a study on the degradation of HDPE liners under acidic conditions (synthetic acid mine drainage), HDPE was found to be chemically resistant to solutions similar to the tailings solutions at the Mill. Mitchell (1985) studied the chemical resistivity of PVC and HDPE at a pH range of 1.5 to 2.5 standard units using sulfuric acid. This study concluded that PVC performed satisfactorily under these conditions and HDPE performed better and was overall more stable under these acidic conditions.

As described above, it is expected that most of the metal and non-metal impurities entering the leach system with the Uranium Material will be converted to sulfate ions, precipitated, and eventually discharged to the tailings system.

Every metal and non-metal cation and anion component in the Uranium Material already exists in the Mill's tailings system and/or is analyzed under the GW monitoring program. A summary of the potential tailings composition before and after processing the Uranium Material using historical data for tailings Cell 3 is presented in Table 6 for projected tailings composition before and after processing the Uranium Material using data for Cell 4A or 4B.

Every component, except copper, in the Uranium Material has been:

1. detected in analyses of the existing tailings cells liquids;
2. detected in analyses of existing tailings cells solids;
3. detected in analyses of alternate feed materials that have already been licensed for processing at the Mill; or
4. detected in process streams or intermediate products when previous alternate feeds were processed at the Mill.

Generally the concentrations of constituents identified in the tailings liquids or solids, feed materials or process streams at the mill are generally comparable to the concentrations in the Uranium Material. Due to the small annual and total quantities of the Uranium Material, an increase in the concentration of these analytes in the Mill's tailings is not expected to be significant. A few constituents such as barium, beryllium, silver, manganese, copper, and calcium are present in the Uranium Material and are either present in lower concentrations in the ores and other alternate feeds at the mill or as in the case of copper, information on concentration in the ore and other alternate feeds was not available. Although the percent total of these constituents contributed from the Uranium Material to the Mill Tailings in the 10 year period seems high, between 5 and 100 percent of these constituents present in the tailings is from the Uranium Material, the total contributed tons is less than one percent of the total mass in the Tailings Cell.

The constituents in the Uranium Material are expected to produce no incremental additional environmental, health, or safety impacts in the Mill's tailings system beyond those produced by the Mill's processing of natural ores or previously approved alternate feeds. Since the impacts of all the constituents on the tailings system are already anticipated for normal Mill operations, and permitted under the Mill's license, they have not been re-addressed in this evaluation.

Groundwater Monitoring Program

One difference in the milling process of Uranium Material and disposal of tails in the tailings cells at the Mill compared to processing conventional ore, is the introduction of barium to the tailings cells. However, as discussed above barium is currently present in Cell 3, and has been introduced at higher concentration than in the Uranium Material, from other alternate feed materials. Barium is not a constituent that is monitored under the Mill's GWDP. Calcium is also contained in the Uranium Material, but is found in conventional ores and it is monitored under the Mill's GWDP. As discussed below, there is no need to add barium to the Mill's GWDP monitoring program.

Barium will be introduced to the Mill's tailings cells with disposal of the tailings from processing the Uranium Material. The chemistry of the tailings cells would limit the mobility of barium due to the abundance of sulfate in the tailings cells. The insolubility of barium in the presence of sulfate is generally consistent regardless of the liquid medium. That is, the solubility of barium sulfate in cold water is 0.022 mg/L and in concentrated sulfuric acid is 0.025 mg/L (Handbook of Chemistry and Physics, 68th Edition). At the listed concentrations of sulfate in the tailings solutions (67,600 mg/L to 87,100 mg/L in Cell 4A), a change in the ambient barium concentration in the tailings solutions (0.02 mg/L) would be negligible. Therefore, given the strong tendency of barium to partition to solids, especially in the presence of sulfate, there is no reasonable potential for barium to migrate to ground water from the tailings cells at the Mill in the unlikely event of a leak in the tailings cells. Calcium Kd value in UDEQ Statement of Basis for the permit (December 1, 2004) contains published Kd values for calcium of 5 to 100 Llkg for sandy to clayey soils. The Kd for barium is 100 to 150,000 Llkg for the same soil types indicating less mobility in groundwater, and Tetra Tech has therefore concluded that barium is sufficiently represented by monitoring for calcium and has identified no technical reason to add barium to the list of constituents monitored in ground water in the vicinity of the tailings cells.

Excluding barium, chemical and radiological make-up of the Uranium Material is similar to other ores and alternate feed materials processed at the Mill, and their resulting tailings will have the chemical composition of typical uranium process tailings, for which the Mill's tailings system was designed. As a result, the existing groundwater monitoring program at the Mill will be adequate to detect any potential future impacts to groundwater.

Conclusions and Recommendations

While concentrated levels of certain constituents in the Uranium Material may be present, no additional material management requirements during handling and processing will be required. The Mill has successfully implemented processing of previous alternate feeds with similar or higher concentrations of the constituents contained in the Uranium Material. For example, the Mill has successfully processed and recovered uranium from uranium-bearing salts, calcium fluoride precipitates, recycled metals, metal oxides, and calcified product, all of which posed potential chemical reactivity and material handling issues comparable to or more significant than those associated with this Uranium Material.

Based on the foregoing information, it can be concluded that:

1. All the constituents in the Uranium Material have either been reported to be, or can be assumed to be, already present in the Mill's tailings system or were reported in other alternate feeds processed at the Mill, at levels generally comparable to those reported in the Uranium Material.
2. All the constituents in the Uranium Material have either been reported to be, or can be assumed to be, previously introduced into the Mill's process, with no adverse effects to the process, or worker health and safety.
3. All the known impurities in the Uranium Material have either been reported to be, or can be assumed to be, previously introduced into the Mill tailing impoundments, with no adverse effects to the tailings system, or human health and safety.
4. There will be no significant incremental environmental impacts from processing Uranium Material beyond those that are already anticipated in the Final Environmental statement and subsequent Environmental Assessments for the Mill.
5. Spill response and control measures designed to minimize particulate radionuclide hazards will be more than sufficient to manage chemical hazards from particulate metal oxides.

It should be noted that the Uranium Material originated entirely from the contact of sources of environmental water (surface and or groundwater) with natural uranium ore. Every constituent in the Uranium Material, except barium, is a constituent of natural uranium ore and is present in the Uranium Material as a result of natural leaching from uranium ore. Every constituent in the ore is already present in natural ores including the ores stored on the Mill's ore pad, and is already present in the Mill circuit and tailings system.

Further, the total quantity of Uranium Material is very low. The entire annual volume of Uranium Material to be shipped to the Mill constitutes only a small fraction of one day's processing in the Mill. The entire volume of Uranium Material will make an insignificant contribution to the total volume of tailings in the Mill's tailings system.

As discussed in the section on Effects on Tailings System, above, after processing of the Uranium Material all constituents except beryllium, calcium and manganese, will have a de minimis or no impact on the tailings composition, will create a slight reduction in the average concentrations in the tailings cells, or will create a change that is within the range of increases created by other alternate feeds.

Of the three whose impact may be detectable, manganese and calcium (a non-hazardous nutrient in surface and groundwater), these constituents are already monitored under the Mill's groundwater monitoring program. As discussed above, barium is well represented geochemically by calcium which is already monitored in the Mill's groundwater monitoring program.

Due to the above facts, specifically that the Uranium Material originated from natural ore and will be shipped and processed at very low rates, the constituents in the Uranium Material could be expected to have a negligible effect on the Mill process and the tailings system, and will have no discernible environment or health and safety effects beyond the effects of natural ore processing.

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Table 1. Incompatibilities and Chemical Hazards for Components of the Uranium Material

Component	Chemical Symbol	Estimated Concentration Range in Uranium Material at 25% to 45% Solids (ppm)	Incompatibilities
Ammonia	NH4	14-26	Strong oxidizers, halogens, acids, salts of silver and zinc
Barium	Ba	14,667-26,400	As Barium oxides – reacts with water to form hydroxides; reacts with N_2O_4, hydroxylamines, SO_3, H_2S
Beryllium	Be	63-114	As BeO – gives off toxic gases in fire
Cadmium	Cd	77-139	As CdO – reacts with magnesium, decomposes on heating to form cadmium fumes
Calcium	Ca	28,417-51,150	As Ca oxides – react with water
			As Ca hydroxides – react with water
			As $CaSO_4$ – diazomethane, aluminum, phosphorous, water
			As $CaSiO_3$ or $CaOSiO_2$ - none
Chloride	Cl	72-130	Varies with compound form. As inorganic salts - none
Chromium	Cr	36-64	As CrO_2 - none
			As CrO_3 – combustible materials (paper, wood, sulfur, aluminum, plastics)
Cobalt	Co	2,200-3,960	As CoO - none
Copper	Cu	312-561	As CuO – acetylene, zirconium
Fluoride	F	70-125	Varies with compound form. As inorganic salts - none
Iron	Fe	1,311-2,360	As Fe_2O_3 – calcium hypochlorite, carbon monoxide, hydrogen peroxide
			As $Fe_2(SO_4)_3$ – decomposes at high temperature
			As $As_2Fe_2O_6$ – decomposes on heating to yield fumes of arsenic and iron
Lead	Pb	34-61	As PbO – strong oxidants, aluminum powder, sodium; also decomposes on heating to form lead fumes
Manganese	Mn	201,667-363,000	As $Mn(OH)_3MN_2O_3$, MnO - none
Nickel	Ni	3,208-5,775	As NiO- iodine, H_2S
Nitrates	NO_x	6-10	None reported
Selenium	Se	47-84	As SeO - none
Silver	Ag	21-38	As AG_2O – fire and explosion hazard with organic material or ammonia
Sulfate	SO4	31,167-56,100	As SO4 compounds, see other compounds in this table
Zinc	Zn	6,417-11,550	As ZnO - none

Table 2. Historic Water Quality of DMC WTP Influent

Location ID	Collection Date	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
SW-39 (PIT-3)	2/25/1998					43	--	280	--			86000	--					3500	--	4.41	--	2	U	22	--	22	--
SW-39	4/29/1998					46	--	250	--			85000	--					3400	--	4.26	--			18	--	18	--
SW-39	7/22/1998					49	--	260	--			90000	--					3500	--	4.09	--						
SW-39	10/14/1998	61900	--	20	U	46	--	1000	U	7	B	89700	--	1810	--	23688.2	--	3660	--	4.45	--	5	U	67.2	--	67.2	--
SW-39	10/27/1998					48	--	260	--			95000	--					3700	--	4.4	--						
SW-39	11/15/1998	60500	--	5	B	43	--	1000	U	4	B	96400	--	1790	--	24632.7	--	3600	--	4.41	--	5	U				
SW-39	12/10/1998	58600	--	5	B	37	--	1000	U	5	--	81000	--	1650	--	18140.9	--	3000	B	4.56	--	14	B	45.6	--	45.6	--
SW-39	1/25/1999					46	--	230	--			85000	--					3500	--	4.64	--						
SW-39	4/15/1999					34	--	230	--			70000	--					3000	--	4.76	--						
SW-39	4/21/1999	49900	--	10	U	26	--	210	--	2	U	62200	--	20	U	12084.0	--	2500	--	4.13	--	5	U	23	--	23	--
SW-39	5/17/1999	50300	--	5	B	34	--	269	--	2	B	69200	--	1310	--	18021.0	--	3000	--	4.44	--	5	U	24	--	24	--
SW-39	6/15/1999	56200	--	7	--	33.3	--	160	--	3.7	--	82900	--	1480	--	17751.1	--	3270	--	4.26	--	5	U	29	--	29	--
SW-39	7/27/1999					43	--	230	--			85000	--					3400	--	4.05	--						
SW-39	10/6/1999					49	--	250	--			95000	--					1100	--	4.45	--						
SW-39	12/12/1999	46800	--	8	B	51.8	--	228	--	5.9	--	79300	--	1430	--	18545.7	--	3210	--	4.38	--	5	U	30	--	30	--
SW-39	1/27/2000					69	--	200	--			130000	--					5700	--	3.91	--						
SW-39	2/4/2000	92300	--	100	U	70	B	200	B	20	U	120000	--	2430	--	2051.0	--	5480	--	4.04	--	12	B	36	--	36	--
SW-39	4/7/2000	20100	--	1	B	25.6	--	181	--	3.1	--	32200	--	640	--	11334.3	--	1410	--	4.32	--	8	B	31	--	31	--
SW-39	4/17/2000					29	--	240	--			46000	--					1900	--	4.37	--	3	U				
SW-39	5/12/2000	44200	--	1	B	49.5	--	258	--	6.2	--	62600	--	1180	--	10614.7	--	2500	--	4.35	--	5	U	42	--	42	--
SW-39	6/7/2000	51000	--	7	B	56.1	--	313	--	8.9	--	70500	--	1370	--			2960	--	4.1	--	5	U	45	--	45	--
SW-39	7/13/2000	68600	--	6	B	58	--	225	--	9	--	95800	--	1940	--			4220	--	3.94	--	5	U	57	--	57	--
SW-39	7/20/2000					46	--	300	--			85000	--					3600	--	3.85	--	3	U				
SW-39	8/15/2000	97200	--	10	B	82	--	199	--	10	--	129000	--	2620	--			5720	--	3.9	--	5	U	83	--	83	--
SW-39	9/14/2000	105000	--	3	U	64	--	190	--	15.1	--	146000	--	2800	--			6160	--	4.06	--	6	B	70	--	70	--
SW-39	10/25/2000					63	--	230	--			140000	--					5700	--	4.12	--	3	U				
SW-39	10/30/2000	98900	--	5	U	81	--	165	--	7	--	146000	--	2910	--			6620	--	4.34	--	5	U	70	--	70	--
SW-39	1/17/2001					54	--	200	--			120000	--					5000	--	4.65	--	3	U				
SW-39	1/27/2001	76500	--	5	U	57	--	149	--	8	--	121000	--	2310	--			4670	--	4.51	--	8	B	54	--	54	--
SW-39	4/6/2001					83	--	770	--			120000	--					5100	--	4.52	--	3	U	82	--	82	--
SW-39	4/26/2001	61900	--	3	U	71	--	522	--	7	--	84200	--	1700	--			3690	--	4.32	--	5	U				
SW-39	7/5/2001					71	--	630	--			110000	--					4600	--	4.08	--	3	--				
SW-39	10/4/2001	69600	--	10	U	80	--	560	--	10	--	118000	--	2090	--	24000.0	--	4400	--	4.33	--	5	--	48	--	48	--
SW-39	2/7/2002	14900	--	1	U	16	--	95	--	2	--	31300	--	658	--	8850.0	--	1360	--	4.49	--			32.6	--	32.6	--
SW-39	4/17/2002	12800	--	10	U	20	--	80	--	10	U	30200	--	550	--	7430.0	--	1130	--	4.91	--	10	U	20.6	--	20.6	--
SW-39	7/11/2002	24000	--	10	U	20	--	180	--	10	U	53400	--	810	--	11300.0	--	1680	--	4.4	--	5	U	38.7	--	38.7	--
SW-39	10/9/2002	36500	--	10	U	40	--	300	--	10	U	62200	--	1110	--	14800.0	--	2310	--	4.49	--	0.05	U	53.9	--	53.9	--
SW-39	1/15/2003	34800	--	10	U	40	--	290	--	10	U	57400	--	1050	--	12100.0	--	2220	--	4.49	--	8	--	40.8	--	40.8	--
SW-39	4/24/2003	36500	--	10	U	30	--	260	--	10	U	48600	--	1100	--	12000.0	--	2390	--	4.62	--	5	U	40.3	--	40.3	--

Table 2. Historic Water Quality of DMC WTP Influent Continued

Location ID	Collection Date	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
SW-39 (PIT-3)	7/15/2003	44800	--	10	U	40	--	280	--	10	U	68400	--	1260	--	14400.0	--	2660	--	4.26	--	5	U	30.1	--	30.1	--
SW-39	10/23/2003	42400	--	10	--	50	--	260	--	10	U	66800	--	1270	--	15900.0	--	2680	--	4.5	--	5	U	21.6	--	21.6	--
SW-39	1/14/2004	53400		10	U	50		280		10	U	76700		1440		16400.0		3110		4.58		5	U	30		30	
SW-39	4/23/2004	40300		10	U	50		180		10	U	55300		1080		12100.0		2520		4.5		5	U	37.5		37.5	
SW-39	7/16/2004	49500		10	U	50		230		10		78400		1310		19100.0		2810		4.24		5	U	33.3		33.3	
SW-39	10/13/2004	58700		10		60		230		10	U	80000		1550		17600.0		3350		4.5		5	U	22.8		22.8	
SW-39	4/22/2005	35700		10	U	40		140		10	U	60900		1070		12400.0		2350		4.71				21.3		21.3	
SW-39	7/14/2005	45900		10	U	40		150		10	U	76300		1230		16900.0		2700		4.41		5	U	24		24	
SW-39	10/11/2005	46000		10	U	50		150		10	U	83000		1430		15800.0		2960		4.68				25.6		25.6	
SW-39	4/20/2006	32300		10	U	30		150		10	U	43900		910		10200.0		1910		4.56		5	U	23.7		23.7	
SW-39	7/13/2006	60300		10	U	30		180		10	U	49600		1180		11200.0		2400		4.23		5	U	31.7		31.7	
SW-39	10/11/2006	40300		10	U	40		170		10	U	60800		1220		13100.0		2570		4.6		5	U	33.9		33.9	
SW-39	4/19/2007	39500		10	U	33.8		137		10	U	56000		1080		12700.0		2950		4.56		10	U	20.5		20.5	
SW-39	7/11/2007	47200		10	U	40.9		150		10	U	67700		1210		15400.0		2570		4.39		5	U	29.6		29.6	
SW-39	10/4/2007	42700		10	U	48.2		159		10	U	64200		1340		14200.0		2980		4.52		5	U	28.3		28.3	
SW-39	4/25/2008	37100		10	U	27.5		161		10	U	47400		1220		9770.0		2480		4.74		1	U	18.9		18.9	
SW-39	7/22/2008	40700		10	U	44.8		162		10	U	49700		1420		12500.0		2750		4.31		4		27		27	
SW-39	10/2/2008	45400		6.65		39.5		139				73100		1600		14400.0		2870		4.26		5	U	19		19	
SW-39	4/27/2009	31400		<10		28.9		118		<10		45000		865		9160.0		1850		4.66		1					
SW-39	7/10/2009	46200		<10		29.9		132		<10		76000		1170		14200.0		2430		4.4		3				34	
SW-39	10/6/2009	36300		<10		40.2		133		<10		58500		1250		15400.0		2620		4.37		2				32	

	SW-39 (Pit 3)	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
	Count (n)	45		42		60		60		41		60		45		38		60		60		48		43		45	
	Max	105,000		100		83		1,000		20		146,000		2,910		24,633		6,620		5		14		83		83	
	Min	12,800		1		16		80		2		30,200		20		2,051		1,100		4		0		18		18	
	Avg	49,891		10		46		271		9		79,147		1,397		14,215		3,223		4		5		37		37	
	Std Dev	20,343		15		16		207		3		28,429		575		4,539		1,243		0		3		17		17	
	2 x Std Dev	40,685		29		32		414		7		56,859		1,149		9,078		2,486		0		5		34		34	

Table 2. Historic Water Quality of DMC WTP Influent Continued

Location ID	Collection Date	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
SW-40 (PIT-4)	1/15/1998					5	U	6	--			1100	--					10	--	6.22	--	3	U	1.9	--	1.9	--
SW-40	4/29/1998					4	U	10	--			880	--					7	--	7.78	--			3	--	3	--
SW-40	7/22/1998					4	U	5	U			370	--					2	U	6.79	--						
SW-40	10/14/1998	80	B	10	U	2	U	10	U	2	U	262	--	10	U	3280.0	--	20	U	7.54	--	5	U	1.78	--	1.78	--
SW-40	10/27/1998					4	U	5	U			490	--					6	--	7.57	--						
SW-40	11/15/1998	90	B	2	U	1	U	5	U	1	U	518	--	10	U	3520.0	--	10	B	7.1	--	5	U	2.06	--	2.06	--
SW-40	12/10/1998	120	B	2	U	0.4	U	10	B	0.4	U	505	--	10	U	3810.0	--	20	U	7.02	--	5	U	3.23	--	3.23	--
SW-40	1/14/1999					9	--	4	U			630	--					13	--	6.81	--						
SW-40	1/14/1999	120	B	2	U	0.4	U	2	U	0.4	U	574	--	10	B	3820.0	--	26	--	6.85	--	5	U	5.52	--	5.52	--
SW-40	2/20/1999	210	--	5	U	1	U	7	B	1	U	663	--	20	B	3070.0	--	30	B	6.92	--	5	U	8.76	--	8.76	--
SW-40	4/15/1999					3	U	5	--			940	--					29	--	6.61	--						
SW-40	4/21/1999	500	--	2	U	0.4	U	3	B	0.4	U	649	--	660	--	1370.0	--	60	B	7	--	5	U	7.6	--	7.6	--
SW-40	5/17/1999	90	B	2	U	0.4	U	3	B	0.4	U	764	--	30	B	2420.0	--	20	--	7.43	--	5	U	5.1	--	5.1	--
SW-40	6/15/1999	120	B	1	B	0.2	B	2	B	0.2	U	747	--	30	B	2830.0	--	26	--	6.99	--	5	U	3.7	--	3.7	--
SW-40	7/27/1999					4	U	6	--			1000	--					31	--	6.79	--						
SW-40	10/6/1999					4	U	4	U			460	--					10	--	7.16	--			1.1	--	1.1	--
SW-40	1/27/2000					4	U	4	U			860	--					22	--	6.74	--			9.7	--	9.7	--
SW-40	4/17/2000					4	U	9	--			1000	--					29	--	6.04	--	5	--	8.6	--	8.6	--
SW-40	7/20/2000					3	U	6	--			300	--					3	--	7.07	--	3	U	1.6	--	1.6	--
SW-40	10/25/2000					4	U	11	--			290	--					2	U	6.72	--	3	U	2.8	--	2.8	--
SW-40	1/17/2001					4	U	40	--			660	--					2	U	5.36	--	3	U	4.5	--	4.5	--
SW-40	4/6/2001					4	U	5	--			660	--					16	--	7.35	--	3	U	4.3	--	4.3	--
SW-40	7/5/2001					4	U	4	U			370	--					2	U	6.96	--	3	U	2.9	--	2.9	--
SW-40	10/4/2001	100	U	10	U	10	U	10	U	10	U	710	--	10	U	6000.0	--	10	U	6.86	--	10	U	4.1	--	4.1	--
SW-40	2/7/2002	1	U	1	U	1	U	6	--	1	U	1610	--	55	--	4770.0	--	62	--	6.47	--	10	U	29.6	--	29.6	--
SW-40	4/17/2002	100	--	10	U	10	U	10	U	10	U	1640	--	60	--	2430.0	--	90	--	5.82	--	10	U	21.1	--	21.1	--
SW-40	7/11/2002	100	U	10	U	10	U	10	U	10	U	1250	--	40	--	3830.0	--	50	--	6.51	--	5	U	4.2	--	4.2	--
SW-40	10/9/2002	10	U	10	U	10	U	10	U	10	U	1040	--	30	--	5500.0	--	40	--	7.28	--	5	U	3.3	--	3.3	--
SW-40	1/15/2003	600	--	10	U	10	U	10	U	10	U	2190	--	70	--	5600.0	--	110	--	6.63	--	5	U	27.8	--	27.8	--
SW-40	4/24/2003	10	U	10	U	10	U	10	U	10	U	1280	--	60	--	3510.0	--	60	--	7.26	--	5	U	8.6	--	8.6	--
SW-40	7/15/2003	10	U	10	U	10	U	10	U	10	U	940	--	30	--	3430.0	--	20	--	7.66	--	5	U	4.1	--	4.1	--
SW-40	10/23/2003	10	U	10	U	10	U	10	U	10	U	490	--	20	--	4030.0	--	20	--	7.43	--	5	U	2.3	--	2.3	--
SW-40	1/14/2004	200		10	U	10	U	10	U	10	U	930		20		4740.0		20		6.83		5	U	2.8		2.8	
SW-40	4/23/2004	100	U	10	U	10	U	10	U	10	U	880		30		4050.0		50		7.32		5	U	9.2		9.2	
SW-40	7/16/2004	200		10	U	10	U	10	U	30		280		10		3720.0		60		7.19		5	U	1.7		1.7	
SW-40	10/13/2004	100	U	10	U	10	U	10	U	10	U	150		10	U	4260.0		10	U	7		5	U	1.5		1.5	
SW-40	4/22/2005	300		10	U	10	U	10	U	10	U	530		20		4880.0		30		6.74				6.4		6.4	
SW-40	7/14/2005	2400		10	U	10	U	10	U	10	U	260		10	U	4520.0		410		7.57		5	U	2.3		2.3	
SW-40	10/11/2005	100		10	U	10	U	10	U	10	U	210		10	U	5460.0		10	U	6.65				1.5		1.5	
SW-40	4/20/2006	100	U	10	U	10	U	10	U	10	U	1360		60		1280.0		80		6.72		5	U	12.1		12.1	

Table 2. Historic Water Quality of DMC WTP Influent Continued

Location ID	Collection Date	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
SW-40 (PIT-4)	7/13/2006	100	U	10	U	10	U	10	U	10	U	1370		40		2060.0		40		6.98		5	U	5.9		5.9	
SW-40	10/11/2006	100	U	10	U	10	U	10	U	10	U	500		20		3060.0		30		7.64		5	U	1.8		1.8	
SW-40	1/25/2007	100		10	U	10	U	10	U	10	U	600		20		3380.0		40		7.69		5	U	8		8	
SW-40	4/19/2007	100	U	10	U	10	U	10	U	10	U	821		26.1		2660.0		31.6		7.7		10	U	5		5	
SW-40	7/11/2007	100	U	10	U	10	U	10	U	10	U	445		14.4		2410.0		13		7.14		5	U	1.9		1.9	
SW-40	10/4/2007	100	U	10	U	10	U	10	U	10	U	128		10	U	2960.0		10.9		7.1		5	U	0.9		0.9	
SW-40	4/25/2008	100	U	10	U	10	U	10	U	10	U	767		29.8		2200.0		36.9		8.36		5	U	7.3		7.3	
SW-40	7/22/2008	17.4		10	U	10	U	10	U	10	U	201		10	U	1930.0		10	U	7.01		2		1.3		1.3	
SW-40	10/2/2008	10	U	1.18		1	U	1	U			90.5		2.25		3420.0		10	U	8.45		5	U	0.57		0.57	
SW-40	4/27/2009	<100		<10		<10		<10		<10		606		34.2		2150.0		43		6.90		<1					
SW-40	7/10/2009	<100		<10		<10		<10		<10		177		<10		2310.0		<10		7.48		2				2.2	
SW-40	10/6/2009	<100		<10		<10		<10		<10		116		<10		3100.0		<10		6.92		1				1.2	
Summary																											
	SW-40 (Pit 4)	**Aluminum µg/L**		**Arsenic µg/L**		**Cadmium µg/L**		**Copper µg/L**		**Lead µg/L**		**Manganese µg/L**		**Nickel µg/L**		**Uranium µg/L**		**Zinc µg/L**		**pH S.U.**		**TSS mg/L**		**Ra-226 (diss) pCi/l**		**Ra-226 (total) pCi/l**	
	Count (n)	34		34		49		49		33		52		35		37		50		52		40		44		46	
	Max	2,400		10		10		40		30		2,190		660		6,000		410		8		10		30		30	
	Min	1		1		0		1		0		91		2		1,280		2		5		2		1		1	
	Avg	191		8		6		8		8		697		44		3,453		36		7		5		6		6	
	Std Dev	410		4		4		5		6		438		109		1,185		59		1		2		6		6	
	2 x Std Dev	820		7		8		11		11		877		217		2,369		118		1		4		13		12	
		Aluminum µg/L		**Arsenic µg/L**		**Cadmium µg/L**		**Copper µg/L**		**Lead µg/L**		**Manganese µg/L**		**Nickel µg/L**		**Uranium µg/L**		**Zinc µg/L**		**pH S.U.**		**TSS mg/L**		**Ra-226 (diss) pCi/l**		**Ra-226 (total) pCi/l**	
	COMBINED																										
	Count (n)	79		76		109		109		74		112		80		75		110		112		88		87		91	
	Max	105,000		100		83		1,000		30		146,000		2,910		24,633		6,620		8		14		83		83	
	Min	1		1		0		1		0		91		2		1,280		2		4		0		1		1	
	Avg	28,501		9		28		153		8		42,724		805		8,906		1,774		6		5		21		21	
	Std Dev	29,100		11		23		202		5		44,432		803		6,350		1,838		1		2		20		20	
	2 x Std Dev	58,200		22		46		403		9		88,864		1,607		12,700		3,677		3		5		40		40	

Table 3. Historical Total WTP Uranium Material Testing Data

Date	Initial Composite Sludge Sample			Annual Composite Sample	
	U-nat	**Ra-226**	**Moisture**	**U-nat**	**Ra-226**
	(mg/kg)	**(pCi/g)**	**(%)**	**(mg/kg)**	**(pCi/g)**
4/1/2003	11,100	5.7	83.6	9,700	5.3
4/1/2004	9,060	7.6	87.0	8,600	2.4
4/1/2005	12,900	14	86.4	19,000	11
4/1/2006	5,200	4.3	86.3	11,200	9.1
4/2/2007	2,700	4.7	84.3	12,000	24.2
4/9/2008	19,000	5.1	79.4	13,500	10.8
5/20/2009		8.7			
4/13/2010	15,333				
Count:	7	7	6	6	6
Max:	**19,000**	**14**	**87.0**	**19,000**	**24**
Min:	**2,700**	**4.3**	**79.4**	**8,600**	**2**
Avg:	**10,756**	**7.2**	**84.5**	**12,333**	**10**

	Avg	**Avg. % Solids**	**Max**	**Measured % Solids**	**Min**	**Measured % Solids**
U Conc. Dry Weight Basis (mg/Kg)	10,756		19,000		2,700	
U Conc. Wet Weight Basis (mg/Kg)	1,667.2	15.5%	3,914	20.6%	424	15.7%
U Conc. Wet Weight Basis (%)	0.17%		0.39%		0.04%	

% solids = 100% - % Moisture

U Conc. Wet Weight Basis (mg/Kg) = U Conc. Dry Weight Basis x % solids

Table 4. Uranium Material Metals Analysis for RCRA Characteristics

Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	2002	<0.05	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2003	<0.5	<10	0.2	<0.5	<0.5	<0.02	<0.1	<0.5
	2004	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2005	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2006	<0.5	<10	0.25	<0.5	<0.5	<0.02	<0.1	<0.5
	2007	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2008	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	5/20/2009	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	9/17/2009	<0.06	0.083	<0.005	<0.01	<0.04	<0.0002	<0.06	<0.01
	9/19/2009	<0.04	0.16	0.019	<0.01	<0.04	<0.0002	<0.04	<0.01
	9/23/2009	<0.04	0.12	0.011	<0.01	<0.04	<0.0002	<0.04	<0.01
	10/6/2009	<0.1	0.066	0.03	0.03	<0.08	<0.0002	0.2	<0.02
WTPS-1	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.051	<0.1
WTPS-2	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.054	<0.1
WTPS-3	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.054	<0.1
Count		15	15	15	15	15	15	15	15
Min		<0.04	0.066	<0.005	<0.01	<0.03	<0.0002	<0.04	<0.01
Max		<0.1	<10	<0.05	<0.5	<0.5	<0.02	0.2	<0.5
40 CFR Part 261.24		5	100	1	5	5	0.2	1	5
PASS?		Yes	Yes	Yes	Yes	Yes	Yes	Yrs	Yes

Table 5. Uranium Material Analyses for RCRA Listed Hazardous Waste

Target Analyte [1]	Units	Laboratory Results			Calculated Average
		WTPS-1	WTPS-2	WTPS-3	
Total Uranium - Method SW6020A					
Total Uranium	mg/kg	15,000	16,000	15,000	15,333
Total ICP Metals - Method SW6010B					
Arsenic	mg/kg	<5.9	<5.9	<5.7	<5.8
Barium	mg/kg	8,100	7,900	7,200	7,733
Beryllium	mg/kg	33	36	36	35
Cadmium	mg/kg	40	44	43	42
Calcium	mg/kg	15,000	16,000	16,000	15,667
Chromium	mg/kg	19	20	19	19
Cobalt	mg/kg	1,200	1,200	1,100	1,167
Copper	mg/kg	160	180	170	170
Iron	mg/kg	690	740	740	723
Lead	mg/kg	18	19	17	18
Manganese	mg/kg	110,000	110,000	96,000	105,333
Molybdenum	mg/kg	<5.8	<6.0	<5.7	<5.8
Nickel	mg/kg	1,700	1,800	1,800	1,767
Selenium	mg/kg	25	26	26	26
Silver	mg/kg	11	12	11	11
Thallium	mg/kg	<580	<600	<570	<583
Tin	mg/kg	<29	<30	<29	<29
Vanadium	mg/kg	<5.8	<6.0	<5.7	<5.8
Zinc	mg/kg	3,400	3,600	3,600	3,533
Total Mercury - Method SW7471A					
Total Mercury	mg/kg	<0.19	<0.2	<0.19	<0.19
GC/MS Total Volatile Organics - Method SW8260					
Chloromethane	µg/kg	<1.1	<1.2	<1.1	<1.1
Acetone	µg/kg	22 B	29 B	33 B	28
Methylene Chloride	µg/kg	3.8 J,B	3.7 J,B	5.8 J,B	4.4
2-Butanone	µg/kg	<5.7	<5.9	<5.7	<5.8
Tetrahydrofuran	µg/kg	<7.2	<7.4	<7.2	<7.3
Chloroform	µg/kg	1.7 J	2 J	1.2 J	1.6
Carbon Tetrachloride	µg/kg	<1.3	<1.4	<1.3	<1.3
Benzene	µg/kg	<0.94	<0.96	<0.93	<0.94
Toluene	µg/kg	2.2 J,B	1.9 J,B	1.3 J,B	1.8
m,p-Xylene	µg/kg	<1.9	<1.9	<1.9	<1.9
o-Xylene	µg/kg	<0.95	<0.97	<0.94	<0.95
Naphthalene	µg/kg	<1.4	<1.4	<1.4	<1.4

(1) All values as reported by ALS Laboratory as dry weight values

Table 5. Uranium Material Analyses for RCRA Listed Hazardous Waste Continued

Target Analyte	Units(1)	Laboratory Results			Calculated Average
		WTPS-1	WTPS-2	WTPS-3	
GC/MS Total Semi-Volatile Organics - Method SW8270D					
Pyridine	µg/kg	<310	<320	<320	<317
1,4-dichlorobenzene	µg/kg	<310	<320	<320	<317
2-methylphenol	µg/kg	<310	<320	<320	<317
3+4-methylphenol	µg/kg	<310	<320	<320	<317
Hexachloroethane	µg/kg	<310	<320	<320	<317
Nitrobenzene	µg/kg	<310	<320	<320	<317
Hexachlorobutadiene	µg/kg	<310	<320	<320	<317
2,4,6-trichlorophenol	µg/kg	<310	<320	<320	<317
2,4,5-trichlorophenol	µg/kg	<310	<320	<320	<317
2,4-dinitrotoluene	µg/kg	<310	<320	<320	<317
Hexachlorobenzene	µg/kg	<310	<320	<320	<317
Pentachlorophenol	µg/kg	<490	<500	<500	<497
Gasoline Range Organics - Method SW8015B					
Gasoline Range Organics	mg/kg	<0.38	<0.35	<0.39	<0.37
Diesel Range Organics - Method SW8015MB					
Diesel Range Organics	mg/kg	<6.5	<6.6	<6.8	<6.6
Oil & Grease					
Oil & Grease	mg/kg	<120	<120	<120	<120
Inorganics					
Ammonia as N - Method EPA350.1	mg/kg	7.9	7.9	8.3	8.0
Nitrate/Nitrite as N - Method EPA353.2 Revision 2	mg/kg	3.1	3.2	3.1	3.1
Total Dissolved Solids - EPA160.1	mg/kg	26,000	26,000	27,000	26333.3
Fluoride - Method EPA300.0 Revision 2.1	mg/kg	38	38	40	38.7
Chloride - Method EPA300.0 Revision 2.1	mg/kg	40	39	41	40
Sulfate - Method EPA300.0 Revision 2.1	mg/kg	17,000	17,000	17,000	17,000
Gross Alpha/Beta - GFPC					
Gross Alpha	pCi/g	4,310±690	4,830±770	5,440±870	4,860
Gross Beta	pCi/g	4,870±780	4,780±760	4,860±780	4,867
Lead-210 - Liquid Scintillation					
Lead-210	pCi/g	33.1±8.0	34.7±8.4	32.0±7.8	33.3
Radium-226 - GFPC					
Radium-226	pCi/g	22.8±5.8	25.7±6.6	23.8±6.1	24.1
Total Alpha Emitting Radium - GFPC					
Total Radium	pCi/g	39.7±10	41±11	36.6±9.4	39.1
Total Radium (duplicate sample)	pCi/g	35.8±9.2			
Isotopic Thorium - Alpha Spectroscopy					
Th-228	pCi/g	1.24±0.99	1.50±0.74	0.93±0.67	1.22
Th-230	pCi/g	20.4±3.8	21.4±3.9	20.4±3.7	20.7
Th-232	pCi/g	1.14±0.48	0.66±0.34	0.71±0.32	0.84

(1) All values as reported by ALS Laboratory as dry weight values

		Midnite Mine Uranium Material Composition			Cell 3 Composition in 2004			Baseline for Cell 4A (or 4B)		Year 1			
Component	A Conc. in Ores and Other Alternate Feeds (ppm)[1]	B Range in Uranium Material (mg/kg)[2]	C Estimated Average Conc. in Uranium Material (mg/kg)[3]	D Estimated Historical Maximum Annual Mass in Uranium Material (tons)[4]	E Estimated Conc. Range in Cell 3 Mill Tailings solution (mg/L or ppm)[5]	F Estimated Average Conc. in Cell 3 Mill Tailings solution (mg/L or ppm)[5]	G Estimated Mass in Cell 3 Mill Tailings 2004 (tons)[6]	H Estimated Annual Mass in Cell 4A or 4B Mill Tailings (tons)[7]	I Conc. in Cell 4A (or 4B) Mill Tailings (ppm)[8]	1J Estimated Mass in Uranium Material (tons)[9]	1K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)[10]	1L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)[11]	1M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)[12]
Acetone		U	U	0	28-514	192	340	41.3	192.0	0.000	41.3	192.0	0.0
Ammonia (NH_4)	100-730	7.9-8.3	8.0	0.002	3-13,900	3,131	5,539	673.2	3131.0	0.002	673.2	3130.6	-0.4
Arsenic (As)	3.5-16,130	U	U	0	0.3-440	149	264	32.0	149.0	0.000	32.0	149.0	0.0
Barium (Ba)	21-43,000	7,200-8,100	7,733	1.523	0.021-0.1	0.02	0.035	0.0	0.0	1.52	1.5	7.1	7.1
Beryllium (Be)	1-105	33-36	35	0.007	0.347-0.78	0.5	0.88	0.1	0.5	0.007	0.1	0.5	0.0
Cadmium (Cd)	0.004-16	40-44	42	0.008	1.64-6.6	3.4	6.0	0.7	3.4	0.008	0.7	3.4	0.0
Calcium (Ca)	up to 217,000	15,000-16,000	15,667	3.086	90-630	368	651	79.1	368.0	3.09	82.2	382.3	14.3
Cobalt (Co)	9-350,400	1,100-1,200	1,167	0.230	14-120	60.7	107	13.1	60.7	0.230	13.3	61.8	1.1
Chromium (Cr)	8-16,000	19-20	19	0.004	1.0-13	6.2	11	1.3	6.2	0.004	1.3	6.2	0.0
Chloride (Cl)	07-89,900	39-41	40	0.008	2,110-8,000	4,608	8,152	990.7	4608.0	0.008	990.7	4607.4	-0.6
Copper (Cu)	Unknown	160-180	170	0.033	Unknown			0.0	0.0	0.033	0.0	0.2	0.2
Fluoride (F)	3-460,000	38-40	38.7	0.008	0.02-4,440	1,695	2,998	364.4	1695.0	0.008	364.4	1694.8	-0.2
Iron (Fe)	up to 46,000	680-740	723	0.142	1,080-3,400	2,212	3,913	475.6	2212.0	0.142	475.7	2212.4	0.4
Lead (Pb)	9-235,000	17-19	18	0.004	0.21-6.0	3	5	0.6	3.0	0.004	0.6	3.0	0.0
Manganese (Mn)	172-3,070	96,000-110,000	105,333	20.751	74-222	145	259	31.4	146.0	20.8	52.1	242.5	96.5
Mercury (Hg)	0.0004-14	U	U	0	0.0008-17.6	3.5	6	0.8	3.5	0.000	0.8	3.5	0.0
Molybdenum (Mo)	12-17,000	U	U	0	0.44-240	52.8	93	11.4	52.8	0.000	11.4	52.8	0.0
Nickel (Ni)	7-450,000	1,700-1,800	1,767	0.348	7.2-370	83	147	17.8	83.0	0.348	18.2	84.6	1.6
Nitrates (NOx)	0.6-350,000	3.1-3.2	3.1	0.001	24	24	42	5.2	24.0	0.0006	5.2	24.0	0.0
Selenium (Se)	0.02-710	25-28	26	0.005	0.18-2.4	1.4	2.5	0.3	1.4	0.0051	0.3	1.4	0.0
Silver (Ag)	0.007-80	11-12	11	0.002	0.005-0.14	0.1	0.2	0.0	0.1	0.002	0.0	0.1	0.0
Sulfate (SO_4=)	24-300,000	17,000	17,000	3.349	28,900-190,000	64,914	114,833	13956.5	64914.0	3.349	13959.9	64920.5	6.5
Thallium (Tl)	0.02-960	U	U	0	0.7-45	16	28	3.4	16.0	0.000	3.4	16.0	0.0
Tin (Sn)	20,900-116,000	U	U	0	<5	5	9	1.1	5.0	0.000	1.1	5.0	0.0
Vanadium (V)	10-25,000	U	U	0	136-510	263	465	58.5	263.0	0.000	58.5	263.0	0.0
Zinc (Zn)	8-14,500	3,400-3,600	3,533	0.696	50-1,300	641	1,134	137.8	641.0	0.696	138.5	644.1	3.1
Total Selected Components										30.2			
Total Tailings Cell Mass								215000.0			215030.2		

* - Assume 20% reduction per year for 5 years from historical maximum levels (190 tons per year) to final remedy estimate of 18 tons per year dry uranium material

[1] The concentration in other alternate feeds represents some selected concentrations for constituents found in characterization data for other alternate feed materials licensed for processing at the Mill, for comparison purposes

[2] The range in the Uranium Materiel is based on three sampling events for the DMC WTP solids

[3] The estimated average concentration in Uranium Material has been calculated as the mean value reported

[4] Estimated mass in the Uranium Materiel is calculated by assuming 197 tons dry annually from historical values

[5] Mill tailings range and average concentrations were taken from Mill tailings samples to date, as summarized in Table 5 of the draft Statement of Basis for the Utah Groundwater Discharge Permit for the Mill (November 29, 2004)

[6] Estimated current mass in Mill tailings is calculated by multiplying the estimated average concentration in the Mill tailings in Column F by 1,769,000 dry tons of tailings reported in the Mill's active Tailings Cell No. 3

[7] The baseline estimated annual mass in Mill tailings for cell 4A or 4B is calculated by multiplying the estimated mass in Cell 3 (Column G) by the ratio of Cell 4A (or 4B) total mass capacity of 2,150,000 dry tons to capacity of Cell 3 of 1,769,000 dry tons as of November 29, 2004 and dividing it by ten years as the estimated time to fill cell 4A (or 4B)

[8] The baseline concentration in Cell 4A (or 4B) Mill tailings is calculated by dividing Column H by 215,000 dry tons as the assumed annual mass addition of tailings to the Cell without the Uranium Material

[9] Year 1 and Year 2 estimated mass in the Uranium Material is assumed to be equal to Column D historical values

[10] The mass in Mill tailings after Uranium Material processing is calculated by adding the total tailings mass from the previous year to the total additional tailings mass added in the current year

[11] The concentration in Cell 4A (or 4B) Mill tailings after Uranium Material processing is calculated by dividing the Mass in Cell 4A (or 4B) Mill tailings for that year by the total cumulative mass in cell 4A (or 4B) tailings after Uranium Material is processed

[12] The increase in baseline Mill tailings concentration after Uranium Material processing is calculated by subtracting baseline concentration (Column I) from the concentration in Cell 4A (or 4B) after Uranium Material processing for that year.

[13] The Year 3 and Year 4 approximate estimated mass in the Uranium Material is assumed to be 5 times the amount in Column D based on the estimated increased flow treated to be 1,000 gpm for 7 months of the year and 450 gpm for the remaining 5 months

[14] The Year 5 through Year 10 approximate estimated mass in the Uranium Material is assumed to be reduced from the maximum historical value per year to the final remedy estimate of dry Uranium Material (20 %reduction per year) after 2 years of construction.

[15] The Estimated Mass in Uranium Material over 10-Year Period is the Cumulative Contribution from the Uranium Material to the tailings

[16] The Estimated Mass in Cell 4A (or 4B) Mill tailings over 10-year period after Uranium Material processing is the total cumulative mass contribution from including Uranium Material to the tailings

[17] The approximate percent total contributed from Uranium Material is the 10-year contribution to the tailings from the Uranium Material.

	Year 2				Year 3 (Const)				Year 4 (Const)			
Component	2J Estimated Mass in Uranium Material (tons)^{9}	2K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)^{10}	2L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)^{11}	2M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)^{12}	3J Estimated Mass in Uranium Material (tons)^{13}	3K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)^{10}	3L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)^{11}	3M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)^{12}	4J Estimated Mass in Uranium Material (tons)^{13}	4K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)^{10}	4L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)^{11}	4M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)^{12}
Acetone	0.000	82.6	192.0	0.0	0.000	123.8	191.9	-0.1	0.000	165.1	191.9	-0.1
Ammonia (NH_4)	0.002	1346.3	3130.6	-0.4	0.008	2019.5	3129.9	-1.1	0.008	2692.7	3129.6	-1.4
Arsenic (As)	0.000	64.1	149.0	0.0	0.000	96.1	148.9	-0.1	0.000	128.1	148.9	-0.1
Barium (Ba)	1.52	3.1	7.1	7.1	8.067	11.1	17.2	17.2	8.067	19.2	22.3	22.3
Beryllium (Be)	0.007	0.2	0.5	0.0	0.037	0.4	0.6	0.1	0.037	0.5	0.6	0.1
Cadmium (Cd)	0.008	1.5	3.4	0.0	0.044	2.3	3.5	0.1	0.044	3.0	3.5	0.1
Calcium (Ca)	3.09	164.4	382.3	14.3	16.344	259.9	402.8	34.8	16.344	355.3	413.0	45.0
Cobalt (Co)	0.230	26.6	61.8	1.1	1.217	40.8	63.3	2.6	1.217	55.1	64.0	3.3
Chromium (Cr)	0.004	2.7	6.2	0.0	0.020	4.0	6.2	0.0	0.020	5.4	6.3	0.1
Chloride (Cl)	0.008	1981.5	4607.4	-0.6	0.042	2972.2	4606.5	-1.5	0.042	3963.0	4606.1	-1.9
Copper (Cu)	0.033	0.1	0.2	0.2	0.177	0.2	0.4	0.4	0.177	0.4	0.5	0.5
Fluoride (F)	0.008	728.9	1694.8	-0.2	0.040	1093.3	1694.5	-0.5	0.040	1457.8	1694.4	-0.6
Iron (Fe)	0.142	951.4	2212.4	0.4	0.754	1427.8	2212.9	0.9	0.754	1904.1	2213.1	1.1
Lead (Pb)	0.004	1.3	3.0	0.0	0.019	2.0	3.0	0.0	0.019	2.6	3.1	0.1
Manganese (Mn)	20.8	104.3	242.5	96.5	109.865	245.6	380.6	234.6	109.865	386.8	449.6	303.6
Mercury (Hg)	0.000	1.5	3.5	0.0	0.000	2.3	3.5	0.0	0.000	3.0	3.5	0.0
Molybdenum (Mo)	0.000	22.7	52.8	0.0	0.000	34.1	52.8	0.0	0.000	45.4	52.8	0.0
Nickel (Ni)	0.348	36.4	84.6	1.6	1.843	56.1	86.9	3.9	1.843	75.8	88.1	5.1
Nitrates (NOx)	0.0006	10.3	24.0	0.0	0.003	15.5	24.0	0.0	0.003	20.6	24.0	0.0
Selenium (Se)	0.0051	0.6	1.4	0.0	0.027	0.9	1.5	0.1	0.027	1.3	1.5	0.1
Silver (Ag)	0.002	0.0	0.1	0.0	0.011	0.1	0.1	0.0	0.011	0.1	0.1	0.0
Sulfate ($SO_4^{=}$)	3.349	27919.7	64920.5	6.5	17.735	41894.0	64929.7	15.7	17.735	55868.2	64934.3	20.3
Thallium (Tl)	0.000	6.9	16.0	0.0	0.000	10.3	16.0	0.0	0.000	13.8	16.0	0.0
Tin (Sn)	0.000	2.2	5.0	0.0	0.000	3.2	5.0	0.0	0.000	4.3	5.0	0.0
Vanadium (V)	0.000	113.1	263.0	0.0	0.000	169.6	262.9	-0.1	0.000	226.2	262.9	-0.1
Zinc (Zn)	0.696	277.0	644.1	3.1	3.686	418.5	648.7	7.7	3.686	560.0	650.9	0.9
Total Selected Components	30.2				160.0				160.0			
Total Tailings Cell Mass		430060.4				645220.4				860380.3		

* - Assume 20% reduction per year for 5 years from historical maximum levels (160 tons per year) to final remedy estimate of 16 tons per year dry uranium material

1 The concentration in other alternate feeds represents some selected concentrations for constituents found in characterization data for other alternate feed materials licensed for processing at the Mill, for comparison purposes

2 The range in the Uranium Material is based on three sampling events for the DMC WTP solids.

3 The estimated average concentration in Uranium Material has been calculated as the mean value reported

4. Estimated mass in the Uranium Material is calculated by assuming 197 tons dry annually from historical values

5. Mill tailings range and average concentrations were taken from Mill tailings samples to date, as summarized in Table 5 of the draft Statement of Basis for the Utah Groundwater Discharge Permit for the Mill (November 29, 2004)

6 Estimated current mass in Mill tailings is calculated by multiplying the estimated average concentration in the Mill tailings in Column F by 1,769,000 dry tons of tailings reported in the Mill's active Tailings Cell No 3

7. The baseline estimated annual mass in Mill tailings for cell 4A or 4B is calculated by multiplying the estimated mass in Cell 3 (Column G) by the ratio of Cell 4A (or 4B) total mass capacity of 2,150,000 dry tons to capacity of Cell 3 of 1,769,000 dry tons as of November 29, 2004 and dividing it by ten years as the estimated time to fill cell 4A (or 4B)

8 The baseline concentration in Cell 4A (or 4B) Mill tailings is calculated by dividing Column H by 215,000 dry tons as the assumed annual mass addition of tailings to the Cell without the Uranium Material

9 Year 1 and Year 2 estimated mass in the Uranium Material is assumed to be equal to Column D historical values

10 The mass in Mill tailings after Uranium Material processing is calculated by adding the total tailings mass from the previous year to the total additional tailings mass added in the current year

11 The concentration in Cell 4A (or 4B) Mill tailings after Uranium Material processing is calculated by dividing the Mass in Cell 4A (or 4B) Mill tailings for that year by the total cumulative mass in cell 4A (or 4B) tailings after Uranium Material is processed

12 The increase in baseline Mill tailings concentration after Uranium Material processing is calculated by subtracting baseline concentration (Column I) from the concentration in Cell 4A (or 4B) after Uranium Material processing for that year.

13 The Year 3 and Year 4 approximate estimated mass in the Uranium Material is assumed to be 5 times the amount in Column D based on the estimated increased flow treated to be 1,000 gpm for 7 months of the year and 450 gpm for the remaining 5 months

14 The Year 5 through Year 10 approximate estimated mass in the Uranium Material is assumed to be reduced from the maximum historical value per year to the final remedy estimate of dry Uranium Material (20 %reduction per year) after 2 years of construction

15. The Estimated Mass in Uranium Material over 10-Year Period is the Cumulative Contribution from the Uranium Material to the tailings

16 The Estimated Mass in Cell 4A (or 4B) Mill tailings over 10-year period after Uranium Material processing is the total cumulative mass contribution from including Uranium Material to the tailings

17. The approximate percent total contributed from Uranium Material is the 10-year contribution to the tailings from the Uranium Material.

	Year 5				Year 6				Year 7			
Component	5J Estimated Mass in Uranium Material (tons)[14]	5K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)[10]	5L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)[11]	5M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)[12]	6J Estimated Mass in Uranium Material (tons)[14]	6K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)[10]	6L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)[11]	6M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)[12]	7J Estimated Mass in Uranium Material (tons)[14]	7K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)[10]	7L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)[11]	7M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)[12]
Acetone	0.000	206.4	191.9	-0.1	0.000	247.7	191.9	-0.1	0.000	289.0	191.9	-0.1
Ammonia (NH_4)	0.002	3355.8	3129.8	-1.2	0.001	4039.0	3130.0	-1.0	0.001	4712.2	3130.1	-0.9
Arsenic (As)	0.000	160.2	148.9	-0.1	0.000	192.2	148.9	-0.1	0.000	224.2	149.0	0.0
Barium (Ba)	1.52	20.7	19.3	19.3	1.25	22.0	17.0	17.0	0.97	23.0	15.2	15.2
Beryllium (Be)	0.007	0.6	0.6	0.1	0.006	0.7	0.6	0.1	0.004	0.9	0.6	0.1
Cadmium (Cd)	0.008	3.8	3.5	0.1	0.007	4.5	3.5	0.1	0.005	5.2	3.5	0.1
Calcium (Ca)	3.09	437.5	406.9	38.9	2.53	519.2	402.3	34.3	1.97	600.3	398.7	30.7
Cobalt (Co)	0.230	68.4	63.6	2.9	0.188	81.6	63.2	2.5	0.147	84.8	63.0	2.3
Chromium (Cr)	0.004	6.7	6.2	0.0	0.003	8.1	6.2	0.0	0.002	9.4	6.2	0.0
Chloride (Cl)	0.008	4953.7	4606.3	-1.7	0.006	5944.4	4606.5	-1.5	0.005	6935.2	4606.7	-1.3
Copper (Cu)	0.033	0.5	0.4	0.4	0.027	0.5	0.4	0.4	0.021	0.5	0.3	0.3
Fluoride (F)	0.008	1822.2	1694.4	-0.8	0.006	2186.7	1694.5	-0.5	0.005	2551.1	1694.6	-0.4
Iron (Fe)	0.142	2379.8	2213.0	1.0	0.117	2855.5	2212.8	0.8	0.091	3331.2	2212.8	0.8
Lead (Pb)	0.004	3.3	3.0	0.0	0.003	3.9	3.0	0.0	0.002	4.6	3.0	0.0
Manganese (Mn)	20.8	439.0	408.2	262.2	17.0	487.4	377.7	231.7	13.2	532.0	353.4	207.4
Mercury (Hg)	0.000	3.8	3.5	0.0	0.000	4.5	3.5	0.0	0.000	5.3	3.5	0.0
Molybdenum (Mo)	0.000	56.8	52.8	0.0	0.000	68.1	52.8	0.0	0.000	79.5	52.8	0.0
Nickel (Ni)	0.348	94.0	87.4	4.4	0.285	112.1	86.9	3.9	0.222	130.2	86.5	3.5
Nitrates (NOx)	0.0006	25.8	24.0	0.0	0.0005	31.0	24.0	0.0	0.0004	36.1	24.0	0.0
Selenium (Se)	0.0051	1.6	1.5	0.1	0.0042	1.9	1.5	0.1	0.0033	2.2	1.5	0.1
Silver (Ag)	0.002	0.1	0.1	0.0	0.002	0.2	0.1	0.0	0.001	0.2	0.1	0.0
Sulfate (SO_4=)	3.349	69828.1	64931.5	17.5	2.74	83787.3	64929.5	15.5	2.14	97746.0	64927.9	13.9
Thallium (Tl)	0.000	17.2	16.0	0.0	0.000	20.6	16.0	0.0	0.000	24.1	16.0	0.0
Tin (Sn)	0.000	5.4	5.0	0.0	0.000	6.5	5.0	0.0	0.000	7.6	5.0	0.0
Vanadium (V)	0.000	282.7	262.9	-0.1	0.000	330.3	262.9	-0.1	0.000	395.6	262.9	-0.1
Zinc (Zn)	0.686	698.5	649.6	8.6	0.570	836.9	648.6	7.8	0.444	975.2	647.8	6.8
Total Selected Components	30.2				24.7				19.3			
Total Tailings Cell Mass		1075410.5				1290435.3				1505454.5		

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* - Assume 20% reduction per year for 5 years from historical maximum levels (190 tons per year) to final remedy estimate of 18 tons per year dry uranium material.

1 The concentration in other alternate feeds represents some selected concentrations for constituents found in characterization data for other alternate feed materials licensed for processing at the Mill, for comparison purposes

2 The range in the Uranium Material is based on three sampling events for the DMC WTP solids.

3 The estimated average concentration in Uranium Material has been calculated as the mean value reported

4 Estimated mass in the Uranium Material is calculated by assuming 197 tons dry annually from historical values

5 Mill tailings range and average concentrations were taken from Mill tailings samples to date, as summarized in Table 5 of the draft Statement of Basis for the Utah Groundwater Discharge Permit for the Mill (November 29, 2004)

6 Estimated current mass in Mill tailings is calculated by multiplying the estimated average concentration in the Mill tailings in Column F by 1,769,000 dry tons of tailings reported in the Mill's active Tailings Cell No 3

7 The baseline estimated annual mass in Mill tailings for cell 4A or 4B is calculated by multiplying the estimated mass in Cell 3 (Column G) by the ratio of Cell 4A (or 4B) total mass capacity of 2,150,000 dry tons to capacity of Cell 3 of 1,769,000 dry tons as of November 29, 2004 and dividing it by ten years as the estimated time to fill cell 4A (or 4B)

8 The baseline concentration in Cell 4A (or 4B) Mill tailings is calculated by dividing Column H by 215,000 dry tons as the assumed annual mass addition of tailings to the Cell without the Uranium Material

9 Year 1 and Year 2 estimated mass in the Uranium Material is assumed to be equal to Column D historical values

10 The mass in Mill tailings after Uranium Material processing is calculated by adding the total tailings mass from the previous year to the total additional tailings mass added in the current year.

11 The concentration in Cell 4A (or 4B) Mill tailings after Uranium Material processing is calculated by dividing the Mass in Cell 4A (or 4B) Mill tailings for that year by the total cumulative mass in cell 4A (or 4B) tailings after Uranium Material is processed.

12. The increase in baseline Mill tailings concentration after Uranium Material processing is calculated by subtracting baseline concentration (Column I) from the concentration in Cell 4A (or 4B) after Uranium Material processing for that year

13. The Year 3 and Year 4 approximate estimated mass in the Uranium Material is assumed to be 5 times the amount in Column D based on the estimated increased flow treated to be 1,000 gpm for 7 months of the year and 450 gpm for the remaining 5 months

14 The Year 5 through Year 10 approximate estimated mass in the Uranium Material is assumed to be reduced from the maximum historical value per year to the final remedy estimate of dry Uranium Material (20 %reduction per year) after 2 years of construction

15 The Estimated Mass in Uranium Material over 10-Year Period is the Cumulative Contribution from the Uranium Material to the tailings

16 The Estimated Mass in Cell 4A (or 4B) Mill tailings over 10-year period after Uranium Material processing is the total cumulative mass contribution from including Uranium Material to the tailings

17. The approximate percent total contributed from Uranium Material is the 10-year contribution to the tailings from the Uranium Material.

	Year 8				Year 9				Year 10			
Component	8J Estimated Mass in Uranium Material (tons)[14]	8K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)[10]	8L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)[11]	8M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)[12]	9J Estimated Mass in Uranium Material (tons)[14]	9K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)[10]	9L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)[11]	9M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)[12]	10J Estimated Mass in Uranium Material (tons)[14]	10K Mass in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (tons)[10]	10L Conc. in Cell 4A (or 4B) Mill Tailings after Uranium Material Processing (ppm)[11]	10M Increase in Baseline Mill Tailings Conc. After Uranium Material Processing (ppm)[12]
Acetone	0.000	330.2	191.9	-0.1	0.000	371.5	192.0	0.0	0.000	412.8	192.0	0.0
Ammonia (NH_4)	0.001	5385.3	3130.2	-0.8	0.000	6058.5	3130.2	-0.8	0.000	6731.7	3130.3	-0.7
Arsenic (As)	0.000	256.3	149.0	0.0	0.000	288.3	149.0	0.0	0.000	320.4	149.0	0.0
Barium (Ba)	0.70	23.7	13.7	13.7	0.42	24.1	12.4	12.4	0.14	24.2	11.3	11.2
Beryllium (Be)	0.003	1.0	0.6	0.1	0.002	1.1	0.6	0.1	0.001	1.2	0.6	0.051
Cadmium (Cd)	0.004	6.0	3.5	0.1	0.002	6.7	3.5	0.1	0.001	7.4	3.5	0.1
Calcium (Ca)	1.41	680.8	395.7	27.7	0.85	760.8	393.1	25.1	0.20	840.2	390.7	22.7
Cobalt (Co)	0.105	108.0	62.8	2.1	0.063	121.1	62.6	1.9	0.022	134.2	62.4	1.7
Chromium (Cr)	0.002	10.7	6.2	0.0	0.001	12.1	6.2	0.0	0.000	13.4	6.2	0.0
Chloride (Cl)	0.004	7925.9	4606.8	-1.2	0.002	8916.6	4606.9	-1.1	0.001	9907.3	4607.0	-1.0
Copper (Cu)	0.015	0.5	0.3	0.3	0.009	0.5	0.3	0.3	0.003	0.5	0.2	0.2
Fluoride (F)	0.003	2915.5	1694.6	-0.4	0.002	3279.9	1694.6	-0.4	0.001	3644.4	1694.7	-0.3
Iron (Fe)	0.065	3806.8	2212.7	0.7	0.039	4282.5	2212.6	0.6	0.013	4758.1	2212.6	0.6
Lead (Pb)	0.002	5.2	3.0	0.0	0.001	5.9	3.0	0.0	0.000	6.5	3.0	0.0
Manganese (Mn)	9.5	572.9	333.0	187.0	5.7	610.0	315.2	169.2	2.0	643.3	299.2	153.2
Mercury (Hg)	0.000	6.0	3.5	0.0	0.000	6.8	3.5	0.0	0.000	7.5	3.5	0.0
Molybdenum (Mo)	0.000	90.8	52.8	0.0	0.000	102.2	52.8	0.0	0.000	113.5	52.8	0.0
Nickel (Ni)	0.159	148.2	86.1	3.1	0.096	166.1	85.8	2.8	0.033	184.0	85.6	2.6
Nitrates (NOx)	0.0003	41.3	24.0	0.0	0.0002	46.4	24.0	0.0	0.0001	51.6	24.0	0.0
Selenium (Se)	0.0023	2.5	1.4	0.0	0.0014	2.8	1.4	0.0	0.0005	3.1	1.4	0.0
Silver (Ag)	0.001	0.2	0.1	0.0	0.001	0.2	0.1	0.0	0.000	0.2	0.1	0.0
Sulfate ($SO_4^{=}$)	1.53	111704.0	64926.5	12.5	0.92	125661.4	64925.3	11.3	0.32	139618.3	64924.2	10.2
Thallium (Tl)	0.000	27.5	16.0	0.0	0.000	31.0	16.0	0.0	0.000	34.4	16.0	0.0
Tin (Sn)	0.000	8.6	5.0	0.0	0.000	9.7	5.0	0.0	0.000	10.8	5.0	0.0
Vanadium (V)	0.000	452.4	262.9	-0.1	0.000	508.9	262.9	-0.1	0.000	565.5	262.9	-0.1
Zinc (Zn)	0.318	1113.3	647.1	6.1	0.192	1251.3	646.5	5.5	0.066	1389.2	646.0	5.0
Total Selected Components	13.8				8.3				2.9			
Total Tailings Cell Mass		1720468.3				1935476.7				2150479.5		

* - Assume 20% reduction per year for 5 years from historical maximum levels (100 tons per year) to final remedy estimate of 18 tons per year dry uranium material.

1 The concentration in other alternate feeds represents some selected concentrations for constituents found in characterization data for other alternate feed materials licensed for processing at the Mill, for comparison purposes

2 The range in the Uranium Material is based on three sampling events for the DMC WTP solids.

3 The estimated average concentration in Uranium Material has been calculated as the mean value reported

4 Estimated mass in the Uranium Material is calculated by assuming 197 tons dry annually from historical values

5 Mill tailings range and average concentrations were taken from Mill tailings samples to date, as summarized in Table 5 of the draft Statement of Basis for the Utah Groundwater Discharge Permit for the Mill (November 29, 2004)

6 Estimated current mass in Mill tailings is calculated by multiplying the estimated average concentration in the Mill tailings in Column F by 1,769,000 dry tons of tailings reported in the Mill's active Tailings Cell No 3

7. The baseline estimated annual mass in Mill tailings for cell 4A or 4B is calculated by multiplying the estimated mass in Cell 3 (Column G) by the ratio of Cell 4A (or 4B) total mass capacity of 2,150,000 dry tons to capacity of Cell 3 of 1,769,000 dry tons as of November 29, 2004 and dividing it by ten years as the estimated time to fill cell 4A (or 4B)

8 The baseline concentration in Cell 4A (or 4B) Mill tailings is calculated by dividing Column H by 215,000 dry tons as the assumed annual mass addition of tailings to the Cell without the Uranium Material

9. Year 1 and Year 2 estimated mass in the Uranium Material is assumed to be equal to Column D historical values

10. The mass in Mill tailings after Uranium Material processing is calculated by adding the total tailings mass from the previous year to the total additional tailings mass added in the current year

11 The concentration in Cell 4A (or 4B) Mill tailings after Uranium Material processing is calculated by dividing the Mass in Cell 4A (or 4B) Mill tailings for that year by the total cumulative mass in cell 4A (or 4B) tailings after Uranium Material is processed

12 The increase in baseline Mill tailings concentration after Uranium Material processing is calculated by subtracting baseline concentration (Column I) from the concentration in Cell 4A (or 4B) after Uranium Material processing for that year.

13 The Year 3 and Year 4 approximate estimated mass in the Uranium Material is assumed to be 5 times the amount in Column D based on the estimated increased flow treated to be 1,000 gpm for 7 months of the year and 450 gpm for the remaining 5 months

14 The Year 5 through Year 10 approximate estimated mass in the Uranium Material is assumed to be reduced from the maximum historical value per year to the final remedy estimate of dry Uranium Material (20 %reduction per year) after 2 years of construction

15 The Estimated Mass in Uranium Material over 10-Year Period is the Cumulative Contribution from the Uranium Material to the tailings

16 The Estimated Mass in Cell 4A (or 4B) Mill tailings over 10-year period after Uranium Material processing is the total cumulative mass contribution from including Uranium Material to the tailings

17. The approximate percent total contributed from Uranium Material is the 10-year contribution to the tailings from the Uranium Material.

	Final		
Component	N Estimated Mass in Uranium Material over 10-year Period (tons)[15]	O Estimated Mass in Cell 4A (or 4B) Mill Tailings over 10-year Period After Uranium Material Processing (tons)[16]	P Percent Total Contributed from Uranium Material [17]
Acetone	0.0	412.8	0.000%
Ammonia (NH_4)	0.0	6731.7	0.000%
Arsenic (As)	0.0	320.4	0.000%
Barium (Ba)	24.2	24.2	100%
Beryllium (Be)	0.1	1.2	9.24%
Cadmium (Cd)	0.1	7.4	1.77%
Calcium (Ca)	49.0	840.2	5.83%
Cobalt (Co)	3.6	134.2	2.72%
Chromium (Cr)	0.1	13.4	0.444%
Chloride (Cl)	0.1	9907.3	0.001%
Copper (Cu)	0.5	0.5	100%
Fluoride (F)	0.1	3644.4	0.003%
Iron (Fe)	2.3	4758.1	0.048%
Lead (Pb)	0.1	6.5	0.865%
Manganese (Mn)	329.4	643.3	51.2%
Mercury (Hg)	0.0	7.5	0.000%
Molybdenum (Mo)	0.0	113.5	0.000%
Nickel (Ni)	5.5	184.0	3.00%
Nitrates (NOx)	0.0	51.6	0.019%
Selenium (Se)	0.1	3.1	2.63%
Silver (Ag)	0.0	0.2	13.79%
Sulfate (SO_4=)	53.2	139618.3	0.038%
Thallium (Tl)	0.0	34.4	0.000%
Tin (Sn)	0.0	10.8	0.000%
Vanadium (V)	0.0	568.5	0.000%
Zinc (Zn)	11.0	1389.2	0.795%
Total Selected Components	479.5		0.0223%
Total Tailings Cell Mass		2150479.5	

* - Assume 20% reduction per year for 5 years from historical maximum levels (190 tons per year) to final remedy estimate of 18 tons per year dry uranium material

1 The concentration in other alternate feeds represents some selected concentrations for constituents found in characterization data for other alternate feed materials licensed for processing at the Mill, for comparison pu

2. The range in the Uranium Material is based on three sampling events for the DMC WTP solids

3 The estimated average concentration in Uranium Material has been calculated as the mean value reported.

4 Estimated mass in the Uranium Material is calculated by assuming 197 tons dry annually from historical values

5 Mill tailings range and average concentrations were taken from Mill tailings samples to date, as summarized in Table 5 of the draft Statement of Basis for the Utah Groundwater Discharge Permit for the Mill (November

6 Estimated current mass in Mill tailings is calculated by multiplying the estimated average concentration in the Mill tailings in Column F by 1,769,000 dry tons of tailings reported in the Mill's active Tailings Cell No 3

7 The baseline estimated annual mass in Mill tailings for cell 4A or 4B is calculated by multiplying the estimated mass in Cell 3 (Column G) by the ratio of Cell 4A (or 4B) total mass capacity of 2,150,00 capacity of Cell 3 of 1,769,000 dry tons as of November 29, 2004 and dividing it by ten years as the estimated time to fill cell 4A (or 4B)

8 The baseline concentration in Cell 4A (or 4B) Mill tailings is calculated by dividing Column H by 215,000 dry tons as the assumed annual mass addition of tailings to the Cell without the Uranium Material

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17. The approximate percent total contributed from Uranium Material is the 10-year contribution to the tailings from the Uranium Material.

MATERIAL SAFETY DATA SHEET

Page 1 of 5
Rev. Date : 7/30/02

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product Name :	**NS 6852**
Company :	Neo Solutions, Inc. P.O. Box 26 Beaver, PA 15009
Emergency Telephone Number :	(724) 728-1847 Fax : (724) 728-3440
Product Use :	Process aid for industrial applications.

2. COMPOSITION / INFORMATION ON INGREDIENTS

Identification of the preparation : Anionic water-soluble polymer.

3. HAZARDS IDENTIFICATION

Aqueous solutions or powders that become wet render surfaces extremely slippery.

4. FIRST AID MEASURES

Inhalation :	Move to fresh air.
Skin contact :	Wash with water and soap as a precaution. In case of persistent skin irritation, consult a physician.
Eye contact :	Rinse thoroughly with plenty of water, also under the eyelids. In case of persistent eye irritation, consult a physician.
Ingestion :	The product is not considered toxic based on studies on laboratory animals.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media :	Water, water spray, foam, carbon dioxide (CO_2), dry powder.
Special fire-fighting precautions :	Aqueous solutions or powders that become wet render surfaces extremely slippery.
Special protective equipment for firefighters :	No special protective equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions : No special precautions required.

Environmental precautions : Do not contaminate water.

Methods for cleaning up : Do not flush with water. Clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling : Avoid contact with skin and eyes. Avoid dust formation. Do not breathe the dust. Wash hands before breaks and at the end of workday.

Storage : Keep in a dry, cool place (0 - 35 °C).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures to reduce exposure : Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Personal protection equipment :

- Respiratory protection : Dust safety masks are recommended where concentration of total dust is more than 10 mg / m^3.
- Hand protection : Rubber gloves.
- Eye protection : Safety glasses with side-shields. Do not wear contact lenses.
- Skin and body protection : Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.

Hygiene measures : Wash hands before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form :	granular solid
Color :	white
Odor :	none
pH :	4 - 9 @ 5 g/L (for product series. See Technical Bulletin for specific value)
Melting point (°C) :	Not applicable.
Flash point (°C) :	Not applicable.
Autoignition temperature (°C) :	Not applicable.
Vapor pressure (mm Hg) :	Not applicable.
Bulk density :	See Technical Bulletin.
Water solubility :	See Technical Bulletin.
Viscosity (mPa's) :	See Technical Bulletin.

10. STABILITY AND REACTIVITY

Stability : Product is stable, no hazardous polymerization will occur.

Materials to avoid : Oxidizing agents may cause exothermic reactions.

Hazardous decomposition products : Thermal decomposition may produce : nitrogen oxides (NOx), carbon oxides.

11. TOXICOLOGICAL INFORMATION

Acute toxicity :

- Oral : LD50 / oral / rat > 5000 mg/kg
- Dermal : The results of testing on rabbits showed this material to be non-toxic even at high dose levels.
- Inhalation : The product is not expected to be toxic by inhalation.

Irritation :

- Skin : The results of testing on rabbits showed this material to be non-irritating to the skin.
- Eyes : Testing conducted according to the Draize technique showed the material produces no corneal or iridial effects and only slight transitory conjuctival effects similar to those which all granular materials have on conjuctivae.

Sensitization : The results of testing on guinea pigs showed this material to be non-sensitizing.

Chronic toxicity : A two-year feeding study on rats did not reveal adverse health effects. A one-year feeding study on dogs did not reveal adverse health effects.

12. ECOLOGICAL INFORMATION

Acute aquatic toxicity :

- Fish : LC50 / Danio rerio / 96 hours > 100 mg/L (OECD 203)
- Daphnids : EC50 / Daphnia magna / 48 hours > 100 mg/L (OECD 202)
- Algae : IC50 / Scenedesmus subspicatus / 72 hours > 100 mg/L (OECD 201)
- Hydrolysis : Does not hydrolyze.
- Biodegradation : Not readily biodegradable.
- LogP_{ow} : 0
- Bioaccumulation : Does not bioaccumulate.

16. OTHER INFORMATION

Further information :

This MSDS was prepared in accordance with the following :

Council Directive 92 / 32 / EEC of 30 April 1992 amending for the seventh time Directive 67 / 548 / EEC on the approximation of the laws, regulations, and administrative provisions relating to the classification, packaging, and labeling of dangerous substances and all subsequent adaptations to technical progress.

Directive 1999 / 45 / EC of the European Parliament and the Council of 31 May 1999 concerning the approximation of the laws, regulations, and administrative provisions of the Member States relating to the classification, packaging, and labeling of dangerous preparations.

Commission Directive 2001 / 58 / EC of 27 July 2001 amending for the second time Directive 91 / 155 / EEC defining and laying down the detailed arrangements for the system of specific information relating to dangerous preparations in implementation of Article 14 of European Parliament and Council Directive 1999 / 45 / EC and relating to dangerous substances in implementation of Article 27 of Council Directive 67 / 548 / EEC (safety data sheets).

ISO 11014-1 : Material Safety Data Sheet for Chemical Products.

Person to contact : Product Manager

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13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products :	In accordance with local and national regulations.
Contaminated packaging :	Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local regulations.

14. TRANSPORT INFORMATION

Remarks :	Not classified as dangerous in the meaning of transport regulations.

15. REGULATORY INFORMATION

This product is not a hazardous article and need not be labeled according to EC-Directives as amended.

Inventory status :

EINECS (Europe) :	Existing polymer according to the definition in the 7th Amendment to Directive 67 / 548 / EEC. All starting materials and additives are listed in EINECS.
TSCA (USA) :	Complies with all applicable rules or orders under TSCA.
DSL (Canada) :	All components listed on inventory.
AICS (Australia) :	All components listed on inventory.
MITI (Japan) :	All components listed on inventory.
ECL (Korea) :	All components listed on inventory.
NEPA (China) :	All components listed on inventory.
PICCS (Philippines) :	All components listed on inventory.

TETRA TECH

Attachment 2 – Email from Jeff Kujawa

From: Jeff Kujawa [Jeff.Kujawa@ALSGlobal.com]
Sent: Friday, August 20, 2010 6:41 PM
To: Hudson, Jen
Subject: Chloroform in 1007337 - WTP Sludge
Here is what I was able to get back from Salt Lake.

All results are flagged with a J indicating an estimate because it is below the PQL.
The samples were only 27% solid meaning all the results are getting multiplied by a factor of almost 4. That could be causing the number to "look" higher than it is.
Chloroform occasionally gets into the water/air in the building and could conceivably be causing the contamination. There are trace amounts in the blank at a level about half that of the uncorrected samples (0.2 ug/Kg) but the result was less than the MDL of 0.291. Hopefully this is helpful.

How was your customer experience? Please send us your feedback.

Jeff Kujawa
PROJECT MANAGER

ALS | Enviromental

225 Commerce Drive
Fort Collins, CO 80524

PHONE: +1 970 490 1511
FAX: +1 970 490 1522

www.alsglobal.com

Please consider the environment before printing this email.

The OC Pest has low recovery for Endrin in the LCS and LCSD at 53% and 57%. The LCL is 60%

The Herbicide analysis has low surrogate recoveries for samples 1007337-1, 1007337-2 and 1007337-3 at 38%, 10% and 34%. The LCL is 57%.

We will document the excursion in the case narratives.

How was your customer experience? Please send us your feedback.

Jeff Kujawa

PROJECT MANAGER

ALS | Enviromental

225 Commerce Drive
Fort Collins, CO 80524

PHONE: +1 970 490 1511
FAX: +1 970 490 1522

www.alsglobal.com

Please consider the environment before printing this email.

TETRA TECH

Tel Fax

Technical Memorandum

To: Jo Ann Tischler

Company: Denison Mines (USA) Corp.

Re: Review of Chemical Contaminants in Dawn Mining Company (DMC) Midnite Mine Uranium Material to Determine the Potential Presence of RCRA Characteristic or RCRA Listed Hazardous Waste

From: Jen Hudson

Date: June 14, 2013

Jennifer Hudson

Project #: 114-181850/300

This report summarizes the characterization of the Dawn Mining Company ("DMC") Uranium Material (the "Uranium Material"), also referred to as the Water Treatment Plant ("WTP") solids to be transported from the DMC Midnite Mine, Wellpinit, Washington, to determine whether or not the Uranium Material is or contains any listed or characteristic hazardous waste as defined by the Resource Conservation and Recovery Act ("RCRA"). The results of this characterization will provide information to Denison Mines (USA) Corp. ("Denison") to determine the requirements necessary for an amendment to its White Mesa Uranium Mill ("Mill") State of Utah Radioactive Materials License No. UT1900479 (the "License"), to permit the processing of the Uranium Material as an alternate feed material at the Mill.

In accordance with the definitions in the Atomic Energy Act, as amended, and 10 Code of Federal Regulations ("CFR") 40.4, ores with natural uranium content of 0.05 weight percent or higher are classified as source material and, as per 40 CFR Part 261.4, are exempt from regulation under RCRA. As summarized in the Radioactive Material Profile Record, the Uranium Material has historically had an average uranium content of approximately 0.18 wet weight percent uranium (0.21 wet weight percent U_3O_8), 1.2 dry weight percent natural uranium (1.4 dry weight percent U_3O_8). This Uranium Material is therefore source material, and is categorically exempt from RCRA.

Although the Uranium Material is exempt from regulation under RCRA, Denison nonetheless requires a due diligence evaluation of potential materials to be processed, to assess:

1. Whether the material is, or contains, any hazardous constituents that would be regulated as RCRA listed hazardous waste, if the Uranium Material were not categorically exempt from RCRA as a uranium ore or a categorically exempt solid waste.
2. Whether the material contains any constituents that could generate a worker safety or environmental hazard under the conditions under which it will be processed at the Mill.
3. Whether the material contains any constituents that would be incompatible with the Mill's tailings system.

This memorandum provides the evaluation of the regulatory status of the Uranium Material relative to RCRA. Evaluation of potential safety and environmental hazards, and compatibility with the Mill's tailings system are provided in a separate memorandum.

1. Site History and Background

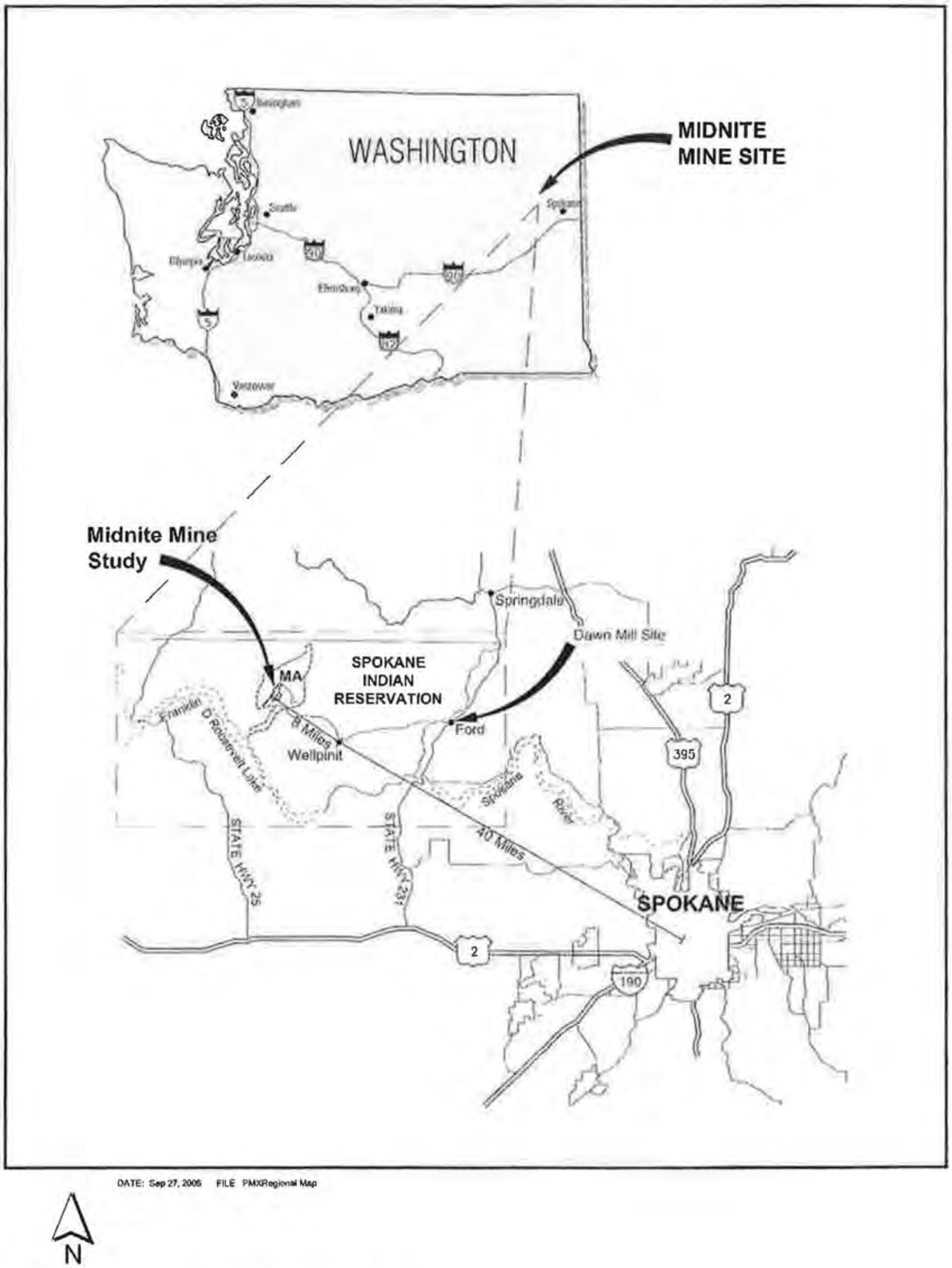
The Midnite Mine Superfund Site ("Site") is an inactive open-pit uranium mine that is currently administrated by the U.S. Environmental Protection Agency ("EPA") Region 10 under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), also known as Superfund. The Site EPA Identification Number is WA980978753.

The Site is located on the Spokane Indian Reservation in eastern Washington State, approximately 48 air miles northwest of Spokane (Figure 1). These lands are owned by the federal government and held in trust for the Spokane Tribe of Indians ("Tribe") and individual tribal members.

Uranium was discovered on the site in 1954. The prospectors and several tribal members subsequently formed Midnite Mines, Inc. and acquired the mining leases at the Site. Midnite Mines, Inc. then joined with Newmont Mining Company ("Newmont") to create the DMC, with Newmont Mining Company as the 51 percent shareholder and Midnite Mines, Inc. owning 49 percent. Newmont USA Limited is the corporate successor of Newmont Mining Company and continues to be the majority shareholder of DMC (EPA, 2006).

The mine operated from 1954 until 1965, providing uranium under contracts with the United States Atomic Energy Commission ("AEC"). The mine went into standby from 1965 and resumed mining in 1969. The ores were milled at the Mill site, located near Ford, Washington. Mining was suspended in 1981 due to decreases in uranium prices and never resumed. The Mine was regulated by several United States Department of the Interior ("USDOI") agencies, including U.S. Geological Survey, U.S. Bureau of Mines, and U.S. Bureau of Land Management ("BLM") Minerals Management Service. The Bureau of Indian Affairs ("BIA") represented the Tribe and individual tribal allotment owners in matters related to leases and royalties.

An estimated 5.3 million tons of ore and proto-ore and 33 million tons of waste rock were removed from nine pits between 1955 and 1981. All but two of the mine pits have been backfilled using waste rock. The last two pits to be mined consisted of Pit 3 and Pit 4, these pits were not backfilled and remain open (EPA, 2006). Several reclaimed waste rock piles remain on the mine property and an estimated 2.4 million tons of ore and proto-ore were stockpiled on Site during active mining operations.



DATE: Sep 27, 2006 FILE PMXRegional Map

Figure 1. Midnite Mine Site Location

1.1 Seep and Surface Water Collection System

In the late 1970s, seeps with dissolved ore-derived constituents were observed at the toe of the largest waste rock piles at Midnite Mine. The BLM ordered DMC to construct a control pond (the Pollution Control Pond, or "PCP") in 1979 to capture the seeps for evaporation. Following the suspension of mining in 1981, DMC began pumping water from the PCP to the now inactive Pit 3 in response to growing quantities of water in the PCP and newly identified seeps at the base of the largest waste rock pile. Since cessation of mining operations, mine site surface runoff water has been collected in engineered channels and diverted to the inactive open mining pit, Pit 3. In addition, natural ground water from the ore zones of the pits has flowed into and accumulated in the two open mining pits, Pit 3 and Pit 4, at the site. In February of 1985, DMC applied to the EPA for a National Pollution Discharge Elimination System ("NPDES") permit to allow for the discharge of treated water from those pits and other waters collected on the site. In September of 1986 DMC was issued a NPDES permit.

In 1987 a Compliance Order was issued by EPA under the Clean Water Act ("CWA") and in conjunction with the NPDES permit requiring DMC to eliminate discharges of pollutants to waters of the United States. Subsequently, DMC developed a seep collection and pumpback program that collected water from Site drainages and returned them to the PCP and Pit 3 and mixed with the accumulating water from surface water runoff as described previously. Seep and surface water collection occurs at six specific locations throughout the Midnite Mine Site as part of this seep collection and pumpback program including the PCP. Pit 3 waters consist of mine site waters collected and pumped from the seep collection and pumpback program, direct precipitation and local mine surface runoff in the immediate area of Pit 3, and natural ground water inflow from the Pit 3 ore zones. The water that accumulates in Pit 4 consists of direct precipitation, groundwater inflow, and surface runoff in the immediate area of Pit 4. All waters collected in the seep collection and pumpback system are derived from seeps from waste rock piles or surface runoff at the Site. The seep collection and pumpback system does not collect water from any areas that have ever been known to contain or currently contain any listed hazardous wastes.

In 1988, DMC built a water treatment plant at the Site to treat the accumulating water in the open pits. In 1991 the BLM issued an order requiring DMC to dewater the open pits and treat for metals, uranium and sulfate removal in the water treatment plant for compliance with the NPDES permit and in 1992 the WTP began treating pit water.

There are no shop areas, petroleum tanks, or other sources of hydrocarbons at the mine site with the exception of a 300 gallon diesel fuel tank for the Pit 4 pump, and a 300 gallon tank of gasoline for WTP equipment. The diesel fuel tank and pump are located in secondary containment near Pit 4 with a maximum volume stored of 300 gallons, and the 300 gallon gasoline tank is located next to the WTP. These fuels are stored and managed separately from the Uranium Material and have not impacted the Uranium Material in the past nor do they have a reasonable potential to do so in the future. The constituents precipitated from the WTP influent are derived from flow of natural precipitation through uranium mine waste rock and natural ore, collected surface runoff from natural materials, and natural ground water inflow from the ore zones into one of the two remaining open pits, Pit 3 and Pit 4 as discussed above.

A Remedial Investigation/Feasibility Study (RI/FS) was completed on 9/30/05 for the Midnite Mine. The Selected Remedy for the Site is Alternative 5a (Complete Pit Backfill with Passive Drains and Ex-Situ Water Treatment) of the FS. Based on the FS and issued in the Record of

Decision (ROD) as the Selected Remedy ("Remedy), Pits 3 and 4 will be backfilled, waste rock and proto-ore will be moved and capped, and a new passive water collection system will be installed to capture groundwater from these and other backfilled pit areas. The surface water management will be designed to divert surface flows around sources of contamination and therefore minimize the volume of water to be treated after the Remedy is implemented. The existing WTP is located on a waste rock pile that must be removed for the Remedy. Therefore, a new water treatment plant will be built before construction of the Remedy begins It is estimated that the construction will require approximately 2 years and the new WTP must be capable of treating water at a rate of 1,000 gpm year round for the construction phase. It is likely that the new WTP will be comparable to the current treatment employed using lime and barium addition for removal of constituents from the feed water. This higher design flow will allow for rapid dewatering of the pits during backfilling, as well as groundwater collection and surface water collection treatment. After construction, it expected that the flows will be reduced to an ultimate annual value of 65 million gpm and will take an estimated 6 to 7 years to reach these reduced flows.

The water quality during construction is assumed to be the same composition as currently is captured and treated, and it is expected that the water quality after implementation of the Remedy will improved from current water quality.

1.2 Water Treatment Plant Process Description

The WTP is a conventional lime treatment high-density solids process in which the metals and uranium are precipitated out in the treatment process, and includes addition of barium chloride for radium removal. A polymer coagulant is added, and the resultant slurry is settled and filtered to produce a solution free of solids for surface discharge under the EPA CERCLA program and NPDES permit issued to DMC. The precipitate is currently centrifuged and the final solids contain on average 0.18 wet weight percent uranium (0.21 wet weight percent U_3O_8) at an average historical solids content of 15 percent. However, the centrifuges are to be replaced with a hydraulic filter press in 2011, increasing the percent solids of the final Uranium Material to between 25% and 45% resulting in a proportional increase in weight percent uranium estimated to be between 0.3 and 0.55 wet weight percent uranium (0.35 and 0.65 wet weight percent U_3O_8). The wet weight concentrations of the constituents present in the Uranium Material are expected to increase by 67 to 300 percent from current values as a result of dewatering with the filter press. The total constituent mass will remain equal to or less than the amount currently produced as discussed herein. No other material changes to the physical or chemical processes of the WTP are planned. Therefore, no other significant changes to the chemical composition of the Uranium Material are expected to occur.

The WTP is typically operational from early May through the end of October and operates 24 hours per day, four days per week. WTP influent is derived from approximately 400 gpm influent from Pit 3 and approximately 50 gpm influent from Pit 4. The pit waters are pumped to the WTP using positive displacement pumps which are piped separately to the WTP through polyethylene piping. The WTP reagents are pre-mixed in individual mixing tanks prior to addition to the treatment stream. The hydrated lime and flocculent are pre-mixed using makeup water from Pit 4 while the barium chloride is mixed with potable water.

The powdered barium chloride is pre-mixed at a ratio of 500 pounds (lbs) of barium chloride to 1,200 gallons of potable water. This barium chloride solution is then injected directly into the Pit

3 influent line in the WTP at rates from 170 milliliters per minute ("ml/min") to 180 ml/min for the 400 gpm inflow for precipitation of radium. The Pit 3 influent then discharges into the first of three agitation tanks for mixing. Added to this agitation tank is approximately 90 gpm, or roughly 20% of the total process stream, from the clarifier bottoms (clarifier underflow) to increase the overall final Uranium Material density.

This first agitation tank then gravity feeds into a second agitation tank where hydrated lime is added for the precipitation of uranium and metals. The hydrated lime solution is added to the second agitation tank as needed to achieve a target pH of 9.8 to 9.9 standard pH units prior to clarification. The second agitation tank gravity feeds to a third agitation tank for additional mixing, which in turn gravity feeds to the neutralization surge tank.

The neutralization surge tank receives two influent streams. The primary influent stream is the flow from the third agitation tank, described above. The secondary influent stream is the liquid collected from the dewatering process (currently centrifuge, which will be replaced by a hydraulic filter press system in 2011). Waters removed by the dewatering process are collected in the concentrate surge tank and pumped to the neutralization surge tank. At the discharge of the neutralization surge tank, an anionic water soluble polymer (Neo Solutions, NS-6852) is added as a coagulant to facilitate clarification.

The neutralization surge tank discharge is currently sent to one of two clarifiers. Pit 4 water is higher in pH and significantly lower in metals and radionuclide concentrations than the Pit 3 water (See Table 1) and therefore requires less initial treatment. As a result, the remaining portion of the Pit 4 influent stream not used for reagent make up is pumped directly to the clarifiers. The precipitated solids are drawn from the clarifier bottom and, as mentioned previously, approximately 20% of the clarifier underflow (approximately 90 gpm) is pumped back to the first agitation tank to increase overall Uranium Material density. The liquid fraction of the remaining 80% of the process stream (approximately 360 gpm) is decanted from the top of the clarifier (clarifier decant) for final pH adjustment and addition of scale inhibitor for direct surface discharge, while the remaining solids fraction from the clarifier underflow is sent to the centrifuge for dewatering. The centrifuge will be replaced for the 2011 operating season with a hydraulic filter press as discussed in more detail below.

The clarifier decant is sent to the clarifier overflow tank, where it is pH adjusted to between 6.5 and 9.0 using sulfuric acid, and a polyacrylic scale inhibitor ("anti-scalant") is added prior to discharge. Neither the sulfuric acid nor anti-scalant added to the final plant discharge water are introduced to the solids generation process and therefore do not become components of the Uranium Material.

The dewatered solids are currently transferred from the centrifuge to the hauling truck via a discharge conveyor. The transport truck is housed within the WTP building and remains in that location until it is hauled for final disposal, thereby eliminating any opportunity for other waste materials to be introduced into the Uranium Material.

From 2001 through 2008 the WTP processed produced between 1.05 million ("M") lbs and 2.5 M lbs per year of Uranium Material at 15% solids (average 1.9 M lbs at 15% solids). This is equivalent to 164,000 to 393,500 dry tons of annual solids produced. The average annual total volume of Pit water treated is approximately 55.5 million gallons for the period of 2001 through 2008. Volumes vary depending on how much precipitation the site receives in a given year.

The plant will be modified for the 2011 operational season and the centrifuges currently used for Uranium Material dewatering will be replaced by a hydraulic filter press. It is expected that the same water soluble polymer will be used for coagulation; however the polymer application rate may be increased from the current rate to improve the dewatering characteristics of the solids. The Uranium Material solids percent is expected to increase from an average of 15 weight percent solids to between 25 and 45 percent, resulting in an estimated lower average volume of sludge production while the total dry weight production will remain in the range of 82 tons to 197 tons annually. No material changes to the physical or chemical processes of the WTP are planned aside from the increased flows to the new plant as discussed above. Therefore, no other significant changes to the chemical composition of the Uranium Material are expected to occur.

2. Basis and Limitations of this Evaluation

The Uranium Material to be processed at the Denison White Mesa Mill consists solely of the solids to be produced from the existing DMC WTP. The characterization of the Uranium Material is based on assessment of the mine site historical operations, the origins and handling of the waters treated in the WTP, assessment of the WTP influent water quality, assessment of the treatment process and process chemicals, analysis of representative Uranium Material samples in 2010 as well as assessment of historical Uranium Material analysis for a limited suite of parameters.

Three Uranium Material samples collected in 2010 were tested for radionuclides, recoverable metal values, RCRA regulated organic and inorganic contaminants, diesel and gas range organics (DRO and GRO) as well as for RCRA hazardous waste characteristics. Radionuclide analyses included Lead-210, isotopic thorium, gross alpha and beta, and total alpha emitting radium. Additional parameters including nutrients (ammonia and nitrate/nitrite), and other non-metals were included in the analysis to assess compatibility with existing tailings and process chemicals at the White Mesa Mill and presented in *Technical Memorandum: Review of Chemical Contaminants in Dawn Mining Company (DMC) Midnite Mine Uranium Material to Determine the Potential Worker Safety and Environmental Issues and Chemical Compatibility at the Denison Mines White Mesa Mill*. The historical water quality data indicates that influent water parameters are relatively consistent over the WTP operational history (Table 1). The total uranium values from the 2010 sampling results indicate average uranium concentration in the sludge to be 15,333 mg/kg (1.5 percent) corresponding with the historical values for uranium.

Organic constituents have not historically been analyzed in the WTP influent, or the final Uranium Material; however, comprehensive laboratory analysis of recent WTP solid samples is included in this report. The recent Uranium Material test results are taken to be representative of the material characteristics over the WTPs operating life, as the characteristics have not varied widely across different periods of WTP operation. As a result, these studies provide sufficiently representative characterization to assess the regulatory status, worker safety environmental hazards, and chemical and processing properties of the Uranium Material.

Table 2 presents the results of 2009 and 2010 toxicity characteristic leaching procedure ("TCLP") analyses for the eight RCRA metals. Table 3 presents testing results of the Uranium Material for RCRA hazardous waste characteristics including organochlorine pesticides, chlorinated herbicides, volatiles and semi-volatiles, and for corrosivity, reactivity and ignitability. Table 4 presents total analyses of the Uranium Material for uranium, 20 metals, total volatile and semi-volatile organics, gasoline range organic and diesel range organics, inorganic parameters including ammonia and nitrate plus nitrite as well as gross alpha beta.

The following contamination evaluation is based on:

1. Midnite Mine Superfund Site Record of Decision
2. Current Midnite Mine Uranium Material analytical data
3. Historic Midnite Mine Water Quality and Uranium Material analytical data
4. Denison estimated tailings compositional data for tailings
5. Denison Protocol for Determining Whether Alternate Feeds Are Listed Hazardous Wastes (Denison, November 1999).
6. Radioactive Material Profile Record for the Dawn Mining Company Midnite Mine Uranium Material (September 2010)
7. Affidavit of Robert Nelson, Midnite Mine Site Supervisor (Attachment 2 - October 2010).

Denison has developed a "Protocol for Determining Whether Alternate Feed Materials are Listed Hazardous Wastes" (November 22, 1999) (the "Protocol"). The Protocol has been developed in conjunction with, and accepted by, the State of Utah Department of Environmental Quality ("UDEQ") (Letter of December 7, 1999). Copies of the Protocol and UDEQ letter are provided in Attachment 2 of the License Amendment Application. The RCRA evaluation and recommendations in this Report were developed in accordance with the Protocol.

3. Application of Protocol to Uranium Material

3.1 Source Investigation

Several of the information sources enumerated above were used to perform the Source Investigation indicated in Box 1 of the flow diagram (the "Protocol Diagram") that forms part of the Protocol.

The following sections describe the status of the Uranium Material relative to RCRA Characteristic and RCRA Listed Hazardous Waste regulations, and relative to the specific parameters identified in the Denison/UDEQ Hazardous Waste Protocol. Although alternate feed materials may contain RCRA characteristic wastes, for completeness, this Report also determines whether or not the Uranium Material contains any characteristic wastes.

3.2 Determination Methods in the Denison / UDEQ Protocol

3.2.1 Regulatory History of the Midnite Mine Uranium Material

As mentioned in Section 1.0 of this Report, DMC applied to the EPA for a NPDES permit in February of 1985 to allow for the discharge of treated water from the open pits (Pits 3 and 4) and other waters collected on the Site. In September of 1986, the EPA's Region 10 issued DMC an NPDES permit (WA 002572-1), which was administered by the State of Washington. In 1987 a Compliance Order was issued by EPA under the Clean Water Act requiring DMC to eliminate discharges of pollutants to waters of the United States. Subsequently, DMC developed a seep collection and pumpback program that collected water from Site drainages and returned them to a pollution control pond and Pit 3.

In 1988, DMC built the WTP at the Midnite Mine to treat the accumulating water in the open pits. However, the treatment plant was not operated until approximately four years later. In 1991 the

BLM issued an order requiring DMC to dewater the open pits for compliance with the NPDES permit issued in 1986, and in 1992 the WTP began treating pit water.

The Washington Department of Health, under the authority of the Nuclear Regulatory Commission ("NRC") Agreement State Program, issued a Radioactive Materials License (WN-I0390-1) in 1992 for possession of the Uranium Material. This License was terminated by the State of Washington on December 31, 2008. Operation of the WTP is currently administered by the EPA under CERCLA.

In 1998, EPA performed an Expanded Site Investigation and scored the Site using the Hazard Ranking System to determine the eligibility of the Site for inclusion on the National Priorities List ("NPL"). The Site was included in the NPL and a Record of Decision ("ROD") was signed on September 29, 2006, which established the Selected Remedy for the Site. Part of the Selected Remedy for Operable Unit 1 (Mined Area and the Mining Affected Area, which includes Pit 3 and Pit 4) included treatment of seep collection system waters and the pit waters, with on-site discharge of treated water in compliance with interim discharge limits (EPA, 2006).

The Uranium Material generated from the treatment of these mine waters were processed off site at the Dawn Uranium Mill ("Dawn Mill") for their source material content under the Dawn Mill License (WN-I043-2) from 1992 until the mill was decommissioned in 2001. Following mill decommissioning, the solids were placed directly in the Dawn Mill tailings facility (License Conditions 9.B, and Conditions 28 through 33). The Uranium Material are currently being disposed of at the Tailings Disposal Area 4 ("TDA-4") at the Dawn Mill Site. However, per the ROD, alternate disposal of the Uranium Material is required starting in 2011 due to mandated reclamation of the tailings facility.

The Rod states that the Uranium Material may be disposed of at a licensed off-site disposal facility, or additional treatment, such as ion exchange for uranium removal to modify solids characteristics, may be implemented for alternative disposal options. The Dawn Mill tailings and reclamation materials are not included in the materials to be sent to the White Mesa facility, only newly generated Uranium Material from the Midnite Mine.

The Uranium Material, which has materially not changed in form or content since first being produced in 1992, remain definitional source material as per 40 CFR Part 261.4, and is explicitly exempt from regulation under RCRA. However, for the sake of completeness, Denison has required the following evaluation to confirm that even if the Uranium Material were not exempt from RCRA, it is not and does not contain, a RCRA-listed waste, nor does it contain any characteristic wastes.

3.2.2 Evaluation of Potential RCRA Listings Associated with Specific Contaminants

For potential alternate feeds that are not exempt from RCRA, the Protocol describes additional steps Denison will take to assess whether contaminants associated with any potential RCRA waste listings are present, and the likelihood that they resulted from RCRA listed hazardous wastes or RCRA listed processes. These steps include tabulation of all potential listings associated with each known chemical contaminant at the site, and the review of chemical process and material/waste handling history at the site to assess whether the known chemical contaminants in the material resulted from listed or non- listed sources. This evaluation is described in Box 8 and Decision Diamonds 9 through 11 in the Protocol Diagram.

If the results of the evaluation indicate that the contaminants are not listed waste, the Protocol specifies an additional assessment of whether the data on which this determination was made is sufficiently representative, or whether an ongoing acceptance sampling program should be implemented, and a similar evaluation performed on any new constituents identified during acceptance sampling.

In the case of the DMC Uranium Material, Steps 9 through 11 is not required as indicated by the statements provided in the Affidavit of Robert Nelson (Attachment 1). However, for the sake of a thorough due diligence evaluation, Steps 9 through 11 were completed, and the results are presented below.

4. Chemical Contaminants

The chemical contamination profile reported for the DMC Uranium Material includes historic WTP influent water quality data (Table 1), limited historical testing of the Uranium Material (Table 2), and three Uranium Material samples collected during the 2010 WTP operations period. These 2010 samples were analyzed for the following RCRA characteristic and listed hazardous waste properties: total uranium, total mercury, total metals, TCLP metals and mercury, Lead-210, isotopic thorium, total alpha emitting radium, volatile organic compounds ("VOCs"), semi-volatile organic compounds ("SVOCs"), diesel range organics ("DRO"), gas range organics ("GRO"), pesticides, herbicides, inorganics (reactive cyanides and reactive sulfides), and ignitibility. These analyses were performed to determine whether the Uranium Material is classified as a listed waste under RCRA and to determine the RCRA characteristics for processing and disposal considerations at the Mill.

A summary of the RCRA listed hazardous waste findings for metal analytes is provided in Table 4 of this Report.

Determination of whether the Uranium Material is listed according to RCRA regulations included consideration of the source history and the total constituent analytical values from material sampling analyses presented in Table 4. The Uranium Material has not been classified or treated as listed hazardous waste nor has it been in contact with any listed hazardous wastes as attested to in Attachment 2 of the License Application Amendment (Affidavit of Robert Nelson, October 2010).

There were no processes conducted at the site which fall under the "F" listed hazardous wastes from non-specific sources and designated in the following seven categories:

- Spent solvent wastes (F001-F005)
- Wastes from electroplating and other metal finishing operations (F006-F012, F019)
- Dioxin-bearing wastes (F020-F023 and F026-F028)
- Wastes from the production of certain chlorinated aliphatic hydrocarbons (F024, F025)
- Wastes from wood preserving (F032, F034, and F035)
- Petroleum refinery wastewater treatment sludges (F037 and F038)
- Multi-source leachate (F039)

There were no processes conducted at the site which fall under the "K" listed hazardous wastes from specific sources and designated in the following 14 categories:

- Wood preservation (K001)

- Inorganic pigment manufacturing (K002 –K008)
- Organic chemicals manufacturing (K009-K030, K083, K085, K093-K096, K103-K105, K107-K118, K136, K149-K151, K156-K159, K161, K174-K175, K181)
- Inorganic chemicals manufacturing (K071, K073, K106, K176-178)
- Pesticides manufacturing (K031-K043, K097-K099, K123-K126, K131-K132)
- Explosives manufacturing (K044-K047)
- Petroleum refining (K048-52, K170-K172)
- Iron and steel production (K061-K062)
- Primary aluminum production (K088)
- Secondary lead processing (K069, K100)
- Veterinary pharmaceuticals manufacturing (K084, K101-K102)
- Ink formulation (K086)
- Coking (K060, K087, K141-K145, K147-K148)
- Military munitions

The Uranium Material does not contain any "P" or "U" listed wastes as there have been no discarded commercial chemical products, off-specification species, container residues, and spill residues thereof. Any chemicals used at the WTP are used for their intended purpose and are not waste materials.

4.1 Volatile Organic Compounds

The sampling results for the total VOCs in Table 4 indicate that acetone, methylene chloride, and toluene were reported at very low concentrations in the three samples for total analysis. Acetone was reported at concentrations ranging from 22 milligrams per kilogram ("mg/kg") to 33 mg/kg with an average value of 28 mg/kg. Methylene chloride was reported at concentrations ranging from 3.7 mg/kg to 5.8 mg/kg with an average value of 4.4 mg/kg. Toluene was reported at concentrations ranging from 1.5 mg/kg to 2.7 mg/kg with an average value of 2.1 mg/kg. However all of these constituents were also detected in the method blanks for the coinciding sample runs. Chloroform was detected in the three samples just above the method detection limit ("MDL"). The method blank samples did indicate low levels of total chloroform; however the detection of chloroform in the blank was below the MDL and was therefore not reported by the laboratory as stated in the email from laboratory personnel Jeff Kujawa (Attachment 3). As indicated; chloroform, methylene chloride, and toluene were therefore present due to laboratory interferences, and not present in the Uranium Material.

Trichloroethene (or trichloroethylene) was reported at very low concentrations from the TCLP testing of only two of the Uranium Material samples with concentrations ranging from 1.5 micrograms per liter ("µg/L") to 2.7. µg/L with an average concentration of 2.1 µg/L. However, trichloroethene was detected in the leachate method blank at 3.3 ug/L which was above the MDL, but below the reporting limit ("RL"). Two of the three associated samples had detectable amounts less than the RL and less than 10 times the amount found in the method blank, so the samples were qualified as "U", raising the amount to the RL (5 ug/L). That is, trichloroethene was identified in the results due to laboratory interferences, and is not present in the Uranium Material.

Review of the site operational history, WTP processes and chemicals, as well as sample collection, preservation and shipping methods did not identify any source of potential sample contamination for these constituents. Since these compounds were present in the method blank and there are no known sources for these constituents from the Site or from the sampling preservation or shipping methods, their detection is apparently due to laboratory influences, and does not indicate they are present in the Uranium Material. These are common laboratory solvents and there are multiple laboratory pathways that could introduce them during analytical processes, including the use of methylene chloride for extraction of SVOCs in other analytical procedures.

4.2 Semi-Volatile Organic Compounds

The sampling results for the total semi-volatile organic compounds in Table 4 indicate that there was no detection of any of the constituents tested for and are consistent with plant operations and activities historically conducted at the mine site.

4.3 Other Non-Metal Inorganic Compounds

The sampling results for Ammonia, Nitrate/Nitrite, and Fluoride indicate low levels of these constituents in the Uranium Material. Historic water quality sampling data indicate that all three of these constituents are present in the feed water to the WTP as presented below.

Historic Water Quality for Selected Parameters

	Fluoride (mg/L)	Ammonia (mg/L)	Nitrate/Nitrite as N (mg/L)
Min	0.2	0.02	0.01
Max	5.0	0.1	46.0
Avg	1.2	0.1	4.3
Count	25	4	154

4.3.1 Ammonia as N

In general, nitrogen (ammonia, nitrate/nitrite) compounds may carry the following RCRA listings: P002, P007, P008, P009, P020, P024, P027, P031, P034, P041, P042, P044, P045, P046, P047, P048, P066, P069, P070, P071, P076, P077, P078, P081, P082, P084, P089, P097, P101, P112, P119, P128, P185, P189, P191, P194, P197, P198, P203, U003, U005, U009, U010, U011, U012, U014, U021, U026, U035, U049, U058, U059, U073, U091, U092, U093, U095, U105, U106, U110, U111, U149, U150, U152, U155, U158, U163, U167, U168, U169, U170, U171, U172, U173, U174, U176, U177, U178, U179, U180, U181, U185, U194, U206, U217, U221, U222, U234, U236, U237, U271, U328, U353, U394, and U404 if they resulted from the disposal of commercial chemical products, or manufacturing of chemical intermediates associated with each hazardous waste number. There is no reason that any of these compounds would be present as chemical product, off-spec product, or manufacturing byproduct on the Site.

Nitrogen wastes may carry the following F or K listings if they resulted from the specific industries listed here:

F004, F005	Spend Solvent Wastes
K060, K144	Coking
K011, K013-014, K025, K104, K111-116	Organic Chemical Manufacturing

None of the above operations or processes was ever conducted at the Midnite Mine. It is present in the Uranium Material as an impurity precipitated during the water treatment process and none of the F or K listings are applicable to the Uranium Material.

Ammonia compounds may be present in the Uranium Material as a trace residue from the historical use of blasting caps during mining operations, or as a result of nitrogen rich windblown soils from nearby agricultural operations in the area of the Site. Nitrogen is also naturally occurring in the surface water and groundwater seeps due to the natural nitrogen cycle in which nitrogen in the atmosphere is converted in the soils initially to ammonium and further converted into nitrate and nitrite. These nitrogen constituents are incorporated into the surface water and groundwater systems resulting in detectable amounts of ammonia and nitrate/nitrite.

4.3.2 Nitrate/Nitrite as N

Nitrate/nitrite compounds may be present in the Uranium Material as a trace residue from the historical use of blasting caps during mining operations, or as a result of nitrogen rich windblown soils from nearby agricultural operations in the area of the Site. Nitrogen is also naturally occurring in the surface water and groundwater seeps due to the natural nitrogen cycle in which nitrogen in the atmosphere is converted in the soils initially to ammonium and further converted into nitrate and nitrite. These nitrogen constituents are incorporated into the surface water and groundwater systems resulting in detectable amounts of ammonia and nitrate/nitrite.

4.3.3 Chlorides

Chlorides may carry RCRA listings U216, P033 or P095 if they resulted from the disposal of thallium chloride, cyanogen chloride, or carbonic chloride as commercial chemical products, off-spec commercial chemical products, or manufacturing chemical intermediates.

Thallium chloride is used as a catalyst in chlorination reactions, and as a radiation sensor in applications such as control on sun lamps. Cyanogen chloride is used in organic synthesis, as an active agent in tear gas, and as a warning agent (due to odor warning properties) in fumigation gases. Phosgene is used widely in synthesis for addition of carbon groups to larger structures, particularly in manufacture of isocyanate intermediates, other polymers, and pesticides. It was formerly used in chemical warfare agents as a choking agent. There is no reason that any of these compounds would be present as chemical product, off-spec product, or manufacturing byproduct on the Site.

None of the above RCRA listings applies to the chlorides present in the WTP pits. Chlorides are naturally present as trace contaminants in many transition metal and rare earth ores, and the addition of barium chloride to the influent Pit 3 water may contribute minimal amounts of chlorides. This is the most likely source of the chlorides in the Uranium Material. Chlorides from ore sources are not associated with any RCRA hazardous waste listings.

4.3.4 Fluorides

Fluorides may carry RCRA listings U005, U033, U075, U134, U121, U120, P043, P056, P057, P058 if they resulted from the disposal of acetamide, carbonic difluoride, dichlorodifluoromethane, fluoranthene, hydrofluoric acid, trichlorofluoromethane, diisopropylfluorophosphate (DFP), fluorine, fluoroacetamide, or fluoroacetic acid.

None of the above RCRA listings applies to the chlorides present in the WTP pits. Fluorides are naturally present as trace contaminants in many transition metal and rare earth ores. This is the most likely source of the fluorides in the Uranium Material. Fluorides from ore sources are not associated with any RCRA hazardous waste listings.

4.3.5 Sulfates

Sulfates can carry RCRA listing U103 if they resulted from the disposal of dimethyl sulfate commercial chemical products, off-spec commercial chemical products, or manufacturing chemical intermediates. Dimethyl sulfate is used in organic synthesis as a methylating agent for production of amines, phenols, and polyurethanes adhesives. There is no reason ditnethyl sulfate would be present as chemical product, off-spec product, or manufacturing byproduct on the Site.

Sulfates can also carry RCRA listing P115 if they result from the disposal of thallium sulfate commercial chemical products, off-spec commercial chemical products, or manufacturing chemical intermediates. Thallium sulfate is used as a rodenticide and pesticide, in the measure of ozone content in gases, and as an indicator in testing for iodine in the presence of chlorine. There is no reason thallium sulfate would be present as chemical product, off-spec product, or manufacturing byproduct on the Site.

Neither of the above RCRA listings applies to the sulfates present in the WTP pits. As indicated in the historic process information from Site, sulfates resulted from the metal sulfates in the influent from the pits, which are not associated with any RCRA hazardous waste listings.

4.4 Metals

A summary of the RCRA evaluation findings for the metal analytes identified in the Uranium Material is provided in Tables 2, 3 and 4 of this report.

The three 2010 samples were analyzed for total metals and results indicate that 14 metals: barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, silver, and zinc were present in the Uranium Material.

All of the metals are known to be constituents of uranium ores with the exception of barium, which is added to the treatment process for radon removal. Residues from processing of uranium are not RCRA listed hazardous wastes.

Barium may be associated with one RCRA listing, P013, if it resulted from the disposal of barium cyanide commercial chemical products, off-spec commercial chemical products, or manufacturing chemical intermediates. Barium cyanide is used in metal finishing and electroplating. There is no reason barium would be present as a chemical product, off-spec product, or manufacturing byproduct on the Site.

Barium chloride is added in the water treatment plant to precipitate out the radium from the influent water from Pit 3 and Pit 4. It is therefore an impurity precipitated out during the water treatment process and the P013 listing does not apply to the Uranium Material.

4.5 Summary of RCRA Listed Material Findings

Based on the information presented above, none of the constituents in the Uranium Material would be indicative of RCRA listed hazardous waste, even if the Uranium Material were not already exempt from RCRA as source material.

5. RCRA Characteristics

Three Uranium Material samples collected during the 2010 operational period were analyzed for RCRA TCLP including Organochlorine Pesticides, Chlorinated Herbicides, SVOCs, VOCs, Inorganics, Metals, and Mercury (Tables 2 and 3) as well as the RCRA characteristics corrosivity, ignitibility, and reactivity. In addition, four samples from 2009 were analyzed for TCLP metals (Table 3).

These test results demonstrate that the Uranium Material is not ignitable, corrosive, or reactive per the RCRA definitions of these characteristics. No organic or inorganic contaminant exceeded its respective TCLP threshold for RCRA toxicity characteristic as defined in Table 1 of 40 CFR Part 261.24(b) (Table 3) with the exception of trichloroethene. The laboratory results indicate that this constituent was detected at a concentration of 2.7 µg/L in WTPS-1 and 1.5 µ g/L in WTPS-2 but not in WTPS-3. However, trichloroethene was also detected in the leachate method blank at 3.3 ug/L which was above the MDL, but below the adjusted RL of 5 µg/L. Though detected, these laboratory QA results indicate that the compound is not likely present in either of the samples. Regardless, the results are two orders of magnitude below the regulatory action level of 0.5 mg/L (500 µg/L) for trichloroethylene and, therefore, this constituent does not exhibit RCRA characteristic concentrations.

Therefore, the test results indicate that that the Uranium Material does not have the RCRA characteristic of toxicity. The Affidavit from the Midnite Mine Site Supervisor (Attachment 1) affirms that the Uranium Material has never been classified for shipment or off-site management as a RCRA characteristic waste. This is consistent with the source of the constituents and the treatment process used to develop the DMC Uranium Material. The historic solids testing data from 2001 to 2009 (Table 2) and the historic water quality data for the same period (Table 1) show relatively consistent results in the constituents and concentrations in the plant feed water.

As discussed in the introduction to this report, the Uranium Material is exempt from regulation under RCRA; however, even if it were classified as a characteristic hazardous waste, alternate feed materials are permitted to contain RCRA characteristic wastes under NRC's Alternate Feed Guidance (10 CFR 40, Appendix A).

Based on all of the above information, the DMC WTP Uranium Material is not a RCRA characteristic hazardous waste.

6. Conclusions and Recommendations

In summary, the following conclusions can be drawn from the RCRA analysis of the Site information presented above:

1. The Uranium Material is not a RCRA listed hazardous waste because it has a natural uranium content of greater than 0.05 weight percent, is therefore source material and, as a result, is exempt from regulation under RCRA.

2. Even if the Uranium Material were not source material, it would not be a RCRA listed hazardous waste for the following additional reasons:

    a) It was generated from a known process under the control of the generator, who has provided an Affidavit declaring that the Uranium Material is not and does not contain RCRA listed hazardous waste. This determination is consistent with Boxes 1 and 2 and Decision Diamonds 1 and 2 in the Denison/UDEQ Protocol Diagram;
    b) The five volatile organic compounds detected at very low concentrations in the Uranium Material have been attributed to laboratory contamination and are not actual contaminants in the DMC uranium Material;
    c) None of the metals in the Uranium Material samples came from RCRA listed hazardous waste sources. This determination is consistent with Box 8 and Decision Diamonds 9 through 11 in the Denison/UDEQ Protocol Diagram.

3. The Uranium Material does not exhibit any of the RCRA characteristics of ignitability, corrosivity, reactivity, or toxicity for any constituent.

7. References

Midnite Mine Superfund Site. Spokane Indian Reservation Washington Record of Decision (ROD), EPA Region 10, September 2006.

Title 10 Code of Federal Regulations; Chapter I – Nuclear Regulatory Commission, Part 40 – Domestic Licensing of Source Material: 40.4 – Definitions (10 CFR 40.4)

Title 10 Code of Federal Regulations; Appendix A – Nuclear Regulatory Commission, Part 40 – Domestic Licensing of Source Material: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content (10 CFR 40 Appendix A)

Title 40 Code of Federal Regulations; Protection of the Environment, Part 261 – Identification and Listing of Hazardous Waste: Subpart A, 261.4 – Exclusions: Subpart B – Criteria for Identifying the Characteristics of Hazardous Waste and for Listing Hazardous Waste.

Table 1. Historic Water Quality of DMC WTP Influent

Location ID	Collection Date	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
SW-39 (PIT-3)	2/25/1998					43	--	280	--			86000	--					3500	--	4.41	--	2	U	22	--	22	--
SW-39	4/29/1998					46	--	250	--			85000	--					3400	--	4.26	--			18	--	18	--
SW-39	7/22/1998					49	--	260	--			90000	--					3500	--	4.09	--						
SW-39	10/14/1998	61900	--	20	U	46	--	1000	U	7	B	89700	--	1810	--	23688.2	--	3660	--	4.45	--	5	U	67.2	--	67.2	--
SW-39	10/27/1998					48	--	260	--			95000	--					3700	--	4.4	--						
SW-39	11/15/1998	60500	--	5	B	43	--	1000	U	4	B	96400	--	1790	--	24632.7	--	3600	--	4.41	--	5	U				
SW-39	12/10/1998	58600	--	5	B	37	--	1000	U	5	--	81000	--	1650	--	18140.9	--	3000	B	4.56	--	14	B	45.6	--	45.6	--
SW-39	1/25/1999					46	--	230	--			85000	--					3500	--	4.64	--						
SW-39	4/15/1999					34	--	230	--			70000	--					3000	--	4.76	--						
SW-39	4/21/1999	49900	--	10	U	26	--	210	--	2	U	62200	--	20	U	12084.0	--	2500	--	4.13	--	5	U	23	--	23	--
SW-39	5/17/1999	50300	--	5	B	34	--	269	--	2	B	69200	--	1310	--	18021.0	--	3000	--	4.44	--	5	U	24	--	24	--
SW-39	6/15/1999	56200	--	7	--	33.3	--	160	--	3.7	--	82900	--	1480	--	17751.1	--	3270	--	4.26	--	5	U	29	--	29	--
SW-39	7/27/1999					43	--	230	--			85000	--					3400	--	4.05	--						
SW-39	10/6/1999					49	--	250	--			95000	--					1100	--	4.45	--						
SW-39	12/12/1999	46800	--	8	B	51.8	--	228	--	5.9	--	79300	--	1430	--	18545.7	--	3210	--	4.38	--	5	U	30	--	30	--
SW-39	1/27/2000					69	--	200	--			130000	--					5700	--	3.91	--						
SW-39	2/4/2000	92300	--	100	U	70	B	200	B	20	U	120000	--	2430	--	2051.0	--	5480	--	4.04	--	12	B	36	--	36	--
SW-39	4/7/2000	20100	--	1	B	25.6	--	181	--	3.1	--	32200	--	640	--	11334.3	--	1410	--	4.32	--	8	B	31	--	31	--
SW-39	4/17/2000					29	--	240	--			46000	--					1900	--	4.37	--	3	U				
SW-39	5/12/2000	44200	--	1	B	49.5	--	258	--	6.2	--	62600	--	1180	--	10614.7	--	2500	--	4.35	--	5	U	42	--	42	--
SW-39	6/7/2000	51000	--	7	B	56.1	--	313	--	8.9	--	70500	--	1370	--			2960	--	4.1	--	5	U	45	--	45	--
SW-39	7/13/2000	68600	--	6	B	58	--	225	--	9	--	95800	--	1940	--			4220	--	3.94	--	5	U	57	--	57	--
SW-39	7/20/2000					46	--	300	--			85000	--					3600	--	3.85	--	3	U				
SW-39	8/15/2000	97200	--	10	B	82	--	199	--	10	--	129000	--	2620	--			5720	--	3.9	--	5	U	83	--	83	--
SW-39	9/14/2000	105000	--	3	U	64	--	190	--	15.1	--	146000	--	2800	--			6160	--	4.06	--	6	B	70	--	70	--
SW-39	10/25/2000					63	--	230	--			140000	--					5700	--	4.12	--	3	U				
SW-39	10/30/2000	98900	--	5	U	81	--	165	--	7	--	146000	--	2910	--			6620	--	4.34	--	5	U	70	--	70	--
SW-39	1/17/2001					54	--	200	--			120000	--					5000	--	4.65	--	3	U				
SW-39	1/27/2001	76500	--	5	U	57	--	149	--	8	--	121000	--	2310	--			4670	--	4.51	--	8	B	54	--	54	--
SW-39	4/6/2001					83	--	770	--			120000	--					5100	--	4.52	--	3	U	82	--	82	--
SW-39	4/26/2001	61900	--	3	U	71	--	522	--	7	--	84200	--	1700	--			3690	--	4.32	--	5	U				
SW-39	7/5/2001					71	--	630	--			110000	--					4600	--	4.08	--	3	--				
SW-39	10/4/2001	69600	--	10	U	80	--	560	--	10	--	118000	--	2090	--	24000.0	--	4400	--	4.33	--	5	--	48	--	48	--
SW-39	2/7/2002	14900	--	1	U	16	--	95	--	2	--	31300	--	658	--	8850.0	--	1360	--	4.49	--			32.6	--	32.6	--
SW-39	4/17/2002	12800	--	10	U	20	--	80	--	10	U	30200	--	550	--	7430.0	--	1130	--	4.91	--	10	U	20.6	--	20.6	--
SW-39	7/11/2002	24000	--	10	U	20	--	180	--	10	U	53400	--	810	--	11300.0	--	1680	--	4.4	--	5	U	38.7	--	38.7	--
SW-39	10/9/2002	36500	--	10	U	40	--	300	--	10	U	62200	--	1110	--	14800.0	--	2310	--	4.49	--	0.05	U	53.9	--	53.9	--
SW-39	1/15/2003	34800	--	10	U	40	--	290	--	10	U	57400	--	1050	--	12100.0	--	2220	--	4.49	--	8	--	40.8	--	40.8	--
SW-39	4/24/2003	36500	--	10	U	30	--	260	--	10	U	48600	--	1100	--	12000.0	--	2390	--	4.62	--	5	U	40.3	--	40.3	--

Table 1. Historic Water Quality of DMC WTP Influent Continued

Location ID	Collection Date	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
SW-39 (PIT-3)	7/15/2003	44800	--	10	U	40	--	280	--	10	U	68400	--	1260	--	14400.0	--	2660	--	4.26	--	5	U	30.1	--	30.1	--
SW-39	10/23/2003	42400	--	10	—	50	--	260	--	10	U	66800	--	1270	--	15900.0	--	2680	--	4.5	--	5	U	21.6	--	21.6	--
SW-39	1/14/2004	53400		10	U	50		280		10	U	76700		1440		16400.0		3110		4.58		5	U	30		30	
SW-39	4/23/2004	40300		10	U	50		180		10	U	55300		1080		12100.0		2520		4.5		5	U	37.5		37.5	
SW-39	7/16/2004	49500		10	U	50		230		10		78400		1310		19100.0		2810		4.24		5	U	33.3		33.3	
SW-39	10/13/2004	58700		10		60		230		10	U	80000		1550		17600.0		3350		4.5		5	U	22.8		22.8	
SW-39	4/22/2005	35700		10	U	40		140		10	U	60900		1070		12400.0		2350		4.71				21.3		21.3	
SW-39	7/14/2005	45900		10	U	40		150		10	U	76300		1230		16900.0		2700		4.41		5	U	24		24	
SW-39	10/11/2005	46000		10	U	50		150		10	U	83000		1430		15800.0		2960		4.68				25.6		25.6	
SW-39	4/20/2006	32300		10	U	30		150		10	U	43900		910		10200.0		1910		4.56		5	U	23.7		23.7	
SW-39	7/13/2006	60300		10	U	30		180		10	U	49600		1180		11200.0		2400		4.23		5	U	31.7		31.7	
SW-39	10/11/2006	40300		10	U	40		170		10	U	60800		1220		13100.0		2570		4.6		5	U	33.9		33.9	
SW-39	4/19/2007	39500		10	U	33.8		137		10	U	56000		1080		12700.0		2950		4.56		10	U	20.5		20.5	
SW-39	7/11/2007	47200		10	U	40.9		150		10	U	67700		1210		15400.0		2570		4.39		5	U	29.6		29.6	
SW-39	10/4/2007	42700		10	U	48.2		159		10	U	64200		1340		14200.0		2980		4.52		5	U	28.3		28.3	
SW-39	4/25/2008	37100		10	U	27.5		161		10	U	47400		1220		9770.0		2480		4.74		1	U	18.9		18.9	
SW-39	7/22/2008	40700		10	U	44.8		162		10	U	49700		1420		12500.0		2750		4.31		4		27		27	
SW-39	10/2/2008	45400		6.65		39.5		139				73100		1600		14400.0		2870		4.26		5	U	19		19	
SW-39	4/27/2009	31400		<10		28.9		118		<10		45000		865		9160.0		1850		4.66		1					
SW-39	7/10/2009	46200		<10		29.9		132		<10		76000		1170		14200.0		2430		4.4		3				34	
SW-39	10/6/2009	36300		<10		40.2		133		<10		58500		1250		15400.0		2620		4.37		2				32	

	SW-39 (Pit 3)	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
	Count (n)	45		42		60		60		41		60		45		38		60		60		48		43		45	
	Max	105,000		100		83		1,000		20		146,000		2,910		24,633		6,620		5		14		83		83	
	Min	12,800		1		16		80		2		30,200		20		2,051		1,100		4		0		18		18	
	Avg	49,891		10		46		271		9		79,147		1,397		14,215		3,223		4		5		37		37	
	Std Dev	20,343		15		16		207		3		28,429		575		4,539		1,243		0		3		17		17	
	2 x Std Dev	40,685		29		32		414		7		56,859		1,149		9,078		2,486		0		5		34		34	

Table 1. Historic Water Quality of DMC WTP Influent Continued

Location ID	Collection Date	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
SW-40 (PIT-4)	1/15/1998					5	U	6	--			1100	--					10	--	6.22	--	3	U	1.9	--	1.9	--
SW-40	4/29/1998					4	U	10	--			880	--					7	--	7.78	--			3	--	3	--
SW-40	7/22/1998					4	U	5	U			370	--					2	U	6.79	--						
SW-40	10/14/1998	80	B	10	U	2	U	10	U	2	U	262	--	10	U	3280.0	--	20	U	7.54	--	5	U	1.78	--	1.78	--
SW-40	10/27/1998					4	U	5	U			490	--					6	--	7.57	--						
SW-40	11/15/1998	90	B	2	U	1	U	5	U	1	U	518	--	10	U	3520.0	--	10	B	7.1	--	5	U	2.06	--	2.06	--
SW-40	12/10/1998	120	B	2	U	0.4	U	10	B	0.4	U	505	--	10	U	3810.0	--	20	U	7.02	--	5	U	3.23	--	3.23	--
SW-40	1/14/1999					9	--	4	U			630	--					13	--	6.81	--						
SW-40	1/14/1999	120	B	2	U	0.4	U	2	U	0.4	U	574	--	10	B	3820.0	--	26	--	6.85	--	5	U	5.52	--	5.52	--
SW-40	2/20/1999	210	--	5	U	1	U	7	B	1	U	663	--	20	B	3070.0	--	30	B	6.92	--	5	U	8.76	--	8.76	--
SW-40	4/15/1999					3	U	5	--			940	--					29	--	6.61	--						
SW-40	4/21/1999	500	--	2	U	0.4	U	3	B	0.4	U	649	--	660	--	1370.0	--	60	B	7	--	5	U	7.6	--	7.6	--
SW-40	5/17/1999	90	B	2	U	0.4	U	3	B	0.4	U	764	--	30	B	2420.0	--	20	--	7.43	--	5	U	5.1	--	5.1	--
SW-40	6/15/1999	120	B	1	B	0.2	B	2	B	0.2	U	747	--	30	B	2830.0	--	26	--	6.99	--	5	U	3.7	--	3.7	--
SW-40	7/27/1999					4	U	6	--			1000	--					31	--	6.79	--						
SW-40	10/6/1999					4	U	4	U			460	--					10	--	7.16	--			1.1	--	1.1	--
SW-40	1/27/2000					4	U	4	U			860	--					22	--	6.74	--			9.7	--	9.7	--
SW-40	4/17/2000					4	U	9	--			1000	--					29	--	6.04	--	5	--	8.6	--	8.6	--
SW-40	7/20/2000					3	U	6	--			300	--					3	--	7.07	--	3	U	1.6	--	1.6	--
SW-40	10/25/2000					4	U	11	--			290	--					2	U	6.72	--	3	U	2.8	--	2.8	--
SW-40	1/17/2001					4	U	40	--			660	--					2	U	5.36	--	3	U	4.5	--	4.5	--
SW-40	4/6/2001					4	U	5	--			660	--					16	--	7.35	--	3	U	4.3	--	4.3	--
SW-40	7/5/2001					4	U	4	U			370	--					2	U	6.96	--	3	U	2.9	--	2.9	--
SW-40	10/4/2001	100	U	10	U	10	U	10	U	10	U	710	--	10	U	6000.0	--	10	U	6.86	--	10	U	4.1	--	4.1	--
SW-40	2/7/2002	1	U	1	U	1	U	6	--	1	U	1610	--	55	--	4770.0	--	62	--	6.47	--	10	U	29.6	--	29.6	--
SW-40	4/17/2002	100	--	10	U	10	U	10	U	10	U	1640	--	60	--	2430.0	--	90	--	5.82	--	10	U	21.1	--	21.1	--
SW-40	7/11/2002	100	U	10	U	10	U	10	U	10	U	1250	--	40	--	3830.0	--	50	--	6.51	--	5	U	4.2	--	4.2	--
SW-40	10/9/2002	10	U	10	U	10	U	10	U	10	U	1040	--	30	--	5500.0	--	40	--	7.28	--	5	U	3.3	--	3.3	--
SW-40	1/15/2003	600	--	10	U	10	U	10	U	10	U	2190	--	70	--	5600.0	--	110	--	6.63	--	5	U	27.8	--	27.8	--
SW-40	4/24/2003	10	U	10	U	10	U	10	U	10	U	1280	--	60	--	3510.0	--	60	--	7.26	--	5	U	8.6	--	8.6	--
SW-40	7/15/2003	10	U	10	U	10	U	10	U	10	U	940	--	30	--	3430.0	--	20	--	7.66	--	5	U	4.1	--	4.1	--
SW-40	10/23/2003	10	U	10	U	10	U	10	U	10	U	490	--	20	--	4030.0	--	20	--	7.43	--	5	U	2.3	--	2.3	--
SW-40	1/14/2004	200		10	U	10	U	10	U	10	U	930		20		4740.0		20		6.83		5	U	2.8		2.8	
SW-40	4/23/2004	100	U	10	U	10	U	10	U	10	U	880		30		4050.0		50		7.32		5	U	9.2		9.2	
SW-40	7/16/2004	200		10	U	10	U	10	U	30		280		10		3720.0		60		7.19		5	U	1.7		1.7	
SW-40	10/13/2004	100	U	10	U	10	U	10	U	10	U	150		10	U	4260.0		10	U	7		5	U	1.5		1.5	
SW-40	4/22/2005	300		10	U	10	U	10	U	10	U	530		20		4880.0		30		6.74				6.4		6.4	
SW-40	7/14/2005	2400		10	U	10	U	10	U	10	U	260		10	U	4520.0		410		7.57		5	U	2.3		2.3	
SW-40	10/11/2005	100		10	U	10	U	10	U	10	U	210		10	U	5460.0		10	U	6.65				1.5		1.5	
SW-40	4/20/2006	100	U	10	U	10	U	10	U	10	U	1360		60		1280.0		80		6.72		5	U	12.1		12.1	

Table 1. Historic Water Quality of DMC WTP Influent Continued

Location ID	Collection Date	Aluminum µg/L		Arsenic µg/L		Cadmium µg/L		Copper µg/L		Lead µg/L		Manganese µg/L		Nickel µg/L		Uranium µg/L		Zinc µg/L		pH S.U.		TSS mg/L		Ra-226 (diss) pCi/l		Ra-226 (total) pCi/l	
SW-40 (PIT-4)	7/13/2006	100	U	10	U	10	U	10	U	10	U	1370		40		2060.0		40		6.98		5	U	5.9		5.9	
SW-40	10/11/2006	100	U	10	U	10	U	10	U	10	U	500		20		3060.0		30		7.64		5	U	1.8		1.8	
SW-40	1/25/2007	100		10	U	10	U	10	U	10	U	600		20		3380.0		40		7.69		5	U	8		8	
SW-40	4/19/2007	100	U	10	U	10	U	10	U	10	U	821		26.1		2660.0		31.6		7.7		10	U	5		5	
SW-40	7/11/2007	100	U	10	U	10	U	10	U	10	U	445		14.4		2410.0		13		7.14		5	U	1.9		1.9	
SW-40	10/4/2007	100	U	10	U	10	U	10	U	10	U	128		10	U	2960.0		10.9		7.1		5	U	0.9		0.9	
SW-40	4/25/2008	100	U	10	U	10	U	10	U	10	U	767		29.8		2200.0		36.9		8.36		5	U	7.3		7.3	
SW-40	7/22/2008	17.4		10	U	10	U	10	U	10	U	201		10	U	1930.0		10	U	7.01		2		1.3		1.3	
SW-40	10/2/2008	10	U	1.18		1	U	1	U			90.5		2.25		3420.0		10	U	8.45		5	U	0.57		0.57	
SW-40	4/27/2009	<100		<10		<10		<10		<10		606		34.2		2150.0		43		6.90		<1					
SW-40	7/10/2009	<100		<10		<10		<10		<10		177		<10		2310.0		<10		7.48		2				2.2	
SW-40	10/6/2009	<100		<10		<10		<10		<10		116		<10		3100.0		<10		6.92		1				1.2	
Summary																											
	SW-40 (Pit 4)	**Aluminum µg/L**		**Arsenic µg/L**		**Cadmium µg/L**		**Copper µg/L**		**Lead µg/L**		**Manganese µg/L**		**Nickel µg/L**		**Uranium µg/L**		**Zinc µg/L**		**pH S.U.**		**TSS mg/L**		**Ra-226 (diss) pCi/l**		**Ra-226 (total) pCi/l**	
	Count (n)	34		34		49		49		33		52		35		37		50		52		40		44		46	
	Max	2,400		10		10		40		30		2,190		660		6,000		410		8		10		30		30	
	Min	1		1		0		1		0		91		2		1,280		2		5		2		1		1	
	Avg	191		8		6		8		8		697		44		3,453		36		7		5		6		6	
	Std Dev	410		4		4		5		6		438		109		1,185		59		1		2		6		6	
	2 x Std Dev	820		7		8		11		11		877		217		2,369		118		1		4		13		12	
		Aluminum µg/L		**Arsenic µg/L**		**Cadmium µg/L**		**Copper µg/L**		**Lead µg/L**		**Manganese µg/L**		**Nickel µg/L**		**Uranium µg/L**		**Zinc µg/L**		**pH S.U.**		**TSS mg/L**		**Ra-226 (diss) pCi/l**		**Ra-226 (total) pCi/l**	
	COMBINED																										
	Count (n)	79		76		109		109		74		112		80		75		110		112		88		87		91	
	Max	105,000		100		83		1,000		30		146,000		2,910		24,633		6,620		8		14		83		83	
	Min	1		1		0		1		0		91		2		1,280		2		4		0		1		1	
	Avg	28,501		9		28		153		8		42,724		805		8,906		1,774		6		5		21		21	
	Std Dev	29,100		11		23		202		5		44,432		803		6,350		1,838		1		2		20		20	
	2 x Std Dev	58,200		22		46		403		9		88,864		1,607		12,700		3,677		3		5		40		40	

Table 2. Uranium Material Metals Analysis for RCRA Characteristics

Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	2002	<0.05	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2003	<0.5	<10	0.2	<0.5	<0.5	<0.02	<0.1	<0.5
	2004	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2005	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2006	<0.5	<10	0.25	<0.5	<0.5	<0.02	<0.1	<0.5
	2007	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	2008	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	5/20/2009	<0.5	<10	<0.1	<0.5	<0.5	<0.02	<0.1	<0.5
	9/17/2009	<0.06	0.083	<0.005	<0.01	<0.04	<0.0002	<0.06	<0.01
	9/19/2009	<0.04	0.16	0.019	<0.01	<0.04	<0.0002	<0.04	<0.01
	9/23/2009	<0.04	0.12	0.011	<0.01	<0.04	<0.0002	<0.04	<0.01
	10/6/2009	<0.1	0.066	0.03	0.03	<0.08	<0.0002	0.2	<0.02
WTPS-1	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.051	<0.1
WTPS-2	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.054	<0.1
WTPS-3	4/13/2010	<0.1	<1	<0.05	<0.1	<0.03	<0.002	0.054	<0.1
Count		15	15	15	15	15	15	15	15
Min		<0.04	0.066	<0.005	<0.01	<0.03	<0.0002	<0.04	<0.01
Max		<0.5	<10	<0.25	<0.5	<0.5	<0.02	0.2	<0.5
40 CFR Part 261.24		5	100	1	5	5	0.2	1	5
PASS?		Yes	Yes	Yes	Yes	Yes	Yes	Yrs	Yes

Table 3. Uranium Material Organics and Pesticides Analyses for RCRA Toxicity Characteristics (TCLP)

Target Analyte	Units	Results			
		Maximum TCLP	WTPS-1	WTPS-2	WTPS-3
Organochlorine Pesticides - Method SW8081A - TCLP Leachate					
Gamma-BHC (Lindane)	mg/L	0.4	<0.0001	<0.0001	<0.0001
Heptachlor	mg/L	See Next Row	<0.00015	<0.00015	<0.00015
Heptachlor Epoxide	mg/L	0.008	<0.000079	<0.000079	<0.000079
Gamma-Chlordane	mg/L	0.03	<0.000078	<0.000078	<0.000078
Alpha-Chlordane	mg/L	0.03	<0.00009	<0.00009	<0.00009
Endrin	mg/L	0.02	<0.000096	<0.000096	<0.000096
Methoxychlor	mg/L	10.0	<0.00039	<0.00039	<0.00039
Toxaphene	mg/L	0.5	<0.0051	<0.0051	<0.0051
Chlordane	mg/L	0.03	<0.0011	<0.0011	<0.0011
Chlorinated Herbicides - Method SW8151A - TCLP Leachate					
2,4-D	µg/L	10.0	<1.6	<1.6	<1.6
Silvex	µg/L	1.0	<0.12	<0.12	<0.12
GC/MS Semivolatiles - Method SW8270D - TCLP Leachate					
Pyridine	mg/L	5.0	<0.02	<0.02	<0.02
1,4-Dichlorobenzene	mg/L	7.5	<0.02	<0.02	<0.02
2-Methylphenol (o Cresol)	mg/L	200	<0.02	<0.02	<0.02
3+4-Methylphenol (m+p Cresol)	mg/L	200	<0.02	<0.02	<0.02
Hexachloroethane	mg/L	3.0	<0.02	<0.02	<0.02
Nitrobenzene	mg/L	2.0	<0.02	<0.02	<0.02
Hexachlorobutadiene	mg/L	0.5	<0.02	<0.02	<0.02
2,4,6-Trichlorophenol	mg/L	2.0	<0.02	<0.02	<0.02
2,4,5-Trichlorophenol	mg/L	400	<0.02	<0.02	<0.02
2,4-Dinitrotoluene	mg/L	0.13	<0.02	<0.02	<0.02
Hexachlorobenzene	mg/L	0.13	<0.02	<0.02	<0.02
Pentachlorophenol	mg/L	100	<0.043	<0.043	<0.043
GC/MS Volatiles - Method SW8260_25B - Leachate					
Vinyl Chloride	µg/L	0.2	<0.83	<0.83	<0.83
1,1-Dichloroethene*	µg/L	0.7	<0.83	<0.83	<0.83
2-Butanone (Methyl Ethyl Keytone)	µg/L	200	<8.3	<8.3	<8.3
Chloroform	µg/L	6.0	<0.83	<0.83	<0.83
Carbon Tetrachloride	µg/L	0.5	<0.83	<0.83	<0.83
1,2-Dichloroethane	µg/L	0.5	<0.83	<0.83	<0.83
Benzene	µg/L	0.5	<0.83	<0.83	<0.83
Trichloroethene*	µg/L	0.5	2.7 B,J	1.5 B,J	<0.83
Tetrachloroethene*	µg/L	0.7	<0.83	<0.83	<0.83
Chlorobenzene	µg/L	100	<0.83	<0.83	<0.83
Inorganics - Method SW 846_7.3.1 (Cyanide) & _7.3.2 (Sulfide), SW9045C (pH)					
Reactive Cyanide	mg/kg	N/A	<0.1	<0.1	<0.1
Reactive Sulfide	mg/kg	N/A	<50	<50	<50
Solid pH in Water @ 25°C	pH	N/A	9.09	9.19	9.26
Ignitability - Method SW1010A					
Ignitability - 95°C	°C	N/A	U	U	U

Table 4. Uranium Material Analyses for RCRA Listed Hazardous Waste

Target Analyte [1]	Units	Laboratory Results			Calculated Average
		WTPS-1	WTPS-2	WTPS-3	
Total Uranium - Method SW6020A					
Total Uranium	mg/kg	15,000	16,000	15,000	15,333
Total ICP Metals - Method SW6010B					
Arsenic	mg/kg	<5.9	<5.9	<5.7	<5.8
Barium	mg/kg	8,100	7,900	7,200	7,733
Beryllium	mg/kg	33	36	36	35
Cadmium	mg/kg	40	44	43	42
Calcium	mg/kg	15,000	16,000	16,000	15,667
Chromium	mg/kg	19	20	19	19
Cobalt	mg/kg	1,200	1,200	1,100	1,167
Copper	mg/kg	160	180	170	170
Iron	mg/kg	690	740	740	723
Lead	mg/kg	18	19	17	18
Manganese	mg/kg	110,000	110,000	96,000	105,333
Molybdenum	mg/kg	<5.8	<6.0	<5.7	<5.8
Nickel	mg/kg	1,700	1,800	1,800	1,767
Selenium	mg/kg	25	26	26	26
Silver	mg/kg	11	12	11	11
Thallium	mg/kg	<580	<600	<570	<583
Tin	mg/kg	<29	<30	<29	<29
Vanadium	mg/kg	<5.8	<6.0	<5.7	<5.8
Zinc	mg/kg	3,400	3,600	3,600	3,533
Total Mercury - Method SW7471A					
Total Mercury	mg/kg	<0.19	<0.2	<0.19	<0.19
GC/MS Total Volatile Organics - Method SW8260					
Chloromethane	µg/kg	<1.1	<1.2	<1.1	<1.1
Acetone	µg/kg	22 B	29 B	33 B	28
Methylene Chloride	µg/kg	3.8 J,B	3.7 J,B	5.8 J,B	4.4
2-Butanone	µg/kg	<5.7	<5.9	<5.7	<5.8
Tetrahydrofuran	µg/kg	<7.2	<7.4	<7.2	<7.3
Chloroform	µg/kg	1.7 J	2 J	1.2 J	1.6
Carbon Tetrachloride	µg/kg	<1.3	<1.4	<1.3	<1.3
Benzene	µg/kg	<0.94	<0.96	<0.93	<0.94
Toluene	µg/kg	2.2 J,B	1.9 J,B	1.3 J,B	1.8
m,p-Xylene	µg/kg	<1.9	<1.9	<1.9	<1.9
o-Xylene	µg/kg	<0.95	<0.97	<0.94	<0.95
Naphthalene	µg/kg	<1.4	<1.4	<1.4	<1.4

[1] All values as reported by ALS Laboratory as dry weight values

Table 4. Uranium Material Analyses for RCRA Listed Hazardous Waste Cont'd

Target Analyte	Units(1)	Laboratory Results			Calculated Average
		WTPS-1	WTPS-2	WTPS-3	
GC/MS Total Semi-Volatile Organics - Method SW8270D					
Pyridine	µg/kg	<310	<320	<320	<317
1,4-dichlorobenzene	µg/kg	<310	<320	<320	<317
2-methylphenol	µg/kg	<310	<320	<320	<317
3+4-methylphenol	µg/kg	<310	<320	<320	<317
Hexachloroethane	µg/kg	<310	<320	<320	<317
Nitrobenzene	µg/kg	<310	<320	<320	<317
Hexachlorobutadiene	µg/kg	<310	<320	<320	<317
2,4,6-trichlorophenol	µg/kg	<310	<320	<320	<317
2,4,5-trichlorophenol	µg/kg	<310	<320	<320	<317
2,4-dinitrotoluene	µg/kg	<310	<320	<320	<317
Hexachlorobenzene	µg/kg	<310	<320	<320	<317
Pentachlorophenol	µg/kg	<490	<500	<500	<497
Gasoline Range Organics - Method SW8015B					
Gasoline Range Organics	mg/kg	<0.38	<0.35	<0.39	<0.37
Diesel Range Organics - Method SW8015MB					
Diesel Range Organics	mg/kg	<6.5	<6.6	<6.8	<6.6
Oil & Grease					
Oil & Grease	mg/kg	<120	<120	<120	<120
Inorganics					
Ammonia as N - Method EPA350.1	mg/kg	7.9	7.9	8.3	8.0
Nitrate/Nitrite as N - Method EPA353.2 Revision 2	mg/kg	3.1	3.2	3.1	3.1
Total Dissolved Solids - EPA160.1	mg/kg	26,000	26,000	27,000	26333.3
Fluoride - Method EPA300.0 Revision 2.1	mg/kg	38	38	40	38.7
Chloride - Method EPA300.0 Revision 2.1	mg/kg	40	39	41	40
Sulfate - Method EPA300.0 Revision 2.1	mg/kg	17,000	17,000	17,000	17,000
Gross Alpha/Beta - GFPC					
Gross Alpha	pCi/g	4,310±690	4,830±770	5,440±870	4,860
Gross Beta	pCi/g	4,870±780	4,780±760	4,860±780	4,867
Lead-210 - Liquid Scintillation					
Lead-210	pCi/g	33.1±8.0	34.7±8.4	32.0±7.8	33.3
Radium-226 - GFPC					
Radium-226	pCi/g	22.8±5.8	25.7±6.6	23.8±6.1	24.1
Total Alpha Emitting Radium - GFPC					
Total Radium	pCi/g	39.7±10	41±11	36.6±9.4	39.1
Total Radium (duplicate sample)	pCi/g	35.8±9.2			
Isotopic Thorium - Alpha Spectroscopy					
Th-228	pCi/g	1.24±0.99	1.50±0.74	0.93±0.67	1.22
Th-230	pCi/g	20.4±3.8	21.4±3.9	20.4±3.7	20.7
Th-232	pCi/g	1.14±0.48	0.66±0.34	0.71±0.32	0.84

(1) All values as reported by ALS Laboratory as dry weight values

Appendix L

MSDS Sheet for Regeneration Product

Issue Date: June 30, 1998
Revision Date: Not Applicable

MATERIAL SAFETY DATA SHEET

SECTION I - PRODUCT IDENTIFICATION AND USE

Product Name: Regeneration Product	Product Code: UN 2912

Manufacturer: Cameco Corporation P.O. Box 1539 Blind River, Ontario P0R 1B0

Emergency Phone No: (705) 356-1496 (Cameco Security)

Contact: Manager, Blind River Operations

Product Use: Regeneration product is produced from refining uranium ore concentrates to uranium trioxide. Modified organic degradation products form when tributyl phosphate and kerosene solvent mixture contacts nitric acid at elevated temperatures. These organic products are subsequently recovered in a sodium carbonate solution, which is acidified with nitric acid to form a waxy organic material, known as regeneration product. Regeneration product contains uranium which can be economically recovered at licenced handling facilities.

Molecular Weight: Not applicable.

NFPA RATING:	Health: 2	Flammability: 1	Reactivity: 1
	Specific Hazards: Radioactive Material (Low Specific Activity), Corrosive, [✓ Toxic], Oxidizer		

PIN No.: UN 2912

SECTION II - INGREDIENTS

Ingredient	Quantity	CAS Numbers	Exposure Limits
Major Components:			
Uranium (radiological type F)	5-30%	AECB FFOL225-5	2.5 X 10^4 Bq ALI
Nitric Acid (HNO_3)	35% strength	7697-37-2	ACGIH TLV-TWA: 2 ppm HNO_3
Kerosene (Norpar 13 or C12-C14)	<10%	64771-72-8	
Tributyl Phosphate (TBP)	<3%	126-73-8	ACGIH TWA: 0.2 ppm or 2.2 mg/m^3 TBP
Dibutyl Phosphate (DBP)	20-70%	107-66-4	ACGIH TWA: 1 ppm; STEL: 2 ppm DBP
Monobutyl Phosphate (MBP)	0.1-1%		
Butyric Acid ($CH_3(CH_2)_2COOH$)	20-50%	107-92-6	
Propionic Acid (CH_3CH_2COOH)	5-20%	79-09-4	
Acetic Acid (CH_3COOH)	2-10%	64-19-7	ACGIH TWA: 10 ppm; 15 ppm CH_3COOH
Formic Acid (HCOOH)	<5%	64-18-6	ACGIH TWA: 5 ppm; 10 ppm HCOOH
Longer Carbon Chain Carboxylic Acids from Kerosene Degradation	<5%		ALI-Annual Limit of Intake TLV-Threshold Limit Value
Nitrated and Nitro Organics (similar to carboxylic acids)	<5%		TWA-Time Weighed Average concentration of a chemical in air for an 8 hour work day or 40 hour work week. STEL-Short Term Exposure Limit

SECTION III - PHYSICAL DATA

Physical State: Gas _ Liquid: X Solid: X

Appearance and Odour: Regeneration product varies from a light yellow-brown coloured waxy solid to a dark brown semi-liquid material with the consistency of molasses. A liquid phase may be present, which contain nitric acid or residual TBP and kerosene solvent. The material will have the rancid odour from propionic acid.

Vapour Pressure (mm Hg): 13.7 at 20°C (TBP)
11.4 at 20°C (acetic acid)
10 at 4°C (propionic acid)
0.43 at -7°C (butyric acid)
<1 at 20°C (kerosene, DBP)
45 at 20°C (20-40% strength nitric acid)

Density (g/cm^3 at 25°C): Range from 0.76 to 1.06 g/cm^3 for kerosene and dibutyl phosphate respectively. The other major regeneration product components have densities within this range.

Freezing/Melting Point (°C): 16°C (acetic acid)
-4°C (kerosene)
-5.5°C (butyric acid)

Solubility in Water (20°C): Components of regenerated product are water soluble to a varying extent.

Boiling Point (°C): Ranges from 118°C and 225°C for acetic acid and kerosene respectively. The other regeneration product compounds have boiling points within this temperature range.

pH: Less than pH 1 due to residual HNO_3 in regeneration product.

Relative Vapour Density (Air=1): Ranges from 2.1 for acetic acid to 7.2 for dibutyl phosphate and 9.2 for tributyl phosphate.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flammable: X Yes _ No
If yes, under what conditions: Regeneration product has a low flammability hazard. Flashpoint depends on composition of the product, but ranges from 120 to 140°C. Volatile components may have flash points at lower temperatures.

Extinguishing Media: If the product is in contact with fire, use water spray to cool exposed surfaces and to protect personnel. Isolate the fuel supply from the fire. Use foam or dry chemical or carbon dioxide to extinguish the fire. Avoid spraying water directly into the storage vessels to avoid over flowing the container. Heat generated from the fire will produce combustible vapours. The liquid or vapour will collect in low lying areas, travel some distance along the ground to an ignition source.

Flash Point (°C) and Method: 39°C (acetic acid); 54°C (propionic acid); 72°C (butyric acid); 83°C (kerosene), 157°C (DBP), 160°C (TBP) by the Pensky-Martens Closed Cup ASTM D-93 and D-92. Flash point for regeneration product is 120 to 140°C.

Explosion Data: Regeneration product may ignite when exposed to heat or with direct flame contact.

Special Procedures: Not applicable.

Sensitivity to Mechanical Impact: Not applicable.

Sensitivity to Static Discharge: Regeneration product may ignite when exposed to a static discharge.

SECTION V - REACTIVITY DATA

Stable X Yes _ No
If NO, under which conditions? .

Hazardous Polymerization will occur?: _ Yes X No

Decomposition Products: Regeneration product is a mixture of organics (alkanes, phosphate esters, carboxylic acids, nitrated organic). Decomposition products of HNO_3, nitrate and nitro organics are carbon dioxide (CO_2), carbon monoxide (CO) and oxides of nitrogen (NO, NO_2) which are toxic. The phosphate esters will decompose to phosphorous oxides (eg. P_4O_{10}).

Incompatibility with other substances: X Yes _ No
If yes, which ones: Strong oxidizing chemicals (ie. hydrogen peroxide) will react with the organics. Alkaline solutions will react with the residual HNO_3 in the regeneration product, generating heat from neutralization of the residual acid.

SECTION VI - TOXICOLOGICAL PROPERTIES / HEALTH HAZARD DATA

LD_{50}: Not determined for regeneration product. Acute toxicity data for components of regeneration product are as follows: 20 to 40% HNO_3 - Inhalation LC_{50}(Rat)-67 ppm NO_2. Propionic acid - Oral LD_{50} (rat)-1510 mg/kg; iv LD_{50} (mouse)-625 mg/kg; dermal LD_{50} (rabbit)-500 mg/kg; Oral LD_{50} (rabbit)-1900 mg/kg. Butyric acid - Oral LD_{50} (rat)-2940 mg/kg; dermal LD_{50} (rabbit)-530 mg/kg; iv LD_{50} (mouse)-800 mg/kg. Acetic acid - Oral LD_{50} (rat)-3530 mg/kg; dermal LD_{50} (rabbit)-1060 mg/kg. TBP - Oral LD_{50} (rat)-3000 mg/kg; dermal LD_{50} (rabbit)->5000 mg/kg. Kerosene - Oral LD_{50} (rat or rabbit)-28 g/kg; dermal LD_{50} (rabbit)-180 mg/kg. DBP - Oral LD_{50} (rat) - 3200 mg/kg. Overall rating is moderately toxic or a rating of 4 based on the American Industrial Hygiene Association classification.

General: TDG hazard classification - Radioactive material, Class 7 and a secondary classification of Corrosive, Class 8. *Controlled Products Regulation* classifications are Class C Oxidizer; Class D, Division 2, Subdivision B Toxic Material and Class E Corrosive Material.

Inhalation: High vapour/ aerosol concentrations (greater than the STEL values listed in Section II) are irritating to the eyes and respiratory tract, and may cause headaches, dizziness, anaesthesia, drowsiness, unconsciousness, and other central nervous system effects. These effects may be experienced at elevated temperatures. Prolonged exposure at ambient temperatures may result in respiratory difficulty and damage, chest pain and laryngeal spasm.

Skin contact: Frequent or prolonged exposure may cause skin irritation or dermatitis. Residual HNO_3 may cause irritation, redness, pain, drying and cracking of the skin. Always wear chemical resistant gloves when handling regeneration product to avoid skin contact.

Eye contact: The residual HNO_3 is corrosive, which will cause pain, burns and cause permanent corneal damage, which could result in blindness, if not flushed immediately with water.

Ingestion: Ingestion can result in an internal radiation dose from uranium. Kidney damage can occur due to chemical toxicity. Residual HNO_3 may cause burns to the inside of the mouth, throat and abdomen. The kerosene, DBP, carboxylic acids etc. could cause a sore throat, gastrointestinal effects or damage and possibly collapse.

SECTION VII - FIRST AID MEASURES

Inhalation: Move casualty from the workplace to prevent further exposure. Administer artificial respiration if breathing has stopped. Keep the person at rest. Call for prompt medical attention.

Skin contact: Flush with large volumes of water, while removing contaminated clothing. Use soap to help remove regeneration product from the skin. Seek medical aid if skin irritation occurs.

Eye contact: Immediately flush eyes with running water for a minimum of 15 minutes. Hold eyes open during flushing. If irritation persists, repeat flushing. Obtain medical attention.

Ingestion: Remove casualty from the workplace to prevent further exposure. Rinse the mouth with water and drink 200-400 ml of water to dilute the product, if the person is not showing signs of losing consciousness. Do not induce vomiting to avoid aspiration of product into the lungs. Keep the person at rest. Seek immediate medical attention. Submit a urine sample for uranium determination.

SECTION VIII - PREVENTIVE MEASURES

Engineering Controls: Adequate ventilation to maintain vapours in the workplace below TLV for chemicals listed in Section II.

PERSONAL PROTECTIVE EQUIPMENT

Gloves: Impervious chemical resistant neoprene, PVC gloves or equivalent.

Eyes: Safety glasses with side shields and/or chemical splash goggles. Face shield with goggles are to be worn when handling or transferring bulk quantities of regeneration product.

Clothing: Long sleeved neoprene or PVC chemical resistant jacket and pants or disposable coveralls to avoid skin contact. Steel toed safety boots are to be worn while handling drums of regeneration product.

Respiratory Protection: A NIOSH/MSA approved air-purifying chemical cartridge respirator. Wear a self-contained positive pressure breathing apparatus in case of fire, temperatures above ambient or if oxides of nitrogen (NO_2, NO) are released from contact with other chemicals.

SECTION IX - STORAGE AND HANDLING

Storage Requirements: Store in closed 55 US gallon polyethylene drums. Label the drums with appropriate workplace hazardous material information labels. Fire fighting equipment for hydrocarbon fires should be available in the area. Post as radiation area with appropriate placards. Drums should be stored in an area maintained between 0°C and 35°C to avoid freezing or heating of regeneration product with associated physical expansion damaging the drum or vapour generation of the product respectively.

Handling Procedures and Equipment: Use protective equipment as outlined in Section VIII. All regeneration product handling systems are to be connected to appropriate fume handling systems for control of vapours.

SECTION X - SPILL AND LEAK PROCEDURES

Clean-up: Restrict area access until the clean-up is completed. Personnel involved in containment and clean-up are to wear proper protective equipment (NIOSH/MSA air-purifying respirator, eye protection, chemical resistant gloves, disposable coveralls or PVC/ neoprene chemical resistant jacket and pants, safety boots). Regeneration product can be dissolved in a solution of sodium carbonate if the spill is in a contained area.

If the spill is outdoors, dike the area to avoid runoff of any liquid into sanitary sewers and watercourses. Contain spilled liquid with sand or earth. Cover the spilled material with plastic sheets or a tarp to avoid spread of contamination by rain. Collect the material and the top layer of earth in drums for disposal. Clean-up the site to background radiation levels.

Disposal: Drums of the material are to be returned to Cameco's Blind River Operations for final disposal. Do not dispose of the waste with normal garbage or in a sewer system. Contaminated protective clothing must be forwarded for handling by Cameco. Place in separate, marked drums.

SECTION XI - ADDITIONAL INFORMATION

Special Shipping Information: Drummed, regeneration product is transported in closed trailers to licenced facilities for recovery of uranium. Drums and trailer are to display low specific activity (LSA) labels Radioactive, Class 7 as well as a secondary TDG hazard classification Corrosive, Class 8.

Product Identification Number is UN 2912. Use yellow Radioactive II or III labels.

Sources Used: 1996 North American Emergency Response Guidebook.
Dangerous Properties of Industrial Materials, Fifth Edition.
National Fire Codes Subscription Service, NFPA 704, 1996 Edition.
MSDS for 20-40% nitric acid, acetic acid, dibutyl phosphate, tributyl phosphate, Norpar 13 (kerosene) from suppliers of these products.

Prepared by: Charles J. Martens
Date: June 30, 1998

Appendix M

TTLC Table for Molycorp Amendment Request

Total Threshold Limit Concentration (TTLC) Analysis on Dry-Weight Basis
Unoxidized Lead\Iron Residue

Table 1

	P8-4 (4.5-5.0)	P8-4 (6.5-7.0)	P8-6 (5.0-5.5)	P8-6 (6.0-6.5)	P11-1 (5.0-5.5)	P11-1 (6.5-7.0)	P11-2 (4.5-5.0)	P11-2 (7.0-7.5)	P11-2 (10.0-10.5)	P11-3 (4.5-5.0)
Constituent	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)
Antimony	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
Arsenic	9.0	<2.0	12	<2.0	<2.0	32.9	<2.0	61.7	<2.0	<2.0
Barium	14,804	589	22190	708	374	1549	695	26244	477	1213
Beryllium	22	105	10	31	36	39	43	13	37	38
Cadmium	<4.0	<4.0	<4.0	8.9	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Chromium	<2.0	<2.0	2.3	<2.0	<2.0	<2.0	<2.0	24.7	<2.0	<2.0
Cobalt	22	41	19	<10	16	33	36	29	21	<10
Copper	<5.0	435	6	163	179	203	221	<5.0	97	117
Fluoride	<0.5	41	3.7	9.1	7.5	0.9	10.8	<0.5	10.5	20.0
Lead	1,571	235595	2441	279870	128472	172085	189545	1544	114450	112113
Mercury	0.56	1.18	0.12	0.71	0.41	0.58	0.74	0.48	0.21	0.46
Molybdenum	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	<8.0	51	<8.0	21	21	39	52	31	14	15
Selenium	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Silver	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	122.0	174.9	<2.0
Thallium	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Thorium ^{232}	137.61	668.81	450.46	100.92	455.05	153.21	1339.45	95.41	368.81	539.45
Thorium ^{233}	2.96E-04	5.68E-04	2.46E-04	1.41E-04	1.72E-04	1.95E-04	6.83E-04	1.79E-04	1.80E-04	1.91E-04
Thorium ^{228}	2.30E-08	6.93E-08	8.76E-08	2.20E-08	3.13E-08	8.66E-08	1.99E-07	1.63E-08	6.65E-08	3.61E-08
Total Thorium	137.61	668.81	450.46	100.92	455.05	153.21	1339.45	95.41	368.81	539.45
Uranium ^{233}	17.57	4074.65	18.98	1505.99	1736.53	232.93	2149.70	15.90	1086.83	1625.75
Uranium ^{234}	2.87	612.62	2.49	221.03	257.48	33.46	310.28	2.39	171.03	262.15
Uranium ^{235}	1.32	219.22	2.25	81.68	87.99	14.41	225.23	2.01	60.96	75.68
Total Uranium	21.77	4906.69	23.72	1808.70	2081.99	280.81	2685.21	20.30	1318.82	1963.57
Vanadium	199	<10	43	<10	<10	19	<10	136	25	<10
Zinc	415	435	51	161	358	3129	727	117	223	98

	P8-4 (5.0-5.5)	P8-4 (7.0-7.5)	P8-6 (5.5-6.0)	P8-6 (8.5-9.0)	P11-1 (4.0-4.5)	P11-1 (6.0-6.5)	P11-2 (5.0-5.5)	P11-2 (8.0-8.5)	P11-2 (10.5-11.0)	P11-3 (4.0-4.5)
Constituent	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)	Concentration (mg/kg)
Chloride	3,300	7,200	6,500	9,300	11,900	69,900	14,300	46,500	8,300	700
LnO	130,000	16,800	274,500	236,100	29,300	337,800	43,600	304,100	26,300	2,200
Sulfate	160,700	119,800	14,400	124,300	138,300	188,800	105,600	168,100	243,700	117,200
% H2O	44.61%	60.95%	9.87%	64.63%	62.62%	56.44%	57.95%	54.37%	58.86%	53.58%

Investigation of Process Ponds, Molycorp, Inc., November 6, 1985

Appendix N

MSDS for CaF_2 Product

ALLIED

Allied Corporation
P O Box 430
Metropolis, Illinois 62960 USA
(618) 524-2111
Telex 204387

September 30, 1987

Mr. Gerald Richards
Energy Fuels
6425 South Highway 163
Blanding, Utah 84511

Dear Mr. Richards:

There are four plastic bottles in this package. The larger bottles contain samples which are typical of current bed material and filter fines inventory. The smaller bottles contain samples of lumps which are likely to be found in some of our drums. Our analyses of these materials are as follows:

	% U
Bed Material	1.970
Filter Fines	3.047
Brown Lumps	~0.700
White Lumps	~1.000

Moisture results on five randomly selected lots sent to another uranium mill were 0.34, 0.15, 0.10, 0.31 and 0.71% H_2O. Also included on the attached page are assays of previous lots sent to that mill and an MSDS for the material supplied.

In addition, we feel that a minimum uranium concentrate in the supplied material would be no less than one percent. This minimum value is based on uranium assay exchange data with the mill currently recovering the uranium from this material.

A copy of the revised contract and information on volume will be forthcoming.

If you have questions, please contact me.

Sincerely,

M. L. Shepherd
Manager, Process Technology/QA

MLS/sm

Enclosures

Allied
Ore project

SAMPLES REC'D
10/8/879 @.UEN
TO DKS

cc: Don Sparling, Plant Manager
Energy Fuels
6425 South Highway 163
Blanding, UT 84511

Muril Vincelette, V.P. Operations
Energy Fuels Nuclear, Inc.
One Tabor Center, Suite 2500
1200 Seventeenth Street
Denver, CO 80202

E. W. Shortride, Operations Mgr.
UMETCO
P. O. Box 1029
Grand Junction, CO 81502

ALLIED ASSAYS OF MATERIAL TO PRESENT "TOLL MILL"

LOT NUMBER	% U
1	1.719
2	1.773
3	1.860
4	1.791
5	1.874
6	1.770
7	1.970
8	1.855
9	1.739
10	2.126
11	1.946
12	2.230
13	1.895
14	1.670
15	1.713
16	1.723
17	1.653
18	2.112
19	1.653
20	1.969
21	2.160
22	1.759

AVG. % U = 1.862

Allied Chemical

PRODUCT SAFETY DATA SHEET

PLANT INTERMEDIATE

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME OR SYNONYM) BED MATERIAL; FILTER FINES	☐ C.A.S. NO. ☐ ALLIED PRODUCT CODE #

CHEMICAL NAME
Calcium Fluoride containing Uranium Tetrafluoride, Uranium Daughter Products, and other Fluoride Impurities(HF).

FORMULA N.D.	MOLECULAR WEIGHT N.D.

DIVISION/PLANT ADDRESS (No., STREET, CITY, STATE AND ZIP CODE)
Allied Corporation
Engineering Materials Sector, P. O. Box 430
Metropolis, IL 62960

CONTACT	PHONE NUMBER	ISSUED DATE	REVISED DATE
R.W. Yates, Health Physicist	524-2111 (6361)	3-2-87	7-22-87

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER
(618)524-2111,Ext.228

Remove individual from contaminated area.
Skin: Thoroughly wash exposed area with water.
Eyes: Irrigate the eyes with plenty of water for at least 15 minutes.
Ingestion: Drink large amount of water to dilute material. do not induce vomiting. Get medical attention for irritation, injestion, or discomfort from inhalation.
Contact: Plant Nurse, Ext.6228 or EMT, Ext.6329

C. HAZARDS INFORMATION

FIRE AND EXPLOSION

FLASH POINT °C	AUTO IGNITION TEMPERATURE °C	FLAMMABLE LIMITS IN AIR (% BY VOL.)	
Not Flammable ☐ OPEN CUP ☐ CLOSED CUP	N/A	LOWER N/A	UPPER N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS
N/A

HEALTH

INHALATION May cause respiratory irritation. Continuous long-term exposure to dust containing Uranium compounds may cause deposit of insoluble Uranium compounds in the lungs.

INGESTION Acute exposure can cause severe nausea, vomiting, diarrhea, and abdominal pain. Acute and chronic overexposures may cause radiation dose to critical organs. Absorption of soluble Uranium compounds result in Uranium deposition in bones and kidneys.

SKIN May cause skin irritation, especially under prolong contact or when moisture is present.

EYES Dust may irritate the eyes.
Radiation exposure to the lens of the eyes is 5 rem/year.

PERMISSIBLE CONCENTRATION: AIR (SEE SECTION J) MPC=1 E-10 μc/cc (insoluble U) TLV-TWA=2.5 mg/m3 (as F^-) TLV-TWA=0.2 mg/m3 (Soluble U)	BIOLOGICAL Fluorides:7mg/1F Urine(post shift):4mg/1F Uranium:2.5mg/day Urinary Excretic

UNUSUAL CHRONIC TOXICITY Bed material or filter fines contain Uranium and Uranium daughter products emits alpha, beta, and gamma radiation. Uranium is a heavy metal poison. Chronic exposure to inorganic fluorides may cause fluorosis.

D. PRECAUTIONS/PROCEDURES

VENTILATION

Local exhaust

Ventilation should maintain dust levels consistent with generally accepted industrial hygiene and housekeeping practices.

NORMAL HANDLING Avoid breathing dust. Wear radionuclide cartridge (magenta cartridge) respirator and gloves, when handling opened containers of bed material or filter fines.

STORAGE Bed material and/or filter fines contain some residual Uranium and non-volatile Uranium daughter products; they must be handled, processed and stored in a manner which results in a minimum of impact upon worker's health or the "off-site".

PRECAUTIONARY LABEL ☐ ATTACHED ☐ NOT ATTACHED Process unit equipment which have or could possibly have radiation field in excess of 5 mR/hr. are marked off utilizing yellow and magenta paint stripes on the floor around the equipment. The boundary of radiation area (See K - Additional Information)

SPILL OR LEAK The following steps are to be taken in the event of a spill:

1. Mark off area.   2. Don respirator with Radionuclide Cartridges.
3. Use shovels or vacuum to remove bulk of material.
4. Wash residual into proper disposal sump or in uncontained areas use a sponge or mop, and water to remove all remaining residue.
5. Deposit bulk of material and contaminated water in the proper disposal area.

FIRE EXTINGUISHING AGENTS RECOMMENDED

Any media suitable for extinguishing the supporting fire.

SPECIAL FIRE FIGHTING PRECAUTIONS

Wear self-contained breathing apparatus.

FIRE EXTINGUISHING AGENTS TO AVOID

N/A

SPECIAL PRECAUTIONS/PROCEDURES

N/A

E. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION Where required, radionuclide cartridge respirator provides adequate protection for low particulate concentrations. Full face mask, air line respirator, or self-contained breathing apparatus may be required to perform specific tasks. (See Section K)

EYES AND FACE

In addition, safety glasses, face shield may be required.

HANDS, ARMS, AND BODY

Routine personal protective clothing and gloves.

OTHER CLOTHING AND EQUIPMENT While performing certain task, in addition to routine personal protective clothing, disposable coverall, shoe covers and neopreme glove must be worn.

F. PHYSICAL DATA

MATERIAL IS (AT NORMAL CONDITIONS): ☐ LIQUID ☒ SOLID ☐ GAS ☐	APPEARANCE AND ODOR White to light brown crystalline powder. Odorless to sharp penetrating odor associated with hydrofluoric acid.	
BOILING POINT °C MELTING POINT CaF_2 = 1403 UF_4 = 1036 °C	SPECIFIC GRAVITY (H_2O = 1) N/A	VAPOR DENSITY (AIR = 1) N/A
SOLUBILITY IN WATER (% by Weight) Practically Insoluble	pH N/A	VAPOR PRESSURE (mm Hg at 20°C) N/A
EVAPORATION RATE (Butyl Acetate = 1) N.D.	% VOLATILES BY VOLUME (At 20°C) N/A	

G. REACTIVITY DATA

STABILITY ☐ UNSTABLE ☒ STABLE	CONDITIONS TO AVOID High Temperature
INCOMPATIBILITY (MATERIALS TO AVOID) Acids and Acid fumes.	
HAZARDOUS DECOMPOSITION PRODUCTS Uranium decay daughter products may be more hazardous radiologically than the Uranium parents. Hydrofluoric Acid and highly toxic fumes.	
HAZARDOUS POLYMERIZATION ☐ MAY OCCUR ☒ WILL NOT OCCUR	CONDITIONS TO AVOID N/A

H. HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT	%	%	HAZARD DATA (SEE SECT. J)
	Bed Material	Filter Fines	
Calcium Fluoride	70-80	60-70	
Uranium	≤2	<2	
Other impurities as Fluoride Compounds:			
Aluminum, Iron, Magnesium, Potassium, sodium,			
As individual impurities	≤10	≤10	
As collective impurities	<20	<30	
Hydrofluoric Acid	<0.05	≤0.05	

I. ENVIRONMENTAL

DEGRADABILITY

N/A

OCTANOL/WATER PARTITION COEFFICIENT

N/A

WASTE DISPOSAL METHODS* Bed material and/or filter fines containing a buildup of contaminates, is retired for radioactivity decay and recovery of the Uranium content. Bed material and/or filter fines can be reprocessed through a Uranium Recovery System to recover the Uranium content. Disposal of this type waste must be disposed in an approved radioactive waste site and comply with State and Federal regulations.

*DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS.

J. REFERENCES

PERMISSIBLE CONCENTRATION REFERENCES

OSHA regulation for airborne contaminates 29 CFR 1910.1000 Subpart F
ACGIA 1986-87 List "Threshold Limit Values for Chemical Substances"

REGULATORY STANDARDS

GENERAL
1. "Dangerous Properties of Industrial Material" Sax - 6th Edition
2. "Condensed Chemical Dictionary" 9th Edition
3. "Lange Handbook of Chemistry" - 11th Edition
4. "The Merck Index" 8th Edition
5. "Uranium Plutonium Tranplutonic Elements" - 1973
6. Allied Chemical Source Material License

K. ADDITIONAL INFORMATION

D. Precautionary Label (continued) - is determined by the point which measures a maximum of 2.5 mR/hr. The floor stripes are utilized in conjunction with training to warn employees to minimize stay-times in these areas.

E. Respirator Protection: Each potentially exposed employee is respirator fit tested. Plant regulations require each individual have a respirator on their person before entering a Feed Materials Building.

C. Health: Individual Bio Assay Program:

1. Urinary Uranium sampling evaluates the exposure of individuals to the more soluble Uranium components of plant material.
2. Whole body counting program determines the individuals lung deposit of insoluble natural Uranium.
3. T.L.D. Whole Body badges measures an individual's external exposure to radiation.

EDA Instruments Inc.
5151 Ward Road
Wheat Ridge CO 80033
Telephone: (303) 422 9112

Report of Analysis - Water

To

Umetco Minerals
P.O. Box 1029
Grand Junction, CO 81502

ATTN: Roger Jones

Client No.	Log No.	Client P.O. No.	Date Collected	Date Received	Date Reported
	5596		3/21/86	3/24/86	4/15/86

Sample I.D. M-1146 EP Toxic : Blanding , Perry Alkas [Allied Sample]

	mg/l	meq/l		mg/l	meq/l
Aluminum			Alkalinity ($CaCO_3$)		
Arsenic	0.025		Bicarbonate		
Barium	0.2		Boron		
Cadmium	0.031		Carbonate		
Calcium			Chloride		
Chromium	2.20		Cyanide		
Cobalt			Fluoride		
Copper			Hardness ($CaCO_3$)		
Gold			Nitrate (N)		
Iron			pH (no units)		
Lead	1.10		Phenols		
Lithium			Phosphate		
Magnesium			Silica		
Manganese			Sulfate		
Mercury	<0.0002		Solids (Total Dissolved)		
Molybdenum			Solids (Total Suspended)		
Nickel			Surfactants		
Potassium			Color (P.C.U.)		
Silver	0.32		Conductance (µmhos/cm)		
Selenium	<0.001		Odor (T.O.)		
Sodium			Turbidity (J.T.U.)		
Vanadium					
Zinc			Cation/Anion Balance (%)		

Approved by Russell McCallister

Page 1 of 1

Umetco Minerals
P.O. Box 1029
Grand Junction, CO 81502

ATTN: Roger Jones

LCN: 5596

QUALITY CONTROL DATA SHEET

Time Received: 12:00 Date: 3/24/86 By: Julie Sealock Via: Mail

Sample Container Type: Plastic

Preservative When Received: 1. As received

Additional Lab Preparation: None

Parameter	Reference	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Arsenic	1	206.2	1 µg/1	1	T. Blundell	3/26/86
Barium	2	208.1	100 µg/1	1	M. Peters	3/31/86
Cadmium	1	213.2	0.1 µg/1	1	T. Blundell	3/27/86
Chromium	2	218.1	50 µg/1	1	M. Peters	3/31/86
Lead	1	239.2	1 µg/1	1	T. Blundell	3/27/86
Mercury	1	245.1	0.2 µg/1	1	M. Peters	4/4/86
Silver	2	272.1	10 µg/1	1	M. Peters	4/1/86
Selenium	1	270.2	2 µg/1	1	T. Blundell	3/26/86

Approved By:

7-27

7/20/87 DKS
GFR ✓
PA.

Results of toxicity test on
allied Chem Co. Uranium residues

12DS

	M-1146 (3/21/86)	Std
As	0.025	5.0
Ba	0.2	100
Cd	0.031	1.0
Cr	2.20	5.0
Pb	1.10	5.0
Hg	<0.0002	0.2
Ag	0.32	5.0
Se	<0.001	1.0

Appendix O

2012 Annual Tailings Characterization Data

Cell 1
Chemical and Radiological Characteristics

Constituent	1987	2003 (Avg)	2007 (Avg)	2008	2009	2010	2011	2012	2012 (resample*)
Major Ions (mg/l)									
Carbonate	<5	<1	ND	ND	<1	<1	<1	<1	NS
Bicarbonate	<5	NA	ND	ND	<1	<1	<1	<1	NS
Calcium	630	307	483.8	604	635	711	577	426	NS
Chloride	8000	6728	37340	9830	20700	7440	33800	78000	NS
Fluoride	<100	3005	31.72	0.3	0.4	28.4	69.2	62.9	NS
Magnesium	7900	5988	21220	6550	16200	5410	14300	16000	NS
Nitrogen-Ammonia	7800	3353	10628	5250	15200	8120	12900	9750	NS
Nitrogen-Nitrate	<100	41.8	269.4	64.9	142	58	212	556	NS
Potassium	NA	647	5698	1880	4140	1840	4510	9750	NS
Sodium	10000	8638	62600	13200	39000	16700	29500	41700	NS
Sulfate	190000	63667	287600	118000	232000	107000	182000	158000	NS
pH (s.u.)	0.70	1.88	0.80	1.53	1.15	2.73	2.23	1.9	NS
TDS	120000	94700	357400	131000	140000	130000	216000	342000	NS
Conductivity (umhos/cm)	NA	NA	NA	NA	365000	110000	112000	136000	NS
Metals (ug/l)									
Arsenic	440000	121267	849000	271000	436000	74400	299000	25500	NS
Beryllium	780	475	2262	500	410	338	1270	3180	NS
Cadmium	6600	3990	29320	8790	9120	2940	13700	30700	NS
Chromium	13000	6365	29940	6760	18700	5620	22700	12100	NS
Cobalt	120000	NA	88240	23500	97500	16200	56000	53100	NS
Copper	740000	196667	881000	360000	168000	125000	483000	885000	NS
Iron	3400000	2820000	13480000	3280000	2390000	3400000	8940000	840000	NS
Lead	<20000	3393	27420	11200	10600	9240	23600	17000	NS
Manganese	140000	162500	990200	206000	723000	173000	735000	1560000	NS
Mercury	NA	NA	ND	ND	7.61	7.2	61.4	117	NS
Molybdenum	240000	50550	415600	106000	142000	35300	235000	434000	NS
Nickel	370000	36950	40860	32000	156000	27500	43700	15000	NS
Selenium	<20000	1862	15420	13000	14800	5220	11600	8090	NS
Silver	<5000	NA	1559.2	449	558	155	1110	4310	NS
Thallium	45000	NA	407.8	165	387	193	560	13	NS
Tin	<5000	NA	6512	1240	2290	263	1500	<100	NS
Uranium	105000	134517	788600	416000	578000	159000	838000	1450000	NS
Vanadium	280000	348000	2208200	1200000	773000	752000	2500000	1940000	NS
Zinc	1300000	NA	642940	476000	229000	171000	398000	811000	NS
Radiologics (pCi/l)									
Gross Alpha	NA	169333[1]	29380	21900	16500	11300	3610	12600	NS
VOCS (ug/L)									
Acetone	35	NA	66.5	110	710	260	80	310	NS
Benzene	<5	NA	ND	ND	<1	<1	<1	<1	NS
Carbon tetrachloride	<5	NA	ND	ND	<1	<1	<1	<1	NS
Chloroform	8	NA	6.7	6.6	16	4.9	13	19	NS
Chloromethane	NA	NA	ND	9.4	11	4.4	3.6	4.0	NS
MEK	NA	NA	ND	ND	120	65	<1	200	NS
Methylene Chloride	11	NA	ND	ND	2.0	<1	<1	2	NS
Naphthalene	<10000	NA	<10	ND	1.1	5.4	2	3	NS
Tetrahydrofuran	NA	NA	150	<20	<100	<10	<500	2.9	NS
Toluene	<5	NA	ND	ND	<1	<1	<1	<1	NS
Xylenes	<5	NA	ND	ND	<1	<1	<1	<1	NS
SVOCS (ug/L)									
1,2,4-Trichlorobenzene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
1,2-Dichlorobenzene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
1,3-Dichlorobenzene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
1,4-Dichlorobenzene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
1-Methylnaphthalene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2,4,5-Trichlorophenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2,4,6-Trichlorophenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2,4-Dichlorophenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2,4-Dimethylphenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2,4-Dinitrophenol	NA	NA	NA	NA	<250	<20	<20	<67.7	<20
2,4-Dinitrotoluene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10

Cell 1
Chemical and Radiological Characteristics

Constituent	1987	2003 (Avg)	2007 (Avg)	2008	2009	2010	2011	2012	2012 (resample*)
Major Ions (mg/l)									
2,6-Dinitrotoluene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2-Chloronaphthalene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2-Chlorophenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2-Methylnaphthalene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2-Methylphenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
2-Nitrophenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
3&4-Methylphenol	NA	NA	NA	NA	<22	<10	<10	<33.3	<10
3,3´-Dichlorobenzidine	NA	NA	NA	NA	<100	<10	<10	<33.3	<10
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	<250	<10	<10	<33.3	<10
4-Bromophenyl phenyl ether	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
4-Chloro-3-methylphenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
4-Nitrophenol	NA	NA	NA	NA	<250	<10	<10	<33.3	<10
Acenaphthene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Acenaphthylene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Anthracene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Azobenzene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Benz(a)anthracene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Benzidine	NA	NA	NA	NA	<100	<10	<10	<33.3	<10
Benzo(a)pyrene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Benzo(b)fluoranthene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Benzo(g,h,i)perylene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Benzo(k)fluoranthene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Bis(2-chloroethyl) ether	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Bis(2-chloroisopropyl) ether	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	<50	27	<10	37.7	<10
Butyl benzyl phthalate	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Chrysene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Dibenz(a,h)anthracene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Diethyl phthalate	NA	NA	NA	NA	170	<10	<10	<33.3	<10
Dimethyl phthalate	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Di-n-butyl phthalate	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Di-n-octyl phthalate	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Fluoranthene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Fluorene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Hexachlorobenzene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Hexachlorobutadiene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Hexachlorocyclopentadiene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Hexachloroethane	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Isophorone	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Naphthalene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Nitrobenzene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
N-Nitrosodimethylamine	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
N-Nitrosodiphenylamine	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Pentachlorophenol	NA	NA	NA	NA	<250	<10	<10	<33.3	<10
Phenanthrene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Phenol	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Pyrene	NA	NA	NA	NA	<50	<10	<10	<33.3	<10
Pyridine	NA	NA	NA	NA	<50	<10	<10	<33.3	<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 3
Chemical and Radiological Characteristics

Constituent	1987	2003 (Avg)	2007 (Avg)	2008	2009	2010	2011	2012
Major Ions (mg/l)								
Carbonate	NA	<1	ND	ND	<1	<1	<1	<1
Bicarbonate	<5	NA	ND	ND	<1	<1	<1	<1
Calcium	300	418	887	478	628	560	200	591
Chloride	NA	2460	15965	15400	17200	3470	40400	8880
Fluoride	<100	667	42.8	1.4	0.6	54.8	64.1	2300
Magnesium	5400	3386	15767	13100	17100	2500	22100	5680
Nitrogen-Ammonia	13900	1302	13867	9010	21600	2650	6470	6840
Nitrogen-Nitrate	<100	20	102	44	142	26	261	64
Potassium	NA	254	6657	4760	3820	782	2590	1190
Sodium	5900	3198	25583	22900	28600	5620	47900	6660
Sulfate	180000	33400	173667	167000	214000	40400	197000	80000
pH (s.u.)	0.82	2.28	1.60	1.79	1.4	2.18	1.27	2.4
TDS	189000	51633	228500	193000	243000	56200	296000	120000
Conductivity (umhos/cm)	NA	NA	NA	NA	304000	59800	86400	80300
Metals (ug/l)								
Arsenic	163000	32867	256500	489000	ND	52900	263000	4340
Beryllium	540	430	913	840	905	206	1570	678
Cadmium	2600	1958	9260	15400	ND	1960	12200	3460
Chromium	12000	3742	14883	12800	ND	3360	22800	10900
Cobalt	48000	NA	82783	57000	ND	13000	76000	76100
Copper	360000	87333	505000	345000	ND	89000	768000	379000
Iron	2100000	1278333	4874500	4400000	5970000	1460000	1.02E+7	3400000
Lead	<20000	2507	9647	16900	ND	17200	16700	1860
Manganese	82000	144000	496833	313000	ND	101000	587000	3110000
Mercury	ND	NA	ND	16	ND	<4	30.9	9.6
Molybdenum	52000	12250	122167	209000	14	21300	96200	790
Nickel	170000	20917	131833	241000	ND	23800	75800	150000
Selenium	<2000	910	5856	10200	ND	3080	6900	2460
Silver	<2500	NA	305	1010	ND	101	792	1850
Thallium	4700	NA	446	1200	ND	190	518	1080
Tin	NA	NA	1090	1070	ND	155	325	<100
Uranium	118000	67833	332333	636000	3690	180000	458000	835000
Vanadium	210000	158333	935000	1130000	ND	692000	2370000	836000
Zinc	590000	NA	748833	515000	ND	134000	726000	652000
Radiologics (pCi/l)								
Gross Alpha	NA	101583[1]	16533	21700	17000	4030	11100	1530
VOCS (ug/L)								
Acetone	28	NA	80	100	67	37	330	64
Benzene	<5	NA	ND	ND	<1	<1	<1	<1
Carbon tetrachloride	<5	NA	ND	ND	<1	<1	<1	<1
Chloroform	6	NA	ND	11	4.2	2.6	31	2
Chloromethane	NA	NA	ND	ND	1.4	1.8	3.5	1
MEK	NA	NA	ND	ND	<1	<1	67	<20
Methylene Chloride	10	NA	ND	ND	<1	<1	7.4	<1
Naphthalene	<10000	NA	ND	<10	<1	2.1	1.2	<1
Tetrahydrofuran	NA	NA	150	<20	<100	<10	<10	<1
Toluene	<5	NA	ND	ND	<1	<1	<1	<1
Xylenes	<5	NA	ND	ND	<1	<1	<1	<1
SVOCS (ug/L)								
1,2,4-Trichlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10
1,2-Dichlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10
1,3-Dichlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10
1,4-Dichlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10
1-Methylnaphthalene	NA	NA	NA	NA	<11	<10	<10	<10
2,4,5-Trichlorophenol	NA	NA	NA	NA	<11	<10	<10	<10
2,4,6-Trichlorophenol	NA	NA	NA	NA	<11	<10	<10	<10
2,4-Dichlorophenol	NA	NA	NA	NA	<11	<10	<10	<10
2,4-Dimethylphenol	NA	NA	NA	NA	<11	<10	<10	<10
2,4-Dinitrophenol	NA	NA	NA	NA	<53	<20	<20	<20
2,4-Dinitrotoluene	NA	NA	NA	NA	<11	<10	<10	<10
2,6-Dinitrotoluene	NA	NA	NA	NA	<11	<10	<10	<10

Cell 3
Chemical and Radiological Characteristics

Constituent	1987	2003 (Avg)	2007 (Avg)	2008	2009	2010	2011	2012
Major Ions (mg/l)								
2-Chloronaphthalene	NA	NA	NA	NA	<11	<10	<10	<10
2-Chlorophenol	NA	NA	NA	NA	<11	<10	<10	<10
2-Methylnaphthalene	NA	NA	NA	NA	<11	<10	<10	<10
2-Methylphenol	NA	NA	NA	NA	<11	<10	<10	<10
2-Nitrophenol	NA	NA	NA	NA	<11	<10	<10	<10
3&4-Methylphenol	NA	NA	NA	NA	<11	<10	<10	<10
3,3´-Dichlorobenzidine	NA	NA	NA	NA	<21	<10	<10	<10
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	<53	<10	<10	<10
4-Bromophenyl phenyl ether	NA	NA	NA	NA	<11	<10	<10	<10
4-Chloro-3-methylphenol	NA	NA	NA	NA	<11	<10	<10	<10
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	<11	<10	<10	<10
4-Nitrophenol	NA	NA	NA	NA	<53	<10	<10	<10
Acenaphthene	NA	NA	NA	NA	<11	<10	<10	<10
Acenaphthylene	NA	NA	NA	NA	<11	<10	<10	<10
Anthracene	NA	NA	NA	NA	<11	<10	<10	<10
Azobenzene	NA	NA	NA	NA	<11	<10	<10	<10
Benz(a)anthracene	NA	NA	NA	NA	<11	<10	<10	<10
Benzidine	NA	NA	NA	NA	<21	<10	<10	<10
Benzo(a)pyrene	NA	NA	NA	NA	<11	<10	<10	<10
Benzo(b)fluoranthene	NA	NA	NA	NA	<11	<10	<10	<10
Benzo(g,h,i)perylene	NA	NA	NA	NA	<11	<10	<10	<10
Benzo(k)fluoranthene	NA	NA	NA	NA	<11	<10	<10	<10
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	<11	<10	<10	<10
Bis(2-chloroethyl) ether	NA	NA	NA	NA	<11	<10	<10	<10
Bis(2-chloroisopropyl) ether	NA	NA	NA	NA	<11	<10	<10	<10
Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	<11	10.6	<10	<10
Butyl benzyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10
Chrysene	NA	NA	NA	NA	<11	<10	<10	<10
Dibenz(a,h)anthracene	NA	NA	NA	NA	<11	<10	<10	<10
Diethyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10
Dimethyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10
Di-n-butyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10
Di-n-octyl phthalate	NA	NA	NA	NA	<11	<10	<10	<10
Fluoranthene	NA	NA	NA	NA	<11	<10	<10	<10
Fluorene	NA	NA	NA	NA	<11	<10	<10	<10
Hexachlorobenzene	NA	NA	NA	NA	<11	<10	<10	<10
Hexachlorobutadiene	NA	NA	NA	NA	<11	<10	<10	<10
Hexachlorocyclopentadiene	NA	NA	NA	NA	<11	<10	<10	<10
Hexachloroethane	NA	NA	NA	NA	<11	<10	<10	<10
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	<11	<10	<10	<10
Isophorone	NA	NA	NA	NA	<11	<10	<10	<10
Naphthalene	NA	NA	NA	NA	<11	<10	<10	<10
Nitrobenzene	NA	NA	NA	NA	<11	<10	<10	<10
N-Nitrosodimethylamine	NA	NA	NA	NA	<11	<10	<10	<10
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	<11	<10	<10	<10
N-Nitrosodiphenylamine	NA	NA	NA	NA	<11	<10	<10	<10
Pentachlorophenol	NA	NA	NA	NA	<53	<10	<10	<10
Phenanthrene	NA	NA	NA	NA	<11	<10	<10	<10
Phenol	NA	NA	NA	NA	<11	<10	<10	<10
Pyrene	NA	NA	NA	NA	<11	<10	<10	<10
Pyridine	NA	NA	NA	NA	<11	<10	<10	<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
Major Ions (mg/l)				
Carbonate	<1	<1	<1	<1
Bicarbonate	<1	<1	<1	<1
Calcium	627	598	558	591
Chloride	4650	7350	5870	4980
Fluoride	0.3	21.6	30.6	43
Magnesium	3250	4940	4720	2230
Nitrogen-Ammonia	3140	5230	4930	1540
Nitrogen-Nitrate	28	52	44	27
Potassium	980	1440	1450	558
Sodium	5980	11300	11400	7130
Sulfate	67600	87100	267000	64900
pH (s.u.)	1.40	1.99	1.73	1.2
TDS	81400	107000	108000	76000
Conductivity (umhos/cm)	131000	101000	82100	78100
Metals (ug/l)				
Arsenic	626000	109000	86600	60500
Beryllium	296	215	323	167
Cadmium	1920	3670	2190	844
Chromium	3220	7500	5900	5990
Cobalt	9440	26500	22500	22900
Copper	99200	168000	181000	433000
Iron	2360000	2920000	3390000	3190000
Lead	5360	11800	11000	5270
Manganese	178000	209000	131000	112000
Mercury	1.19	<4	15.2	2.4
Molybdenum	24300	43800	24200	58200
Nickel	17100	40900	43500	41300
Selenium	4620	5810	4460	1310
Silver	78	193	216	127
Thallium	162	350	410	250
Tin	257	378	319	169
Uranium	118000	217000	153000	91000
Vanadium	918000	1090000	730000	237000
Zinc	142000	224000	286000	200000
Radiologics (pCi/l)				
Gross Alpha	8910	3400	8290	16300
VOCS (ug/L)				
Acetone	60	55	100	25
Benzene	<1	<1	<1	<1
Carbon tetrachloride	<1	<1	<1	<1
Chloroform	4.0	8.5	10	<1
Chloromethane	3.4	5.5	7.9	<1
MEK	<1	<1	<1	<1
Methylene Chloride	<1	<1	<1	<20
Naphthalene	1.8	<1	<1	<1
Tetrahydrofuran	<100	<10	<10	1.36
Toluene	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1
SVOCS (ug/L)				
1,2,4-Trichlorobenzene	<11	<10	<10	<10
1,2-Dichlorobenzene	<11	<10	<10	<10
1,3-Dichlorobenzene	<11	<10	<10	<10
1,4-Dichlorobenzene	<11	<10	<10	<10
1-Methylnaphthalene	<11	<10	<10	<10
2,4,5-Trichlorophenol	<11	<10	<10	<10
2,4,6-Trichlorophenol	<11	<10	<10	<10
2,4-Dichlorophenol	<11	<10	<10	<10
2,4-Dimethylphenol	<11	<10	<10	<10

Cell 4A
Chemical and Radiological Characteristics

Constituent	2009	2010	2011	2012
Major Ions (mg/l)				
2,4-Dinitrophenol	<53	<20	<20	<20
2,4-Dinitrotoluene	<11	<10	<10	<10
2,6-Dinitrotoluene	<11	<10	<10	<10
2-Chloronaphthalene	<11	<10	<10	<10
2-Chlorophenol	<11	<10	<10	<10
2-Methylnaphthalene	<11	<10	<10	<10
2-Methylphenol	<11	<10	<10	<10
2-Nitrophenol	<11	<10	<10	<10
3&4-Methylphenol	<11	<10	<10	<10
3,3′-Dichlorobenzidine	<21	<10	<10	<10
4,6-Dinitro-2-methylphenol	<53	<10	<10	<10
4-Bromophenyl phenyl ether	<11	<10	<10	<10
4-Chloro-3-methylphenol	<11	<10	<10	<10
4-Chlorophenyl phenyl ether	<11	<10	<10	<10
4-Nitrophenol	<53	<10	<10	<10
Acenaphthene	<11	<10	<10	<10
Acenaphthylene	<11	<10	<10	<10
Anthracene	<11	<10	<10	<10
Azobenzene	<11	<10	<10	<10
Benz(a)anthracene	<11	<10	<10	<10
Benzidine	<21	<10	<10	<10
Benzo(a)pyrene	<11	<10	<10	<10
Benzo(b)fluoranthene	<11	<10	<10	<10
Benzo(g,h,i)perylene	<11	<10	<10	<10
Benzo(k)fluoranthene	<11	<10	<10	<10
Bis(2-chloroethoxy)methane	<11	<10	<10	<10
Bis(2-chloroethyl) ether	<11	<10	<10	<10
Bis(2-chloroisopropyl) ether	<11	<10	<10	<10
Bis(2-ethylhexyl) phthalate	<11	19.6	<10	<10
Butyl benzyl phthalate	<11	<10	<10	<10
Chrysene	<11	<10	<10	<10
Dibenz(a,h)anthracene	<11	<10	<10	<10
Diethyl phthalate	<11	<10	<10	<10
Dimethyl phthalate	<11	<10	<10	<10
Di-n-butyl phthalate	<11	<10	<10	<10
Di-n-octyl phthalate	<11	<10	<10	<10
Fluoranthene	<11	<10	<10	<10
Fluorene	<11	<10	<10	<10
Hexachlorobenzene	<11	<10	<10	<10
Hexachlorobutadiene	<11	<10	<10	<10
Hexachlorocyclopentadiene	<11	<10	<10	<10
Hexachloroethane	<11	<10	<10	<10
Indeno(1,2,3-cd)pyrene	<11	<10	<10	<10
Isophorone	<11	<10	<10	<10
Naphthalene	<11	<10	<10	<10
Nitrobenzene	<11	<10	<10	<10
N-Nitrosodimethylamine	<11	<10	<10	<10
N-Nitrosodi-n-propylamine	<11	<10	<10	<10
N-Nitrosodiphenylamine	<11	<10	<10	<10
Pentachlorophenol	<53	<10	<10	<10
Phenanthrene	<11	<10	<10	<10
Phenol	<11	<10	<10	<10
Pyrene	<11	<10	<10	<10
Pyridine	<11	<10	<10	<10

Cell 4B
Chemical and Radiological Characteristics

Constituent	2011	2012
Major Ions (mg/l)		
Carbonate	<1	<1
Bicarbonate	<1	<1
Calcium	570	580
Chloride	8290	8170
Fluoride	26.7	23.3
Magnesium	3910	4500
Nitrogen-Ammonia	5220	5580
Nitrogen-Nitrate	39	42
Potassium	1370	1650
Sodium	9050	11700
Sulfate	134000	119000
pH (s.u.)	1.87	1.5
TDS	98000	128000
Conductivity (umhos/cm)	76900	86900
Metals (ug/l)		
Arsenic	67400	80000
Beryllium	311	356
Cadmium	1990	2540
Chromium	6860	8280
Cobalt	17800	29300
Copper	193000	340000
Iron	2960000	3580000
Lead	9960	11600
Manganese	128000	148000
Mercury	13.7	2.6
Molybdenum	21400	27600
Nickel	33900	50500
Selenium	4670	4470
Silver	137	169
Thallium	237	368
Tin	196	215
Uranium	133000	171000
Vanadium	660000	783000
Zinc	191000	270000
Radiologics (pCi/l)		
Gross Alpha	8590	13600
VOCS (ug/L)		
Acetone	130	94
Benzene	<1	<1
Carbon tetrachloride	<1	<1
Chloroform	9.4	4
Chloromethane	8.5	8
MEK	<1	<1
Methylene Chloride	<1	<1
Naphthalene	<1	<1
Tetrahydrofuran	<10	11.1
Toluene	<1	<1
Xylenes	<1	<1
SVOCS (ug/L)		
1,2,4-Trichlorobenzene	<10	<10
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

Cell 4B
Chemical and Radiological Characteristics

Constituent	2011	2012
Major Ions (mg/l)		
2,4-Dinitrotoluene	<10	<10
2,6-Dinitrotoluene	<10	<10
2-Chloronaphthalene	<10	<10
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	410	19
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

Appendix P

GSE Material Performance Information

Chemical Resistance Chart

GSE is the world's leading supplier of high quality, polyethylene geomembranes. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. Note that the effect of chemicals on any material is influenced by a number of variable factors such as temperature, concentration, exposed area and duration. Many tests have been performed that use geomembranes and certain specific chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for, and various criteria may be used to judge performance. Reported performance ratings may not apply to all applications of a given material in the same chemical. Therefore, these ratings are offered as a guide only.

Medium	Concentration	Resistance at:	
		20° C (68° F)	60° C (140° F)
A			
Acetic acid	100%	S	L
Acetic acid	10%	S	S
Acetic acid anhydride	100%	S	L
Acetone	100%	L	L
Adipic acid	sat. sol.	S	S
Allyl alcohol	96%	S	S
Aluminum chloride	sat. sol.	S	S
Aluminum fluoride	sat. sol.	S	S
Aluminum sulfate	sat. sol.	S	S
Alum	sol.	S	S
Ammonia, aqueous	dil. sol	S	S
Ammonia, gaseous dry	100%	S	S
Ammonia, liquid	100%	S	S
Ammonium chloride	sat. sol	S	S
Ammonium fluoride	sol	S	S
Ammonium nitratesat. sol	S	S	
Ammonium sulfate	sat. sol.	S	S
Ammonium sulfide	sol	S	S
Amyl acetate	100%	S	L
Amyl alcohol	100%	S	L
B			
Barium carbonate	sat. sol	S	S
Barium chloride	sat. sol.	S	S
Barium hydroxide	sat. sol	S	S
Barium sulfate	sat. sol	S	S
Barium sulfide	sol.	S	S
Benzaldehyde	100%	S	L
Benzene	—	L	L
Benzoic acid	sat. sol.	S	S
Beer	—	S	S
Borax (sodium tetraborate)	sat. sol	S	S
Boric acid	sat. sol.	S	S
Bromine, gaseous dry	100%	U	U
Bromine, liquid	100%	U	U
Butane, gaseous	100%	S	S
1-Butanol	100%	S	S
Butyric acid	100%	S	L
C			
Calcium carbonate	sat. sol	S	S
Calcium chlorate	sat. sol	S	S
Calcium chloride	sat. sol	S	S
Calcium nitrate	sat. sol	S	S
Calcium sulfate	sat. sol	S	S
Calcium sulfide	dil. sol.	L	L
Carbon dioxide, gaseous dry	100%	S	S
Carbon disulfide	100%	L	U
Carbon monoxide	100%	S	S
Chloracetic acid	sol.	S	S
Carbon tetrachloride	100%	L	U
Chlorine, aqueous solution	sat. sol	L	U
Chlorine, gaseous dry	100%	L	U
Chloroform	100%	U	U
Chromic acid	20%	S	L
Chromic acid	50%	S	L
Citric acid	sat. sol.	S	S
Copper chloride	sat. sol.	S	S
Copper nitrate	sat. sol	S	S
Copper sulfate	sat. sol	S	S
Cresylic acid	sat. sol	L	—
Cyclohexanol	100%	S	S
Cyclohexanone	100%	S	L
D			
Decahydronaphthalene	100%	S	L
Dextrine	sol	S	S
Diethyl ether	100%	L	—
Dioctylphthalate	100%	S	L
Dioxane	100%	S	S
E			
Ethanediol	100%	S	S
Ethanol	40%	S	L
Ethyl acetate	100%	S	U
Ethylene trichloride	100%	U	U
F			
Ferric chloride	sat. sol	S	S
Ferric nitrate	sol.	S	S
Ferric sulfate	sat. sol	S	S
Ferrous chloride	sat. sol	S	S
Ferrous sulfate	sat. sol	S	S
Fluorine, gaseous	100%	U	U
Fluorosilicic acid	40%	S	S
Formaldehyde	40%	S	S
Formic acid	50%	S	S
Formic acid	98-100%	S	S
Furfuryl alcohol	100%	S	L
G			
Gasoline	—	S	L
Glacial acetic acid	96%	S	L
Glucose	sat. sol	S	S
Glycerine	100%	S	S
Glycol	sol	S	S
H			
Heptane	100%	S	U
Hydrobromic acid	50%	S	S
Hydrobromic acid	100%	S	S
Hydrochloric acid	10%	S	S
Hydrochloric acid	35%	S	S
Hydrocyanic acid	10%	S	S
Hydrofluoric acid	4%	S	S
Hydrofluoric acid	60%	S	L
Hydrogen	100%	S	S
Hydrogen peroxide	30%	S	L
Hydrogen peroxide	90%	S	U
Hydrogen sulfide, gaseous	100%	S	S
Lactic acid	100%	S	S
Lead acetate	sat. sol.	S	—
Magnesium carbonate	sat. sol.	S	S
Magnesium chloride	sat. sol.	S	S
Magnesium hydroxide	sat. sol.	S	S
Magnesium nitrate	sat. sol.	S	S
Maleic acid	sat. sol.	S	S
Mercuric chloride	sat. sol.	S	S
Mercuric cyanide	sat. sol	S	S
Mercuric nitrate	sol.	S	S

Medium	Concentration	Resistance at: 20° C (68° F)	Resistance at: 60° C (140° F)
Mercury	100%	S	S
Methanol	100%	S	S
Methylene chloride	100%	L	—
Milk	—	S	S
Molasses	—	S	S
N			
Nickel chloride	sat. sol.	S	S
Nickel nitrate	sat. sol.	S	S
Nickel sulfate	sat. sol.	S	S
Nicotinic acid	dil. sol.	S	—
Nitric acid	25%	S	S
Nitric acid	50%	S	U
Nitric acid	75%	U	U
Nitric acid	100%	U	U
O			
Oils and Grease	—	S	L
Oleic acid	100%	S	L
Orthophosphoric acid	50%	S	S
Orthophosphoric acid	95%	S	L
Oxalic acid	sat. sol.	S	S
Oxygen	100%	S	L
Ozone	100%	L	U
P			
Petroleum (kerosene)	—	S	L
Phenol	sol	S	S
Phosphorus trichloride	100%	S	L
Photographic developer	cust. conc.	S	S
Picric acid	sat. sol	S	—
Potassium bicarbonate	sat. sol.	S	S
Potassium bisulfide	sol.	S	S
Potassium bromate	sat. sol	S	S
Potassium bromide	sat. sol	S	S
Potassium carbonate	sat. sol.	S	S
Potassium chlorate	sat. sol	S	S
Potassium chloride	sat. sol	S	S
Potassium chromate	sat. sol	S	S
Potassium cyanide	sol.	S	S
Potassium dichromate	sat. sol.	S	S
Potassium ferricyanide	sat. sol	S	S
Potassium ferrocyanide	sat. sol	S	S
Potassium fluorid	sat. sol	S	S
Potassium hydroxide	10%	S	S
Potassium hydroxide	sol.	S	S
Potassium hypochlorite	sol.	S	L
Potassium nitrate	sat. sol	S	S
Potassium orthophosphate	sat. sol	S	S
Potassium perchlorate	sat. sol	S	S
Potassium permanganate	20%	S	S
Potassium persulfate	sat. sol.	S	S
Potassium sulfate	sat. sol.	S	S
Potassium sulfite	sol.	S	S
Propionic acid	50%	S	S
Propionic acid	100%	S	L
Pyridine	100%	S	L
Q			
Quinol (Hydroquinone)	sat. sol.	S	S
S			
Salicylic acid	sat. sol	S	S

Medium	Concentration	Resistance at: 20° C (68° F)	Resistance at: 60° C (140° F)
Silver acetate	sat. sol.	S	S
Silver cyanide	sat. sol	S	S
Silver nitrate	sat. sol.	S	S
Sodium benzoate	sat. sol.	S	S
Sodium bicarbonate	sat. sol.	S	S
Sodium biphosphate	sat. sol.	S	S
Sodium bisulfite	sol.	S	S
Sodium bromide	sat. sol.	S	S
Sodium carbonate	sat. sol.	S	S
Sodium chlorate	sat. sol.	S	S
Sodium chloride	sat. sol.	S	S
Sodium cyanide	sat. sol.	S	S
Sodium ferricyanide	sat. sol.	S	S
Sodium ferrocyanide	sat. sol.	S	S
Sodium fluoride	sat. sol.	S	S
Sodium hydroxide	40%	S	S
Sodium hydroxide	sat. sol.	S	S
Sodium hypochlorite	15% active chlorine	S	S
Sodium nitrate	sat. sol.	S	S
Sodium nitrite	sat. sol	S	S
Sodium orthophosphate	sat. sol.	S	S
Sodium sulfate	sat. sol.	S	S
Sodium sulfide	sat. sol	S	S
Sulfur dioxide, dry	100%	S	S
Sulfur trioxide	100%	U	U
Sulfuric acid	10%	S	S
Sulfuric acid	50%	S	S
Sulfuric acid	98%	S	U
Sulfuric acid	fuming	U	U
Sulfurous acid	30%	S	S
T			
Tannic acid	sol.	S	S
Tartaric acid	sol.	S	S
Thionyl chloride	100%	L	U
Toluene	100%	L	U
Triethylamine	sol.	S	L
U			
Urea	sol.	S	S
Urine	—	S	S
W			
Water	—	S	S
Wine vinegar	—	S	S
Wines and liquors	—	S	S
X			
Xylenes	100%	L	U
Y			
Yeast	sol.	S	S
Z			
Zinc chloride	sat. sol	S	S
Zinc (II) chloride	sat. sol	S	S
Zinc (IV) chloride	sat. sol	S	S
Zinc oxide	sat. sol	S	S
Zinc sulfate	sat. sol.	S	S

Specific immersion testing should be undertaken to ascertain the suitability
of chemicals not listed above with reference to special requirements.

Notes:

(S) Satisfactory: Liner material is resistant to the given reagent at the given concentration and temperature. No mechanical or chemical degradation is observed

(L) Limited Application Possible: Liner material may reflect some attack. Factors such as concentration, pressure and temperature directly affect liner performance against the given media. Application, however, is possible under less severe conditions, e.g. lower concentration, secondary containment, additional liner protections, etc

(U) Unsatisfactory: Liner material is not resistant to the given reagent at the given concentration and temperature. Mechanical and/or chemical degradation is observed

(–) Not tested

sat. sol. = Saturated aqueous solution, prepared at 20°C (68°F)

sol. = aqueous solution with concentration above 10% but below saturation level

dil. sol. = diluted aqueous solution with concentration below 10%

cust. conc. = customary service concentration

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

GSE
ENVIRONMENTAL™

[DURABILITY RUNS DEEP] For more information on this product and others, please visit us at GSEworld.com, call 800 435 2008 or contact your local sales office

Appendix Q

Energy Laboratories, Inc. Certifications

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

JUL 12 2012

Ref: 8TMS-L

Mr. Jim Judge
Energy Laboratories
2393 Salt Creek Highway
Casper, WY 82601

Dear Mr. Judge:

In accordance with the authority as stated in 40 CFR 141 and 142, EPA Region 8 staff has reviewed your request for reciprocal certification for drinking water contaminants along with the documentation that was attached. Based upon the recommendation of my staff, I hereby grant certification for the State of Wyoming and all tribal public water systems in EPA Region 8 to Energy Labs facilities located at 2393 Salt Creek Highway and contiguous facilities at 2325 Kerzell Lane in Casper, Wyoming for the chemical parameters, methods, and certification status listed below. This reciprocal certification is based on the National Environmental Laboratory Accreditation Program (NELAP) accreditation of your laboratory by the State of Florida. This letter also reflects your laboratory's certification status following the Region's 2010 microbiology and 2011 radiochemistry on-site evaluations.

		Certification		
Parameter	**Method(s)**	**Begin Date**	**End Date**	**Status**
Group: Disinfection Byproducts				
TTHM	524.2	7/1/2012	6/30/2013	Reciprocal
Group: Copper & Lead				
Copper	200.7	7/1/2012	6/30/2013	Reciprocal
	200.8	7/1/2012	6/30/2013	Reciprocal
Lead	200.8	7/1/2012	6/30/2013	Reciprocal
Group: Nitrate & Nitrite				
Nitrate	300.0	7/1/2012	6/30/2013	Reciprocal
	353.2	7/1/2012	6/30/2013	Reciprocal
Nitrite	300.0	7/1/2012	6/30/2013	Reciprocal
	4500-NO_2^- B	7/1/2012	6/30/2013	Reciprocal
Nitrate + Nitrite	300.0	7/1/2012	6/30/2013	Reciprocal
	353.2	7/1/2012	6/30/2013	Reciprocal
Group: Metals				
Antimony	200.8	7/1/2012	6/30/2013	Reciprocal
Arsenic	SM 3114B	7/1/2012	6/30/2013	Reciprocal
	200.8	7/1/2012	6/30/2013	Reciprocal
Barium	200.8	7/1/2012	6/30/2013	Reciprocal
	200.7	7/1/2012	6/30/2013	Reciprocal
Beryllium	200.7	7/1/2012	6/30/2013	Reciprocal
	200.8	7/1/2012	6/30/2013	Reciprocal
Cadmium	200.8	7/1/2012	6/30/2013	Reciprocal
	200.7	7/1/2012	6/30/2013	Reciprocal
Chromium	200.7	7/1/2012	6/30/2013	Reciprocal
	200.8	7/1/2012	6/30/2013	Reciprocal

Parameter	Method(s)	Certification		
		Begin Date	End Date	Status
Mercury	200.8	7/1/2012	6/30/2013	Reciprocal
	SM 3112B	7/1/2012	6/30/2013	Reciprocal
	245.1	7/1/2012	6/30/2013	Reciprocal
Selenium	200.8	7/1/2012	6/30/2013	Reciprocal
Thallium	200.8	7/1/2012	6/30/2013	Reciprocal
Group: Inorganics				
Fluoride	300.0	7/1/2012	6/30/2013	Reciprocal
	4500-F^{-} C	7/1/2012	6/30/2013	Reciprocal
Group: Synthetic Organic Contaminants Phase II				
Carbofuran	531.1	7/1/2012	6/30/2013	Reciprocal
Dibromochloropropane	504.1	7/1/2012	6/30/2013	Reciprocal
Ethylene dibromide	504.1	7/1/2012	6/30/2013	Reciprocal
Group: Synthetic Organic Contaminants Phase V				
Diquat	549.2	7/1/2012	6/30/2013	Reciprocal
Glyphosate	547	7/1/2012	6/30/2013	Reciprocal
Oxamyl	531.1	7/1/2012	6/30/2013	Reciprocal
Group: Volatile Organic Contaminants				
1, 1, 1-Trichloroethane	524.2	7/1/2012	6/30/2013	Reciprocal
1, 1, 2-Trichloroethane	524.2	7/1/2012	6/30/2013	Reciprocal
1, 1-Dichloroethylene	524.2	7/1/2012	6/30/2013	Reciprocal
1, 2, 4-Trichlorobenzene	524.2	7/1/2012	6/30/2013	Reciprocal
1, 2-Dichlorobenzene	524.2	7/1/2012	6/30/2013	Reciprocal
1, 2- Dichloroethane	524.2	7/1/2012	6/30/2013	Reciprocal
1, 2-Dichloropropane	524.2	7/1/2012	6/30/2013	Reciprocal
1, 4-Dichlorobenzene	524.2	7/1/2012	6/30/2013	Reciprocal
Benzene	524.2	7/1/2012	6/30/2013	Reciprocal
Carbon Tetrachloride	524.2	7/1/2012	6/30/2013	Reciprocal
Chlorobenzene	524.2	7/1/2012	6/30/2013	Reciprocal
Cis-1, 2-dichloroethylene	524.2	7/1/2012	6/30/2013	Reciprocal
Dichloromethane	524.2	7/1/2012	6/30/2013	Reciprocal
Ethylbenzene	524.2	7/1/2012	6/30/2013	Reciprocal
Styrene	524.2	7/1/2012	6/30/2013	Reciprocal
Tetrachloroethylene	524.2	7/1/2012	6/30/2013	Reciprocal
Toluene	524.2	7/1/2012	6/30/2013	Reciprocal
Trans-1, 2-dichloroethylene	524.2	7/1/2012	6/30/2013	Reciprocal
Trichloroethylene	524.2	7/1/2012	6/30/2013	Reciprocal
Vinyl Chloride	524.2	7/1/2012	6/30/2013	Reciprocal
Xylenes	524.2	7/1/2012	6/30/2013	Reciprocal
Group: Radiochemical Contaminants				
Gross Alpha	EPA 900.0	10/1/2011	4/12/2014	Full
Gross Beta	EPA 900.0	10/1/2011	4/12/2014	Full
Radium-226	EPA 903.0	10/1/2011	4/12/2014	Full
Radium-228	Ra-05	10/1/2011	4/12/2014	Full
Uranium	200.8	7/1/2012	6/30/2013	Reciprocal
	Sm 7500-U C	7/1/2012	6/30/2013	Reciprocal
Radioactive Strontium 90	EPA 905.0	10/1/2011	4/12/2014	Full
Tritium	EPA 906.0	10/1/2011	4/12/2014	Full
Cesium-134	EPA 901.1	10/1/2011	4/12/2014	Full
Iodine-131	EPA 901.1	10/1/2011	4/12/2014	Full
Gamma Emitters	EPA 901.1	10/1/2011	4/12/2014	Full
Group: Microbiological Contaminants				
Total Coliforms	9223 B Colilert^{a} (Detect)	9/23/2010	9/23/2013	Full
	9223 B Colilert QuantiTray^{b} (Count)	9/23/2010	9/23/2013	Full
	9221 D^{a} MTF, P-A Broth (Detect)	9/23/2010	9/23/2013	Full
E. coli	9223 B^{a,c} Colilert (Detect)	9/23/2010	9/23/2013	Full
	9223 B QuantiTray^{d} (Count)	9/23/2010	9/23/2013	Full
	9221 D->F ^{a,c,d} (Detect & Count)	9/23/2010	9/23/2013	Full
Heterotrophic Plate Count	SimPlate^{b} (Count)	9/23/2010	9/23/2013	Full
Fecal Coliforms	9221 D->E^{a} (Detect)	9/23/2010	9/23/2013	Full

a - Drinking Water - Total Coliform Rule 40 CFR 141.21
b- Source Water - Surface Water Treatment Rule 40 CFR 141.74
c- Ground Water - Ground Water Rule 40 CFR 141.402
d- Source Water - Long Term 2 Enhanced Surface Water Treatment Rule (LT2) 40 CFR 136.3

The expiration date for each parameter is listed in the tables above. Certification will remain in effect for the specified period, under the conditions that the laboratory follow the specified methods and that Water Supply Proficiency Testing (PT) samples are analyzed by the laboratory for each of the above listed parameters with acceptable results at a frequency of once per year. It is the laboratory's responsibility to request reciprocal certification beyond the scope in the table above.

If you have comments or questions, please contact Marcie Tidd, Region 8 Drinking Water Laboratory Certification Program Manager, at 303-312-7764.

Sincerely,

Judith Wong

Judith Wong
Assistant Regional Administrator
Office of Technical & Management Services

State of Utah

Department of Health

Environmental Laboratory Certification Program

Certification is hereby granted to

Energy Laboratories Incorporated - Casper

2393 Salt Creek Highway
Casper, WY 82601

Has conformed with the
2009 TNI Standard
Scope of accreditiation is limited to the
State of Utah Accredited Fields of Accreditiation
Which accompanies this Certificate

EPA Number: WY00002
Expiration Date: 6/30/2013
Certificate Number: WY000022012-3

Robyn M. Atkinson, Ph.D, HCLD
Director, Unified State Laboratories: Public Health

Continued accredited status depends on successful ongoing particitpation in the program.

UTAH DEPARTMENT OF
HEALTH

State of Utah
Gary R Herbert
Governor
Gregory S Bell
Lieutenant Governor

Utah Department of Health
W. David Patton Ph.D
Executive Director

Disease Control and Prevention
Robyn M. Atkinson, Ph.D, HCLD
Director, Unified State Laboratories: Public Health

Bureau of Laboratory Improvement
David B Mendenhall, MPA, MT (ASCP)
Bureau Director

EPA Number: *WY00002* **Attachment to Certificate Number: WY000022012-3**

Energy Laboratories Incorporated - Casper

Program/Matrix: *CWA (Non Potable Water)*

	Start Date	Expires	AB
Method EPA 1664A (HEM)			
Oil & Grease	7/1/2012	6/30/2013	FL
Total recoverable petroleum hydrocarbons (TRPH)	7/1/2012	6/30/2013	FL
Method EPA 200.7			
Aluminum	7/1/2012	6/30/2013	FL
Antimony	7/1/2012	6/30/2013	FL
Arsenic	7/1/2012	6/30/2013	FL
Barium	7/1/2012	6/30/2013	FL
Beryllium	7/1/2012	6/30/2013	FL
Boron	7/1/2012	6/30/2013	FL
Cadmium	7/1/2012	6/30/2013	FL
Calcium	7/1/2012	6/30/2013	FL
Chromium	7/1/2012	6/30/2013	FL
Cobalt	7/1/2012	6/30/2013	FL
Copper	7/1/2012	6/30/2013	FL
Iron	7/1/2012	6/30/2013	FL
Lead	7/1/2012	6/30/2013	FL
Magnesium	7/1/2012	6/30/2013	FL
Manganese	7/1/2012	6/30/2013	FL
Molybdenum	7/1/2012	6/30/2013	FL
Nickel	7/1/2012	6/30/2013	FL
Phosphorus, total	7/1/2012	6/30/2013	FL
Potassium	7/1/2012	6/30/2013	FL
Selenium	7/1/2012	6/30/2013	FL
Silica as SiO2	7/1/2012	6/30/2013	FL
Silver	7/1/2012	6/30/2013	FL
Sodium	7/1/2012	6/30/2013	FL
Strontium	7/1/2012	6/30/2013	FL
Thallium	7/1/2012	6/30/2013	FL
Titanium	7/1/2012	6/30/2013	FL
Vanadium	7/1/2012	6/30/2013	FL
Zinc	7/1/2012	6/30/2013	FL
Method EPA 200.8			
Aluminum	7/1/2012	6/30/2013	FL
Antimony	7/1/2012	6/30/2013	FL
Arsenic	7/1/2012	6/30/2013	FL

Program/Matrix: *CWA (Non Potable Water)*

	Start Date	Expires	AB
Barium	7/1/2012	6/30/2013	FL
Beryllium	7/1/2012	6/30/2013	FL
Boron	7/1/2012	6/30/2013	FL
Cadmium	7/1/2012	6/30/2013	FL
Calcium	7/1/2012	6/30/2013	FL
Chromium	7/1/2012	6/30/2013	FL
Cobalt	7/1/2012	6/30/2013	FL
Copper	7/1/2012	6/30/2013	FL
Lead	7/1/2012	6/30/2013	FL
Manganese	7/1/2012	6/30/2013	FL
Mercury	7/1/2012	6/30/2013	FL
Molybdenum	7/1/2012	6/30/2013	FL
Nickel	7/1/2012	6/30/2013	FL
Potassium	7/1/2012	6/30/2013	FL
Selenium	7/1/2012	6/30/2013	FL
Silver	7/1/2012	6/30/2013	FL
Sodium	7/1/2012	6/30/2013	FL
Strontium	7/1/2012	6/30/2013	FL
Thallium	7/1/2012	6/30/2013	FL
Thorium	7/1/2012	6/30/2013	FL
Tin	7/1/2012	6/30/2013	FL
Titanium	7/1/2012	6/30/2013	FL
Uranium	7/1/2012	6/30/2013	FL
Vanadium	7/1/2012	6/30/2013	FL
Zinc	7/1/2012	6/30/2013	FL
Method EPA 245.1			
Mercury	7/1/2012	6/30/2013	FL
Method EPA 245.7			
Mercury	7/1/2012	6/30/2013	FL
Method EPA 300.0			
Bromide	7/1/2012	6/30/2013	FL
Chloride	7/1/2012	6/30/2013	FL
Fluoride	7/1/2012	6/30/2013	FL
Nitrate as N	7/1/2012	6/30/2013	FL
Nitrate-nitrite	7/1/2012	6/30/2013	FL
Nitrite as N	7/1/2012	6/30/2013	FL
Orthophosphate as P	7/1/2012	6/30/2013	FL
Sulfate	7/1/2012	6/30/2013	FL
Method EPA 353.2			
Nitrate-nitrite	7/1/2012	6/30/2013	FL
Method EPA 900			
Gross-alpha	7/1/2012	6/30/2013	FL
Gross-beta	7/1/2012	6/30/2013	FL
Method EPA 903			
Radium-226	7/1/2012	6/30/2013	FL
Method HACH 8000			
Chemical oxygen demand	7/1/2012	6/30/2013	FL

Energy Laboratories Incorporated - Casper	**Start Date**	**Expires**	**AB**
Program/Matrix: ***CWA (Non Potable Water)***			
Method SM 2320 B			
Alkalinity as CaCO3	7/1/2012	6/30/2013	FL
Method SM 2340 B			
Total hardness as CaCO3	7/1/2012	6/30/2013	FL
Method SM 2510 B			
Conductivity	7/1/2012	6/30/2013	FL
Method SM 2540 C			
Residue-filterable (TDS)	7/1/2012	6/30/2013	FL
Method SM 2540 D			
Residue-nonfilterable (TSS)	7/1/2012	6/30/2013	FL
Method SM 3112 B			
Mercury	7/1/2012	6/30/2013	FL
Method SM 3114 B			
Arsenic	7/1/2012	6/30/2013	FL
Selenium	7/1/2012	6/30/2013	FL
Method SM 4500-Cl^- B			
Chloride	7/1/2012	6/30/2013	FL
Method SM 4500-F^- C			
Fluoride	7/1/2012	6/30/2013	FL
Method SM 4500-H+ B			
pH	7/1/2012	6/30/2013	FL
Method SM 4500-NH3 G			
Ammonia as N	7/1/2012	6/30/2013	FL
Method SM 4500-$NO2^-$ B			
Nitrite as N	7/1/2012	6/30/2013	FL
Method SM 4500-$SO4^-$ E			
Sulfate	7/1/2012	6/30/2013	FL
Method SM 5310 C			
Total organic carbon	7/1/2012	6/30/2013	FL
Method SM 7500-U C			
Uranium	7/1/2012	6/30/2013	FL

Energy Laboratories Incorporated - Casper	**Start Date**	**Expires**	**AB**
Program/Matrix: ***RCRA (Non Potable Water)***			
Method EPA 1664A			
Total recoverable petroleum hydrocarbons (TRPH)	7/1/2012	6/30/2013	FL
Method EPA 1664A (HEM)			
Oil & Grease	7/1/2012	6/30/2013	FL
Method EPA 3010A			
Preparation/Extraction	7/1/2012	6/30/2013	FL
Method EPA 3510C			
Preparation/Extraction	7/1/2012	6/30/2013	FL
Method EPA 5030			
Preparation/Extraction	7/1/2012	6/30/2013	FL
Method EPA 6010A			
Arsenic	7/1/2012	6/30/2013	FL
Method EPA 6010B			
Arsenic	7/1/2012	6/30/2013	FL
Barium	7/1/2012	6/30/2013	FL
Cadmium	7/1/2012	6/30/2013	FL
Chromium	7/1/2012	6/30/2013	FL
Lead	7/1/2012	6/30/2013	FL
Selenium	7/1/2012	6/30/2013	FL
Silver	7/1/2012	6/30/2013	FL
Method EPA 6020			
Arsenic	7/1/2012	6/30/2013	FL
Barium	7/1/2012	6/30/2013	FL
Cadmium	7/1/2012	6/30/2013	FL
Chromium	7/1/2012	6/30/2013	FL
Lead	7/1/2012	6/30/2013	FL
Mercury	7/1/2012	6/30/2013	FL
Selenium	7/1/2012	6/30/2013	FL
Silica as SiO2	7/1/2012	6/30/2013	FL
Silver	7/1/2012	6/30/2013	FL
Method EPA 7470A			
Mercury	7/1/2012	6/30/2013	FL
Method EPA 8015B			
Diesel range organics (DRO)	7/1/2012	6/30/2013	FL
Gasoline range organics (GRO)	7/1/2012	6/30/2013	FL
Method EPA 8260B			
1,1,1,2-Tetrachloroethane	7/1/2012	6/30/2013	FL
1,1,1-Trichloroethane	7/1/2012	6/30/2013	FL
1,1,2,2-Tetrachloroethane	7/1/2012	6/30/2013	FL
1,1,2-Trichloroethane	7/1/2012	6/30/2013	FL
1,1-Dichloroethane	7/1/2012	6/30/2013	FL
1,1-Dichloroethylene	7/1/2012	6/30/2013	FL
1,1-Dichloropropene	7/1/2012	6/30/2013	FL
1,2,3-Trichlorobenzene	7/1/2012	6/30/2013	FL
1,2,3-Trichloropropane	7/1/2012	6/30/2013	FL
1,2,4-Trichlorobenzene	7/1/2012	6/30/2013	FL

Program/Matrix: *RCRA (Non Potable Water)*

	Start Date	Expires	AB
1,2,4-Trimethylbenzene	7/1/2012	6/30/2013	FL
1,2-Dibromo-3-chloropropane (DBCP)	7/1/2012	6/30/2013	FL
1,2-Dibromoethane (EDB, Ethylene dibromide)	7/1/2012	6/30/2013	FL
1,2-Dichlorobenzene (o-Dichlorobenzene)	7/1/2012	6/30/2013	FL
1,2-Dichloroethane (Ethylene dichloride)	7/1/2012	6/30/2013	FL
1,2-Dichloropropane	7/1/2012	6/30/2013	FL
1,3,5-Trimethylbenzene	7/1/2012	6/30/2013	FL
1,3-Dichlorobenzene	7/1/2012	6/30/2013	FL
1,3-Dichloropropane	7/1/2012	6/30/2013	FL
1,4-Dichlorobenzene	7/1/2012	6/30/2013	FL
1-Chlorohexane	7/1/2012	6/30/2013	FL
2,2-Dichloropropane	7/1/2012	6/30/2013	FL
2-Butanone (Methyl ethyl ketone, MEK)	7/1/2012	6/30/2013	FL
2-Chloroethyl vinyl ether	7/1/2012	6/30/2013	FL
2-Chlorotoluene	7/1/2012	6/30/2013	FL
2-Hexanone	7/1/2012	6/30/2013	FL
4-Chlorotoluene	7/1/2012	6/30/2013	FL
4-Methyl-2-pentanone (MIBK)	7/1/2012	6/30/2013	FL
Acetone	7/1/2012	6/30/2013	FL
Acetonitrile	7/1/2012	6/30/2013	FL
Acrolein (Propenal)	7/1/2012	6/30/2013	FL
Acrylonitrile	7/1/2012	6/30/2013	FL
Allyl chloride (3-Chloropropene)	7/1/2012	6/30/2013	FL
Benzene	7/1/2012	6/30/2013	FL
Bromobenzene	7/1/2012	6/30/2013	FL
Bromochloromethane	7/1/2012	6/30/2013	FL
Bromodichloromethane	7/1/2012	6/30/2013	FL
Bromoform	7/1/2012	6/30/2013	FL
Carbon disulfide	7/1/2012	6/30/2013	FL
Carbon tetrachloride	7/1/2012	6/30/2013	FL
Chlorobenzene	7/1/2012	6/30/2013	FL
Chlorodibromomethane	7/1/2012	6/30/2013	FL
Chloroethane (Ethyl chloride)	7/1/2012	6/30/2013	FL
Chloroform	7/1/2012	6/30/2013	FL
Chloroprene (2-Chloro-1,3-butadiene)	7/1/2012	6/30/2013	FL
cis-1,2-Dichloroethylene	7/1/2012	6/30/2013	FL
cis-1,3-Dichloropropene	7/1/2012	6/30/2013	FL
Dibromomethane (Methylene bromide)	7/1/2012	6/30/2013	FL
Dichlorodifluoromethane (Freon-12)	7/1/2012	6/30/2013	FL
Diethyl ether	7/1/2012	6/30/2013	FL
Ethyl acetate	7/1/2012	6/30/2013	FL
Ethyl methacrylate	7/1/2012	6/30/2013	FL
Ethylbenzene	7/1/2012	6/30/2013	FL
Hexachlorobutadiene	7/1/2012	6/30/2013	FL
Iodomethane (Methyl iodide)	7/1/2012	6/30/2013	FL
Isobutyl alcohol (2-Methyl-1-propanol)	7/1/2012	6/30/2013	FL
Isopropylbenzene	7/1/2012	6/30/2013	FL
Methyl bromide (Bromomethane)	7/1/2012	6/30/2013	FL
Methyl chloride (Chloromethane)	7/1/2012	6/30/2013	FL

	Start Date	Expires	AB
Program/Matrix: ***RCRA (Non Potable Water)***			
Methyl tert-butyl ether (MTBE)	7/1/2012	6/30/2013	FL
Methylene chloride (Dichloromethane)	7/1/2012	6/30/2013	FL
Naphthalene	7/1/2012	6/30/2013	FL
n-Butylbenzene	7/1/2012	6/30/2013	FL
n-Propylbenzene	7/1/2012	6/30/2013	FL
Propionitrile (Ethyl cyanide)	7/1/2012	6/30/2013	FL
sec-Butylbenzene	7/1/2012	6/30/2013	FL
Styrene	7/1/2012	6/30/2013	FL
tert-Butylbenzene	7/1/2012	6/30/2013	FL
Tetrachloroethylene (Perchloroethylene)	7/1/2012	6/30/2013	FL
Toluene	7/1/2012	6/30/2013	FL
trans-1,2-Dichloroethylene	7/1/2012	6/30/2013	FL
trans-1,3-Dichloropropylene	7/1/2012	6/30/2013	FL
trans-1,4-Dichloro-2-butene	7/1/2012	6/30/2013	FL
Trichloroethene (Trichloroethylene)	7/1/2012	6/30/2013	FL
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	7/1/2012	6/30/2013	FL
Vinyl acetate	7/1/2012	6/30/2013	FL
Vinyl chloride	7/1/2012	6/30/2013	FL
Xylene (total)	7/1/2012	6/30/2013	FL
Method EPA 9020			
Total organic halides (TOX)	7/1/2012	6/30/2013	FL
Method EPA 9040			
pH	7/1/2012	6/30/2013	FL

Program/Matrix: ***RCRA (Solid & Hazardous Material)***

	Start Date	Expires	AB
Method EPA 1311			
Toxicity Characteristic Leaching Procedure Metals	7/1/2012	6/30/2013	FL
Toxicity Characteristic Leaching Procedure Volatiles	7/1/2012	6/30/2013	FL
Method EPA 3050B			
Preparation/Extraction	7/1/2012	6/30/2013	FL
Method EPA 3550A			
Preparation/Extraction	7/1/2012	6/30/2013	FL
Method EPA 5035			
Preparation/Extraction	7/1/2012	6/30/2013	FL
Method EPA 6010B			
Antimony	7/1/2012	6/30/2013	FL
Arsenic	7/1/2012	6/30/2013	FL
Barium	7/1/2012	6/30/2013	FL
Cadmium	7/1/2012	6/30/2013	FL
Chromium	7/1/2012	6/30/2013	FL
Lead	7/1/2012	6/30/2013	FL
Selenium	7/1/2012	6/30/2013	FL
Silver	7/1/2012	6/30/2013	FL
Method EPA 6020			
Arsenic	7/1/2012	6/30/2013	FL
Barium	7/1/2012	6/30/2013	FL
Cadmium	7/1/2012	6/30/2013	FL
Chromium	7/1/2012	6/30/2013	FL
Lead	7/1/2012	6/30/2013	FL
Selenium	7/1/2012	6/30/2013	FL
Silver	7/1/2012	6/30/2013	FL
Method EPA 7471A			
Mercury	7/1/2012	6/30/2013	FL
Method EPA 8015B			
Diesel range organics (DRO)	7/1/2012	6/30/2013	FL
Gasoline range organics (GRO)	7/1/2012	6/30/2013	FL
Method EPA 8260B			
1,1,1,2-Tetrachloroethane	7/1/2012	6/30/2013	FL
1,1,1-Trichloroethane	7/1/2012	6/30/2013	FL
1,1,2,2-Tetrachloroethane	7/1/2012	6/30/2013	FL
1,1,2-Trichloroethane	7/1/2012	6/30/2013	FL
1,1-Dichloroethane	7/1/2012	6/30/2013	FL
1,1-Dichloroethylene	7/1/2012	6/30/2013	FL
1,1-Dichloropropene	7/1/2012	6/30/2013	FL
1,2,3-Trichlorobenzene	7/1/2012	6/30/2013	FL
1,2,3-Trichloropropane	7/1/2012	6/30/2013	FL
1,2,4-Trichlorobenzene	7/1/2012	6/30/2013	FL
1,2,4-Trimethylbenzene	7/1/2012	6/30/2013	FL
1,2-Dibromo-3-chloropropane (DBCP)	7/1/2012	6/30/2013	FL
1,2-Dibromoethane (EDB, Ethylene dibromide)	7/1/2012	6/30/2013	FL
1,2-Dichlorobenzene (o-Dichlorobenzene)	7/1/2012	6/30/2013	FL
1,2-Dichloroethane (Ethylene dichloride)	7/1/2012	6/30/2013	FL

Program/Matrix: ***RCRA (Solid & Hazardous Material)***

	Start Date	Expires	AB
1,2-Dichloropropane	7/1/2012	6/30/2013	FL
1,3,5-Trimethylbenzene	7/1/2012	6/30/2013	FL
1,3-Dichlorobenzene	7/1/2012	6/30/2013	FL
1,3-Dichloropropane	7/1/2012	6/30/2013	FL
1,4-Dichlorobenzene	7/1/2012	6/30/2013	FL
2,2-Dichloropropane	7/1/2012	6/30/2013	FL
2-Butanone (Methyl ethyl ketone, MEK)	7/1/2012	6/30/2013	FL
2-Chloroethyl vinyl ether	7/1/2012	6/30/2013	FL
2-Chlorotoluene	7/1/2012	6/30/2013	FL
2-Hexanone	7/1/2012	6/30/2013	FL
4-Chlorotoluene	7/1/2012	6/30/2013	FL
4-Methyl-2-pentanone (MIBK)	7/1/2012	6/30/2013	FL
Acetone	7/1/2012	6/30/2013	FL
Acetonitrile	7/1/2012	6/30/2013	FL
Acrolein (Propenal)	7/1/2012	6/30/2013	FL
Acrylonitrile	7/1/2012	6/30/2013	FL
Allyl chloride (3-Chloropropene)	7/1/2012	6/30/2013	FL
Benzene	7/1/2012	6/30/2013	FL
Bromobenzene	7/1/2012	6/30/2013	FL
Bromochloromethane	7/1/2012	6/30/2013	FL
Bromodichloromethane	7/1/2012	6/30/2013	FL
Bromoform	7/1/2012	6/30/2013	FL
Carbon disulfide	7/1/2012	6/30/2013	FL
Carbon tetrachloride	7/1/2012	6/30/2013	FL
Chlorobenzene	7/1/2012	6/30/2013	FL
Chlorodibromomethane	7/1/2012	6/30/2013	FL
Chloroethane (Ethyl chloride)	7/1/2012	6/30/2013	FL
Chloroform	7/1/2012	6/30/2013	FL
Chloroprene (2-Chloro-1,3-butadiene)	7/1/2012	6/30/2013	FL
cis-1,2-Dichloroethylene	7/1/2012	6/30/2013	FL
cis-1,3-Dichloropropene	7/1/2012	6/30/2013	FL
Dibromomethane (Methylene bromide)	7/1/2012	6/30/2013	FL
Dichlorodifluoromethane (Freon-12)	7/1/2012	6/30/2013	FL
Diethyl ether	7/1/2012	6/30/2013	FL
Ethyl methacrylate	7/1/2012	6/30/2013	FL
Ethylbenzene	7/1/2012	6/30/2013	FL
Hexachlorobutadiene	7/1/2012	6/30/2013	FL
Iodomethane (Methyl iodide)	7/1/2012	6/30/2013	FL
Isobutyl alcohol (2-Methyl-1-propanol)	7/1/2012	6/30/2013	FL
Isopropylbenzene	7/1/2012	6/30/2013	FL
Methyl bromide (Bromomethane)	7/1/2012	6/30/2013	FL
Methyl chloride (Chloromethane)	7/1/2012	6/30/2013	FL
Methyl tert-butyl ether (MTBE)	7/1/2012	6/30/2013	FL
Methylene chloride (Dichloromethane)	7/1/2012	6/30/2013	FL
Naphthalene	7/1/2012	6/30/2013	FL
n-Butylbenzene	7/1/2012	6/30/2013	FL
n-Propylbenzene	7/1/2012	6/30/2013	FL
Propionitrile (Ethyl cyanide)	7/1/2012	6/30/2013	FL
sec-Butylbenzene	7/1/2012	6/30/2013	FL

Energy Laboratories Incorporated - Casper	**Start Date**	**Expires**	**AB**
Program/Matrix: *RCRA (Solid & Hazardous Material)*			
Styrene	7/1/2012	6/30/2013	FL
tert-Butylbenzene	7/1/2012	6/30/2013	FL
Tetrachloroethylene (Perchloroethylene)	7/1/2012	6/30/2013	FL
Toluene	7/1/2012	6/30/2013	FL
trans-1,2-Dichloroethylene	7/1/2012	6/30/2013	FL
trans-1,3-Dichloropropylene	7/1/2012	6/30/2013	FL
trans-1,4-Dichloro-2-butene	7/1/2012	6/30/2013	FL
Trichloroethene (Trichloroethylene)	7/1/2012	6/30/2013	FL
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	7/1/2012	6/30/2013	FL
Vinyl acetate	7/1/2012	6/30/2013	FL
Vinyl chloride	7/1/2012	6/30/2013	FL
Xylene (total)	7/1/2012	6/30/2013	FL
Method EPA 9023			
Extractable organics halides (EOX)	7/1/2012	6/30/2013	FL
Method EPA 9045C			
pH	7/1/2012	6/30/2013	FL

	Start Date	Expires	AB
Program/Matrix: *SDWA (Potable Water)*			
Method Brooks/Blanchard Ra-228			
Radium-228	7/1/2012	6/30/2013	FL
Method EPA 200.8			
Uranium	7/1/2012	6/30/2013	FL
Method EPA 900.0			
Gross-alpha	7/1/2012	6/30/2013	FL
Gross-beta	7/1/2012	6/30/2013	FL
Method EPA 901.1			
Gamma Emitters	7/1/2012	6/30/2013	FL
Method EPA 903			
Radium-226	7/1/2012	6/30/2013	FL
Method EPA 905			
Strontium-90	7/1/2012	6/30/2013	FL
Method EPA 906			
Tritium	7/1/2012	6/30/2013	FL
Method EPA Ra-05			
Radium-228	7/1/2012	6/30/2013	FL
Method Radon in Drinking Water			
Radon-222	7/1/2012	6/30/2013	FL
Method SM 7500-U C			
Uranium	7/1/2012	6/30/2013	FL

The Utah Environmental Laboratory Certification Program (ELCP) encourages clients and data users to verify the most current certification letter for the authorized method.

The analytes by method which a laboratory is authorized to perform at any given time will be those indicated in the most recent certificate letter. The most recent certification letter supersedes all previous certification or authorization letters. It is the certified laboratory's responsibility to review this letter for discrepancies. The certified laboratory must document any discrepancies in this letter and send notice to this bureau within 15 days of receipt. This certificate letter will be recalled in the event your laboratory's certification is revoked.

Utah Department of Health
W. David Patton Ph.D
Executive Director

Disease Control and Prevention
Robyn M. Atkinson, Ph.D, HCLD
Director, Unified State Laboratories, Public Health

Bureau of Laboratory Improvement
David B Mendenhall, MPA, MT (ASCP)
Bureau Director

State of Utah
Gary R Herbert
Governor
Gregory S Bell
Lieutenant Governor

Energy Laboratories Incorporated - Casper

Thefollowing parameters have not been approved by the ELCP for certification.

Program/Matrix: ***CWA / Non Potable Water***

Method EPA 901.1

Gamma Emitters

Parameter not on Primary state accreditation letter.

Program/Matrix: ***RCRA / Solid & Hazardous Material***

Method EPA 8260B

1-Chlorohexane

Parameter not on Primary state accreditation letter.

Ethyl acetate

Parameter not on Primary state accreditation letter.

State of Florida
Department of Health, Bureau of Laboratories
This is to certify that

E87641

ENERGY LABORATORIES INC.
2393 SALT CREEK HWY
CASPER, WY 82602

has complied with Florida Administrative Code 64E-1,
for the examination of Environmental samples in the following categories

DRINKING WATER - GROUP I UNREGULATED CONTAMINANTS, DRINKING WATER - GROUP II UNREGULATED CONTAMINANTS, DRINKING WATER - OTHER REGULATED CONTAMINANTS, DRINKING WATER - PRIMARY INORGANIC CONTAMINANTS, DRINKING WATER - SECONDARY INORGANIC CONTAMINANTS, DRINKING WATER - RADIOCHEMISTRY, DRINKING WATER - SYNTHETIC ORGANIC CONTAMINANTS, NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS - EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

Date Issued: July 01, 2012   Expiration Date: June 30, 2013

Max Salfinger

Max Salfinger, M.D.
Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 7/04
NON-TRANSFERABLE E87641-27-07/01/2012
Supersedes all previously issued certificates

Laboratory Scope of Accreditation

Attachment to Certificate #: E87641-27, expiration date June 30, 2013. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: **E87641** EPA Lab Code: **WY00002** **(307) 235-0515**

E87641
Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Drinking Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	4/22/2009
1,1,1-Trichloroethane	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
1,1,2,2-Tetrachloroethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
1,1,2-Trichloroethane	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
1,1-Dichloroethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
1,1-Dichloroethylene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
1,1-Dichloropropene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
1,2,3-Trichlorobenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
1,2,3-Trichloropropane	EPA 504.1	Group II Unregulated Contaminants	NELAP	7/7/2009
1,2,3-Trichloropropane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
1,2,4-Trichlorobenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
1,2,4-Trimethylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504.1	Synthetic Organic Contaminants	NELAP	7/22/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 504.1	Synthetic Organic Contaminants	NELAP	7/22/2002
1,2-Dichlorobenzene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
1,2-Dichloroethane	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
1,2-Dichloropropane	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
1,3,5-Trimethylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
1,3-Dichlorobenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
1,3-Dichloropropane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
1,4-Dichlorobenzene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
2,2-Dichloropropane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
2-Chlorotoluene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
3-Hydroxycarbofuran	EPA 531.1	Group I Unregulated Contaminants	NELAP	7/22/2002
4-Chlorotoluene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
4-Isopropyltoluene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
Aldicarb (Temik)	EPA 531.1	Group I Unregulated Contaminants	NELAP	7/22/2002
Aldicarb sulfone	EPA 531.1	Group I Unregulated Contaminants	NELAP	7/22/2002
Aldicarb sulfoxide	EPA 531.1	Group I Unregulated Contaminants	NELAP	7/22/2002
Alkalinity as CaCO3	SM 2320 B	Primary Inorganic Contaminants	NELAP	7/22/2002
Aluminum	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Aluminum	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/7/2009
Antimony	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Arsenic	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Arsenic	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Arsenic	SM 3114 B	Primary Inorganic Contaminants	NELAP	7/22/2002

Matrix: **Drinking Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Barium	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Barium	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Benzene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Beryllium	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Beryllium	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Boron	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Bromide	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/7/2009
Bromobenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Bromochloromethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
Bromodichloromethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Bromoform	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Cadmium	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Cadmium	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Calcium	ELI-C-SOP 50-018-07/ICP-MS	Secondary Inorganic Contaminants	NELAP	1/12/2012
Calcium	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/22/2002
Carbaryl (Sevin)	EPA 531.1	Group I Unregulated Contaminants	NELAP	7/22/2002
Carbofuran (Furadan)	EPA 531.1	Synthetic Organic Contaminants	NELAP	7/22/2002
Carbon tetrachloride	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Chloride	EPA 300.0	Secondary Inorganic Contaminants	NELAP	7/22/2002
Chloride	SM 4500 Cl- B	Secondary Inorganic Contaminants	NELAP	7/22/2002
Chloroethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Chloroform	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Chromium	EPA 200.7	Primary Inorganic Contaminants	NELAP	1/12/2012
Chromium	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
cis-1,2-Dichloroethylene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
cis-1,3-Dichloropropene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Color	SM 2120 B	Secondary Inorganic Contaminants	NELAP	1/12/2012
Conductivity	SM 2510 B	Primary Inorganic Contaminants	NELAP	1/12/2012
Copper	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Copper	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Corrosivity (langlier index)	SM 2330 B	Secondary Inorganic Contaminants	NELAP	1/12/2012
Dibromochloromethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Dibromomethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Dichlorodifluoromethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Dichloromethane (DCM, Methylene chloride)	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Diquat	EPA 549.2	Synthetic Organic Contaminants	NELAP	7/22/2002

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Matrix: **Drinking Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Dissolved organic carbon (DOC)	SM 5310 C	Primary Inorganic Contaminants	NELAP	1/12/2012
Ethylbenzene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Fluoride	EPA 300.0	Primary Inorganic Contaminants,Secondary Inorganic Contaminants	NELAP	7/22/2002
Fluoride	SM 4500 F-C	Secondary Inorganic Contaminants	NELAP	7/22/2002
Glyphosate	EPA 547	Synthetic Organic Contaminants	NELAP	7/22/2002
Hardness	SM 2340 B	Secondary Inorganic Contaminants	NELAP	1/12/2012
Hexachlorobutadiene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
Iron	ELI-C-SOP 50-018-07/ICP-MS	Secondary Inorganic Contaminants	NELAP	1/12/2012
Iron	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Isopropylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
Lead	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Magnesium	ELI-C-SOP 50-018-07/ICP-MS	Secondary Inorganic Contaminants	NELAP	1/12/2012
Magnesium	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/22/2002
Manganese	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Manganese	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/7/2009
Mercury	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Mercury	EPA 245.1	Primary Inorganic Contaminants	NELAP	7/7/2009
Mercury	SM 3112 B	Primary Inorganic Contaminants	NELAP	7/22/2002
Methiocarb (Mesurol)	EPA 531.1	Group I Unregulated Contaminants	NELAP	1/12/2012
Methomyl (Lannate)	EPA 531.1	Group I Unregulated Contaminants	NELAP	7/22/2002
Methyl bromide (Bromomethane)	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Methyl chloride (Chloromethane)	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Methyl tert-butyl ether (MTBE)	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Molybdenum	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/7/2009
Naphthalene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
n-Butylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
Nickel	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Nickel	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Nitrate as N	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/22/2002
Nitrate as N	EPA 353.2	Primary Inorganic Contaminants	NELAP	7/22/2002
Nitrite as N	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/22/2002
Nitrite as N	SM 4500-NO2-B	Primary Inorganic Contaminants	NELAP	7/22/2002
n-Propylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
Orthophosphate as P	EPA 300.0	Primary Inorganic Contaminants	NELAP	4/10/2009

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Analyte	Method/Tech	Category	Certification Type	Effective Date
Oxamyl	EPA 531.1	Synthetic Organic Contaminants	NELAP	7/22/2002
pH	SM 4500-H B	Primary Inorganic Contaminants,Secondary Inorganic Contaminants	NELAP	7/22/2002
Potassium	ELI-C-SOP 50-018-07/ICP-MS	Secondary Inorganic Contaminants	NELAP	1/12/2012
Potassium	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Propoxur (Baygon)	EPA 531.1	Group I Unregulated Contaminants	NELAP	1/12/2012
Residue-filterable (TDS)	SM 2540 C	Secondary Inorganic Contaminants	NELAP	7/22/2002
sec-Butylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
Selenium	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/7/2009
Selenium	SM 3114 B	Primary Inorganic Contaminants	NELAP	1/12/2012
Silica as SiO2	EPA 200.7	Primary Inorganic Contaminants	NELAP	5/12/2009
Silver	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Silver	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/7/2009
Sodium	ELI-C-SOP 50-018-07/ICP-MS	Secondary Inorganic Contaminants	NELAP	1/12/2012
Sodium	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/22/2002
Styrene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Sulfate	EPA 300.0	Primary Inorganic Contaminants,Secondary Inorganic Contaminants	NELAP	7/22/2002
Sulfate	SM 4500 SO4-E	Secondary Inorganic Contaminants	NELAP	7/22/2002
Surfactants - MBAS	SM 5540 C	Secondary Inorganic Contaminants	NELAP	1/12/2012
tert-Butylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/7/2009
Tetrachloroethylene (Perchloroethylene)	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Thallium	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/22/2002
Toluene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Total nitrate-nitrite	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/22/2002
Total nitrate-nitrite	EPA 353.2	Primary Inorganic Contaminants	NELAP	7/22/2002
Total organic carbon	SM 5310 C	Primary Inorganic Contaminants	NELAP	7/22/2002
Total trihalomethanes	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
trans-1,2-Dichloroethylene	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
trans-1,3-Dichloropropene	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Trichloroethene (Trichloroethylene)	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Trichlorofluoromethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	7/22/2002
Turbidity	SM 2130 B	Secondary Inorganic Contaminants	NELAP	1/12/2012
Uranium	EPA 200.8	Radiochemistry	NELAP	2/17/2006
Vanadium	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009

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Matrix: **Drinking Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Vanadium	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/7/2009
Xylene (total)	EPA 524.2	Other Regulated Contaminants	NELAP	7/22/2002
Zinc	EPA 200.7	Primary Inorganic Contaminants	NELAP	7/7/2009
Zinc	EPA 200.8	Primary Inorganic Contaminants	NELAP	7/7/2009

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Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,1-Trichloroethane	EPA 624	Volatile Organics	NELAP	1/24/2001
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,2,2-Tetrachloroethane	EPA 624	Volatile Organics	NELAP	1/24/2001
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,2-Trichloroethane	EPA 624	Volatile Organics	NELAP	1/24/2001
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloroethane	EPA 624	Volatile Organics	NELAP	1/24/2001
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloroethylene	EPA 624	Volatile Organics	NELAP	1/24/2001
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	3/19/2010
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	1/24/2001
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichloroethane	EPA 624	Volatile Organics	NELAP	1/24/2001
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichloropropane	EPA 624	Volatile Organics	NELAP	1/24/2001
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	1/24/2001
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,4-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	1/24/2001
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1-Chlorohexane	EPA 8260	Volatile Organics	NELAP	7/1/2003
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Chloroethyl vinyl ether	EPA 624	Volatile Organics	NELAP	1/24/2001
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003

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Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
2-Hexanone	EPA 8260	Volatile Organics	NELAP	7/1/2003
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acetone	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acetonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acrolein (Propenal)	EPA 624	Volatile Organics	NELAP	1/24/2001
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acrylonitrile	EPA 624	Volatile Organics	NELAP	1/24/2001
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003
Alkalinity as CaCO3	SM 2320 B	General Chemistry	NELAP	1/24/2001
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Aluminum	EPA 200.7	Metals	NELAP	1/24/2001
Aluminum	EPA 200.8	Metals	NELAP	1/24/2001
Aluminum	EPA 6010	Metals	NELAP	7/1/2003
Aluminum	EPA 6020	Metals	NELAP	7/1/2003
Ammonia as N	SM 4500-NH3 G	General Chemistry	NELAP	1/24/2001
Antimony	EPA 200.7	Metals	NELAP	7/7/2009
Antimony	EPA 200.8	Metals	NELAP	1/24/2001
Antimony	EPA 6010	Metals	NELAP	7/7/2009
Antimony	EPA 6020	Metals	NELAP	7/1/2003
Arsenic	EPA 200.7	Metals	NELAP	9/2/2002
Arsenic	EPA 200.8	Metals	NELAP	1/24/2001
Arsenic	EPA 6010	Metals	NELAP	7/7/2009
Arsenic	EPA 6020	Metals	NELAP	7/1/2003
Arsenic	SM 3114 B	Metals	NELAP	1/24/2001
Barium	EPA 200.7	Metals	NELAP	1/24/2001
Barium	EPA 200.8	Metals	NELAP	1/24/2001
Barium	EPA 6010	Metals	NELAP	7/1/2003
Barium	EPA 6020	Metals	NELAP	7/1/2003
Benzene	EPA 624	Volatile Organics	NELAP	1/24/2001
Benzene	EPA 8021	Volatile Organics	NELAP	7/1/2003
Benzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Beryllium	EPA 200.7	Metals	NELAP	7/22/2002
Beryllium	EPA 200.8	Metals	NELAP	1/24/2001
Beryllium	EPA 6010	Metals	NELAP	7/7/2009
Beryllium	EPA 6020	Metals	NELAP	7/1/2003

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Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Biochemical oxygen demand	SM 5210 B	General Chemistry	NELAP	1/24/2001
Boron	EPA 200.7	Metals	NELAP	7/22/2002
Boron	EPA 6010	Metals	NELAP	7/1/2003
Boron	EPA 6020	Metals	NELAP	1/12/2012
Boron (limited CWA use only per EPA ATP)	EPA 200.8	Metals	NELAP	1/12/2012
Bromide	EPA 300.0	General Chemistry	NELAP	1/24/2001
Bromobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromodichloromethane	EPA 624	Volatile Organics	NELAP	1/24/2001
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromoform	EPA 624	Volatile Organics	NELAP	1/24/2001
Bromoform	EPA 8260	Volatile Organics	NELAP	7/1/2003
Cadmium	EPA 200.7	Metals	NELAP	7/22/2002
Cadmium	EPA 200.8	Metals	NELAP	1/24/2001
Cadmium	EPA 6010	Metals	NELAP	7/7/2009
Cadmium	EPA 6020	Metals	NELAP	7/1/2003
Calcium	ELI-C-SOP 50-018-07/ICP-MS	Metals	NELAP	1/12/2012
Calcium	EPA 200.7	Metals	NELAP	1/24/2001
Calcium	EPA 6010	Metals	NELAP	7/1/2003
Calcium	EPA 6020	Metals	NELAP	1/12/2012
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	7/1/2003
Carbon tetrachloride	EPA 624	Volatile Organics	NELAP	1/24/2001
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Carbonaceous BOD (CBOD)	SM 5210 B	General Chemistry	NELAP	1/24/2001
Chemical oxygen demand	HACH 8000	General Chemistry	NELAP	1/24/2001
Chloride	EPA 300.0	General Chemistry	NELAP	1/24/2001
Chloride	SM 4500 Cl- B	General Chemistry	NELAP	1/24/2001
Chlorobenzene	EPA 624	Volatile Organics	NELAP	1/24/2001
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroethane	EPA 624	Volatile Organics	NELAP	1/24/2001
Chloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroform	EPA 624	Volatile Organics	NELAP	1/24/2001
Chloroform	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroprene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chromium	EPA 200.7	Metals	NELAP	7/22/2002
Chromium	EPA 200.8	Metals	NELAP	1/24/2001

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Analyte	Method/Tech	Category	Certification Type	Effective Date
Chromium	EPA 6010	Metals	NELAP	7/7/2009
Chromium	EPA 6020	Metals	NELAP	7/1/2003
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
cis-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	1/24/2001
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Cobalt	EPA 200.7	Metals	NELAP	7/22/2002
Cobalt	EPA 200.8	Metals	NELAP	1/24/2001
Cobalt	EPA 6010	Metals	NELAP	7/7/2009
Cobalt	EPA 6020	Metals	NELAP	7/1/2003
Conductivity	SM 2510 B	General Chemistry	NELAP	1/24/2001
Copper	EPA 200.7	Metals	NELAP	7/22/2002
Copper	EPA 200.8	Metals	NELAP	1/24/2001
Copper	EPA 6010	Metals	NELAP	7/7/2009
Copper	EPA 6020	Metals	NELAP	7/1/2003
Dibromochloromethane	EPA 624	Volatile Organics	NELAP	1/24/2001
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dibromomethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	7/1/2003
Diethyl ether	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ethyl acetate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ethylbenzene	EPA 624	Volatile Organics	NELAP	1/24/2001
Ethylbenzene	EPA 8021	Volatile Organics	NELAP	7/1/2003
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Fluoride	EPA 300.0	General Chemistry	NELAP	1/24/2001
Fluoride	SM 4500 F-C	General Chemistry	NELAP	1/24/2001
Gasoline range organics (GRO)	EPA 8015	Extractable Organics	NELAP	7/1/2003
Hardness	SM 2340 B	Metals	NELAP	7/17/2002
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ignitability	EPA 1010	General Chemistry	NELAP	7/1/2003
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Iron	EPA 200.7	Metals	NELAP	1/24/2001
Iron	EPA 6010	Metals	NELAP	7/1/2003
Iron	EPA 6020	Metals	NELAP	1/12/2012
Iron (limited CWA use only per EPA ATP)	EPA 200.8	Metals	NELAP	11/22/2010

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State Laboratory ID: **E87641** EPA Lab Code: **WY00002** **(307) 235-0515**

E87641
Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Lead	EPA 200.7	Metals	NELAP	7/22/2002
Lead	EPA 200.8	Metals	NELAP	1/24/2001
Lead	EPA 6010	Metals	NELAP	7/7/2009
Lead	EPA 6020	Metals	NELAP	7/1/2003
Magnesium	EPA 200.7	Metals	NELAP	1/24/2001
Magnesium	EPA 200.8	Metals	NELAP	11/22/2010
Magnesium	EPA 6010	Metals	NELAP	7/1/2003
Magnesium	EPA 6020	Metals	NELAP	1/12/2012
Manganese	EPA 200.7	Metals	NELAP	1/24/2001
Manganese	EPA 200.8	Metals	NELAP	1/24/2001
Manganese	EPA 6010	Metals	NELAP	7/1/2003
Manganese	EPA 6020	Metals	NELAP	7/7/2009
Mercury	EPA 200.8	Metals	NELAP	1/24/2001
Mercury	EPA 245.1	Metals	NELAP	7/7/2009
Mercury	EPA 245.7	Metals	NELAP	1/12/2012
Mercury	EPA 6020	Metals	NELAP	1/12/2012
Mercury	EPA 7470	Metals	NELAP	7/1/2003
Mercury	SM 3112 B	Metals	NELAP	1/24/2001
Methyl bromide (Bromomethane)	EPA 624	Volatile Organics	NELAP	1/24/2001
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl chloride (Chloromethane)	EPA 624	Volatile Organics	NELAP	1/24/2001
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl tert-butyl ether (MTBE)	EPA 8021	Volatile Organics	NELAP	7/1/2003
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methylene chloride	EPA 624	Volatile Organics	NELAP	1/24/2001
Methylene chloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Molybdenum	EPA 200.7	Metals	NELAP	7/22/2002
Molybdenum	EPA 200.8	Metals	NELAP	1/24/2001
Molybdenum	EPA 6010	Metals	NELAP	7/1/2003
Molybdenum	EPA 6020	Metals	NELAP	7/7/2009
Naphthalene	EPA 8021	Volatile Organics	NELAP	7/1/2003
Naphthalene	EPA 8260	Volatile Organics	NELAP	7/1/2003
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Nickel	EPA 200.7	Metals	NELAP	7/22/2002

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Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Nickel	EPA 200.8	Metals	NELAP	1/24/2001
Nickel	EPA 6010	Metals	NELAP	7/7/2009
Nickel	EPA 6020	Metals	NELAP	7/1/2003
Nitrate as N	EPA 300.0	General Chemistry	NELAP	1/24/2001
Nitrate as N	EPA 353.2	General Chemistry	NELAP	1/24/2001
Nitrate-nitrite	EPA 300.0	General Chemistry	NELAP	1/24/2001
Nitrate-nitrite	EPA 353.2	General Chemistry	NELAP	1/24/2001
Nitrite as N	EPA 300.0	General Chemistry	NELAP	1/24/2001
Nitrite as N	SM 4500-NO2-B	General Chemistry	NELAP	1/24/2001
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Oil & Grease	EPA 1664A	General Chemistry	NELAP	1/24/2001
Orthophosphate as P	EPA 300.0	General Chemistry	NELAP	1/24/2001
pH	EPA 9040	General Chemistry	NELAP	7/1/2003
pH	SM 4500-H+-B	General Chemistry	NELAP	1/24/2001
Phosphorus	EPA 6020	Metals	NELAP	1/12/2012
Phosphorus, total	EPA 200.7	Metals	NELAP	7/22/2002
Phosphorus, total	EPA 6010	Metals	NELAP	7/1/2003
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Potassium	ELI-C-SOP 50-018-07/ICP-MS	Metals	NELAP	1/12/2012
Potassium	EPA 200.7	Metals	NELAP	1/24/2001
Potassium	EPA 6010	Metals	NELAP	7/1/2003
Potassium	EPA 6020	Metals	NELAP	1/12/2012
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Residue-filterable (TDS)	SM 2540 C	General Chemistry	NELAP	1/24/2001
Residue-nonfilterable (TSS)	SM 2540 D	General Chemistry	NELAP	7/7/2009
Residue-total	SM 2540 B	General Chemistry	NELAP	1/12/2012
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Selenium	EPA 200.7	Metals	NELAP	7/22/2002
Selenium	EPA 200.8	Metals	NELAP	1/24/2001
Selenium	EPA 6010	Metals	NELAP	7/1/2003
Selenium	EPA 6020	Metals	NELAP	7/7/2009
Selenium	EPA 7742	Metals	NELAP	1/12/2012
Selenium	SM 3114 B	Metals	NELAP	1/24/2001
Silicon	EPA 200.7	Metals	NELAP	1/24/2001
Silicon	EPA 6010	Metals	NELAP	7/1/2003
Silicon	EPA 6020	Metals	NELAP	1/12/2012

Laboratory Scope of Accreditation

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State Laboratory ID: **E87641** EPA Lab Code: **WY00002** **(307) 235-0515**

E87641
Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Silver	EPA 200.7	Metals	NELAP	7/7/2009
Silver	EPA 200.8	Metals	NELAP	1/24/2001
Silver	EPA 6010	Metals	NELAP	7/7/2009
Silver	EPA 6020	Metals	NELAP	7/7/2009
Sodium	ELI-C-SOP 50-018-07/ICP-MS	Metals	NELAP	1/12/2012
Sodium	EPA 200.7	Metals	NELAP	1/24/2001
Sodium	EPA 6010	Metals	NELAP	7/1/2003
Sodium	EPA 6020	Metals	NELAP	1/12/2012
Strontium	EPA 200.7	Metals	NELAP	7/7/2009
Strontium	EPA 6010	Metals	NELAP	7/1/2003
Strontium	EPA 6020	Metals	NELAP	7/7/2009
Strontium (limited CWA use only per EPA ATP)	EPA 200.8	Metals	NELAP	1/12/2012
Styrene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Sulfate	EPA 300.0	General Chemistry	NELAP	1/24/2001
Sulfate	SM 4500 SO4-E	General Chemistry	NELAP	1/24/2001
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Tetrachloroethylene (Perchloroethylene)	EPA 624	Volatile Organics	NELAP	1/24/2001
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Tetrahydrofuran (THF)	ELI-C-SOP 50-073-05/GC-MS	Volatile Organics	NELAP	1/12/2012
Thallium	EPA 200.8	Metals	NELAP	1/24/2001
Thallium	EPA 6020	Metals	NELAP	7/1/2003
Thorium	EPA 200.8	Metals	NELAP	7/7/2009
Thorium	EPA 6020	Metals	NELAP	7/7/2009
Tin	EPA 6020	Metals	NELAP	7/7/2009
Tin (limited CWA use only per EPA ATP)	EPA 200.8	Metals	NELAP	1/12/2012
Titanium	EPA 200.7	Metals	NELAP	7/7/2009
Titanium	EPA 6010	Metals	NELAP	7/7/2009
Titanium	EPA 6020	Metals	NELAP	7/7/2009
Titanium (limited CWA use only per EPA ATP)	EPA 200.8	Metals	NELAP	1/12/2012
Toluene	EPA 624	Volatile Organics	NELAP	1/24/2001
Toluene	EPA 8021	Volatile Organics	NELAP	7/1/2003
Toluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Total hardness as CaCO3	EPA 200.7	Metals	NELAP	1/24/2001
Total organic carbon	SM 5310 C	General Chemistry	NELAP	1/24/2001
Total organic halides (TOX)	EPA 9020	General Chemistry	NELAP	7/1/2003

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Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Total Petroleum Hydrocarbons (TPH)	EPA 1664A	General Chemistry	NELAP	5/10/2010
Total phenolics	EPA 420.1	General Chemistry	NELAP	1/12/2012
trans-1,2-Dichloroethylene	EPA 624	Volatile Organics	NELAP	1/24/2001
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
trans-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	1/24/2001
trans-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Trichloroethene (Trichloroethylene)	EPA 624	Volatile Organics	NELAP	1/24/2001
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Trichlorofluoromethane	EPA 624	Volatile Organics	NELAP	1/24/2001
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Uranium	EPA 200.8	Metals	NELAP	1/24/2001
Uranium	EPA 6020	Metals	NELAP	7/7/2009
Vanadium	EPA 200.7	Metals	NELAP	7/22/2002
Vanadium	EPA 200.8	Metals	NELAP	1/24/2001
Vanadium	EPA 6010	Metals	NELAP	7/1/2003
Vanadium	EPA 6020	Metals	NELAP	7/7/2009
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Vinyl chloride	EPA 624	Volatile Organics	NELAP	1/24/2001
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Xylene (total)	EPA 624	Volatile Organics	NELAP	7/7/2009
Xylene (total)	EPA 8021	Volatile Organics	NELAP	7/1/2003
Xylene (total)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Zinc	EPA 200.7	Metals	NELAP	7/22/2002
Zinc	EPA 200.8	Metals	NELAP	1/24/2001
Zinc	EPA 6010	Metals	NELAP	7/7/2009
Zinc	EPA 6020	Metals	NELAP	7/1/2003

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E87641
Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	3/16/2010
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	1/24/2001
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	1/24/2001
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	1/24/2001
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	1/24/2001
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	1/24/2001
2-Hexanone	EPA 8260	Volatile Organics	NELAP	1/24/2001
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	1/24/2001
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Acetone	EPA 8260	Volatile Organics	NELAP	1/24/2001
Acetonitrile	EPA 8260	Volatile Organics	NELAP	1/24/2001
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	1/24/2001
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Aluminum	EPA 6010	Metals	NELAP	1/24/2001
Aluminum	EPA 6020	Metals	NELAP	1/24/2001
Antimony	EPA 6010	Metals	NELAP	1/12/2012
Antimony	EPA 6020	Metals	NELAP	1/24/2001

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Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Arsenic	EPA 6010	Metals	NELAP	7/7/2009
Arsenic	EPA 6020	Metals	NELAP	1/24/2001
Barium	EPA 6010	Metals	NELAP	1/24/2001
Barium	EPA 6020	Metals	NELAP	1/24/2001
Benzene	EPA 8021	Volatile Organics	NELAP	1/24/2001
Benzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Beryllium	EPA 6010	Metals	NELAP	7/7/2009
Beryllium	EPA 6020	Metals	NELAP	1/24/2001
Boron	EPA 6010	Metals	NELAP	1/24/2001
Boron	EPA 6020	Metals	NELAP	1/12/2012
Bromobenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
Bromoform	EPA 8260	Volatile Organics	NELAP	1/24/2001
Cadmium	EPA 6010	Metals	NELAP	7/7/2009
Cadmium	EPA 6020	Metals	NELAP	1/24/2001
Calcium	EPA 6010	Metals	NELAP	1/24/2001
Calcium	EPA 6020	Metals	NELAP	1/12/2012
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	1/24/2001
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	1/24/2001
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Chloroethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
Chloroform	EPA 8260	Volatile Organics	NELAP	1/24/2001
Chloroprene	EPA 8260	Volatile Organics	NELAP	7/22/2002
Chromium	EPA 6010	Metals	NELAP	7/7/2009
Chromium	EPA 6020	Metals	NELAP	1/24/2001
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	1/24/2001
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Cobalt	EPA 6010	Metals	NELAP	7/7/2009
Cobalt	EPA 6020	Metals	NELAP	1/24/2001
Copper	EPA 6010	Metals	NELAP	7/7/2009
Copper	EPA 6020	Metals	NELAP	1/24/2001
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
Dibromomethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	1/24/2001

Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Diethyl ether	EPA 8260	Volatile Organics	NELAP	1/24/2001
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	1/24/2001
Ethylbenzene	EPA 8021	Volatile Organics	NELAP	1/24/2001
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Extractable organic halides (EOX)	EPA 9023	General Chemistry	NELAP	1/24/2001
Gasoline range organics (GRO)	EPA 8015	Extractable Organics	NELAP	1/24/2001
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Ignitability	EPA 1010	General Chemistry	NELAP	1/24/2001
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	7/22/2002
Iron	EPA 6010	Metals	NELAP	1/24/2001
Iron	EPA 6020	Metals	NELAP	1/12/2012
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Lead	EPA 6010	Metals	NELAP	7/7/2009
Lead	EPA 6020	Metals	NELAP	1/24/2001
Magnesium	EPA 6010	Metals	NELAP	1/24/2001
Magnesium	EPA 6020	Metals	NELAP	1/12/2012
Manganese	EPA 6010	Metals	NELAP	1/24/2001
Manganese	EPA 6020	Metals	NELAP	7/7/2009
Mercury	EPA 7471	Metals	NELAP	1/24/2001
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Methyl tert-butyl ether (MTBE)	EPA 8021	Volatile Organics	NELAP	1/24/2001
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Methylene chloride	EPA 8260	Volatile Organics	NELAP	1/24/2001
Molybdenum	EPA 6010	Metals	NELAP	1/24/2001
Molybdenum	EPA 6020	Metals	NELAP	7/7/2009
Naphthalene	EPA 8021	Volatile Organics	NELAP	1/24/2001
Naphthalene	EPA 8260	Volatile Organics	NELAP	1/24/2001
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Nickel	EPA 6010	Metals	NELAP	7/7/2009
Nickel	EPA 6020	Metals	NELAP	1/24/2001
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Paint Filter Liquids Test	EPA 9095	General Chemistry	NELAP	1/24/2001
p-Dioxane	EPA 8260	Volatile Organics	NELAP	1/24/2001
pH	EPA 9045	General Chemistry	NELAP	1/24/2001

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E87641
Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Phosphorus, total	EPA 6010	Metals	NELAP	5/12/2009
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Potassium	EPA 6010	Metals	NELAP	1/24/2001
Potassium	EPA 6020	Metals	NELAP	1/12/2012
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	1/24/2001
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Selenium	EPA 6010	Metals	NELAP	1/24/2001
Selenium	EPA 6020	Metals	NELAP	7/7/2009
Selenium	EPA 7742	Metals	NELAP	1/12/2012
Silicon	EPA 6010	Metals	NELAP	1/24/2001
Silver	EPA 6010	Metals	NELAP	7/7/2009
Silver	EPA 6020	Metals	NELAP	7/7/2009
Sodium	EPA 6010	Metals	NELAP	1/24/2001
Sodium	EPA 6020	Metals	NELAP	1/12/2012
Strontium	EPA 6010	Metals	NELAP	1/24/2001
Strontium	EPA 6020	Metals	NELAP	7/7/2009
Styrene	EPA 8260	Volatile Organics	NELAP	1/24/2001
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Thallium	EPA 6010	Metals	NELAP	7/7/2009
Thallium	EPA 6020	Metals	NELAP	1/24/2001
Tin	EPA 6010	Metals	NELAP	7/7/2009
Tin	EPA 6020	Metals	NELAP	7/7/2009
Titanium	EPA 6010	Metals	NELAP	7/7/2009
Titanium	EPA 6020	Metals	NELAP	7/7/2009
Toluene	EPA 8021	Volatile Organics	NELAP	1/24/2001
Toluene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Toxicity Characteristic Leaching Procedure	EPA 1311	General Chemistry	NELAP	1/24/2001
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	1/24/2001
trans-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	1/24/2001
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	1/24/2001
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	1/24/2001
Uranium	EPA 6020	Metals	NELAP	7/7/2009
Vanadium	EPA 6010	Metals	NELAP	1/24/2001
Vanadium	EPA 6020	Metals	NELAP	7/7/2009

Laboratory Scope of Accreditation

Attachment to Certificate #: E87641-27, expiration date June 30, 2013. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: **E87641** EPA Lab Code: **WY00002** **(307) 235-0515**

E87641
Energy Laboratories Inc.
2393 Salt Creek Hwy
Casper, WY 82602

Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	1/24/2001
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	1/24/2001
Xylene (total)	EPA 8021	Volatile Organics	NELAP	1/24/2001
Xylene (total)	EPA 8260	Volatile Organics	NELAP	1/24/2001
Zinc	EPA 6010	Metals	NELAP	7/7/2009
Zinc	EPA 6020	Metals	NELAP	1/24/2001

FLORIDA DEPARTMENT OF
HEALTH

State of Florida
Department of Health, Bureau of Laboratories
This is to certify that

E871017

ENERGY LABORATORIES, INC. - CASPER #2
2325 KERZELL LANE
CASPER, WY 82601

has complied with Florida Administrative Code 64E-1,
for the examination of Environmental samples in the following categories

DRINKING WATER - RADIOCHEMISTRY, NON-POTABLE WATER - RADIOCHEMISTRY

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

Date Issued: July 01, 2012   Expiration Date: June 30, 2013

Max Salfinger

Max Salfinger, M.D.
Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 7/04
NON-TRANSFERABLE E871017-09-07/01/2012
Supersedes all previously issued certificates

Rick Scott
Governor

John H. Armstrong, MD
State Surgeon General

Laboratory Scope of Accreditation

Attachment to Certificate #: E871017-09, expiration date June 30, 2013. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E871017 EPA Lab Code: WY00937 (307) 235-0515

E871017
Energy Laboratories, Inc. - Casper #2
2325 Kerzell Lane
Casper, WY 82601

Matrix: Drinking Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Gamma emitters	EPA 901.1	Radiochemistry	NELAP	11/21/2011
Gross-alpha	EPA 900.0	Radiochemistry	NELAP	5/23/2007
Gross-beta	EPA 900.0	Radiochemistry	NELAP	5/23/2007
Radium-226	EPA 903.0	Radiochemistry	NELAP	5/23/2007
Radium-228	Brooks-Blanchard Ra-228	Radiochemistry	NELAP	11/21/2011
Radium-228	EPA Ra-05	Radiochemistry	NELAP	5/23/2007
Radon-222	ASTM D5072-92	Radiochemistry	NELAP	11/21/2011
Strontium-90	EPA 905.0	Radiochemistry	NELAP	6/16/2009
Tritium	EPA 906.0	Radiochemistry	NELAP	5/23/2007
Uranium	SM 7500-U C	Radiochemistry	NELAP	11/21/2011

Clients and Customers are urged to verify the laboratory's current certification status with the Environmental Laboratory Certification Program. Issue Date: 7/1/2012 Expiration Date: 6/30/2013

Rick Scott
Governor

FLORIDA DEPARTMENT OF
HEALTH

John H. Armstrong, MD
State Surgeon General

Laboratory Scope of Accreditation

Attachment to Certificate #: E871017-09, expiration date June 30, 2013. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E871017 EPA Lab Code: WY00937 (307) 235-0515

E871017
Energy Laboratories, Inc. - Casper #2
2325 Kerzell Lane
Casper, WY 82601

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Gross-alpha	EPA 900.0	Radiochemistry	NELAP	5/23/2007
Gross-beta	EPA 900.0	Radiochemistry	NELAP	5/23/2007
Strontium-90	EPA 905.0	Radiochemistry	NELAP	11/21/2011
Total radium	EPA 903.0	Radiochemistry	NELAP	5/23/2007
Uranium	EPA 908.0	Radiochemistry	NELAP	11/21/2011
Uranium	SM 7500-U C	Radiochemistry	NELAP	11/21/2011

Appendix R

Revised Text for Section 8 of Attachment 5 of the April 2011 Amendment Request

8.0 Potential Effects on Tailings System

8.1 Tailings Cell Liner Material Compatibility

The Uranium Material will be received as a precipitated solid from lime treatment of the WTP influent water. A portion of this material may be insoluble in the acid leach process at the Mill and therefore, the discharge sent to tailings may contain some solid material ("sand"). The remainder of the Uranium Material will be soluble and therefore be contained in the liquid phase after processing in the acid leach system. Tailings from processing the Uranium Material will be sent to one of two tailings cells at the Mill, Cell 4A or Cell 4B or a subsequently-constructed cell. The solutions from the Uranium Material tailings will be recirculated through the mill process for reuse of the acidic properties in the solution. The sands will be only a portion of the total mass of Uranium Material sent to the Mill from the Site. However, assuming a worst case scenario that all of the solid material ends up as sand in the tailings, it is estimated that for the main processing circuit, the additional load to the tailings will be minimal (Table 6).

Cell 4A and 48 both have high-density polyethylene ("HDPE") liners. Cell 4A went into service in October of 2008 and contains conventional ore tailings sands. Solutions from the Mill, starting in July 2009, are also sent to this Cell. Cell 4B was constructed and placed in to operation in February of 2011 and is expected to receive the same type of materials as Cell 4A when operational.

The constituents in the sands and liquids resulting from processing the Midnite Mine Uranium Materials are not expected to be significantly different from those in the conventional ores either in composition or in concentration of constituents. Table ~~7~~ 6 indicates that when comparing the Uranium Material to the tailings, all of the constituents found in the Uranium Material are currently processed in the Mill's main circuit and/or the alternate feed circuit in other ores and alternate feed materials with the exception of copper. No information on the concentration of copper in the ores or alternate feeds is currently available but copper is analyzed under the groundwater monitoring program.

The constituents that will be added to the Mill process are similar to conventional ores, ~~,~~ and contain calcium, barium, and polymer due to the addition of these constituents in the WTP process. These components are not expected to have any adverse effect on the Mill processing system or to the tailings cells. According to Gulec, et al. (2005), a study on the degradation of HDPE liners under acidic conditions (synthetic acid mine drainage), HDPE was found to be chemically resistant to solutions similar to the tailings solutions at the Mill. Mitchell (1985) studied the chemical resistivity of PVC and HDPE at a pH range of 1.5 to 2.5 standard units using sulfuric acid. This study concluded that PVC performed satisfactorily under these conditions and HDPE performed better and was overall more stable under these acidic conditions.

As described above, it is expected that most of the metal and non-metal impurities entering the leach system with the Uranium Material will be converted to sulfate ions, precipitated, and eventually discharged to the tailings system.

Every metal and non-metal cation and anion component in the Uranium Material already exists in the Mill's tailings system and/or is analyzed under the GW monitoring program. A summary of the potential tailings composition before and after processing the Uranium Material using historical data for tailings Cell 3 is presented in Table 6 for projected tailings composition before and after processing the Uranium Material using data for Cell 4A or 4B.

Every component, except copper, in the Uranium Material has been:

1. detected in analyses of the existing tailings cells liquids;
2. detected in analyses of existing tailings cells solids;
3. detected in analyses of alternate feed materials that have already been licensed for processing at the Mill; or
4. detected in process streams or intermediate products when previous alternate feeds were processed at the Mill.

Generally the concentrations of constituents identified in the tailings liquids or solids, feed materials or process streams at the mill are~~,~~ ~~at concentrations that are~~ generally comparable to the concentrations in the Uranium Material.~~,—~~ Due to the small annual and total quantities of the Uranium Material, an increase in the concentration of ~~any~~ these analytes in the Mill's tailings is not expected to be significant. A few constituents such as barium, beryllium, silver, manganese, copper, and calcium are present in the Uranium Material and are either present in lower concentrations in the ores and other alternate feeds at the mill or as in the case of copper, information on concentration in the ore and other alternate feeds was not available. Although the percent total of these constituents contributed from the Uranium Material to the Mill Tailings in the 10 year period seems high, between 5 and 100 percent of these constituents present in the tailings is from the Uranium Material, the total contributed tons is less than one percent of the total mass in the Tailings Cell.

The constituents in the Uranium Material~~,~~ ~~i~~are expected to produce no incremental additional environmental, health, or safety impacts in the Mill's tailings system beyond those produced by the Mill's processing of natural ores or previously approved alternate feeds. Since the impacts of all the constituents on the tailings system are already anticipated for normal Mill operations, and permitted under the Mill's license, they have not been re-addressed in this evaluation.

Groundwater Monitoring Program

One difference in the milling process of Uranium Material and disposal of tails in the tailings cells at the Mill compared to processing conventional ore, is the introduction of barium to the tailings cells. However, as discussed above barium is currently present in Cell 3, and has been introduced at higher concentration than in the Uranium Material, from other alternate feed materials. Barium is not a constituent that is monitored under the Mill's GWDP. Calcium is also contained in the Uranium Material, but is found in conventional ores and it is monitored under the Mill's GWDP. As discussed below, there is no need to add barium to the Mill's GWDP monitoring program.

Barium will be introduced to the Mill's tailings cells with disposal of the tailings from processing the Uranium Material. The chemistry of the tailings cells would limit the mobility of barium due to the abundance of sulfate in the tailings cells. The insolubility of barium in the presence of sulfate is generally consistent regardless of the liquid medium. That is, the solubility of barium sulfate in cold water is 0.022 mg/L and in concentrated sulfuric acid is 0.025 mg/L (Handbook of Chemistry and Physics, 68th Edition). At the listed concentrations of sulfate in the tailings solutions (67,600 mg/L to 87,100 mg/L in Cell 4A), a change in the ambient barium concentration in the tailings solutions (0.02 mg/L) would be negligible. Therefore, given the strong tendency of barium to partition to solids, especially in the presence of sulfate, there is no reasonable potential for barium to migrate to ground water from the tailings cells at the Mill in the unlikely event of a leak in the tailings cells. Calcium Kd value in UDEQ Statement of Basis for the permit (December 1, 2004) contains published Kd values for calcium of 5 to 100 Llkg for sandy to clayey soils. The Kd for barium is 100 to 150,000 Llkg for the same soil types indicating less mobility in groundwater, and Tetra Tech has therefore concluded that barium is sufficiently represented by monitoring for calcium and has identified no technical reason to add barium to the list of constituents monitored in ground water in the vicinity of the tailings cells.

Excluding barium, chemical and radiological make-up of the Uranium Material is similar to other ores and alternate feed materials processed at the Mill, and their resulting tailings will have the chemical composition of typical uranium process tailings, for which the Mill's tailings system was designed. As a result, the existing groundwater monitoring program at the Mill will be adequate to detect any potential future impacts to groundwater.

Conclusions and Recommendations

While concentrated levels of certain constituents in the Uranium Material may be present, no additional material management requirements during handling and processing will be required. The Mill has successfully implemented processing of previous alternate feeds with similar or higher concentrations of the constituents contained in the Uranium Material. For example, the Mill has successfully processed and recovered uranium from uranium-bearing salts, calcium fluoride precipitates, recycled metals, metal oxides, and calcified product, all of which posed potential chemical reactivity and material handling issues comparable to or more significant than those associated with this Uranium Material.

Based on the foregoing information, it can be concluded that:

1. All the constituents in the Uranium Material have either been reported to be, or can be assumed to be, already present in the Mill's tailings system or were reported in other alternate feeds processed at the Mill, at levels generally comparable to those reported in the Uranium Material.
2. All the constituents in the Uranium Material have either been reported to be, or can be assumed to be, previously introduced into the Mill's process, with no adverse effects to the process, or worker health and safety.
3. All the known impurities in the Uranium Material have either been reported to be, or can be assumed to be, previously introduced into the Mill tailing impoundments, with no adverse effects to the tailings system, or human health and safety.
4. There will be no significant incremental environmental impacts from processing Uranium Material beyond those that are already anticipated in the Final Environmental statement and subsequent Environmental Assessments for the Mill.
5. Spill response and control measures designed to minimize particulate radionuclide hazards will be more than sufficient to manage chemical hazards from particulate metal oxides.

It should be noted that the Uranium Material originated entirely from the contact of sources of environmental water (surface and or groundwater) with natural uranium ore. Every constituent in the Uranium Material, except barium, is a constituent of natural uranium ore and is present in the Uranium Material as a result of natural leaching from uranium ore. Every constituent in the ore is already present in natural ores including the ores stored on the Mill's ore pad, and is already present in the Mill circuit and tailings system.

Further, the total quantity of Uranium Material is very low. The entire annual volume of Uranium Material to be shipped to the Mill constitutes only a small fraction of one day's processing in the Mill. The entire volume of Uranium Material will make an insignificant contribution to the total volume of tailings in the Mill's tailings system.

As discussed in the section on Effects on Tailings System, above, after processing of the Uranium Material all constituents except beryllium, calcium and manganese, will have a de_minimis or no impact on the tailings composition, will create a slight reduction in the average concentrations in the tailings cells, or will create a change that is within the range of increases created by other alternate feeds.
Of the three whose impact may be detectable, manganese and calcium (a non-hazardous nutrient in surface and groundwater), these constituents are already monitored under the Mill's groundwater monitoring program. As discussed above, barium is well represented geochemically by calcium which is already monitored in the Mill's groundwater monitoring program.

Due to the above facts, specifically that the Uranium Material originated from natural ore and will be shipped and processed at very low rates, the constituents in the Uranium Material could be expected to have a negligible effect on the Mill process and the tailings system, and will have no discernible environment or health and safety effects beyond the effects of natural ore processing.