DRC-2009-007024

DENISON MINES

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VIA FEDERAL EXPRESS

December 23, 2009

Mr. Dane Finerfrock, Executive Secretary
Utah Radiation Control Board
Utah Department of Environmental Quality
168 North 1950 West
P.O. Box 144810
Salt Lake City, UT 84114-4810

Dear Mr. Finerfrock:

Re: White Mesa Uranium Mill – First Round of Interrogatories From Review of License Amendment Request and Environmental Report For Cell 4B

This letter is in response to the document entitled *Utah Division of Radiation Control, Denison Mines (USA) Corp, Interrogatories From Review of License Amendment Request and Environmental Report for Cell 4B, Under UAC R313-24 and UAC R317-6, Interrogatories – Round 1*, dated October 29, 2009, prepared by URS Corporation ("URS") on behalf of the State of Utah Department of Environmental Quality ("UDEQ"), Division of Radiation Control ("DRC") (the "Interrogatories").

1. INTRODUCTION

1.1 Background

Denison Mines (USA) Corp. ("Denison") operates the White Mesa Uranium Mill (the "Mill"), located approximately 6 miles south of Blanding Utah, under State of Utah Radioactive Materials License No. UT1900479 (the "License"), State of Utah Ground Water Discharge Permit No. UGW370004 (the "GWDP") and State of Utah Air Quality Approval Order DAQE-AN1205005-06 (the "Air Approval Order").

By letters to the Executive Secretary of the State of Utah Radiation Control Board (the "Executive Secretary") dated June 11, 2008 (the "License Amendment Request") and June 16, 2008 (the "GWDP Amendment Request" and together with the License Amendment Request, the "Amendment Request"), Denison requested amendments to the License and GWDP, respectively, to construct, operate and (when operations are complete) reclaim a proposed new tailings Cell 4B for the Mill.

In support of the Amendment Request, Denison had also previously submitted to the Executive Secretary a report entitled *Cell 4B Design Report, White Mesa Mill Blanding Utah*, prepared by Geosyntec Consultants (the "Design Report") on December 8, 2007, which sets out the proposed design specifications for Cell 4B, and an *Environmental Report In Support of Construction of Cell 4B, White Mesa Uranium Mill Blanding Utah* (the "Original 2008 Environmental Report") on April 30, 2008.

The Original 2008 Environmental Report was replaced with a revised version (the "2008 ER") on September 11, 2009.

1.2 Documents Incorporated by Reference

This letter incorporates by reference information previously submitted in previous environmental analyses performed at the Mill, as described below.

- the *Final Environmental Statement Related to Operation of White Mesa Uranium Project, Energy Fuels Nuclear, Inc.*, May, 1979, Docket No. 40-8681 (the "FES"), prepared by the United States Nuclear Regulatory Commission ("NRC") for the original License application in May 1979;
- The *Environmental Report, White Mesa Uranium Project San Juan County, Utah*, dated January 1978, prepared by Dames & Moore (the "1978 ER"), which formed the basis for the FES;
- the *Statement of Basis* that was prepared in December 2004 by DRC in connection with the issuance of the GWDP (the "2004 Statement of Basis");
- the *White Mesa Uranium Mill, License Renewal Application, State of Utah Radioactive Materials License No. UT1900479*, February 28, 2007 (the "2007 License Renewal Application");
- the *Environmental Report in Support of the License Renewal Application, State of Utah Radioactive Materials License No. UT1900479*, February 28, 2007 (the "2007 ER");
- the *Revised Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, October 2007, prepared by INTERA, Inc. (the "Existing Well Background Report");
- the *Revised Addendum: -- Evaluation of Available Pre-Operational and Regional Background Data, Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah*, November 16, 2007, prepared by INTERA, Inc. (the "Regional Background Report");
- the *Revised Addendum: -- Background Groundwater Quality Report: New Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah,* April 30, 2008, prepared by INTERA, Inc. (the "New Well Background Report", and together with the Existing Well Background Report and the Regional Background Report, the "Background Reports");
- *White Mesa Uranium Mill, Renewal Application, State of Utah Ground Water Discharge Permit No. UGW370004*, September 1, 2009, prepared by Denison (the "2009 GWDP Renewal Application");

- the *Statement of Basis for a Uranium Milling Facility South of Blanding, Utah, Owned and Operated by Denison Mines (USA) Corp.*, dated September 2009, prepared by DRC in support of proposed modifications to the GWDP (the "2009 Statement of Basis"); and
- the *Reclamation Plan, White Mesa Mill Blanding Utah, Radioactive Materials License No. UT1900479, Revision 4.0*, November 2009 (the "Reclamation Plan, Rev. 4.0").

2. RESPONSES TO INTERROGATORIES

Each Interrogatory is shown in italics below, followed by Denison's response to the question and/or request for information. In order to allow for better tracking of the responses to the interrogatories, those interrogatories that pose several questions have been subdivided and each question has been numbered with a separate subparagraph number. Tables are inserted into the body of this letter. Figures follow the letter under separate tabs.

As a general comment, it is important to keep in mind that, while proposed Cell 4B has not yet been constructed, it was contemplated, described and assessed previously, being a critical component of the initial FES and original licensing of the facility. These initial environmental analyses and the License contemplated six tailings cells that would contain approximately 11 million tons of tailings solids, which would be the tailings resulting from 15 years of Mill operations at full capacity (see Section 3.2.4.7 of the FES and Section 3.4 and Appendices H and I of the 1978 ER). These are evaporation pond Cell 1-I (now referred to as Cell 1), a second evaporation pond (Cell 1-E), which has not been constructed, and a series of 80-acre cells, of which Cells 2 and 3 and half of Cell 4 (Cell 4A) have been constructed to date. 80-acre Cells 4 and 5 have been specifically contemplated and included in the License (see Figure 3.4 of the FES). With the construction of Cell 4A (40 acres), Cell 4B will consume the second 40 acres of the previously authorized 80 acre Cell 4.

The Amendment Request is not an application for the License or renewal of the License as a whole, which are addressed in the 2007 License Renewal Application and the 2007 ER, nor is it an application for approval of the siting and use of Cell 4B, which have already been evaluated and approved and are included in the License as part of the original approval of the tailings management system for the Mill, nor is it an application for the GWDP or renewal of the GWDP which are addressed in the 2009 GWDP Renewal Application. Rather, the Amendment Request applies to the more detailed amendments to the License and GWDP required in connection with the actual construction and operation of Cell 4B.

However, a number of the Interrogatories would appear to be more appropriate for an application for the initial siting and licensing of a uranium mill de novo, rather than for an application to amend the existing license of an existing facility. For example, information is requested about design features, effluent control equipment and performance that relate to the Mill as a whole, and not specifically to Cell 4B. Also, a number of the Interrogatories request modeling information to predict effluent releases and doses, whereas the Mill has approximately 30 years of actual data to draw from, which would not be available for a new site. The objective of the Interrogatories should not be to re-evaluate aspects of the site that have already been evaluated

and approved and are not impacted by the addition of Cell 4B. As a result, the responses in this letter incorporate by reference and refer the reader to previous evaluations and approvals where applicable.

Because previous environmental analyses provided current environmental information and assessments, the scope of the Amendment Request has been limited to focus on pathways and assessments directly related to the construction and operation of the new tailings cell. These pathways are potential airborne releases from the Cell, and the groundwater considerations typically associated with the design of a tailing cell. These are the only two significant pathways that could be impacted by Cell 4B installation and operation. In addition, an archaeological study is being performed on the surface area that will be impacted by construction of Cell 4B, as required by License condition 9.7. That study will be provided to the Executive Secretary in a separate report.

It is important to keep in mind that the Executive Secretary has previously approved the design and construction of directly adjacent Cell 4A. The liner design and underlying ground conditions for Cell 4B are identical to those for Cell 4A.

2.1 *`INTERROGATORY WHITE MESA CELL 4B UAC R313-24-3-01A/01: ENVIRONMENTAL ANALYSIS - RADIOLOGICAL AND NONRADIOLOGICAL IMPACTS*

INTERROGATORY STATEMENT:

2.1.1 Tabulate, analyze, summarize, and report changes of observed meteorological conditions that have occurred since they were last updated.

Denison Response

There have been no significant changes of observed meteorological conditions at the site that have occurred since the 1978 ER and the FES. Meteorological information for the site was updated in Section 1.1 of the Reclamation Plan, Rev. 4.0, as described below.

a) Regional

The climate of southeastern Utah is classified as dry to arid continental. Although varying somewhat with elevation and terrain, the climate in the vicinity of the Mill can be considered as semi-arid with normal annual precipitation of about 13.32 inches. See Table 2.1.1-1. Most precipitation is in the form of rain with snowfall accounting for about 29% of the annual total precipitation. There are two separate rainfall seasons in the region, the first in late summer and early autumn (August to October) and the second during the winter months (December to March). The mean annual relative humidity is about 44 percent and is normally highest in January and lowest in July. The average annual Class A pan evaporation rate is 68 inches (National Oceanic and Atmospheric Administration and U.S. Department of Commerce, 1977), with the largest evaporation rate typically occurring in July. This evaporation rate is not appropriate for determining water balance requirements for the tailings management system and must be reduced by the Class A pan coefficient to determine the latter evaporation rate. Values

of pan coefficients range from 60% to 81%. Denison assumes for water balance calculations an average value of 70% to obtain an annual lake evaporation rate for the Mill area of 47.6 inches. Given the annual average precipitation rate of 13.32 inches, the net evaporation rate is 34.28 inches per year.

The weather in the Blanding area is typified by warm summers and cold winters. The National Weather Service Station in Blanding, Utah is located about 6.25 miles north of the Mill. Data from the station is considered representative of the local weather conditions (1978 ER, Section 2.7.2). The mean annual temperature in Blanding was 50.3°F, based on the current Period of Record Summary (1904 -2006). January is usually the coldest month and July is usually the warmest month. See Table 2.1.1-2

Table 2.1.1-1
Period of Record General Climate Summary – Precipitation

Station:(420738) BLANDING														
From Year=1904 To Year=2006														
	Precipitation											Total Snowfall		
	Mean	High	Year	Low	Year	1 Day Max.		>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean	High	Year
	in.	in.	-	in.	-	in.	dd/yyyy or yyyymmdd	# Days	# Days	# Days	# Days	in.	in.	-
January	1.39	5.31	1993	0.00	1972	1.49	15/1978	6	4	1	0	10.8	46.9	1979
February	1.21	3.87	1913	0.00	1906	1.50	03/1908	6	3	1	0	7.3	39.7	1913
March	1.05	3.72	1906	0.00	1932	1.13	01/1970	6	3	1	0	4.4	17.9	1970
April	0.87	4.35	1926	0.00	1908	1.33	04/1987	5	2	0	0	1.9	15.2	1957
May	0.71	2.62	1926	0.00	1910	1.26	25/1994	4	2	0	0	0.2	4.0	1978
June	0.45	2.84	1948	0.00	1906	1.40	28/1938	3	1	0	0	0.0	0.0	1905
July	1.15	3.55	1914	0.00	1920	1.74	21/1985	6	3	1	0	0.0	2.5	1906
August	1.38	4.95	1968	0.03	1985	4.48	01/1968	7	4	1	0	0.0	0.0	1905
September	1.28	4.80	1927	0.00	1912	1.85	29/1905	5	3	1	0	0.0	3.5	1905
October	1.45	7.01	1916	0.00	1915	2.00	19/1908	5	3	1	0	0.3	6.0	1984
November	1.05	4.17	1905	0.00	1929	2.79	27/1919	4	3	1	0	3.3	19.0	1931
December	1.33	6.84	1909	0.00	1917	3.50	23/1909	5	3	1	0	9.8	55.0	1909
Annual	13.32	24.42	1909	4.93	1956	4.48	19680801	62	36	7	1	38.2	121.0	1909
Winter	3.93	11.95	1909	0.29	1964	3.50	19091223	17	10	2	0	27.9	100.2	1979

Spring	2.63	7.77	1926	0.10	1972	1.33	19870404	15	8	1	0	6.5	28.7	1970
Summer	2.98	6.90	1987	0.12	1960	4.48	19680801	16	8	2	0	0.0	2.5	1906
Fall	3.78	8.70	1972	0.50	1917	2.79	19191127	14	9	2	1	3.7	19.5	1908

Table updated on Jul 28, 2006
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons
Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May
Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

Table 2.1.1-2
Period of Record General Climate Summary - Temperature

Station:(420738) BLANDING

From Year=1904 To Year=2006

	Monthly Averages			Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.	
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	F	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	39.1	17.2	28.2	63	31/2003	-20	12/1963	40.2	2003	12.6	1937	0.0	6.2	30.3	1.8
February	44.9	22.3	33.6	71	28/1906	-23	08/1933	44.2	1995	18.8	1933	0.0	2.0	26.1	0.7
March	52.7	27.8	40.3	86	31/1906	-3	28/1975	51.0	2004	33.0	1948	0.0	0.3	23.4	0.0
April	62.2	34.3	48.2	88	19/1905	10	24/1913	56.9	1992	39.4	1928	0.0	0.0	12.4	0.0
May	72.3	42.1	57.2	98	31/2002	15	16/1910	65.0	2000	50.1	1917	0.4	0.0	2.7	0.0
June	83.3	50.7	67.0	110	22/1905	28	03/1908	75.3	2002	61.2	1907	6.3	0.0	0.2	0.0
July	88.7	57.9	73.3	109	19/1905	36	15/1934	81.1	2003	66.3	1916	15.1	0.0	0.0	0.0
August	86.2	56.2	71.2	106	18/1905	38	23/1968	77.2	1926	65.6	1968	9.0	0.0	0.0	0.0
September	78.2	48.3	63.3	100	01/1905	20	26/1908	70.2	2001	56.6	1922	1.3	0.0	0.3	0.0
October	66.0	38.0	52.0	99	08/1905	10	30/1971	59.6	2003	44.6	1969	0.1	0.0	6.6	0.0
November	51.4	26.7	39.1	74	04/1905	-7	25/1931	47.3	1999	32.4	1952	0.0	0.4	23.6	0.1
December	41.2	19.2	30.2	65	03/1929	-13	23/1990	39.4	1980	19.4	1931	0.0	4.5	30.0	0.9
Annual	63.8	36.7	50.3	110	19050622	-23	19330208	55.1	2003	47.2	1932	32.2	13.5	155.6	3.4
Winter	41.7	19.5	30.7	71	19060228	-23	19330208	37.5	1907	19.3	1933	0.0	12.7	86.4	3.3
Spring	62.4	34.7	48.6	98	20020531	-3	19750328	54.8	2004	43.6	1909	0.4	0.3	38.5	0.0
Summer	86.0	54.9	70.5	110	19050622	28	19080603	76.4	2002	67.4	1941	30.4	0.0	0.2	0.0
Fall	65.2	37.7	51.4	100	19050901	-7	19311125	58.3	1926	47.8	1912	1.4	0.4	30.5	0.1

Table updated on Jul 28, 2006
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons
Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May

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Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

Winds are usually light to moderate in the area during all seasons, although occasional stronger winds may occur in the late winter and spring. The predominant winds are from the north through north-east (approximately 30 percent of the time) and from the south through south-west (about 25 percent of the time). Winds are generally less than 15 mph, with wind speeds faster than 25 mph occurring less than one percent of the time (1978 ER, Section 2.7.2). As an element of the pre-construction baseline study and ongoing monitoring programs, the Mill operates an onsite meteorological station, described in greater detail below. Further details about weather and climate conditions are provided in the 1978 ER (Section 2.7) and in the FES (Section 2.1).

b) Storms (FES Section 2.1.4, updated)

Thunderstorms are frequent during the summer and early fall when moist air moves into the area from the Gulf of Mexico. Related precipitation is usually light, but a heavy local storm can produce over an inch of rain in one day. The maximum 24-hour precipitation reported to have fallen during period 1904-2006 at Blanding was 4.48 inches (11.36 cm). Hailstorms are uncommon in this area. Although winter storms may occasionally deposit comparable amounts of moisture, maximum short-term precipitation is usually associated with summer thunderstorms.

Tornadoes have been observed in the general region, but they occur infrequently. Strong winds can occur in the area along with thunderstorm activity in the spring and summer. The Mill area is susceptible to occasional dust storms, which vary greatly in intensity, duration, and time of occurrence. The basic conditions for blowing dust in the region are created by wide areas of exposed dry topsoil and strong, turbulent winds. Dust storms usually occur following frontal passages during the warmer months and are occasionally associated with thunderstorm activities.

c) On Site

On-site meteorological monitoring at the Mill was initiated in early 1977 and continues today. The original purpose of the meteorological monitoring program was to document the regional atmospheric baseline and to provide data to assist in assessing potential air quality and radiological impacts arising from operation of the Mill.

After the Mill construction was completed, the monitoring programs were modified to facilitate the assessment of Mill operations. The current meteorological monitoring program includes data collection for wind speed, wind direction, atmospheric stability according to the standard Pasquill scheme (via measurements of deviations in wind direction, referred to as sigma-theta), and precipitation as either rain or snow. The recorded on-site meteorological conditions are reported to Denison on a semi-annual basis and are described in semi-annual reports prepared for Denison and maintained at the Mill.

Figures 2.1-1 through 2.1-5 show the annual windrose for the site for each of 2004-2008. It is evident from those windroses that there have not been any significant changes in wind characteristics at the site during that period. The MILDOS-AREA evaluation performed for the site by SENES Consultants Ltd. in April 2008 in support of the Amendment Request (the 2008

MILDOS Evaluation") (see Appendix B of the 2008 ER) uses the average wind speed and direction recorded at the Mill site for 2004 through 2006.

2.1.2 Incorporate changes of observed meteorological conditions into projections of radiation doses to the general public (refer to Interrogatory White Mesa Cell 4B 10CFR40.65(a)(1)-07/01). Alternatively, demonstrate that the impacts of such changes on projected radiation doses to persons potentially exposed to releases from the proposed Cell 4B are inconsequential.

Denison Response

Projections of radiation doses to the general public are set out in the 2008 MILDOS Evaluation. The 2008 MILDOS Evaluation considers airborne releases of radioactive materials. Potential releases to surface water and groundwater are not addressed. However, in the case of the Mill, there are no releases to surface water or groundwater. Any potential releases to surface water or groundwater would be controlled and remediated and would not factor into doses to the public.

Since the 2008 MILDOS Evaluation is based on current windrose data, there are no changes to meteorological conditions that would impact or change the dose calculations set out in the 2008 MILDOS Evaluation.

2.1.3 Estimate the maximum annual external dose (millirems) that would be received by an individual at the nearest site boundary from direct radiation during operations and following closure of proposed Cell 4B. Provide an appendix describing the models, assumptions, and inputs used in these calculations.

Denison Response

The 2008 MILDOS Evaluation provides an estimate of the maximum total effective dose equivalent ("TEDE") for a number of receptors, including the nearest potential residence. The nearest potential residence is at the northern boundary of the Mill property, close to air particulate monitoring station BHV-1, which is the closest private property that could be inhabited full time by a member of the public. That location, BHV-1, is also in one of the predominant wind directions. All other site boundaries abut United States Bureau of Land Management ("BLM") land, which could not be inhabited full time by a resident. Therefore the person likely to receive the highest dose from the licensed operation, as contemplated by Utah Administrative Code ("UAC") R313-15-301 and 302, would be a person at the nearest potential residence. It should be noted that BHV-1, the location of the nearest potential residence is approximately 1.2- miles north of the Mill site itself. The current nearest actual residence is approximately 1.6 miles north of the Mill site. Therefore the 2008 MILDOS Evaluation is conservative in this regard.

For processing of Colorado Plateau Ore, the maximum TEDE was calculated in the 2008 MILDOS Evaluation to be 1.4 mrem/yr for an infant at the nearest potential residence, BHV-1, which is about 1.4% of the R313-15-301(1)(a) limit of 100 mrem/yr to an individual member of the public during Mill operations. For processing higher grade Arizona Strip ores, the TEDE was calculated to be a maximum of 3.1 mrem/yr for an infant at the nearest potential residence, which is about 3.1% of the 100 mrem/yr limit. The annual external dose would be a fraction of the TEDE and would therefore be less than 3.1 mrem/yr, assuming full operations processing high grade Arizona Strip ores.

Following closure of proposed Cell 4B, the TEDEs for all receptors would be less than the modeled results due to the fact that all contaminated materials at the site will be disposed of into the tailings cells and covered with an engineered tailings cover designed to maintain radon releases to within regulatory standards. Site surface clean-up standards are described in Section 3.3 of Attachment A to the Reclamation Plan, Rev. 4.0, and the tailings radon flux standards are described in Section 3.3.2 of the Reclamation Plan, Rev. 4.0. Total emissions from the site will therefore be reduced at closure, and the TEDE to the member of the public likely to receive the highest dose from licensed operations will be lower than during Mill operations. See also Section 2.1.11 below.

2.1.4 Identify and assess hazards and risks to human health and the environment created by all potential constituents of concern at a site.

Denison Response

The construction and operation of Cell 4B will not add any new hazards or risks to human health and the environment created by potential constituents of concern over and above existing licensed facilities at the Mill. The physical, chemical and radiological make up of the tailings is not expected to be significantly different from that of existing tailings or from the assumptions in the 2008 MILDOS Evaluation. The tailings cell cover design will be the same as for the existing tailings cells, including Cell 4A; therefore, radon emanations are not expected to be any different than emanations from Cell 4A. Cell 4B will have a similar double liner/leak detection/slimes drain system as Cell 4A, which is designed not to release tailings solutions to the environment. Any potential releases would

be detected by the Mill's groundwater monitoring program and remediated before there could be any impact to the public. See Appendix B to the 2008 ER for Denison's proposed additions to the site's groundwater monitoring program to accommodate Cell 4B.

The hazards and risks to human health and the environment created by all potential constituents of concern at the Mill site was assessed in detail by Dames and Moore in the 1978 ER and by the NRC in the FES. See Section 5.0 of the 1978 ER and Section 4.0 of the FES.

2.1.5 Characterize the source term for all constituents of concern and identify any potential or future groundwater contamination.

Denison Response

The construction and operation of Cell 4B will not add any new constituents of concern over and above existing licensed facilities at the Mill. The physical, chemical and radiological make up of the tailings to be disposed of in Cell 4B is not expected to be significantly different from that of existing tailings or from the assumptions in the 2008 MILDOS Evaluation.

The hazards and risks to human health and the environment created by all potential constituents of concern at the Mill site was assessed in detail by Dames and Moore in the 1978 ER and by NRC in the FES. See Section 5.0 of the 1978 ER and Section 4.0 of the FES.

2.1.6 Identify the pathways the constituents of concern will likely follow including ingestion of contaminated water and ingestion of contaminated foods. Identify points of exposure.

Denison Response

The pathways for constituents of concern for Cell 4B will be the same as the pathways for constituents of concern applicable to the Mill site as a whole. Those pathways are discussed in detail in Sections 5.1, 5.2, 5.3 and 5.4 of the 1978 ER and Section 4.7.2 of the FES.

Because previous environmental analyses provided current environmental information and assessments, the scope of the Amendment Request has been limited to focus on pathways and assessments directly related to the construction and operation of Cell 4B. Those pathways are potential airborne releases from the Cell and the groundwater considerations typically associated with the design of a tailings cell. Those are the only two significant pathways that could be impacted by Cell 4B installation and operation. In addition, an archaeological study is being performed on the surface area that will be impacted by construction of Cell 4B, as required by License condition 9.7. The results of that study will be provided to the Executive Secretary in a separate report.

2.1.7 Estimate the concentrations or doses those constituents will likely produce at the location where humans or environmental populations could be reasonably exposed.

Denison Response

The concentrations of air particulate radionuclides and gamma concentrations at various receptor locations, including at the nearest potential residence (BHV-1) are reported in the Mill's *Semi Annual Effluent Reports* that are submitted to the Executive Secretary. Therefore, since years of historic data are available, estimations of the concentrations of those constituents and doses are not necessary.

Doses (TEDEs) at the locations where humans or environmental populations could be reasonably exposed are estimated in the 2008 MILDOS Evaluation. See Section 2.1.3 above.

2.1.8 Define the spatial distributions of the various constituents of concern of existing contaminant plumes.

Denison Response

There are three circumstances where applicable groundwater standards have been exceeded at the site that are not associated with natural background: chloroform contamination, tetrahydrofuran ("THF") contamination and nitrate contamination. As discussed below, none of these circumstances appear to be related to discharges from milling activities. The following paragraphs are excerpted from Section 2.16 of the 2009 GWDP Renewal Application.

a) Chloroform Investigation

In May, 1999, excess chloroform concentrations were discovered in monitoring well MW-4, in the shallow perched aquifer along the eastern margin of the Mill site. Because these concentrations were above the State of Utah Ground Water Quality Standards ("GWQSs") for chloroform, the Executive Secretary of the Utah Water Quality Board initiated enforcement action against the Mill on August 23, 1999 through the issuance of a Groundwater Corrective Action Order (UDEQ Docket No. UGO-20-01), which required completion of: 1) a contaminant investigation report to define and bound the contaminant plume, and 2) a groundwater corrective action plan to clean it up. Repeated groundwater sampling by both the Mill and DRC have confirmed the presence of chloroform in concentrations that exceed the GWQS along the eastern margin of the site in wells that are upgradient or cross gradient from the tailings cells. Other volatile organic compound ("VOC") contaminants have also been detected in those samples. After installation of 25 new monitoring wells at the site, groundwater studies appear to have defined the boundaries of the chloroform plume.

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

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

Denison submitted a *Preliminary Corrective Action Plan, White Mesa Mill Near Blanding, Utah*, August 20, 2007, prepared by Hydro Geo Chem, Inc., on August 21, 2007, and a *Preliminary Contamination Investigation Report, White Mesa Mill Near Blanding, Utah*, November 20, 2007, prepared by Hydro Geo Chem, Inc., on December 21, 2007. Those documents are currently under review by the Executive Secretary.

b) THF Study

Detectable concentrations of THF have been found in four wells at the Mill, including upgradient well MW-1, and far downgradient well MW-3, as well as wells MW-2 and MW-12 which are close to the Mill's tailings cells. Two of those wells, upgradient well MW-1 and far downgradient well MW-3 have had THF concentrations that exceeded the GWQS. The two other wells, MW-2 and MW-12, that are closest to the tailings cells exhibited detectable THF concentrations that did not exceed the GWQS. Based on Denison's analysis, and on INTERA, Inc.'s analysis in the Background Reports, Denison has concluded that the THF was most likely derived from PVC glues and solvents used during installation of the PVC well casings found in several monitoring wells at the facility, including each of the four wells described above. This position is consistent with the occurrence of THF in both upgradient and far downgradient wells at the site.

Part I.H.18 of the original GWDP required Denison to develop a plan and complete a study to explain the occurrence of THF in those wells. To that end, Denison submitted plans dated April 7 and December 15, 2005 for Executive Secretary review. The plans set out to demonstrate that the THF contamination was caused by PVC solvents and glues used in the original well construction. After completion of the study, which included a series of THF sampling and analysis at well MW-2, the June 26, 2007 Denison report concluded that the sample results were inconclusive, because no THF was found in MW-2 and the basis for the study in that well was not satisfied. In a letter dated December12, 2007, the Executive Secretary agreed with Denison and advised Denison that, in the absence of meaningful study results, routine compliance monitoring for THF would be required for the foreseeable future at all point of compliance wells at the facility. Later, the Executive Secretary removed the Part I.H.18 study requirement from the GWDP.

However, recent sample results for all monitoring wells at the site, including MW-1 and MW-3, indicate that THF concentrations are now less than the GWQS for THF. There have been no exceedances of the State GWQS in any monitoring well over the last two years.

c) Nitrate Investigation

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

On September 30, 2008, the Executive Secretary issued a request for a voluntary plan and schedule for Denison to investigate and remediate this Nitrate contamination. On November 19, 2008 Denison submitted a plan and schedule prepared by INTERA, Inc., which identified a number of potential sources for the contamination, including several potential historic and offsite sources. On January 27, 2009, the Executive Secretary and Denison signed a Stipulated Consent Agreement by which Denison agreed to conduct an investigation of the Nitrate contamination, determine the sources of pollution, and submit a report by January 4, 2010. On December 1, 2009 the Executive Secretary recommended that the elevated concentrations of chloride associated with the nitrate plume also be addressed in the nitrate investigation. After review and approval of the Contaminant Investigation Report, the Executive Secretary will determine if a groundwater corrective action plan is required. Denison is currently in the process of conducting the investigation.

2.1.9 Provide a reasonably conservative or best estimate and sensitivity of the potential health effects caused by human exposure to potential constituents of concern.

Denison Response

See Sections 2.1.3, 2.1.4, 2.1.5, 2.1.6 and 2.1.7 above.

2.1.10 Identify and evaluate the risks posed by the potential constituents of concern to environmental populations. Estimate the likelihood of human and environmental exposure.

Denison Response

See Sections 2.1.3, 2.1.5 and 2.1.6 above.

2.1.11 Project impacts at the point of exposure over a 1,000-year time frame.

Denison Response

During Mill operations, the doses to the member of the public most likely to be exposed are expected to continue to be approximately the same as they have been to date. See Section 2.1.3 above.

Upon site closure, all Mill buildings and contaminated areas, including area wind-blown contamination will be placed into one of the tailings cells. The clean up standard for all non-tailings areas and surrounding areas is set out in 10 federal Code of Regulations ("CFR") Part 40 Appendix A, Criterion 6(6) (incorporated by reference into UAC R313-24-4) and Section 3.3 of Attachment A to the Reclamation Plan, Rev. 4.0.

After all non-tailings areas are cleaned up and contaminated materials are placed into one of the Mill's tailings cells, the tailings cells will be capped in place. The tailings cell cap must be designed to ensure that radon emanations do not exceed 20 pCi/m2 per second, as required by 10 CFR 40, Appendix A, Criterion 6 and Section 3.3.2 of the Reclamation Plan, Rev. 4.0, for 1,000 years to the extent reasonable practicable, and in any event for 200 years.

Upon license termination, the tailings cells will be transferred to the United States Department of Energy ("DOE") for perpetual care and maintenance.

The doses to members of the public will therefore be minimal and within regulatory standards over a 1,000 year time frame. Upon transfer to DOE, it will be DOE's responsibility to ensure that the tailings cells maintain their integrity such that these standards will continue to be met in perpetuity.

2.1.12 Establish a spectrum of potential accidents involving the proposed Cell 4B by classes of occurrence and appropriately evaluate each class of accidents. Discuss measures that DUSA has implemented or will implement to prevent accidents and demonstrate that such measures are adequate. Describe emergency plans and training for responding to accidents.

Denison Response

The following is a description of each type of radioactive materials and other accident involving proposed Cell 4B, that could potentially occur at the Mill site that could require an emergency response. The following paragraphs are excerpted from the Mill's draft Emergency Response Plan Revision 2, dated April 20, 2009 (the "Emergency Response Plan"), a copy of which has been provided to the Executive Secretary.

a) *Tornado*

Although this is highly unlikely, a tornado could occur at the Mill. A severe tornado could cause buildings and other structures to collapse, chemical or gas releases, major fires as well as general panic. The environmental impacts from a tornado could be the transport of tailings solids and liquids, ores or product from the Mill area into the environment. This dispersed material would contain some uranium, radium, and thorium. An increase in background radiation could result, and, if sufficient quantities are detected and isolated, they would be cleaned up. However, NRC staff have concluded in *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Materials Licensees*, S. A. McGuire, January 1988 ("NUREG-1140") that while tornadoes could release a large amount of radioactive material, they spread the material so greatly that resulting doses are very small. As a result, tornadoes are not discussed further in NUREG-1140 and are not considered to be a significant radiological risk at uranium mills.

However, to the extent that a tornado has caused or is likely to result in an ammonia leak or propane release, an SX building fire or a breach of the Mill's tailings cells, it would be classified as a Site Area Emergency or Alert, as defined in the Emergency Response Plan, depending on which one of those other accidents resulted from the tornado. All other tornadoes would be classified as On-Site Emergencies, as defined in the Emergency Response Plan. See Section 3 of the Emergency Response Plan for the significance of these classifications.

In the event of a major tornado, the procedures outlined in Appendix G to the Emergency Response Plan would be followed.

b) *Major Earthquake*

Although this is highly unlikely, an earthquake could occur at the Mill. A severe earthquake could cause buildings and other structures to collapse, chemical and/or gas releases, major fires as well as general panic. NRC staff concluded in NUREG-1140 that earthquakes were not identified as leading to significant releases of radionuclides unless they were followed by a fire.

To the extent that an earthquake has caused or is likely to result in an ammonia leak or propane release, an SX building fire or a breach of the Mill's tailings cells, it would be classified as a Site Area Emergency or Alert, as defined in the Emergency Response Plan, depending on which one of those accidents resulted from the earthquake. All other major earthquakes would be classified as On-Site Emergencies, as defined in the Emergency Response Plan. See Section 3 of the Emergency Response Plan, for the significance of those classifications.

In the event of a major earthquake the procedures outlined in Appendix G to the Emergency Response Plan would be followed.

c) Tailings Accidents

(i) Flood Water Breaching of Retention System

In general, flood water breaching of tailings embankments presents one of the greatest dangers for the sudden release of tailings solids and impounded water. The tailings cells are designed with sufficient freeboard (at least three feet) to withstand back-to-back 100-year storm events or 40% of the probable maximum flood (PMF) followed by the 100-year storm event. The flood design is equivalent to 15 inches of rainfall. In addition, the tailings dikes were designed in accordance with NRC regulations and allow a sufficient margin of safety even in the event of an earthquake.

The possibility of floods in Westwater Creek, Corral Creek, or Cottonwood Wash causing damage to the tailings retention facility is extremely remote. This is due to the approximately 200 foot elevation difference between the streambeds of the creeks and the toe of the tailings dikes.

Flood water breaching a tailings embankment is classified as an On-Site Emergency, as defined in the Emergency Response Plan, because it is unlikely that any releases to the environment

would leave the Mill property, and in the event that any contamination were to leave the property, it is unlikely that the release would be expected to require a response by an offsite response organization to protect persons offsite. See Section 3 of the Emergency Response Plan for the significance of that classification.

In the event of a Flood Water Breach of the tailings retention system, the procedures in Appendix H of the Emergency Response Plan would be followed.

(ii) Structural Failure of Tailings Dikes

All tailings dikes have been designed with an ample margin of safety as per NRC regulations. This has included design calculations showing dike stability even when the dike is saturated with moisture during a seismic event, the most severe failure mode. In addition, the tailings discharge system is checked at least once per shift during operation, or once per day during Mill standby.

NRC staff concluded in NUREG-1140 that tailings pond failures also release a large quantity of material. However, NRC staff concluded that rapid emergency response is not needed to avoid doses exceeding protection action guides because dose rates at a spill site are very low. NRC staff concluded that an appropriate response would be to monitor drinking water, especially for radium-226, to be sure that drinking water standards are met. Gamma monitoring of the ground would also be appropriate to determine where the tailings have been deposited. However, NRC staff concluded that ground contamination would present little immediate hazard to the public because the gamma dose rates would be low. Gamma dose rates in contact with tailings should be less than 0.1 mR/hr. A clean-up of the spilled tailings would be expected, but this could be done effectively without pre-existing emergency preparedness.

Although the discharge from a dike failure would soon cross the restricted area boundary, the flow path would be over three miles in length before leaving the Mill property. In the event of a dam failure, large operating equipment would be mobilized to construct temporary earthen dikes or berms downgradient of the failed dike. In addition, the Executive Secretary, MSHA, and the State of Utah, Department of Natural Resources, Division of Dam Safety would be notified. The contamination from such an event would be cleaned up and returned to the tailings area.

A tailings dam failure is classified as an On-Site Emergency, as defined in the Emergency Response Plan, because it would be unlikely that any releases to the environment would leave the Mill property, and in the event that any contamination were to leave the property, it would be unlikely that the release would be expected to require a response by an offsite response organization to protect persons offsite. See Section 3 of the Emergency Response Plan, for the significance of that classification.

In the event of a tailings dam failure the procedures outlined in Appendix H of the Emergency Response Plan would be followed.

(iii) Seismic Damage to Transport System

In the event of a seismic rupture of a tailings slurry pipeline, the released slurry would be

contained in the tailings cells regardless of the quantity released. The tailings retention system pipe is in the same drainage basin as the retention system. Any tailings slurry released by a pipe rupture, no matter what the cause, would flow downhill where it would be impounded inside a tailings cell.

If a break occurred, the pumping system would be shut off, personnel removed from the immediate area, and the Executive Secretary notified. The break would be repaired and the affected area cleaned up in the safest and most expeditious manner. The advice and direction of the Executive Secretary would be sought and heeded throughout the episode.

A seismic rupture in the tailings slurry pipeline would be classified as an On-Site Emergency, as defined in the Emergency Response Plan. See Section 3 of the Emergency Response Plan for the significance of that classification.

In the event of a rupture in the tailings slurry pipeline the procedures outlined in Appendix H of the Emergency Response Plan would be followed.

d) Terrorist/Bomb Threat

In the event that any person should receive a threat of a bomb, the procedure set out in Appendix I of the Emergency Response Plan would be followed.

Because of the unknown nature of the risk, a terrorist/bomb threat would be classified as an Alert, as defined in the Emergency Response Plan. See Section 3 of the Emergency Response Plan for the significance of that classification.

In the event of a terrorist/bomb threat, the procedures in Appendix I of the Emergency Response Plan would be followed.

2.2 *INTERROGATORY WHITE MESA CELL 4B UAC R313-24-3-01B/01: ENVIRONMENTAL ANALYSIS - IMPACT ON WATERWAYS AND GROUNDWATER*

INTERROGATORY STATEMENT:

2.2.1 Provide updated information on use and characteristics of groundwater and surface water resources, including aquifer horizontal and vertical permeabilities and other physical/hydraulic properties, well drawdown characteristics for existing wells.

Denison Response

A detailed description of aquifer horizontal and vertical permeabilities and other physical/hydraulic properties, and well drawdown characteristics for existing wells is set out in Sections 6.3, 7.1, 7.2 and 7.3 of the 2008 ER. That information has been updated from January 8, 2008 to August 27, 2009 and is set out in Section 2.5 of the 2009 GWDP Renewal Application.

2.2.2 Provide updated information on present and projected future uses of groundwater and surface water in the area surrounding the mill site within a minimum 10-mile radius.

Denison Response

a) Surface Water

Updated information on present uses of surface water in the area surrounding the Mill is set out in Section 1.4.1 of the Reclamation Plan, Rev. 4.0. Surface water use in the area is not expected to change significantly in the foreseeable future.

b) Ground Water Use

The following discussion is excerpted from Section 1.5.6 of the Reclamation Plan, Rev. 4.0.

Two hundred sixty one groundwater appropriation applications, within a five-mile radius of the Mill site, are on file with the Utah State Engineer's office. A summary of the applications is presented in Table 2.2.1-1 and shown on Figure 2.2.1-1. The majority of the applications are by private individuals and for wells drawing small, intermittent quantities of water, less than eight gallons per minute (gpm), from the Burro Canyon formation. For the most part, these wells are located upgradient (north) of the Mill site. Domestic water, stock watering, and irrigation are listed as primary uses of the majority of the wells. It is important to note that no wells completed in the perched groundwater of the Burro Canyon formation exist directly downgradient of the site within the five-mile radius. Two water wells, which available data indicate are completed in the Entrada/Navajo sandstone (Clow, 1997), exist approximately 4.5 miles southeast of the site on the Ute Mountain Ute Reservation. These wells supply domestic water for the Ute Mountain Ute White Mesa Community, situated on the mesa along Highway 191 (see Figure 2.2.1-1). Data supplied by the Tribal Environmental Programs Office indicate that both wells are completed in the Entrada/Navajo sandstone, which is approximately 1,200 feet below the ground surface. Insufficient data are available to define the groundwater flow direction in the Entrada/Navajo sandstone in the vicinity of the Mill.

The well yield from wells completed in the Burro Canyon formation within the White Mesa site is generally lower than that obtained from wells in this formation upgradient of the site. For the most part, the documented pumping rates from on-site wells completed in the Burro Canyon formation are less than 0.7 cubic feet per second (cfs). Even at that low rate, the on-site wells completed in the Burro Canyon formation are typically pumped dry within a couple of hours.

This low productivity suggests that the Mill is located over a peripheral fringe of perched water; with saturated thickness in the perched zone discontinuous and generally decreasing beneath the site, and with conductivity of the formation being very low. These observations have been verified by studies performed for the DOE's disposal site at Slick Rock, which noted that the Dakota Sandstone, Burro Canyon Formation, and upper claystone of the Brushy Basin Member are not considered aquifers due to the low permeability, discontinuous nature, and limited thickness of these units (DOE, 1993).

Table 2.2.1-1

Water Rights

WR Number	Diversion Type/Location	Well Log	Status	Priority	Uses	CFS	ACFT	Owner Name
09-1006	Underground		U	19771110	IS	0.500	0.000	DOROTHY PERKINS
	S30 W20 E4 02 37S 22E SL							NORTH RESERVOIR ROAD (37-1)
09-1008	Underground		T	19771110	IS	0.500	0.000	ARDEN NIELSON
	S460 E117 W4 01 37S 22E SL							P.O. BOX #378
09-1009	Underground		U	19771110	I	0.500	0.000	BAR M. K. RANCHES INCORPORATED
	N1200 E990 W4 14 37S 22E SL							P.O. BOX 576
09-1009	Underground		U	19771110	I	0.500	0.000	BAR M. K. RANCHES INCORPORATED
	0 W990 N4 14 37S 22E SL							P.O. BOX 576
09-1009	Underground		U	19771110	I	0.500	0.000	BAR M. K. RANCHES INCORPORATED
	N990 W990 S4 11 37S 22E SL							P.O. BOX 576
09-101	Underground	well info	P	19450702	DIS	0.004	0.000	ILO M. BROWN
	N1275 E2708 SW 01 37S 22E SL							BLANDING UT 84535
09-1013	Underground		P	19771207	DI	0.015	0.000	LEWIS A. BLACK
	N2510 E75 S4 34 36S 22E SL							P.O. BOX #403
09-1016	Underground		T	19780103	DIS	0.500	0.000	KENNETH P. MCDONALD
	N559 0 S4 34 36S 22E SL							60 NORTH 100 WEST (16-5)
09-1017	Underground		P	19780105	DI	0.015	0.000	JOHN BRAKE
	N150 E137 S4 34 36S 22E SL							P.O. BOX #173
09-1018	Underground		T	19780104	DIS	0.015	0.000	MARGARET E. THOMPSON

	S2620 W840 NE 36 36S 22E SL							P.O. BOX #231
09-1023	Underground		T	19780126	DIS	1.000	0.000	CALVIN BLACK
	S10 W4000 NE 16 37S 22E SL							P.O. BOX #885
09-1023	Underground		T	19780126	DIS	1.000	0.000	CALVIN BLACK
	S600 W1320 NE 16 37S 22E SL							P.O. BOX #885
09-103	Underground	well info	P	19450710	S	0.003	0.000	WILLARD M. GUYMAN
	S1394 E2295 NW 02 37S 22E SL							BLANDING UT 84535
09-1031	Underground	well info	P	19830425	SX	0.136	0.000	COLLEGE OF EASTERN UTAH
	0 E1000 SW 23 38S 21E SL							451 EAST 400 NORTH
09-1032	Underground		T	19780309	DIS	0.015	0.000	BLANDING CITY
	S840 W875 NE 15 37S 22E SL							BLANDING UT 84511
09-1033	Underground	well info	P	19780309	DIS	0.015	0.000	BARRY LEE AND LOREE A. WOOLLEY
	N1050 W1195 SE 10 37S 22E SL							191 BUTTERNUT DRIVE NORTH
09-1042	Underground	well info	A	19780505	DI	0.015	1.450	AROE G. BROWN
	N1580 W1090 SE 01 37S 22E SL							BLANDING UT 84511
09-1043	Underground		T	19780505	DI	0.015	0.000	ARVID K. BLACK
	S1000 E300 NW 01 37S 22E SL							BOX 339
09-1044	Underground		P	19780429	DI	0.015	0.000	PETE M. BLACK
	S150 E1840 W4 36 36S 22E SL							BOX 386
09-1045	Underground	well info	P	19780504	DIS	0.015	0.000	KENNETH BROWN
	N1580 W1040 SE 01 37S 22E SL							P.O. BOX #637
09-1047	Underground	well info	P	19780511	DIS	0.015	1.586	IVAN Q. JONES
	N105 W1110 E4 02							881 EAST BROWNS

	37S 22E SL							CANYON ROAD
09-1048	Underground	well info	P	19780511	DIS	0.015	0.000	DORIS GUYMON
	N105 W1110 E4 02 37S 22E SL							P.O. BOX #117
09-1057	Underground	well info	P	19780623	DIS	0.015	0.000	EUGENE & DORTHEA GUYMON
	S100 W1400 NE 02 37S 22E SL							BOX 117
09-1058	Underground		U	19780623	I	0.100	0.000	EUGENE & DOROTHEA GUYMON
	N400 W400 E4 02 37S 22E SL							BOX 117
09-1059	Underground	well info	U	19780623	DIS	0.100	0.000	EUGENE & DOROTHEA GUYMON
	S100 W1400 NE 02 37S 22E SL							BOX 117
09-1063	Underground		P	19780802	DO	0.015	0.000	C & C CONSTRUCTION
	N900 W660 SE 34 36S 22E SL							P.O. BOX 415
09-1071	Underground		T	19780824		0.015	0.000	JAMES J. HARRIS
	S600 W1280 E4 36 36S 22E SL							BOX 392
09-1090	Underground	well info	P	19790521	DI	0.015	0.000	GUY DENTON AND PEGGY DENTON
	N1090 W20 S4 02 37S 22E SL							632 EAST BROWNS CANYON ROAD
09-110	Underground	well info	P	19460415	DIS	0.100	0.000	HENRY M. LYMAN
	N1305 W1023 E4 03 37S 22E SL							BLANDING UT 84511
09-1100	Underground		A	19790904	DI	0.015	0.000	LOYD ROPER
	N1430 E275 S4 34 36S 22E SL							P.O. BOX 469
09-1110	Underground	well info	P	19830304	DI	0.015	0.000	RICHARD W. & ARLEEN HURST
	N1170 W1000 SE 01							P.O. BOX 1090

	37S 22E SL							
09-1124	Underground		P	19860818	IS	0.015	0.000	JOHN BRAKE
	N310 E280 S4 34 36S 22E SL							1300 S. 300 W. (60-9)
09-1128	Underground		P	19800310	DIS	0.015	0.000	JAMES A. LAWS
	S1610 E560 N4 02 37S 22E SL							P.O. BOX 1210
09-1144	Underground		P	19800630	DIS	0.015	0.000	LEE R. & MARYLYNN SMITH
	N1272 E149 S4 34 36S 22E SL							P.O. BOX 1169
09-1145	Underground		P	19800630	DIS	0.015	0.000	LEE R. & MARYLYNN SMITH
	N1272 E149 S4 34 36S 22E SL							P.O. BOX 1169
09-1146	Underground		P	19800630	DIS	0.015	0.000	LEE R. & MARYLYNN SMITH
	N1272 E149 S4 34 36S 22E SL							P.O. BOX 1169
09-1147	Underground		P	19800630	DIS	0.015	0.000	LEE R. & MARYLYNN SMITH
	N1272 E149 S4 34 36S 22E SL							P.O. BOX 1169
09-1153	Underground		P	19800825	IS	0.015	0.000	PARLEY V. & REVA V. REDD
	N1350 E1150 SW 34 36S 22E SL							PARLEY AND REVA REDD FAMILY LIVING TRUST (1981)
09-1156	Underground	well info	P	19800909	DIS	0.015	0.000	AL B. CLARKE AND SHIRLEY W. CLARKE
	N2580 W921 S4 01 37S 22E SL							1555 BROWN`S CANYON ROAD
09-1157	Underground		T	19800912	O	0.700	511.540	IUC WHITE MESA LLC
	N1200 E280 SW 21 37S 22E SL							1050 17TH STREET, SUITE 950
09-1157	Underground		T	19800912	O	0.700	511.540	IUC WHITE MESA LLC

	N200 W200 SE 28 37S 22E SL							1050 17TH STREET, SUITE 950
09-1157	Underground		T	19800912	O	0.700	511.540	IUC WHITE MESA LLC
	N1200 W200 SE 33 37S 22E SL							1050 17TH STREET, SUITE 950
09-1157	Underground		T	19800912	O	0.700	511.540	IUC WHITE MESA LLC
	N1200 0 SE 21 37S 22E SL							1050 17TH STREET, SUITE 950
09-116	Underground		P	19460903	S	0.005	0.000	TODD MILTON HURST
	S150 W925 E4 35 36S 22E SL							747 NORTH 300 WEST (34-2)
09-1167	Underground		P	19801209	DIS	0.012	0.000	LYNDA HARRELSON
	S1430 W270 N4 02 37S 22E SL							133 SOUTH 100 WEST A
09-1173	Underground		T	19810202		0.000	1.000	CARBONIT EXPLORATION INCORPORATED
	S1550 W1300 NE 32 38S 22E SL							C/O K & A/HELTON
09-1176	Underground		P	19800912	O	0.600	0.000	IUC WHITE MESA LLC.
	N1400 W3000 SE 28 37S 22E SL							1050 17TH STREET, SUITE 950
09-1176	Underground	well info	P	19800912	O	0.600	0.000	IUC WHITE MESA LLC.
	N1300 W2400 SE 28 37S 22E SL							1050 17TH STREET, SUITE 950
09-1176	Underground	well info	P	19800912	O	0.600	0.000	IUC WHITE MESA LLC.
	N2100 W2200 SE 28 37S 22E SL							1050 17TH STREET, SUITE 950
09-1176	Underground		P	19800912	O	0.600	0.000	IUC WHITE MESA LLC.
	N1290 W170 SE 33 37S 22E SL							1050 17TH STREET, SUITE 950
09-1176	Underground		P	19800912	O	0.600	0.000	IUC WHITE MESA LLC.

	N1000 E650 SW 22 37S 22E SL							1050 17TH STREET, SUITE 950
09-1198	Underground		T	19810406	DIS	0.015	0.000	NED J. AND MARILYN PALMER
	S585 E1460 W4 01 37S 22E SL							12 EAST 5TH SOUTH 107-5
09-1199	Underground		T	19810403	I	0.052	0.000	IVAN R. WATKINS
	S2722 E310 NW 01 37S 22E SL							P.O. BOX 372
09-1201	Underground		P	19810416	DIS	0.015	0.000	KAREN C. KNIGHT
	N100 E1920 W4 36 36S 22E SL							2164 BLUFF ROAD
09-1221	Underground		U	19810721	DIS	1.000	0.000	DENNIS F. AND EDITH G. ANDERSON
	N760 E1532 W4 02 37S 22E SL							1307 SO MAIN
09-1225	Underground		T	19810708	DIS	0.100	0.000	DENNIS E. GUYMON
	N105 W1110 E4 02 37S 22E SL							BOX 657
09-1227	Underground	well info	P	19810810	S	0.015	0.000	DENNIS F. AND EDITH G. ANDERSON
	N760 E1532 W4 02 37S 22E SL							1307 SOUTH MAIN (79-9)
09-123	Underground	well info	P	19470822	S	0.015	0.000	GEORGE F. LYMAN
	N500 E200 SW 15 37S 22E SL							BLANDING UT 84511
09-1230	Underground		T	19810921	DIS	0.015	0.000	RICHARD ARTHUR
	N750 E2390 W4 02 37S 22E SL							427 SOUTH 100 WEST
09-1233	Underground		P	19811007	DIS	0.000	3.266	KIRK BLACK
	N306 E51 W4 01 37S 22E SL							1727 SOUTH AROUND THE WORLD 103-23
09-1236	Underground	well info	P	19811102	DIS	0.015	0.000	JAMES R. AND CHRISTINA J. BRANDT
	S910 E2020 W4 01							139 SOUTH 100

	37S 22E SL							WEST (68-2)
09-1238	Underground	well info	P	19811223	DI	0.015	0.000	ALYCE M. RENTZ
	N1300 E50 S4 01 37S 22E SL							BROWN CANYON ROAD 103-8
09-1248	Underground		P	19820209	D	0.015	0.000	REED HURST
	S1470 E125 N4 02 37S 22E SL							354 S. 300 W. #56
09-1262	Underground	well info	P	19820811	DI	0.015	0.000	GERALD B. HEINER
	N132 E2244 W4 02 37S 22E SL							P.O. BOX 1127
09-1287	Underground	well info	P	19830207	DIS	0.015	0.000	ALVIN H. KAER
	N476 E2256 W4 02 37S 22E SL							P.O. BOX 1133
09-1290	Underground		P	19830323	DI	0.015	0.000	CARLA L. AND MARK E. ENDRES
	S932 W363 N4 03 37S 22E SL							444 WEST 1600 SOUTH
09-1346	Underground		P	19840305	S	0.015	0.000	J. GLEN & EVA L. SHUMWAY
	S1321 W1980 E4 15 37S 22E SL							578 SOUTH 200 WEST 61-1
09-138	Underground		P	19500525	S	0.015	0.000	LORRAINE AND VERL J. ROSE
	S1326 W1205 E4 02 37S 22E SL							1166 SOUTH 100 EAST
09-1396	Underground		T	19841026	O	0.000	3.000	WINTERSHALL OIL & GAS CORPORATION
	S2722 E10 NW 01 37S 22E SL							1020 15TH STREET, SUITE 122E
09-1402	Underground		T	19841113	O	0.000	6.000	C/O PERMITCO WINTERSHALL OIL & GAS CORPORATION
	S2722 E10 NW 01 37S 22E SL							1020 15TH STREET, SUITE 22E
09-141	Underground	well info	P	19500918	S	0.015	0.000	WILLARD M. GUYMON

	N1287 W448 SE 10 37S 22E SL							BLANDING UT 84511
09-1457	Underground		T	19860103	O	0.000	3.000	WINTERSHALL OIL & GAS CORPORATION C/O PERMITCO
	S2722 E10 NW 12 37S 22E SL							1020 15TH STREET SUITE 22E
09-1468	Underground		A	19860414	DIS	0.015	0.000	RONALD D. & CATHERINE A. KIRK
	S570 E1458 W4 01 37S 22E SL							BROWN CANYON ROAD (103-9)
09-1477	Underground	well info	P	19931108	DI	0.015	0.000	JOANN WATKINS
	N750 W2180 SE 01 37S 22E SL							EAST BROWN CANYON ROAD 103-14
09-1535	Underground		T	19871013	O	0.000	3.000	QUINTANA PETROLEUM CORPORATION
	S2722 E10 SW 01 37S 22E SL							ATTN: LISA GREEN, AGENT FOR QUINTANA PETROLEUM
09-1548	Underground		T	19871202	O	0.000	8.000	YATES PETROLEUM CORPORATION
	N2558 E10 SW 01 37S 22E SL							C/O PERMITS WEST INC.
09-1664	Underground		P	19890913	DIS	0.015	0.000	F. GREG STRINGHAM
	N340 W305 SE 34 36S 22E SL							1244 SOUTH 100 EAST (80-1)
09-1673	Underground	well info	A	19940524	IS	0.015	0.000	HENRY CLYDE WATKINS
	S3000 E200 NW 01 37S 22E SL							1000 BROWNS CANYON 103-14
09-1686	Underground		T	19900402	O	0.000	8.000	GENERAL ATLANTIC RESOURCES INC.
	S2722 E10 NW 01 37S 22E SL							C/O PERMITS WEST INC. ATTN: BRIAN

								WOOD
09-1709	Underground		P	19900504	I	0.000	1.120	GORDON REDD MANAGEMENT INC.
	N2505 E1629 S4 34 36S 22E SL							82 SOUTH MAIN STREET
09-1734	Underground		T	19901010	O	0.000	2.000	CELSIUS ENERGY COMPANY
	S2722 E10 NW 01 37S 22E SL							C/O PERMITS WEST INC.
09-1785	Underground		A	19911031	DIS	0.100	0.000	BERTHA SNYDER
	S200 E800 W4 01 37S 22E SL							409 EAST 1000 NORTH
09-1794	Underground	well info	T	19920313	DI	0.100	0.000	JAMES D. REDD
	N1115 E2320 SW 02 37S 22E SL							SANTA FE HEIGHTS 104-9
09-1801	Underground		T	19920714	O	0.000	9.000	TEXAS INC. AMPOLEX
	S2722 E10 NW 01 37S 22E SL							C/O BILLY HASS
09-1822	Underground	well info	A	19930315	IS	0.000	4.730	DENNIS F. AND EDITH G. ANDERSON
	S250 W250 NE 03 37S 22E SL							1307 SOUTH MAIN
09-1843	Underground	well info	P	19940323	DIS	0.000	1.560	JEROLD PERKINS
	S201 E1530 NW 03 37S 22E SL							1092 EAST BROWNS CANYON ROAD (103-18)
09-1844	Underground	well info	T	19940331	IS	0.000	3.760	PRESTON KIRK REDD
	N2125 E846 SW 02 37S 22E SL							292 WEST CENTER STREET BOX 67-7
09-1845	Underground		T	19940331	IS	0.000	3.760	PRESTON KIRK REDD
	N1115 E1220 SW 02 37S 22E SL							292 WEST CENTER STREET BOX 67-7
09-1848	Underground	well info	P	19940411	S	0.000	0.750	M. DALE SLADE

	N35 E40 SW 04 37S 23E SL							332 WEST 400 SOUTH (64-5)
09-1862	Underground		T	19950118	O	0.500	0.000	KOKEPELLI BOTTLING
	N200 W2250 E4 36 36S 22E SL							36 EAST 500 SOUTH (77-15)
09-1875	Underground		T	19950417	DIS	0.000	4.730	STAN & SANDRA PERKINS
	N2105 W235 SE 34 36S 22E SL							686 NORTH DAYBREAK DRIVE
09-1878	Underground		P	19950505	S	0.000	1.680	BRUCE J. LYMAN
	S92 W2566 E4 33 36S 23E SL							SHIRTAIL JUNCTION (105-7)
09-1880	Underground	well info	P	19950620	DIS	0.000	4.730	MITCHELL H. & JANA L. BAILEY
	S945 E1095 NW 15 37S 22E SL							SHIRTAIL CORNER 105-14
09-1886	Underground	well info	A	19950807	DIS	0.000	1.730	PAUL A. OR SHARON BROWN
	N868 W1260 SE 01 37S 22E SL							BROWN`S CANYON ROAD (103-16)
09-1912	Underground	well info	T	19960521	DI	0.000	4.730	THOMAS A. MAY
	N500 W545 S4 02 37S 22E SL							2202 SOUTH CINCO CEDROS ROAD (104-8)
09-193	Underground		P	19560316	S	0.015	0.000	ALMA U. JONES
	S50 W1420 E4 33 37S 22E SL							BLANDING UT 84511
09-1934	Underground	well info	P	19960830	DIS	0.000	1.882	RONALD F. & MERLE MCDONALD
	N1816 W651 S4 01 37S 22E SL							1500 BROWN`S CANYON ROAD (103-2)
09-1947	Underground	well info	P	19961126	DIS	0.000	3.110	THOMAS A. MAY
	N174 W901 S4 02 37S 22E SL							2202 SOUTH CINCO CEDROS ROAD (104-8)
09-1953	Underground		T	19970430	DIS	0.000	4.730	JERRY HOLLIDAY

	S2393 W2494 NE 02 37S 22E SL							P.O. BOX 502
09-1955	Underground	well info	T	19970527	DI	0.000	4.730	JIM & MARY BOURNE
	N3055 W1059 SE 01 37S 22E SL							468 NORTH 500 WEST
09-1959	Underground		T	19970729	I	0.000	4.730	LLOYD D. & CLARABELLA ELLGEN
	N2339 E191 SW 35 36S 22E SL							859 SOUTH 100 EAST (82-9)
09-1964	Underground	well info	P	20030512	DIS	0.000	0.990	BEN J. BLACK
	N516 E625 W4 02 37S 22E SL							83 WEST 300 SOUTH 75-5
09-1968	Underground	well info	A	19970915	DIS	0.000	4.730	BRUCE & PEGGY ROYER
	N600 W880 SE 01 37S 22E SL							PO BOX 1145
09-197	Underground	well info	P	19560512	DS	2.000	0.000	UTE MOUNTAIN UTE TRIBE
	N1005 W207 S4 23 38S 22E SL							TOWAOC CO 81334
09-1972	Underground		T	19971023	DIS	0.000	4.730	DALE & MARTHA LYMAN
	N1095 W725 E4 21 37S 22E SL							P.O. BOX 729
09-1979	Underground	well info	P	19980217	DIS	0.000	3.774	PAUL REDD & LISA MACDONALD
	N110 W2339 W4 34 36S 22E SL							466 WEST 800 SOUTH 60-15
09-1982	Underground		T	19980320	DIS	0.000	4.730	JEANNINE B. ERICKSEN
	N1420 W1560 SE 01 37S 22E SL							771 SOUTH 700 EAST
09-1983	Underground	well info	P	19980413	DI	0.000	1.894	DON C. & REBECCA P. LARSON
	S251 E933 W4 35 36S 22E SL							301 E. EAGLE VIEW LN. 95-19
09-1990	Underground	well info	P	20040304	DI	0.000	4.450	DUSTIN AND BEVERLY

								FELSTEAD
	N1847 W893 SE 01 37S 22E SL							1863 NORTH CANYON VIEW DRIVE (103-22)
09-1991	Underground	well info	T	19980702	DIS	0.000	4.730	ARDEN C. & BILLIE SUE NIELSON
	N1480 W1905 SE 11 37S 22E SL							BOX 864
09-2001	Underground	well info	T	19981002	DIS	0.000	1.480	ANNA M. RAFFERTY
	S860 E315 NW 22 37S 22E SL							P.O. BOX 553
09-2006	Underground		T	19990112	DIS	0.000	4.730	MARTHA LYMAN
	S660 W700 NE 21 37S 22E SL							P.O. BOX 96
09-2010	Underground	well info	P	19990315	DI	0.000	3.130	STEVEN C. AND SHAUNA E. BLACK
	N2430 E2540 SW 36 36S 22E SL							1606 EAST HARRIS LANE (102-9)
09-2012	Underground		P	19990402	DIS	0.000	4.194	JULIE MAY KNITTEL AND CAROL ANN BLISS
	S76 W1085 E4 02 37S 22E SL							2250 NORTH 1200 EAST
09-2021	Underground	well info	P	19990810	DIS	0.000	3.518	SHELLY BLAKE
	S275 E561 W4 35 36S 22E SL							853 SOUTH 200 EAST (95-23)
09-2033	Underground		T	20000412	DIS	0.000	4.730	RANDALL & MARILYN PEMBERTON
	N1652 E30 SW 36 36S 22E SL							1727 SOUTH AROUND THE WORLD 103-23
09-2035	Underground	well info	A	20000504	DI	0.000	4.730	ALAN SHUMWAY
	N1151 E577 SW 35 36S 22E SL							1201 SOUTH 200 EAST (95-22)
09-2040	Underground	well info	T	20000725	DIS	0.000	4.730	DAVID RAY PALMER
	N112 W270 E4 35							755 SOUTH MAIN

	36S 22E SL							STREET
09-2065	Underground		T	20011221	DIS	0.000	4.730	JAMES G. AND STACY MONTELLA
	S100 W650 E4 02 37S 22E SL							978 EAST BROWN CANYON ROAD (103-19)
09-2068	Underground	well info	P	20070502	DIS	0.000	2.904	BRUCE E. STEVENS
	S80 W710 NE 02 37S 22E SL							1314 SOUTH 1100 EAST 102-16
09-2069	Underground	well info	A	20070912	DIS	0.000	1.506	JOE (JR) AND SHIRLEY A. GRISHAM
	S1110 W277 E4 02 37S 22E SL							2044 SOUTH PERKINS LANE 103-20
09-2070	Underground	well info	P	20020409	DI	0.000	1.450	RICHARD I. AND MARIEANN WATKINS
	S162 W4489 E4 01 37S 22E SL							1302 BROWN CANYON ROAD 103-24
09-2074	Underground		T	20020521	S	0.000	4.730	BRUCE J. LYMAN
	N1020 W1220 SE 15 37S 22E SL							SHIRTAIL JUNCTION 105-7
09-2075	Underground		T	20020603	OX	0.000	16.140	USA CORPORATION INTERNATIONAL URANIUM
	S769 W1812 NE 33 37S 22E SL							P.O. BOX 809
09-2075	Underground		T	20020603	OX	0.000	16.140	USA CORPORATION INTERNATIONAL URANIUM
	S1039 W1600 NE 33 37S 22E SL							P.O. BOX 809
09-2075	Underground		T	20020603	OX	0.000	16.140	USA CORPORATION INTERNATIONAL URANIUM
	S1156 W1591 NE 33 37S 22E SL							P.O. BOX 809
09-2075	Underground		T	20020603	OX	0.000	16.140	USA CORPORATION

								INTERNATIONAL URANIUM
	S1023 W1576 NE 33 37S 22E SL							P.O. BOX 809
09-2075	Underground		T	20020603	OX	0.000	16.140	USA CORPORATION INTERNATIONAL URANIUM
	S903 W1563 NE 33 37S 22E SL							P.O. BOX 809
09-2075	Underground		T	20020603	OX	0.000	16.140	USA CORPORATION INTERNATIONAL URANIUM
	S1434 W1537 NE 33 37S 22E SL							P.O. BOX 809
09-2087	Underground	well info	A	20020815	DIS	0.000	3.010	BEN J. BLACK
	N516 E631 W4 02 37S 22E SL							303 EAST BROWNS CANYON RD.
09-2094	Underground		P	20020924	DI	0.000	0.838	SUMNER H. PATTERSON
	N125 W907 E4 34 36S 22E SL							788 SOUTH MAIN STREET 78-11
09-2097	Underground		P	20021004	IS	0.000	4.730	NORMAN F. NIELSON
	S581 E53 W4 01 37S 22E SL							63 NORTH 100 WEST (17-2)
09-2100	Underground		T	20021118	OX	0.000	32.280	INTERNATIONAL URANIUM USA CORPORATION
	N36 W2249 SE 28 37S 22E SL							P.O. BOX 809
09-2100	Underground		T	20021118	OX	0.000	32.280	INTERNATIONAL URANIUM USA CORPORATION
	N139 W2146 SE 28 37S 22E SL							P.O. BOX 809
09-2100	Underground		T	20021118	OX	0.000	32.280	INTERNATIONAL URANIUM USA CORPORATION
	N138 W1890 SE 28 37S 22E SL							P.O. BOX 809

09-2100	Underground		T	20021118	OX	0.000	32.280	INTERNATIONAL URANIUM USA CORPORATION
	N148 W1696 SE 28 37S 22E SL							P.O. BOX 809
09-2100	Underground		T	20021118	OX	0.000	32.280	INTERNATIONAL URANIUM USA CORPORATION
	S6 W1614 NE 33 37S 22E SL							P.O. BOX 809
09-2100	Underground		T	20021118	OX	0.000	32.280	INTERNATIONAL URANIUM USA CORPORATION
	S178 W1598 NE 33 37S 22E SL							P.O. BOX 809
09-211	Underground	well info	P	19570129	S	0.015	0.000	USA BUREAU OF LAND MANAGEMENT
	N3279 E3641 SW 29 38S 23E SL							2370 SOUTH 2300 WEST
09-2125	Underground	well info	P	20030715	M	0.000	4.730	SAN JUAN COUNTY
	N1247 W433 SE 34 36S 22E SL							P.O. BOX 9
09-2139	Underground		T	20040126	DIS	0.000	4.730	MITCHELL H. BAILEY
	N95 E1830 SW 10 37S 22E SL							105-14 SHIRTAIL CORNER
09-2140	Underground	well info	T	20040217	DIS	0.000	4.730	TONY F. GUYMON
	N2565 E2680 SW 02 37S 22E SL							BROWN CANYON ROAD 104-7
09-2152	Underground		A	20041115	DIS	0.000	4.730	JAMES R. AND WENDY L. BUNTING
	S2520 E420 NW 36 36S 22E SL							905 EAST HARRIS LANE
09-2162	Underground		A	20050407	DIS	0.000	4.730	LEE R. & DENIECE A. MEYERS
	N1095 W725 E4 21 37S 22E SL							1051 WEST 4350 SOUTH 105-10
09-2170	Underground	well	P	20060103	DI	0.000	4.730	DANIEL AND

		info						MARILYN KARTCHNER
	S1285 E573 NW 06 37S 23E SL							1551 S. BOOTS & SPURS LANE
09-2182	Underground		A	20060814	DIS	0.000	4.730	GLENN & GLORIA PATTERSON
	N1390 E90 S4 02 37S 22E SL							P.O BOX 972
09-2185	Underground		T	20060908	DI	0.000	4.730	MARTHA A. LYMAN
	S100 W990 NE 21 37S 22E SL							90 WEST 100 SOUTH
09-2187	Underground	well info	A	20060920	DIS	0.000	4.730	RANDALL & MARILYN PEMBERTON
	N784 E278 W4 01 37S 22E SL							72 SOUTH 100 WEST 70-1
09-226	Underground	well info	P	19580110	D	0.015	0.000	WAUKESHA OF UTAH
	S1639 E1689 N4 03 37S 22E SL							BOX #714
09-2263	Underground		A	20070124	DIS	0.000	4.730	STAN & SANDRA PERKINS
	N2010 W235 SE 34 36S 22E SL							686 NORTH DAYBREAK
09-2267	Underground	well info	A	20070323	D	0.000	0.450	JEFF & SHERI MONTELLA
	S516 E2 E4 02 37S 22E SL							P.O. BOX 285
09-2270	Underground	well info	A	20070530	DIS	0.000	2.562	CRAIG B. AND JOANNE T BARLOW
	N2383 E1328 SW 35 36S 22E SL							P.O. BOX 625
09-2276	Underground	well info	A	20070829	DIS	0.000	2.478	GLENN T. AND GLORIA J. PATTERSON
	N348 W1021 E4 01 37S 22E SL							1981 KOKOPELLI LANE
09-2286	Underground		A	20071218	DIS	0.000	4.730	MITCHELL H. & JANA L. BAILEY
	N834 E1230 S4 16 37S 22E SL							210 N. SHIRTTAIL WAY

09-2290	Underground		A	20080221	DIS	0.000	4.730	LOIS SHUMWAY
	S284 W423 NE 03 37S 22E SL							PO BOX 447
09-2296	Underground		A	20080505	DIS	0.000	4.730	WENDELL & ELIZA FRY
	S1255 W814 E4 02 37S 22E SL							P.O. BOX 555
09-2297	Underground		A	20080516	DIS	0.000	4.728	NELLADEE AND JACK L. STREET
	S100 W650 E4 02 37S 22E SL							1004 EAST BROWNS CANYON ROAD
09-2306	Underground	well info	A	20081006	DS	0.000	0.534	ANDY & ALICIA BLACK
	S400 E738 W4 36 36S 22E SL							1312 HARRIS LANE
09-2309	Underground		A	20081103	DIS	0.000	4.470	KEVIN BLACK
	S955 E192 NW 01 37S 22E SL							41 EAST 300 SOUTH
09-2311	Underground		A	20081110	DIS	0.000	4.730	MARK & TERRI LYMAN
	S50 W990 NE 21 37S 22E SL							PO BOX 106
09-2312	Underground		A	20081230	DIS	0.000	4.730	JACK & NELLADEE STREET
	S72 W662 E4 02 37S 22E SL							1004 EAST BROWNS CANYON RD
09-2316	Underground		A	20090209	DIS	0.000	4.590	FRANKLIN P. HAWKINS
	S1095 W725 NE 21 37S 22E SL							4238 SOUTH 1000 WEST
09-255	Underground		P	19660304	S	0.015	0.000	USA BUREAU OF LAND MANAGEMENT
	S688 E128 W4 14 38S 21E SL							2370 SOUTH 2300 WEST
09-275	Underground		P	19600804	S	0.001	0.000	UTAH SCHOOL AND INSTITUTIONAL TRUST LANDS ADMIN.
	S943 W546 N4 32 38S 23E SL							675 EAST 500 SOUTH, 5TH FLOOR

09-348	Underground		P	19640513	S	0.011	0.000	KELLY G. & TERRI J. LAWS
	N2265 W900 S4 33 36S 23E SL							295 W. 400 N.
09-365	Underground		P	19641013	S	0.015	0.000	EUGENE GUYMON
	N747 W932 E4 02 37S 22E SL							P.O. BOX 117
09-385	Underground		T	19650715	I	0.500	0.000	HARRIS SHUMWAY
	S1320 E395 NW 33 37S 22E SL							BOX 172
09-423	Underground		P	19350522	DIS	0.022	5.580	FRED S. LYMAN
	N340 W750 S4 10 37S 22E SL							BLANDING UT 84511
09-466	Underground		P	19680308	S	0.007	0.000	LORENZO HAWKINS
	S152 W76 NE 32 37S 22E SL							P.O. BOX 182
09-473	Underground		P	19680927	D	0.015	0.000	USA UTAH LAUNCH COMPLEX WHITE SANDS MISSLE RANGE
	S608 W327 NE 27 37S 22E SL							C/O A. MURAY MAUGHN, SITE DIRECTOR
09-474	Underground		T	19690303		0.015	0.000	HARVEY J. KARTCHNER
	S3700 W2000 N4 35 36S 22E SL							BOX 232
09-496	Underground		T	19700325		0.100	0.000	MONTICELLO DISTRICT USA BUREAU OF LAND MANAGEMENT
	N1098 E1642 SW 11 38S 21E SL							P.O. BOX 1327
09-504	Underground		P	19700722	S	0.010	0.000	USA BUREAU OF LAND MANAGEMENT
	S3219 E3255 NW 08 37S 22E SL							2370 SOUTH 2300 WEST
09-510	Underground		T	19710318		2.000	0.000	WILLIAM B. REDD
	N200 E2750 SW 03 37S 21E SL							BOX 531

09-510	Underground		T	19710318		2.000	0.000	WILLIAM B. REDD
	N0 E3000 SW 03 37S 21E SL							BOX 531
09-528	Underground		P	19720315	DIS	0.015	0.000	J. PARLEY LAWS
	N3110 W1790 SE 02 37S 22E SL							P.O. BOX #315
09-541	Underground		T	19720731		0.100	0.000	BLANDING VACATIONS INCORPORATED
	S1550 E2500 NW 15 37S 22E SL							PO BOX 66
09-544	Underground		T	19720922		0.015	0.000	ROBERT E. HOSLER
	N1678 W953 SE 03 37S 22E SL							PO BOX 421
09-546	Underground		P	19721012	DI	0.030	0.000	WILLIAM W. AND ROSELINE M. SIMPSON
	S3273 E1687 N4 03 37S 22E SL							P.O. BOX #263
09-573	Underground		P	19730927	DIS	0.084	0.000	ERWIN OLIVER
	N1610 E1260 SW 35 36S 22E SL							P.O. BOX #285
09-581	Underground		P	19740502	I	0.300	0.000	DELORES HURST
	S70 W900 E4 35 36S 22E SL							516 WEST 100 SOUTH (50-5)
09-581	Underground		P	19740502	I	0.300	0.000	DELORES HURST
	S750 W430 E4 35 36S 22E SL							516 WEST 100 SOUTH (50-5)
09-581	Underground		P	19740502	I	0.300	0.000	DELORES HURST
	S20 W325 E4 35 36S 22E SL							516 WEST 100 SOUTH (50-5)
09-582	Underground		P	19740502	I	0.750	0.000	TODD MILTON HURST
	S75 W1185 E4 35 36S 22E SL							747 NORTH 300 WEST (34-2)
09-582	Underground		P	19740502	I	0.750	0.000	TRAVIS EVAN PEHRSON
	S60 W860 E4 35 36S 22E SL							747 NORTH 300 WEST (34-2)
09-584	Underground	well	P	19740503	O	0.015	0.000	LEONARD R. HOWE

		info						
	S619 W135 N4 03 37S 22E SL							P.O. BOX #1025
09-597	Underground		P	19740829	S	0.015	0.000	DOROTHY PERKINS
	S590 W810 E4 21 37S 22E SL							NORTH RESERVOIR ROAD (37-1)
09-606	Underground		T	19741127	DIS	0.100	0.000	JESS M. GROVER
	N2040 W350 S4 01 37S 22E SL							P.O. BOX #564
09-618	Underground	well info	P	19750421	DIS	0.010	0.000	MARK EUGENE SHUMWAY
	S1140 W220 N4 03 37S 22E SL							444 WEST 1600 SOUTH (79-2)
09-619	Underground		T	19750619	DIS	0.015	0.000	BOYD LAWS
	S2400 W210 N4 22 37S 22E SL							P.O. BOX #317
09-631	Underground		P	19751120	DIS	0.100	0.000	EUGENE GUYMON
	N747 W932 E4 02 37S 22E SL							P.O. BOX #117
09-631	Underground		P	19751120	DIS	0.100	0.000	EUGENE GUYMON
	N400 W350 E4 02 37S 22E SL							P.O. BOX #117
09-631	Underground		P	19751120	DIS	0.100	0.000	EUGENE GUYMON
	N275 W150 E4 02 37S 22E SL							P.O. BOX #117
09-634	Underground	well info	P	19751129	S	0.015	0.000	LORRAINE ROSE AND VERL J. ROSE
	S1326 W1205 E4 02 37S 22E SL							1166 SOUTH 100 EAST
09-637	Underground	well info	P	19760103	IS	0.200	0.000	HENRY CLYDE WATKINS
	S2722 E10 NW 01 37S 22E SL							EAST BROWN CANYON ROAD 103-14
09-663	Underground		T	19760623	DIS	0.015	0.000	GRANT L. BAYLES
	N1155 E870 SW 22 37S 22E SL							P.O. BOX #275
09-666	Underground		T	19761021	O	1.000	0.000	HEMI WEST PROPERTIES

	N3200 W2600 SE 23 37S 21E SL							1325 SOUTH 800 EAST
09-666	Underground		T	19761021	O	1.000	0.000	HEMI WEST PROPERTIES
	N3000 W1300 SE 23 37S 21E SL							1325 SOUTH 800 EAST
09-666	Underground		T	19761021	O	1.000	0.000	HEMI WEST PROPERTIES
	N2100 W200 SE 23 37S 21E SL							1325 SOUTH 800 EAST
09-666	Underground		T	19761021	O	1.000	0.000	HEMI WEST PROPERTIES
	N2100 E1200 SW 24 37S 21E SL							1325 SOUTH 800 EAST
09-672	Underground	well info	P	19761210	OS	0.015	0.000	ENERGY FUELS LIMITED
	N640 W1650 SE 28 37S 22E SL							1200 17TH STREET, ONE TABOR CENTER SUITE 2500
09-689	Underground	well info	P	19770307	MOS	1.110	803.600	IUC WHITE MESA LLC
	N1400 W3000 SE 28 37S 22E SL							1050 17TH STREET SUITE 950
09-689	Underground	well info	P	19770307	MOS	1.110	803.600	IUC WHITE MESA LLC
	N1300 W2400 SE 28 37S 22E SL							1050 17TH STREET SUITE 950
09-689	Underground	well info	P	19770307	MOS	1.110	803.600	ENERGY FUELS LTD.
	N2100 W2200 SE 28 37S 22E SL							1200 17TH STREET, ONE TABOR CENTER SUITE 2500
09-689	Underground		P	19770307	MOS	1.110	803.600	IUC WHITE MESA LLC
	N1000 E650 SW 22 37S 22E SL							1050 17TH STREET SUITE 950
09-713	Underground	well info	P	19770407	DIS	0.015	0.000	DEAN W. GUYMON
	S360 W350 NE 03 37S 22E SL							P.O. BOX #194
09-740	Underground	well	P	19770419	I	0.015	0.000	WINSTON AND

		info						KATHRYN J. HURST BAYLISS
	N320 W1240 E4 27 38S 22E SL							259 NORTH 100 WEST
09-743	Underground		T	19851016	DI	0.015	0.000	O. FROST BLACK
	N150 E50 SW 36 36S 22E SL							208 SOUTH 200 WEST (65-5)
09-771	Underground		P	19770427	I	0.015	0.000	ELIZABETH ANN HURST PHILLIPS
	N670 E950 S4 34 36S 22E SL							P.O. BOX #389
09-778	Underground		T	19770504	O	0.015	0.000	REX D. ANDERSON
	S310 E1240 W4 15 37S 22E SL							P.O. BOX 569
09-792	Underground	well info	P	19770509	DIS	0.015	0.000	HENRY CLYDE WATKINS
	S80 E220 W4 01 37S 22E SL							1000 EAST BROWNS CANYON ROAD 103-14
09-805	Underground		T	19770510	DIS	0.015	0.000	BAR M. K. RANCHES INCORPORATED
	N1540 E1340 W4 03 37S 22E SL							BOX 576
09-806	Underground		T	19770510	DIS	0.015	0.000	BAR M. K. RANCHES INCORPORATED
	N1200 E990 W4 14 37S 22E SL							BOX 576
09-808	Underground		T	19770510	DIS	0.015	0.000	BAR M. K. RANCHES INCORPORATED
	N990 W990 S4 11 37S 22E SL							BOX 576
09-826	Underground		U	19770523	DIS	0.500	0.000	CLISBEE LYMAN
	N665 W1015 S4 10 37S 22E SL							435 SOUTH 200 WEST 63-2
09-826	Underground		U	19770523	DIS	0.500	0.000	CLISBEE LYMAN
	N70 W790 S4 10 37S 22E SL							435 SOUTH 200 WEST 63-2
09-826	Underground		U	19770523	DIS	0.500	0.000	CLISBEE LYMAN
	N340 W750 S4 10 37S 22E SL							435 SOUTH 200 WEST 63-2

09-826	Underground		U	19770523	DIS	0.500	0.000	CLISBEE LYMAN
	N315 W450 S4 10 37S 22E SL							435 SOUTH 200 WEST 63-2
09-831	Underground		T	19800516	DIS	0.015	0.000	J. KEITH ROGERS
	N2306 E217 SW 35 36S 22E SL							3488 FOOTHILL DRIVE
09-832	Underground		T	19800516	DIS	0.015	0.000	J. KEITH ROGERS
	N1728 E215 SW 35 36S 22E SL							3488 FOOTHILL DRIVE
09-833	Underground		P	19800516	I	0.015	0.000	J. KEITH ROGERS
	N1265 W250 SE 34 36S 22E SL							3488 NORTH FOOTHILL DRIVE
09-834	Underground		T	19800516	DIS	0.015	0.000	J. KEITH ROGERS
	N2208 E2252 S4 34 36S 22E SL							3488 FOOTHILL DRIVE
09-843	Underground		P	19900308	DI	0.015	0.000	STAN AND SANDRA PERKINS
	N2220 E1930 S4 34 36S 22E SL							864 NORTH DAYBREAK DRIVE
09-860	Underground	well info	P	19770620	DI	0.015	0.000	STANLEY D. MARTINEAU
	S830 E1740 W4 01 37S 22E SL							P.O. BOX #822
09-871	Underground		P	19770606	S	0.015	0.000	JESS M. GROVER
	N270 E520 W4 36 36S 22E SL							BLANDING UT 84511
09-872	Underground	well info	P	19770606	S	0.015	0.000	JESS M. GROVER
	S420 E2080 W4 01 37S 22E SL							BLANDING UT 84511
09-875	Underground	well info	P	19770630	IS	0.015	2.512	AROE G. BROWN
	N1570 W1230 SE 01 37S 22E SL							BOX 213
09-876	Underground	well info	P	19770630	IS	0.015	1.400	PETER D. AND GEORGIA R. KARAMESINES
	N1150 W1900 SE 01 37S 22E SL							1527 LINCOLN STREET APT. #4
09-879	Underground		P	19770706	I	0.015	0.000	JAMES DEWEY AND

								SHIRLEY LOU B. BRADFORD
	N570 W700 SE 36 36S 22E SL							149 SOUTH 800 EAST
09-885	Underground		P	19770711	I	0.015	0.000	GEORGE H. BRADFORD
	N1280 W1050 SE 36 36S 22E SL							BOX 855
09-888	Underground	well info	P	19770711	IS	0.015	0.000	FRED E. HALLIDAY
	S1310 E585 NW 11 37S 22E SL							BOX 335
09-895	Underground		T	19800925	IS	0.015	0.000	NELDON E. HOLT
	S1340 E1300 N4 21 37S 22E SL							BOX 394
09-896	Underground	well info	P	19770713	S	0.007	0.000	NELDON E. HOLT
	N100 E680 SW 15 37S 22E SL							BOX 394
09-906	Underground		T	19770719	DIS	0.015	0.000	REED E. BAYLES
	N1520 E650 S4 35 36S 22E SL							P.O. BOX #203
09-914	Underground		P	19770726	IS	0.015	0.000	EUGENE GUYMON
	N275 W150 E4 02 37S 22E SL							P.O. BOX #117
09-915	Underground		U	19770726	IS	0.100	0.000	EUGENE GUYMON
	N300 W100 E4 02 37S 22E SL							P.O. BOX #117
09-925	Underground	well info	P	19770728	DIS	0.015	0.000	DOROTHY PERKINS
	S75 W25 E4 02 37S 22E SL							205 EAST 700 SOUTH
09-93	Underground		P	19440929	S	0.013	0.000	BARRY LEE AND LOREE A. WOOLLEY
	N644 W855 SE 10 37S 22E SL							191 BUTTERNUT DRIVE NORTH
09-949	Underground		T	19770816	DIS	0.015	0.000	BERTHA SNYDER
	S200 E800 W4 01 37S 22E SL							P.O. BOX 1318
09-954	Underground		P	19770907	DIS	0.015	0.000	PHYLLIS B. JONES

	N500 W1280 SE 36 36S 22E SL							P.O. BOX #472
09-955	Underground		P	19770907	I	0.015	0.000	O. FROST BLACK
	S175 E50 W4 36 36S 22E SL							P.O. BOX #71
09-958	Underground		T	19770915	IS	0.015	0.000	RICHARD & NORMAN NIELSON
	S2640 W400 NE 14 37S 22E SL							P.O. BOX #245
09-959	Underground		T	19840329	DIS	0.015	0.000	NORMAN AND RICHARD C. NIELSON
	N1700 W1100 SE 11 37S 22E SL							63 NORTH 100 WEST (17-2)
09-960	Underground		T	19880622	IS	0.015	0.000	NORMAN AND RICHARD NIELSON
	S585 E40 W4 01 37S 22E SL							63 NORTH 100 WEST (17-2)
09-977	Underground		T	19771005	DIS	0.015	0.000	KENNETH P. MCDONALD
	N559 0 S4 34 36S 22E SL							60 NORTH 100 WEST (16-5)
09-983	Underground		T	19771007	IS	0.500	0.000	PETER D. AND GEORGIA R. KARAMESINES
	N1270 W1980 SE 01 37S 22E SL							1527 LINCOLN STREET APT. #4
09-984	Underground	well info	P	19771013	DIO	0.015	0.000	FRANK A. MONTELLA
	S545 W505 E4 03 37S 22E SL							P.O. BOX #643, HIGHWAY 163 NORTH
09-988	Underground		A	19811117	DI	0.015	0.000	GARTH L. BRADFORD
	N700 W270 SE 36 36S 22E SL							P.O. BOX #1357
09-989	Underground		T	19771031	DO	0.015	0.000	REX D. ANDERSON
	N155 E1010 W4 15 37S 22E SL							P.O. BOX 569
09-990	Underground	well info	P	19771101	IS	0.015	1.280	EUGENE GUYMON

	N400 W350 E4 02 37S 22E SL							P.O. BOX #117
09-993	Underground		P	19771027	DI	0.015	0.000	BERNAL BRADFORD
	N1260 W200 SE 36 36S 22E SL							P.O. BOX #594
09-994	Underground		P	19771108	S	0.015	0.000	UTAH SCHOOL AND INSTITUTIONAL TRUST LANDS ADMIN.
	S660 W660 NE 32 38S 22E SL							675 EAST 500 SOUTH, 5TH FLOOR
a12177	Underground		A	19820223	DIS	0.015	0.000	NED J. AND MARILYN PALMER
	S551 E1540 W4 01 37S 22E SL							12 EAST 5TH SOUTH 107-5
a13054	Underground		T	19831205	IS	0.015	0.000	NORMAN AND RICHARD NIELSON
	S585 E40 W4 01 37S 22E SL							P.O. BOX #245
a20266	Underground		T	19770315	M	2.000	0.000	BLANDING CITY
	S2440 W1245 NE 35 36S 22E SL							50 WEST 100 SOUTH
a20266	Underground		T	19770315	M	2.000	0.000	BLANDING CITY
	S2440 W870 NE 35 36S 22E SL							50 WEST 100 SOUTH
a21545	Underground	well info	T	19970915	DI	0.000	4.730	JIM & MARY BOURNE
	N3055 W1059 SE 01 37S 22E SL							468 NORTH 500 WEST
a24139	Underground	well info	T	20000201	DIS	0.000	1.480	ANNA M. RAFFERTY
	S860 E315 NW 22 37S 22E SL							P.O. BOX 553
a35842	Underground		U	20090819	M	2.000	0.000	BLANDING CITY
	N938 E135 W4 01 37S 22E SL							50 WEST 100 SOUTH
a35842	Underground		U	20090819	M	2.000	0.000	BLANDING CITY
	S145 E133 N4 12 37S 22E SL							50 WEST 100 SOUTH
a35896	Underground		U	20090908	DIS	0.000	4.730	MITCHELL H. &

								JANA L. BAILEY
	N256 W943 SE 16 37S 22E SL							210 N. SHIRTTAIL WAY
t89-09-01	Underground		T	19890118	O	0.000	5.000	IVAN R. WATKINS
	S2722 E10 NW 01 37S 22E SL							BOX 938
t89-09-02	Underground		T	19890504	O	0.000	5.000	IVAN R. WATKINS
	S2722 E10 NW 01 37S 22E SL							BOX 938

Groundwater use in the area is not expected to change significantly in the foreseeable future.

2.2.3 Provide updated information on surface water and groundwater quality for potentially impacted surface waters and groundwater out to at least a 1-mile radius from the site.

Denison Response

a) Surface Water Quality

Updated information on surface water quality for potentially impacted surface waters out to at least a 1-mile radius from the site is set out in Sections 1.4.2 and 1.4.3 of the Reclamation Plan, Rev. 4.0.

b) Ground Water Quality

Updated information on groundwater quality for potentially impacted groundwater out to at least a 1-mile radius from the site is set out in Sections 1.5.2, 1.5.3, 1.5.4 and 1.5.5 of the Reclamation Plan, Rev. 4.0.

2.2.4 Please define the chemical characteristics of existing groundwater and surface water and identify methods utilized for completing monitoring groundwater and surface water quality.

Denison Response

a) Chemical Characteristics

The chemical characteristics of the groundwater and surface water at the Mill site are included in the discussions of groundwater and surface water quality in the Reclamation Plan, Rev. 4.0, referred to in Section 2.2.3 above.

b) Surface Water Monitoring

The following discussion is excerpted from Section 2.3 of the Reclamation Plan, Rev. 4.0.

Surface water monitoring is conducted at two locations adjacent to the Mill facility known as Westwater Creek and Cottonwood Creek. Samples are obtained annually from Westwater Creek and quarterly from Cottonwood Creek using grab sampling. For Westwater Creek, samples are of sediments if a water sample is not available. Field monitored parameters and laboratory monitored parameters are listed in Table 2.2.3-1 below. For further procedural information see Section 2.1 of the Mill's *Environmental Protection Manual* included as Appendix A to the 2007 License Renewal Application. See Section 1.4.3 of the Reclamation Plan, Rev. 4.0 for a summary of the historic results for surface water monitoring.

Table 2.2.3-1
Operational Phase Surface Water Monitoring Program

Monitoring Sites
Westwater Creek and Cottonwood Creek

Field Requirements

1. temperature C;
2. Specific Conductivity umhos at 25 C;
3. pH at 25 C;
4. Sample date;
5. Sample ID Code;

Vendor Laboratory Requirements

Semiannual*	Quarterly
One gallon Unfiltered and Raw	One gallon Unfiltered and Raw
One gallon Unfiltered, Raw and preserved to pH <2 with HNO_3	One gallon Unfiltered, Raw and Preserved to pH <2 with HNO_3
Total Dissolved Solids	Total Dissolved Solids
Total Suspended Solids	Total Suspended Solids
Gross Alpha	
Suspended Unat	
Dissolved Unat	
Suspended Ra-226	
Dissolved Ra-226	
Suspended Th-230	
Dissolved Th-230	

*Semiannual sample must be taken a minimum of four months apart.
**Annual Westwater Creek sample is analyzed for semi-annual parameters.
Radionuclides and LLDs reported in µCi/ml

c) Groundwater Monitoring

The following discussion is excerpted from Section 2.3 of the Reclamation Plan, Rev. 4.0.

At the time of renewal of the License by NRC in March, 1997 and up until issuance of the GWDP in March 2005, the Mill implemented a groundwater detection monitoring program to ensure compliance with 10 CFR Part 40, Appendix A, in accordance with the provisions of the License. The detection monitoring program was in accordance with the report entitled, *Points of Compliance, White Mesa Uranium Mill*, prepared by Titan Environmental Corporation, submitted by letter to the NRC dated October 5, 1994 (Titan, 1994b). Under that program, the Mill sampled monitoring wells MW-5, MW-11, MW-12, MW-14, MW-15 and MW-17, on a

quarterly basis. Samples were analyzed for chloride, potassium, nickel and uranium, and the results of such sampling were included in the Mill's Semi-Annual Effluent Monitoring Reports that were filed with the NRC up until August 2004 and with the DRC subsequent thereto.

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

- The Mill and tailings system had produced no impacts to the perched zone or deep aquifer; and
- The most dependable indicators of water quality and potential cell failure were considered to be chloride, nickel, potassium and natural uranium.

(i) Issuance of the GWDP

On March 8, 2005, the Executive Secretary issued the GWDP, which includes a groundwater monitoring program that supersedes and replaces the groundwater monitoring requirements set out in the License. Groundwater monitoring under the GWDP commenced in March 2005, the results of which are included in the Mill's *Quarterly Groundwater Monitoring Reports* that are filed with the Executive Secretary.

(ii) Current Ground Water Monitoring Program at the Mill Under the GWDP

The current groundwater monitoring program at the Mill under the GWDP consists of monitoring at 22 point of compliance monitoring wells: MW-1, MW-2, MW-3, MW-3A, MW-5, MW-11, MW-12, MW-14, MW-15, MW-17, MW-18, MW-19, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, MW-31 and MW-32. The locations of these wells are indicated on Figure 2.2.3-1.

Part I.E.1.(c) of the GWDP requires that each point of compliance well must be sampled for the following constituents:

Table 2.2.3-2
Groundwater Monitoring Constituents Listed in Table 2 of the GWDP

Nutrients:
Ammonia (as N)
Nitrate & Nitrite (as N)

Heavy Metals:
Arsenic
Beryllium
Cadmium
Chromium
Cobalt
Copper

Iron
Lead
Manganese
Mercury
Molybdenum
Nickel
Selenium
Silver
Thallium
Tin
Uranium
Vanadium
Zinc

Radiologics:
Gross Alpha

Volatile Organic Compounds:
Acetone
Benzene
2-Butanone (MEK)
Carbon Tetrachloride
Chloroform
Chloromethane
Dichloromethane
Naphthalene
Tetrahydrofuran
Toluene
Xylenes (total)

Others:
Field pH (S.U.)
Fluoride
Chloride
Sulfate
TDS

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

- Depth to groundwater
- Temperature
- Specific conductance,

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

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

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

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

(iii)Deep Aquifer

The Mill's culinary well (one of the Mill's supply wells) is completed in the Navajo aquifer, at a depth of approximately 1,800 feet below the ground surface. Due to the fact that the deep confined aquifer at the site is hydraulically isolated from the shallow perched aquifer (see the discussion in Sections 1.5.1.1 and 1.5.1.2 of the Reclamation Plan, Rev. 4.0) no monitoring of the deep aquifer is required under the GWDP.

d) Seeps and Springs Monitoring

Pursuant to Part I.H.8 of the GWDP, Denison has a *Sampling Plan for Seeps and Springs in the Vicinity of the White Mesa Uranium Mill*, Revision: 0, March 17, 2009 (the "SSSP") that requires the Mill to perform groundwater sampling and analysis of all seeps and springs found downgradient or lateral gradient from the tailings cells.

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

Samples are analyzed for all ground water monitoring parameters found in Table 2.2.3-2 above. The laboratory procedures utilized to conduct the analyses of the sampled parameters are those utilized for groundwater sampling. In addition to those laboratory parameters, the pH, temperature and conductivity of each sample is measured and recorded in the field. Laboratories selected by Denison to perform analyses of seeps and springs samples are required to be certified by the State of Utah in accordance with UAC R317-6-6.12.A.

The seeps and springs sampling events are subject to the *White Mesa Uranium Mill Ground Water Monitoring Quality Assurance Plan (QAP)* (the "QAP"), unless otherwise specifically modified by the SSSP to meet the specific needs of this type of sampling.

2.3 *INTERROGATORY WHITE MESA CELL 4B UAC R313-24-3-01C/01: ENVIRONMENTAL ANALYSIS – ALTERNATIVES*

INTERROGATORY STATEMENT:

2.3.1 Add a section to the ER that discusses the second alternative identified in the introduction to Chapter 11, namely, "Amend the license to include the construction of Cell 4B with such additional conditions as are considered necessary or appropriate to protect public health, safety, and the environment. . . ."

Denison Response

Denison believes that the Amendment Request is complete and that the proposed design of Cell 4B and the additional monitoring proposed in Section 10.2 of the 2008 ER are adequate to protect public health, safety, and the environment, without the need to add any additional conditions to the License. Of course, in reviewing the application, the Executive Secretary will have to make his own determination as to whether or not any additional conditions are necessary.

Denison does not believe that a Section to that effect needs to be added to the 2008 ER.

2.3.2 Estimate the increase in operating and closure costs that has occurred since the costs were estimated for the last license renewal.

Denison Response

Closure costs are estimated annually as required by License condition 9.5 and submitted to the Executive Secretary for approval. The most recent update in closure costs is set out in Attachment C to the Reclamation Plan, Rev. 4.0.

The operating costs of the facility are proprietary and not relevant to the Amendment Request.

Denison and the Executive Secretary will estimate the additional closure costs associated with Cell 4B after the design of Cell 4B is approved and prior to commencement of operation of Cell 4B. The Mill's surety will be updated at that time to reflect those additional costs.

2.3.3 Justify the statement that the ". . . costs associated with the operation of the Mill have not changed significantly but the benefits have become more evident over time as the number of uranium mills has dwindled and the demand for uranium milling services from local miners and the industry as whole has increased."

Denison Response

Costs associated with the operation of the Mill have increased roughly with the rate of inflation since the Mill was first constructed. There have also been other increases in operational costs associated with changes in regulatory requirements. Those increases in costs are not unlike the increases in costs for uranium mines and for similar facilities in other industries.

However, at the time the Mill was originally constructed there were a number of other operating uranium mills in the United States that were able to provide toll milling services to nearby uranium mines. The Mill is now the only operating uranium mill in the United States. The cost and time associated with permitting and constructing a new uranium mill or in re-permitting for operation one of the three other existing non-operational uranium mills in the United States would be significant. As a result, over the next several years, the Mill ill be the only alternative for all of the conventional uranium mines in the United States. The increases in the benefits of keeping the Mill in production at this time are therefore evident.

It should be kept in mind, however, that the Amendment Request is not an application for the License or for renewal of the License as a whole, which are addressed in the 2007 License Renewal Application and in the 2007 ER, nor is it an application for approval of the siting and use of Cell 4B, which have already been evaluated and approved and are included in the License as part of the original approval of the tailings management system for the Mill. Rather, the Amendment Request is for the more detailed amendments to the License required in connection with the actual construction and operation of Cell 4B. It is therefore not appropriate to re-analyze the costs and benefits of the Mill as a whole or the costs and benefits of the construction of Cell 4B. Cell 4B will basically be the same design as existing Cell 4A, the construction and operation of which have been approved by the Executive Secretary, and which is located immediately adjacent to proposed Cell 4B.

2.3.4 Present and justify the criteria used for assessing and comparing benefits and costs where these are expressed in nonmonetary or qualitative terms.

Denison Response

The Amendment Request is not an application for the License or for renewal of the License as a whole, which are addressed in the 2007 License Renewal Application and in the 2007 ER, nor is it an application for approval of the siting and use of Cell 4B, which have already been evaluated and approved and are included in the License as part of the original approval of the tailings management system for the Mill. Rather, the Amendment Request is for the more detailed amendments to the License required in connection with the actual construction and operation of Cell 4B. It is therefore not appropriate to re-analyze the costs and benefits of the Mill as a whole or the costs and benefits of the construction of Cell 4B. Cell 4B will basically be the same design as existing Cell 4A, the construction and operation of which have been approved by the Executive Secretary, and which is located immediately adjacent to proposed Cell 4B. The costs and benefits associated with Cell 4B will therefore not be significantly different from the costs and benefits associated with the previously approved Cell 4A.

2.3.5 Summarize and update estimated costs and benefits that were earlier estimated and reported (namely Tables 11.0-1 and 11.0-2 originally presented in D&M 1978).

Denison Response

See Section 2.3.4 above.

2.3.6 Provide additional support using current information for the statement at page 34 of the Cell 4B ER that "There have been no significant changes to the costs [and benefits] associated with the Mill since the last license renewal in 1997 . . . ." Provide a benefit-cost evaluation in the form of a narrative accompanied by tables and charts.

Denison Response

See Section 2.3.4 above.

2.3.7 Present or cite and summarize (including concise citations) objective evidence that supports the Cell 4B ER statement on page 31 that "The Mill has demonstrated that it is capable of continuing to operate in a manner that satisfies all regulatory standards and ALARA goals . . . ." Explain how the Notice and Violation and Groundwater Corrective Action Order issued by the Utah Department of Environmental Quality in 1999 affects confidence that amending the license to allow construction of Cell 4B will be successfully accomplished and properly operated. Explain why the necessity for this Notice and Violation and Groundwater Corrective Action Order and DUSA's responses do not affect the Division's confidence that the Mill will continue ". . . operate in a manner that satisfies all regulatory standards . . . ."

Denison Response

The Mill has been operating since 1980 and has been inspected by NRC up until August 2004 and by DRC since that time. The License was renewed in 1985 for five years and in 1997 for ten years, all of which demonstrates that the Mill is capable of operating in a manner that satisfies all regulatory standards and as low as reasonably achievable ("ALARA") goals. Further, the periodic reports filed with the Executive Secretary all demonstrate that the Mill is operating in compliance with all regulatory standards and ALARA goals. Those Reports are inspected by DRC.

The Amendment Request is not an application for the License or renewal of the License as a whole, which are addressed in the 2007 License Renewal Application and the 2007 ER.

The *Notice and Violation and Groundwater Corrective Action Order issued by the Utah Department of Environmental Quality in 1999* relates to chloroform contamination that predates Mill operations and has nothing to do with the Mill's ability to continue to operate in a manner that satisfies all regulatory standards and ALARA goals. The chloroform contamination at the Mill site has been attributed to the operation of a temporary laboratory facility that was located at the site prior to and during the construction of the Mill facility, and from septic drain fields that were used for laboratory and sanitary wastes prior to construction of the Mill's tailings cells. In April 2003, Denison

commenced an interim remedial program of pumping the chloroform contaminated water from the groundwater to the Mill's tailings cells. This will enable Denison to begin clean up of the contaminated areas and to take a further step towards resolution of this outstanding issue. Pumping from the wells continues at this time. Denison is continuing to work with the State of Utah to develop a long-term corrective action plan. A draft of an action plan was submitted and is currently being reviewed by the State. See Section 2.1.8 above.

2.4 *INTERROGATORY WHITE MESA CELL 4B UAC R313-24-3-01D/01: ENVIRONMENTAL ANALYSIS – LONG-TERM IMPACTS*

INTERROGATORY STATEMENT:

2.4.1 Please provide an updated Reclamation Plan that considers the current concept of fully utilizing Cells 4A and 4B for tailings management, including the long term stabilization and disposal of tailings. The updated Reclamation Plan must account for the use of these two cells for disposal, which will directly impact the length of slopes, precipitation runoff rates and volumes, design of the top cap, and design of the cap side slopes including rock sizing and fill depth.

Denison Response

The Reclamation Plan, Rev. 4.0, was submitted to DRC on November 23, 2009. The Reclamation Plan, Rev. 4.0 presents the plan for reclamation of the site as it exists today, prior to the construction of Cell 4B. The Reclamation Plan will be further revised to incorporate the addition of Cell 4B prior to acceptance and authorization for use by DRC. Figure 2.4.1-1 presents the concept for final reclamation of Cell 4B. As one of several conditions to the GWDP, an infiltration analysis of the tailings cover and re-design of the cover for better performance is in progress. The final revised cover design will address surface water management issues associated with the addition of Cell 4B.

2.4.2 Assess and report the geotechnical stability of the tailings impoundment, including slope stability, liquefaction, and settlement.

Denison Response

The geotechnical stability of the tailings impoundment, slope stability, liquefaction potential and settlement were addressed in Appendix D of the Reclamation Plan, Rev. 4.0.

2.4.3 Prepare and submit the updated Reclamation Plan, and, in particular, discuss the final cover and long-term stabilization design for the facility, including Cell 4B (and Cell 4A), according to requirements of NUREG-1620 and in accordance with 10CFR40 – Appendix A, Criteria 6(3) and 6A(1).

Denison Response

See Section 2.4.1 above.

2.4.4 Address slope stability, liquefaction, and settlement in accordance with NUREG-1620. Address the hydrologic characteristics of the site, including flooding potential, and erosion protection features of the tailings impoundment.

Denison Response

See to 2.4.2 above.

2.4.5 Address the radiation protection design of the tailings disposal impoundment cover for radon and gamma attenuation.

Denison Response

The current tailings cover design, included as Appendix D to the Reclamation Plan, Rev. 4.0 includes an analysis of radon and gamma attenuation characteristics of the proposed cover. The re-designed cover, discussed in Section 2.4.1 above, will include an updated analysis of radon and gamma attenuation characteristics of the re-designed cover.

2.4.6 Evaluate the potential for settlement of the tailings impoundment and cracking of the radon barrier that might result.

Denison Response

See the response to Section 2.4.2 above. Settlement monitors are installed over areas of tailings that have reached the final design grade for the disposal cell. The vertical movement of those monitors is evaluated during the placement of the initial platform fill and the dewatering of the disposal cell. Final cover placement will take place after most of the settlement has occurred, reducing the potential for differential settlement and cracking of the radon barrier.

2.4.7 Address plans for reclaiming and restoring lands disturbed by mining and milling activities.

Denison Response

A description of the complete site reclamation activities is included in Section 3 and Attachment A of the Reclamation Plan, Rev. 4.0.

2.4.8 Estimate costs to implement the Reclamation Plan activities and state the financial Arrangements necessary to provide required financial assurances.

Denison Response

Cost estimates for implementation of the current Reclamation Plan are included in Attachment C to the Reclamation Plan, Rev. 4.0. Estimated costs are guaranteed by surety bond from National Union Fire Insurance Company of Pittsburgh, PA, held by the Executive Secretary.

2.4.9 Assess and describe the long-term environmental impacts resulting from all proposed reclamation activities.

Denison Response

The Mill buildings and non-tailings areas of the Mill facility will be cleaned up and deposited into the Mill's tailings cells. Impacted soils in the vicinity of the Mill will be cleaned up and placed into the Mill's tailings cells. The Mill's tailings cells will be capped in place and transferred to DOE for perpetual care and maintenance.

The long-term environmental impacts resulting from all proposed reclamation activities will therefore be within regulatory standards, will be subject to perpetual institutional care and maintenance and, as a result will be minimal. See also Section 2.1.11 above.

2.4.10 Estimate decontamination criteria derived concentration guidelines (DCGLs) for primary radionuclides. State data quality objectives (DQOs) for radiological surveys and sampling. Provide final verification (status survey) plans and procedures.

Denison Response

Assessment and cleanup verification of radiological site contamination is described in Sections 3.2 and 3.3 of Attachment A to the Reclamation Plan, Rev. 4.0. See also Section 2.1.11 above.

2.5 *INTERROGATORY WHITE MESA CELL 4B 10CFR40.26(C)(2)-02/01: GENERAL LICENSE*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.6 *INTERROGATORY WHITE MESA CELL 4B 10CFR40.31(H)-03/01: APPLICATION FOR SPECIFIC LICENSES*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.7 *INTERROGATORY WHITE MESA CELL 4B 10CFR40.61-06/01: RECORDS*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.8 *INTERROGATORY WHITE MESA CELL 4B 10CFR40.65(A)(1)-07/01: EFFLUENT MONITORING REPORTING REQUIREMENTS.*

INTERROGATORY STATEMENT:

Assess the extent to which meteorological characteristics in the vicinity of the facility have changed since the Environmental Report was revised to account for such changes. Present revised meteorological characteristics.

Denison Response

See Section 2.1.1 above.

2.9 *INTERROGATORY WHITE MESA CELL 4B 10CFR40. INTRODUCTION-08/01: CAPACITY OF TAILINGS OR WASTE SYSTEMS OVER THE LIFETIME OF MILL OPERATIONS*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.10 *INTERROGATORY WHITE MESA CELL 4B 10CFR40 APPENDIX A, INTRODUCTION-09/01: ALTERNATIVE REQUIREMENTS*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.11 *INTERROGATORY WHITE MESA CELL 4B 10CFR40 APPENDIX A, CRITERION 1-10/01: PERMANENT ISOLATION WITHOUT ONGOING MAINTENANCE*

INTERROGATORY STATEMENT:

2.11.1 Refer to Section 14.0 of the Environmental Report and the Reclamation Plan, White Mesa Mill, Blanding, Utah (IUC 2000):

Please demonstrate that previously submitted analyses of slope stability, settlement, and liquefaction are applicable to the design of Cell 4B and that confidence exists that Cell 4B will remain stable following closure, reclamation, and stabilization.

Denison Response

The geotechnical stability of the tailings impoundment, slope stability, liquefaction potential and settlement were addressed in Appendix D of the Reclamation Plan, Rev. 4.0. The liquefaction potential of the tailings solids was evaluated in Attachment E to the Reclamation Plan, Rev. 4.0.

2.11.2 Please provide information, analyses, and discussion to demonstrate that tailings will be disposed of in a manner that requires no active maintenance to preserve conditions of the site or to protect human health and the environment from hazards the tailings might otherwise present. To the extent that such information, analyses, and discussion have been presented previously, please summarize pertinent information, including concise citations to previously submitted documents, and justify their applicability to the Cell 4B closure design.

Denison Response

Denison is currently operating Cell 4A under the DRC-approved *Cell 4A BAT Monitoring, Operations and Maintenance Plan.* The Plan describes the acceptable methods for discharge into the cell of tailing solids and solution from pre-determined locations around the perimeter of the cell. Tailings will continue to be discharged up to the top of the flexible membrane liner (FML), at which time the tailings solids will be contoured to final grades and the dewatering process will begin concurrently with placement of the initial platform fill. A similar BAT Monitoring, Operations and Maintenance Plan will be proposed prior to final approval of Cell 4B. Installation of the final reclamation cap will be in accordance with the Reclamation Plan approved at the time of cell closure. The Reclamation Plan is intended to allow for transfer of the reclaimed site to DOE for perpetual care and maintenance, funded by the site licensee's Long Term Care fund.

2.12 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 2-11/01: PROLIFERATION*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.13 ***INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 3-12/01: PLACEMENT BELOW GRADE***

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.14 ***INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 4-13/01: LOCATION AND DESIGN REQUIREMENTS***

INTERROGATORY STATEMENT:

2.14.1 Indicate, out to 8-km (5-mi) radius, the nature and extent of present and projected land use (e.g., agriculture, livestock raising, dairies, pasturelands, residences, wildlife preserves, sanctuaries, hunting areas, industries, recreation, transportation) and any recent trends such as major or unexpected changes in population or industrial land use patterns.

Denison Response

See Section 3.10 of the 2007 ER and Section 2.5 of the FES. Land use has not changed significantly in the area of the Mill since the FES, with the exception that the nearest residence is now approximately 1.6 miles from the Mill, whereas the nearest residence at the time of the FES was approximately 4.8 miles from the Mill. However, the Mill's 2008 MILDOS Evaluation modeled the nearest *potentia*l residence, which is at the northern boundary of the Mill property, approximately 1.2 miles from the Mill and some 0.40 miles closer to the Mill than the current actual nearest residence. See Section 2.1.3 above.

Populations within a 50-mile radius of the Mill have also been updated since the FES and are included in Section 4.0 of the 2008 ER and Section 3.9 of the 2007 ER. These updated demographics are incorporated into the 2008 MILDOS Evaluation.

No significant trends are expected in population or industrial use patterns in the foreseeable future.

2.14.2 Identify the location, nature, and amounts of present and projected ground-water use (e.g., water supplies, irrigation, reservoirs, recreation, and transportation) within 16 km (10 mi) of the site and the present and projected population (during the active life of the mill) associated with each use point. Information provided for each use point should include:

- *Location*
- *Distance from mill*
- *Withdrawal rate*
- *Return rates*
- *Type of water use*
- *Depth of wells*
- *Groundwater elevation*
- *Drawdown rates*
- *Source and projection of water-use estimates*

Denison Response

There have been no significant changes to the locations, distances from the Mill, withdrawal rates, return rates, type of water use, depth of wells, groundwater elevation, drawdown rates or source of projection of water use estimates downgradient of the proposed Cell 4B, since the FES, other than as described in Section 2.2.2 above.

As the Amendment Request is not an application for licensing of the Mill as a whole, Denison does not believe that the other information requested above is relevant to the Amendment Request.

2.14.3 Provide descriptive information to give recent changes in the locations and populations of neighboring schools; facilities; hospitals; and residential areas within 8 km (5 mi).

Denison Response

See the discussion in Section 2.14.1 above. There have not been any significant changes in the locations and populations of neighboring schools, facilities; hospitals; and residential areas within 5 miles from the Mill. The 2008 MILDOS Evaluation takes into account recent demographic information within a 50-mile radius of the Mill, and calculates the dose to the nearest potential residence, which is at the northern boundary of the Mill. Therefore the potential radiological impacts from the addition of Cell 4B on populations and neighboring residences has been taken into account in that modeling.

2.14.4 Demonstrate that soils in the area where Cell 4B will be constructed are not unstable because of their physical or chemical properties, locations, and dimensions. Address compressibility; rate of consolidation; shear strength (including, for sensitive soils, possible loss of shear strength resulting from strain-softening); liquefaction potential; permeability; dispersion characteristics; swelling and shrinkage; long-term moisture content for radon barrier material; and cover cracking.

Denison Response

Site characteristics and physical properties of the construction materials and the final stability of the Cell 4B impoundment are presented in the Design Report. Cover material characteristics and cover performance are described in Appendix D of the Reclamation Plan, Rev. 4.0. Liquefaction potential of the tailings material is discussed in Attachment D to the Reclamation Plan, Rev. 4.0.

2.14.5 Update records of historical ground-water-level fluctuations at the site.

Denison Response

Figures 2-5 of the Report entitled *Site Hydrogeology and Estimation of Groundwater Travel Times in the Perched Zone, White Mesa Uranium Mill Site Near Blanding, Utah*, dated August 27, 2009, prepared by Hydro Geo Chem, Inc., included as Appendix A to the 2009 GWDP Renewal Application, are perched groundwater contour elevation maps for the years 1990, 1994, 2002 and 2009 respectively. Those Figures identify the mounding in the perched zone at the locations of the three wildlife ponds and the impacts of such mounding on perched zone water levels at the site, due to the periodic recharge of those ponds with water from Recapture Reservoir commencing around 1994.

See also: (1) Figure 7 of the Existing Well Background Report, which contains hydrographs of Mill site monitoring wells showing groundwater elevation trends over time in monitoring wells at the site; (2) Figure 8 of the Existing Well Background Report, which shows the spatial distribution of water level changes from 1994 to 2001; and (3) the discussion in Section 8.3 of that Report

2.14.6 Please state the proposed maximum slope of the stabilized tailings impoundment that includes the Cell 4B area. Justify any slope steeper than 5h:1v and explain why gentler slopes are impracticable. Identify and justify any design enhancements incorporated to provide assurance that the stabilized impoundment will remain stable without reliance on active measures following closure.

Denison Response

All slopes on the reclaimed Mill site and tailings are 5h:1v or less (gentler). As one of several conditions in the GWDP, an infiltration analysis of the tailings cover and re-design of the cover for better performance is in progress. The final revised cover design will address surface water management issues and other design improvements associated with the addition of Cell 4B.

2.14.7 Describe measures taken to stabilize the final cover system following closure that includes the Cell 4B area.

Denison Response

Cover stability is discussed in the Reclamation Plan, Rev. 4.0. The Reclamation Plan will be further revised to incorporate the addition of Cell 4B prior to acceptance and authorization for use by the Executive Secretary.

2.14.8 Discuss the most recent data on seismic events in the region that are applicable to the White Mesa site and identify any implications for design criteria applicable to the design of the facility, including the final closure design for Cell 4B, for ensuring long-term stability; and present and justify the results of any design calculations prepared to incorporate any revised design criteria.

Denison Response

Seismic design information is included in the Design Report, and the Reclamation Plan, Rev. 4.0.

2.14.9 Identify any changes in the nature and extent of present and projected land use (e.g., agriculture, livestock raising, dairies, pasturelands, residences, wildlife preserves, sanctuaries, hunting areas, industries, recreation, transportation) that have occurred since the 1978 ER (D&M 1978) was prepared. Identify any recent trends such as major or unexpected changes in population or industrial patterns have occurred since the 1978 ER (D&M 1978) was prepared.

Denison Response

There have been no significant changes in the nature and extent of present and projected land use (e.g., agriculture, livestock raising, dairies, pasturelands, residences, wildlife preserves, sanctuaries, hunting areas, industries, recreation, transportation) that have occurred since the 1978 ER was prepared nor have there been any significant recent trends such as major or unexpected changes in population or industrial patterns since the 1978 ER, other than the location of the nearest residence. As discussed above, the nearest actual residence is now approximately 1.6 miles from the Mill, as opposed to the nearest actual residence at the time of the 1978 ER, which was approximately 4.8 miles from the Mill.

For the purposes of evaluating radiological doses from the addition of Cell 4B, as set out in the 2008 MILDOS Evaluation, the dose at the nearest potential residence, located approximately 1.2 miles north of the Mill and some 0.40 miles closer to the site than the current actual nearest residence, has been calculated as the dose to the person likely to receive the highest dose from Mill operations. Recent data on populations within a 50 mile radius are also factored into the 2008 MILDOS Evaluation. Cattle grazing on lands abutting the Mill's restricted area is similar to grazing that occurred at the time of the 1979 ER, and is taken into account in the 2009 MILDOS Evaluation.

2.14.10 Provide in tabular form for each of the 22-1/2-degree sectors, the distances [to a distance of 8 km (5 mi)] from the center of the site to the following:

- *Nearest cattle (or other meat animals) grazing on natural forage, with types and numbers of animals specified.*
- *Nearest game animals consumed by sportsmen.*
- *Nearest residence.*
- *Nearest site boundary.*
- *Nearest vegetable garden larger than 50 m^2 (60 yd^2) in area. The type of crop and amounts produced should be noted.*

Denison Response

The Mill and Cell 4B are already sited and the Mill is an existing operating facility. Therefore, Denison does not believe that all of the requested information is relevant to the Amendment Request.

The 2008 MILDOS Evaluation estimated the dose to a number of receptors including the nearest potential residence, located approximately 1.2 miles north of the Mill facility at the northern boundary of the Mill property, based on all plausible exposure pathways.

MILDOS-AREA calculates the impacts based on annual average air concentrations of radionuclides considered. The human pathways considered in MILDOS-AREA for individual and population impacts are: inhalation, external exposure from ground concentrations, external exposure from cloud immersion, ingestion of vegetables, ingestion of meat and ingestion of milk.

With respect to the ingestion of vegetables, the 2008 MILDOS Evaluation incorporated the default provisions of the MILDOS-AREA code, which assume that nearby receptors consume specified percentages of their total vegetable consumption from vegetables grown at their respective receptor locations.

With respect to ingestion of meat and milk, the area immediately north of the Mill is used only for grazing of beef cattle. A second location to the east and south of the Mill is also used for the grazing of beef cattle. Although considered unlikely, the 2008 MILDOS Evaluation contemplated that in one worst case scenario, it is possible that the beef cattle grazed at these locations would be eaten by the residents near the Mill. A scenario which supports dairy cattle grazing at these locations was not included in the modeling because the prospect of supporting dairy cattle grazing near the Mill is not credible, given the arid climate and the much larger feed requirements of dairy cattle as opposed to beef cattle. Further, no dairy cattle have been observed near the Mill. The 2008 MILDOS evaluation assumed, as a worst case scenario, that the inhabitants at the nearest potential residence consumed all of their beef from the cattle grazing at the locations near to the Mill described above, which, based on historic grazing practices, were assumed to graze at those locations for two months each year. The 2008 MILDOS Evaluation also conservatively assumed that such residents drank all of their milk from cows that grazed at the location of the nearest potential residence.

In this worst case scenario, the total dose to the person most likely to receive the highest exposure (i.e., residents at the nearest potential residence) was calculated to be well below the regulatory limit. See Section 5.0 of the 2008 MILDOS Evaluation.

2.14.11 Provide data on annual production and distribution of meat (kg) and truck farming produce (kg) within an 80-km (50-mi) radius from the proposed facility. Provide information on grazing season (months of year) and feeding regimens for cattle. Please provide specific information on actual consumption of the meat from cattle and game animals.

Denison Response

See Section 2.14.10 above.

2.14.12 Identify any changes in the locations, natures, and amounts of present and projected surface and ground-water use (e.g., water supplies, irrigation, reservoirs, recreation, and transportation) within 16 km (10 mi) of the site.

Denison Response

See Section 2.2.2 above. There are no expected changes in the locations, natures, and amounts of present and projected surface and ground-water use within five miles downgradient of the site.

2.14.13 Identify any changes in the present and projected population (during the active life of the mill) associated with each use point, where appropriate.

Denison Response

See Section 2.2.2 above. There are no expected changes in the present and projected population associated with each use point during the active life of the Mill.

2.14.14 Summarize and tabulate data on changes in both present and projected future water use; locate users on maps of legible scale. Tabulations should include:

- *Location: Changes in locations of water users.*
- *Distances of user from mill.*
- *Withdrawal rate: Changes in present and projected withdrawal rates (in liters per second or cubic meters per second) for each water use, including seasonal variability.*
- *Return rates: Changes in present and projected return rates (in liters per second or cubic meters per second), if appropriate, including seasonal variability..*
- *Type of water use: Changes in types of water use for each location, e.g., municipal, industrial, irrigation, stock/game watering.*
- *In addition, for ground-water use: Indicate changes in depths of wells, groundwater elevation, and drawdown rates and characterize the use of each aquifer.*
- *Source and projection of water-use estimates: Where use rates are anticipated to change over the life of the project and beyond, indicate projections and the source of the projection information.*

Denison Response

See Section 2.2.2 above.

2.14.15 Provide changes in the projected population by direction and distance from the site within a 5-mile radius of the mill for the anticipated life of the mill. Identify and discuss significant transient or seasonal population variations, including the bases for assumptions and projections.

Denison Response

See Section 2.14.1 above. There are no expected significant changes in the projected population by direction and distance from the site within a 5-mile radius of the Mill for the anticipated life of the Mill. Further, as discussed in Sections 2.1.3 and 2.14.10 above, the 2008 MILDOS Evaluation

models the nearest potential residence and concludes that the expected dose to that receptor is well within regulatory standards and ALARA goals.

There are no significant transient or seasonal population variations applicable to the area of the Mill.

2.14.16 Provide an evaluation of changes in prominent meteorological parameters prevailing at the site that have occurred since the 1978 ER (D&M 1978) was prepared. Summarize site meteorology based on meteorological measurements taken onsite and at nearby representative stations, including:

- *Quarterly and annual wind rose presentation for the 16 compass directions.*
- *Quarterly and annual wind speed, wind direction, and atmospheric stability data in joint frequency form at heights representative of effluent releases.*
- *Total precipitation and evaporation by month.*
- *Diurnal and monthly averages and extremes of temperature and humidity*
- *Monthly wind characteristics including speeds and direction, annual joint frequency of windspeed, and direction by stability category*
- *Data on precipitation*
- *Frequency of occurrence and effects of storms.*

Denison Response

See Section 2.1.1 above.

2.14.17 To the extent warranted by changes in site meteorology, Identify and justify changes in design features that may result from any changes in design basis events.

Denison Response

See Section 2.1.1 above. There have been no significant changes in site meteorology.

2.14.18 Present and justify background concentrations of radionuclides in groundwater that has resulted from responding to recent Division directives (URS 2008).

Denison Response

The determination of background concentrations of radionuclides and all other constituents of concern at the Mill site has been the subject of the Background Reports, the *Summary of Work Completed, Data Results, Interpretations and Recommendations for the July 2007 Sampling Event at the Denison Mines, USA, White Mesa Uranium Mill Near Blanding Utah*, dated May 2008, prepared by T. Grant Hurst and D. Kip Solomon of the University of Utah, Department of Geophysics, and other analyses. The background concentrations of radionuclides and all other constituents of concern determined by DRC, based on the foregoing analyses, and the rationale for that determination are set out in the 2009 Statement of Basis.

2.14.19 Present and justify parameter values used to characterize mill tailings, including the following:

- *Compressibility and rate of consolidation*
- *Shear strength, including, for sensitive soils, possible loss of shear strength resulting from strain-softening*
- *Liquefaction potential*
- *Permeability*
- *Dispersion characteristics*
- *Swelling and shrinkage*
- *Long-term moisture content for radon barrier material*
- *Cover cracking.*

Denison Response

Material characteristics of tailings material and cover soils are included in the 1978 ER, and the Reclamation Plan, Rev. 4.0, Appendix D.

2.14.20 Provide a detailed description of the applicable field and laboratory investigations and testing that were completed, and summarize material properties (e.g., permeability, moisture-density relationships, gradation, shrinkage and dispersive characteristics, resistance to freeze-thaw degradation, cracking potential, and chemical compatibility, including any amendment materials).

Denison Response

Material characteristics of tailings material and cover soils are included in the 1978 ER, and the Reclamation Plan, Rev. 4.0, Appendix D.

2.14.21 Present details (including sketches) of the disposal cell cover termination at boundaries, with any considerations for safely accommodating subsurface water flows.

Denison Response

Surface water management and erosion protection design is presented in Attachment A and Attachment G of the Reclamation Plan, Rev. 4.0.

2.14.22 Provide a schematic diagram displaying various disposal cell layers and thicknesses. Establish the particle size gradation of the disposal cell bedding layer and the rock layer to ensure stability against particle migration during the period of regulatory interest.

Denison Response

Tailings cell cover design and material characteristics are detailed in Attachment A and Attachment G of the Reclamation Plan, Rev. 4.0.

2.14.23 Demonstrate that the effects of possible freeze-and-thaw cycles on soil strength and radon barrier effectiveness do not compromise their long-term stability or ability to function as required. Demonstrate that freezing and formation of ice crystals and lenses will not cause heaving. Demonstrate that soil is not susceptible to frost heave, considering that uniformly graded soils containing more than 10 percent of particles smaller than 0.02 mm and well-graded soils with more than 3 percent of particles smaller than 0.02 mm are susceptible.

Denison Response

Material characteristics of tailings material and cover soils and an analysis of freeze-thaw cycles on the radon barrier are included in the 1978 ER, and the Reclamation Plan, Rev. 4.0, Appendix D.

2.14.24 Present an analysis of the potential for cracks to develop in the disposal cell cover as a result of differential settlement and shrinkage.

Denison Response

Settlement monitors are installed over areas of tailings that have reached the final design grade for the disposal cell. The vertical movement of these monitors is evaluated during the placement of the initial platform fill and the dewatering of the disposal cell. Final cover placement will take place after most of the settlement has occurred, reducing the potential for differential settlement and cracking of the radon barrier. Liquefaction of the tailings solids due to seismic events and the potential impact on the cell cover is discussed in Attachment E to the Reclamation Plan, Rev. 4.0. Additional analysis, if necessary, will be conducted as a part of the cell cover re-design discussed in response to Section 2.4.1 above.

2.14.25 Demonstrate that any geomembranes included in the final cover(s) are adequate for the proposed disposal cell cover and describe their major properties (e.g., physical, mechanical, and chemical). Discuss methods for membrane installation. Demonstrate that the shear strength of the interface between compacted clay and geomembranes is appropriately considered in the stability analyses under both static and dynamic loads is noted.

Denison Response

No geomembranes are planned for use in the final cover.

2.14.26 Demonstrate that information on site characterization, slope stability, settlement, and liquefaction used in the disposal cell cover design is appropriately reflected in the evaluation, and therefore, constitutes inputs that would contribute to the demonstration of disposal cell design compliance with the regulations.

Demonstrate that the design erosion protection covers for the site conform to the suggested criteria in NUREG–1623 (NRC 2002). Demonstrate that the proposed cover design will meet longevity requirements without the use of active maintenance.

Denison Response

Tailings cell design and cover design were based on then current NRC guidance at the time of approval by NRC in 2000. A review of the current guidance suggests no additional changes need to be made to the cell or cover design, other than the changes to the cover design discussed in Section 2.4.1 above.

2.15 ***INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 5A(1)-14/01: GROUND-WATER PROTECTION STANDARDS***

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.16 ***INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 5A(2)-15/01: LINER***

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.17 ***INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 5A(4)-17/01: PREVENT OVERTOPPING***

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.18 ***INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 5A(5)-18/01: DIKES***

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.19 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 6(1)-19/01: COVER AND CLOSURE AT END OF MILLING OPERATIONS*

INTERROGATORY STATEMENT:

2.19.1 Please provide an updated Reclamation Plan that includes the proposed design of the final cover systems for the disposal cells, including Cells 4A and 4B, and addresses the design of the radon barrier layer(s), including thickness and assumptions regarding initial and long-term moisture content(s) in the radon barrier(s).

Denison Response

Denison submitted the Reclamation Plan, Rev. 4.0 to the Executive Secretary on November 25, 2009.

The Reclamation Plan, Rev. 4.0 represents an update to Revision 3.0 of the Reclamation Plan to reflect approved changes to the Reclamation Plan and to update outdated information, since the Reclamation Plan as a whole was approved by NRC in 2000. However, while the Reclamation Plan, Rev. 4.0 incorporates a number of updates to the Reclamation Plan, the substantive provisions of the Reclamation Plan were not changed.

As required by Part I.H.11 of the GWDP, Denison is in the process of completing an infiltration and contaminant transport model of the final tailings cover system to demonstrate the long-term ability of the cover to protect nearby groundwater quality. Upon review of such modeling, the Executive Secretary will determine if changes to the cover system as set out in the Reclamation Plan, Rev. 4.0 are needed to ensure compliance with the performance criteria contained in Part I.D.8 of the GWDP. Although the modeling has not been completed, modeling results to date suggest that some changes to the final cover design will be needed. However, as the details of such re-design have not been finalized at this time, the approved 2000 cover design and basis continue to be used for the Reclamation Plan, Rev. 4.0. The Reclamation Plan, Rev. 4.0 will be amended in the future to incorporate any changes to the design of the tailings cover system that result from the current modeling effort.

Similarly, upon approval of the Amendment Request, the Reclamation Plan, Rev. 4.0 will be amended to include Cell 4B.

2.19.2 Provide an assessment of long-term radon emission rates for the final cover system(s). Include assumptions and present and describe analysis methodologies used.

Denison Response

The EPA rules in 40 CFR Part 192 require that a "uranium tailings cover be designed to produce reasonable assurance that the radon-222 release rate would not exceed 20 pCi/m^2/sec for a period of 1,000 years to the extent reasonably achievable and in any case for at least 200 years when averaged over the disposal area over at least a one year period" (NRC, 1989). NRC regulations presented in 10 CFR Part 40 (incorporated by reference into UAC R313-24-4) also restrict radon flux to less than 20 pCi/m^2/sec.

Section 3.3.2.1 of the Reclamation Plan, Rev. 4.0 describes the modeling that was performed to demonstrate that the current tailings cover design will meet these regulatory criteria. Section 3.3.2.2 of Reclamation Plan, Rev. 4.0 sets out radon flux measurements for Cells 2 and 3 from 2004 through 2008, which demonstrate that the random fill cover alone, is currently providing an effective barrier to radon flux. Flux rates over those years have all been lower than the regulatory standard, based solely on the interim random fill cover that has been placed over portions of those cells.

As mentioned in Section 2.19.1 above the cover design for the Mill's tailings cells is currently being re-evaluated. Included in that analysis is a demonstration that the revised cover design will also satisfy the regulatory radon emission standards for the facility.

Gamma will be measured at the surface of the final tailings cover to demonstrate that gamma rates are within regulatory standards. Regulatory standards for gamma will be met if the radon flux rates are within the regulatory standards and the materials used to construct the cover meet the prescribed specifications.

2.19.3 Address the radiation protection design of the tailings disposal impoundment cover for radon and gamma attenuation and assess the potential for settlement of the tailings impoundment and resulting cracking of the radon barrier.

Denison Response

See Section 2.19.2 above for a discussion about the radiation protection design of the tailings disposal impoundment cover for radon and gamma attenuation.

An analysis of the potential for settlement of the tailings impoundments and resulting cracking of the radon barrier is set out in Appendix D of the Reclamation Plan, Rev. 4.0.

2.20 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 6(2)-20/01: VERIFY EFFECTIVENESS OF FINAL RADON BARRIER*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.21 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 6(3)-21/01: PHASED EMPLACEMENT OF FINAL RADON BARRIER*

INTERROGATORY STATEMENT:

Provide information regarding the schedule for and manner of placement of the final radon barrier over the disposal cell areas, including Cell 4B. Describe any proposed phasing of radon barrier placement. Describe methods to be used to verify the effectiveness of these radon barrier layers in limiting long-term emissions (e.g., radon) through the final closure cover(s).

Denison Response

Final reclamation of the tailings cells is planned as a phased approach, allowing for utilization of excavated material from construction of new cells to be placed as the initial platform fill on areas of existing cells that have reached design grade for tailings solids. The initial platform fill provides a surcharge to the tailings solids and aids in the consolidation and dewatering of the tailings solids. Settlement monitors placed in areas of partially reclaimed cells are monitored to evaluate the consolidation of the solids. Timing of placement of the final cover over the platform fill is based on the physical condition of the tailings cell and management's decision on overall long range Mill operations and economics. Final cover design and radon barrier performance will be evaluated as a part of the on-going infiltration analysis and re-design of the tailings cover.

See Section 2.19.2 above for a discussion of the methods to be used to verify the effectiveness of the radon barrier layers in limiting long-term emissions (e.g., radon) through the final closure covers

2.22 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 6(4)-22/01: REPORT RADON BARRIER EFFECTIVENESS*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.23 *INERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 6(5)-23/01: ELEVATED RADIUM CONCENTRATIONS IN COVER MATERIALS*

INTERROGATORY STATEMENT:

2.23.1 Demonstrate that adequate quantities are available of all proposed rock cover materials of suitable characteristics required for construction (such as provided in Section 7.2.1 of NUREG 1623) of all remaining covers if DUSA requests are granted.

Denison Response

Cover materials for final reclamation of the tailings cells are available from on-site stockpiles of soils, clay and rock excavated from the cell construction. Current stockpiles exceed the volume of material necessary for the remaining reclamation of Cells 2, 3 and 4A. Additional clay is available from a borrow site located approximately 3 miles south of the site, and rip rap materials are available from one or more BLM public pits located within 4 to 6 miles of the site. The construction of Cell 4B will generate approximately 680,000 cubic yards of soil and clay, and 790,000 cubic yards of rock. Cell 4B reclamation requirements are estimated to be 410,000 cubic yards of soil and rock, 68,000 cubic yards of clay, and 35,000 cubic yards of rip rap. The Cell 4B requirements can easily be met from material generated during construction or from off site locations.

2.23.2 Demonstrate that the radium concentrations of candidate rock materials do not exceed background levels for the vicinity of the White Mesa facility and will not appreciably affect radon fluxes projected for the cover system following construction.

Denison Response

All cover materials are native soils and rock generated from the construction of the tailings cells or from off site borrow locations. Radium concentration of the cover materials will be at naturally occurring levels, and therefore at background levels.

2.24 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 6(6)-24/01: CONCENTRATIONS OF RADIONUCLIDES OTHER THAN RADIUM IN SOIL*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.25 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 6(7)-25/01: NONRADIOLOGICAL HAZARDS*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.26 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 6A(1)-26/01: COMPLETION OF FINAL RADON BARRIER*

INTERROGATORY STATEMENT:

Provide information regarding the schedule for and manner of placement of the final radon barrier over the disposal cell areas, including Cell 4B. Demonstrate that the final radon barrier will be placed as expeditiously as practicable considering technological feasibility after the disposal cell areas or impoundments cease operation.

Denison Response

See Section 2.21 above.

2.27 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 7-29/01: PREOPERATIONAL AND OPERATIONAL MONITORING PROGRAMS*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.28 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 8-30/01: EFFLUENT CONTROL DURING OPERATIONS*

INTERROGATORY STATEMENT:

2.28.1 Provide current information and analyses that demonstrate that milling operations are and will be conducted so that all airborne effluent releases are reduced to levels that are as low as is reasonably achievable (ALARA). Include an analysis of the efficiency of the equipment as designed

and operated that prevent radiation exposures to employees and members of the public and that limit such exposures to ALARA levels.

Denison Response

The Mill has been operating since 1980 and has been inspected by NRC up until August 2004 and by DRC since that time. The License was renewed in 1985 for five years and in 1997 for ten years, all of which demonstrates that the Mill is capable of operating in a manner that satisfies all regulatory standards and ALARA goals. Further, the periodic reports filed with the Executive Secretary are inspected by DRC and demonstrate that the Mill is operating in compliance with all regulatory standards and ALARA goals. See for example the Mill's recent *Semi-Annual Effluent Reports*, which demonstrate that the Mill is operating within all applicable regulatory standards and ALARA goals.

See also Sections 2.19.1 and 2.19.2 above which discuss control of radon emissions from the Mill's tailings cells.

The Amendment Request is not an application for the License or renewal of the License as a whole, which are addressed in the 2007 License Renewal Application and the 2007 ER.

2.28.2 *Provide a description of mill waste and effluent control systems and equipment for minimizing to as low as is reasonably achievable the quantities of materials released into the environment. Specify quantities, concentrations, and physical, chemical, and radiological characteristics of all materials released that depend upon characteristics of ore being processed and state how these parameters affect projected dose rates. Average and maximum release rates should be addressed plus all pertinent supporting information such as assumptions and computational methods used.*

Denison Response

The Amendment Request is not an application for the License or renewal of the License as a whole, which are addressed in the 2007 License Renewal Application and the 2007 ER, nor is it an application for approval of the siting and use of Cell 4B, which have already been evaluated and approved and are included in the License as part of the original approval of the tailings management system for the Mill. Rather, the Amendment Request is for the more detailed amendments to the License required in connection with the actual construction and operation of Cell 4B.

The Mill's tailings cells are the "mill waste and effluent control systems and equipment for minimizing to as low as is reasonably achievable the quantities of materials released into the environment." The construction and operation of Cell 4B will not add any new hazards or risks to human health and the environment created by potential constituents of concern over and above existing licensed facilities at the Mill. The physical, chemical and radiological make up of the tailings is not expected to be significantly different from that of existing tailings or from the assumptions in the 2008 MILDOS Evaluation. The tailings cell cover design will be the same as for the existing tailings cells, including Cell 4A; therefore, radon emanations are not expected to be any different than emanations from Cell 4A. Cell 4B will have a similar double liner/leak detection/slimes drain system

as Cell 4A, which is designed not to release tailings solutions to the environment. Any potential releases will be detected by the Mill's groundwater monitoring program and remediated before there could be any impact on the public. See Appendix B to the 2008 ER for Denison's proposed additions to the site's groundwater monitoring program to accommodate Cell 4B.

The hazards and risks to human health and the environment created by all potential constituents of concern at the Mill site were assessed in detail by Dames and Moore in the 1978 ER and by NRC in the FES. See Section 5.0 of the 1978 ER and Section 4.0 of the FES.

2.28.3 Please present and discuss information concerning any cumulative buildup of radionuclides in the environment. Summarize data, assumptions, and models used in determining radioactivity concentrations and burdens. Estimate the maximum radionuclide concentrations that may be present in important local flora and local and migratory fauna. Values of bioaccumulation factors used in preparing the estimates should be based on site-specific data if available; otherwise, values from the literature may be used. The applicant should tabulate and reference the values of bioaccumulation factors used in the calculations.

Denison Response

The Amendment Request is not an application for the License or renewal of the License as a whole, which are addressed in the 2007 License Renewal Application and the 2007 ER, nor is it an application for approval of the siting and use of Cell 4B, which have already been evaluated and approved and are included in the License as part of the original approval of the tailings management system for the Mill. Rather, the Amendment Request is for the more detailed amendments to the License required in connection with the actual construction and operation of Cell 4B.

The construction and operation of Cell 4B will not add any new hazards or risks to human health and the environment created by potential constituents of concern over and above existing licensed facilities at the Mill. The physical, chemical and radiological make up of the tailings is not expected to be significantly different from that of existing tailings or from the assumptions in the 2008 MILDOS Evaluation. The tailings cell cover design will be the same as for the existing tailings cells, including Cell 4A; therefore, radon emanations are not expected to be any different than emanations from Cell 4A. Cell 4B will have a similar double liner/leak detection/slimes drain system as Cell 4A, which is designed not to release tailings solutions to the environment. Any potential releases will be detected by the Mill's groundwater monitoring program and remediated before there could be any impact on the public. See Appendix B to the 2008 ER for Denison's proposed additions to the site's groundwater monitoring program to accommodate Cell 4B.

Further, in accordance with 40 CFR 61.252 (b)(i), the Mill cannot have more than 2 tailings impoundments in operation at any one time. This means that as Cell 4B comes into operation, Cell 3 must cease operations. As a result, the total emissions from the addition of Cell 4B will not be significantly different from previously licensed operations. The 2008 MILDOS Evaluation takes these factors into account.

The hazards and risks to human health and the environment created by all potential constituents of concern at the Mill site were assessed in detail by Dames and Moore in the 1978 ER and by NRC in the FES. See Section 5.0 of the 1978 ER and Section 4.0 of the FES.

On a review of the Mill's *Semi Annual Effluent Reports*, it is evident that there are no significant trends in monitoring results for surface water, soils or vegetation in the vicinity of the Mill. This is the best evidence that there has been no significant cumulative buildup of radionuclides in the environment from Mill operations over the last 30 years.

2.28.4 Describe in detail the proposed effluent and environmental monitoring programs, including methods and procedures for measuring concentrations and quantities of both radioactive and non-radioactive materials released to the environs from the proposed Cell 4B and neighboring cells. In the description of the proposed monitoring programs, include the technical basis used to determine that environmental concentrations comply with applicable regulatory requirements Describe the proposed sampling program to determine concentrations of airborne radioactive materials (including radon) during routine and non-routine operations, maintenance, and cleanup activities. In the description of the sampling program, address the following:

- *Criteria for determining sampling locations with respect to process operations and personnel occupancy,*
- *Frequency of sampling,*
- *Type of analyses,*
- *Sensitivity of overall sampling and analyses,*
- *Action levels,*
- *Management audits,*
- *Corrective action requirements,*
- *Instrumentation calibration frequency, and*
- *Procedures for sample analyses and instrument calibration (in an appendix).*

Denison Response

The Mill has numerous established effluent and environmental monitoring programs. Those approved programs are described in detail in Section 2.3 of the Reclamation Plan, Rev. 4.0. The technical bases for all of those programs have been approved by NRC and/or the Executive Secretary who, in doing so, have determined that environmental concentrations comply with applicable regulatory requirements. In reviewing the 2007 License Renewal Application, the Executive Secretary will have an opportunity to review all of the existing effluent and environmental monitoring programs to determine if any adjustments to those programs are necessary.

The existing effluent and monitoring programs will continue to be applied to the Mill after the construction of Cell 4B, with the proposed addition of two new groundwater monitoring wells, as discussed in the Report entitled *Site Hydrogeology Estimation of Groundwater Travel Times and Recommended Additional Monitoring wells for Proposed Tailings Cell 4B, White Mesa Uranium Mill Site Near Blanding, Utah*, dated January 8, 2008, prepared by Hydro Geo Chem, Inc., which is attached as Appendix A to the 2008 ER.

SENES Consultants Ltd reviewed the environmental radiological monitoring programs at the Mill to determine whether or not any changes to those programs are warranted by the addition of Cell 4B. SENES concluded that the current radiological monitoring programs at the Mill will continue to adequately monitor the release of radioactive materials to the local environment with the addition of Cell 4B.

2.28.5 Describe the detection monitoring program to be used to determine whether process effluents are reaching site ground water supplies from Cell 4B and neighboring cells. Describe the planned monitoring to detect the presence of process effluents in any local surface waters. Provide the technical basis for the monitoring programs, including the number and location of monitoring stations, the criteria used for locating sampling stations and determining sampling frequency, and action levels and corrective action requirements. Provide procedures for sample collection and analyses for the constituents of concern found in tailings liquor in an appendix.

Denison Response

See Section 2.28.4 above. In addition, Cell 4B will have a leak detection system, similar to the leak detection system in Cell 4A, which will be monitored regularly.

2.29 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 8A-31/01: DAILY INSPECTIONS*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.30 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 9-32/01: FINANCIAL SURETY ARRANGEMENTS*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.31 *INTERROGATORY WHITE MESA CELL 4B 10CFR40, APPENDIX A, CRITERION 10-33/01: COSTS OF LONG-TERM SURVEILLANCE*

INTERROGATORY STATEMENT:

Provide an engineering estimate of the costs attributable to the proposed Cell 4B of conducting long-term surveillance in compliance with all requirements applicable to US DOE's long-term stewardship program. Demonstrate that the estimated cost will be acceptable to US DOE.

Denison Response

Cost estimates for implementation of the Reclamation Plan, Rev. 4.0 are included in Attachment C of that Plan. The estimated costs include an amount, specified by DOE, to be provided as a Long Term Surveillance Fund. This fund is specific to the entire site and is not designated for individual features of the site. There will be no increase in the calculated amount of the fund from the addition of Cell 4B.

2.32 *INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.3-35/01: GROUND WATER DISCHARGE PERMIT APPLICATION*

INTERROGATORY STATEMENT:

2.32.1 Provide a detailed geologic map for the site, including the footprint area and vicinity of proposed Cell 4B. Include geologic cross sections with geology to characterize the surface and subsurface conditions in the Cell 4B area.

Denison Response

A Colorado Plateau geologic map and a map showing the geology of the Mill site and surrounding areas are found as Figures 1.6.1 and 1.6.2, respectively, of the Reclamation Plan, Rev. 4.0. A figure showing the generalized stratigraphy of the Mill site is included as Figure 6 of the 2008 ER and Figure 1.5-1 of the Reclamation Plan, Rev. 4.0.

2.32.2 Provide additional information on the potential presence and distribution of fractures and/or joints, and uncemented/higher permeability intervals in the unsaturated and saturated zone portions of the Dakota Sandstone and Burro Canyon geologic units underlying the site area, including the footprint area of and downgradient vicinity of proposed Cell 4B.

Denison Response

The potential presence and distribution of fractures and/or joints, and uncemented/higher permeability intervals in the unsaturated and saturated zone portions of the Dakota Sandstone and Burro canyon geologic units underlying the site area, including the footprint area of and downgradient vicinity of proposed Cell 4B has been analyzed by Hydro Geo Chem, Inc. See the November 10, 2009 letter report attached as Attachment 1 to this letter. Hydro Geo Chem concludes that the reported sub-

horizontal, limonite-stained features interpreted by Dames and Moore in the 1978 ER as bedding plane fractures may not be actual fractures but may represent structurally weaker zones along bedding planes that appear as partings in core samples. Examination of core samples collected during drilling of angle borings beneath tailings Cells 3 and 4A indicate that where fractures were present in cores, they were cemented with gypsum. Open fractures significant enough to impact groundwater movement in the perched zone were not identified in that investigation. Hydro Geo Chem further concluded that no fractures were reported in cores from MW-3A, MW-16, nor WM-23, the existing wells adjacent to or at the location of proposed Cell 4B. Hydro Geo Chem concludes that this makes it even less likely that potentially undetected fractures could significantly affect subsurface fluid flow in the vicinity of proposed Cell 4B, and that, should the sub-horizontal features reported in the 1978 ER actually represent fractures, their sub-horizontal nature would prevent them from acting as vertical conduits from the tailing cell to the perched groundwater.

2.32.3 Define and provide information regarding all present and assumed future potential points of discharge for effluent or leachate, including sump collection areas of the disposal cells as applicable.

Denison Response

The design of Cell 4B will be essentially the same as the design of Cell 4A. Cell 4A has been and Cell 4B will be designed and constructed with dual synthetic liners, a leak detection system between the liners and a geoclay layer beneath the synthetic liners. This liner system is overlain by a slimes drain system. The cells are therefore designed without any present, and there are no assumed future potential, points of discharge for effluents or leachate from the cells.

2.32.4 Provide information on the relationship between any inferred fractures and/or joints, and uncemented/higher permeability intervals and the potential future location(s) of seepage from the disposal cells, including Cell 4B.

Denison Response

See the discussion in Sections 2.32.3 and 2.32.4 above. No un-cemented fractures or joints have been observed in the vicinity of Cell 4B, and there are no expected potential locations of seepage from Cell 4B.

2.32.5 Evaluate and discuss the potential effects of such features on permeability values and other aquifer properties and evaluate their potential effects on groundwater flow pathways and flow rates, including estimated contaminant travel times to the perched groundwater zone, beneath and downgradient of the disposal cells, including Cell 4B. Summarize the potential impacts of such fractures/joints in these formations on the predicted performance of containment systems that will be installed in the waste disposal/containment cells, including Cell 4B.

Denison Response

A detailed analysis of site hydrology, including permeability values and other aquifer properties, groundwater flow pathways and flow rates, is set out in the Report entitled *Site Hydrogeology*

Estimation of Groundwater Travel Times and Recommended Additional Monitoring Wells for Proposed Tailings Cell 4B, White Mesa Uranium Mill Site Near Blanding, Utah, dated January 8, 2008, prepared by Hydro Geo Chem, Inc. A similar Report, with updated site information is entitled *Site Hydrogeology and Estimation of Groundwater Travel Times in the Perched Zone White Mesa Uranium Mill Site Near Blanding, Utah*, dated August 27, 2009, prepared by Hydro Geo Chem, Inc., a copy of which is included as Appendix B to the Reclamation Plan, Rev. 4.0.

As discussed in Section 2.32.2 above, there are no observed un-cemented fractures or joints in the Mill vicinity that could impact the predicted performance of Cell 4B.

2.32.6 Provide information to demonstrate that existing groundwater compliance monitoring wells MW-5, MW-12, and MW-15 would be preserved and maintained during Cell 4B construction operations. Describe measures to be implemented to protect these monitoring wells during cell construction and provide criteria to be used for determining that repair or replacement of these wells is required if damage occurs to any of these wells during Cell 4B construction.

Denison Response

Each groundwater monitoring well at the Mill site, including MW-5, MW-12 and MW-15, is protected by four posts, forming the corners of a square that surrounds the well. Each post is a four-inch metal pipe filled with concrete that is sunk three feet into the ground and that protrudes three feet above the ground. Each post and the monitoring well casing is painted red for easy visual identification.

In the unlikely event that a monitoring well is damaged, given the above protections, the Executive Secretary would be notified, and the well would be repaired in accordance with a plan that would be submitted to the Executive Secretary for approval and approved prior to commencement of repair.

2.32.7 Please provide well logs for wells MW-3, MW-4, MW-5, MW-11, MW-12, MW-14, MW-15, MW-20, MW-21, MW-22, MW-23, and temporary perched water zone wells TW4-4 and TW4-5.

Denison Response

Well/boring logs for wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-11, MW-12, MW-14, MW-15, MW-16, MW-17, MW-18, and MW-19, are included as Appendix A to the *Hydrological Evaluation of Whiter Mesa Uranium Mill*, July 1994, prepared by Titan Environmental Corporation (the "1994 Titan Report"). A copy of the 1994 Titan Report accompanied the 2009 GWDP Renewal Application.

Lithologic and core logs for wells MW-3A, MW-23, MW-24, MW-25, MW-27, MW-28, MW-29, MW-30 and MW-31 are included as Appendix A to the Report: *Perched Monitoring Well Installation and Testing at the White Mesa Uranium Mill April Through June 2005*, August 3, 2005, prepared by Hydro Geo Chem, Inc., a copy of which Report accompanied the 2009 GWDP Renewal Application.

Lithologic and core logs for well MW-26 (previously named TW4-15) and well MW-32 (previously named TW4-17) are included as Appendix A to the *Letter Report dated August 29, 2002, prepared by Hydro Geo Chem, Inc.* and addressed to Harold Roberts, a copy of which Report accompanied the 2009 GWDP Renewal Application.

Lithologic and core logs for wells MW-20, MW-21 and MW-22 are included in a June 21, 2001 letter report from Hydro Geo Chem, Inc., which is attachment A to Denison's June 22, 2001 letter to the Executive Secretary in response to the Executive Secretary's request for additional site hydrology information.

Lithologic and core logs for wells TW4-4 and TW4-5 are included in an October 4, 2000 report prepared by Hydro Geo Chem, Inc., which has previously been submitted to the Executive Secretary.

2.33 *INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.4-36/01: ISSUANCE OF DISCHARGE PERMIT*

INTERROGATORY STATEMENT:

To complete the application for a Utah Ground Water Discharge Permit (Permit), provide the following information or identify documents in which DUSA has already provided such information:

- *An updated plat map showing all water wells, including the status and use of each well, Drinking Water source protection zones, topography, springs, water bodies, drainages, and man-made structures within a one-mile radius of the discharge. The plat map must also show the location and depth of existing or proposed wells to be used for monitoring ground water quality. Identify any applicable Drinking Water source protection ordinances and their impacts on the proposed permit.*
- *Geologic, hydrologic, and agricultural description of the geographic area within a one-mile radius of the point of discharge, including soil types, aquifers, ground water flow direction, ground water quality, aquifer material, and well logs.*
- *The type, source, and chemical, physical, radiological, and toxic characteristics of the effluent or leachate to be discharged; the average and maximum daily amount of effluent or leachate discharged (gpd), the discharge rate (gpm), and the expected concentrations of any pollutant (mg/l) in each discharge or combination of discharges. If more than one discharge point is used, information for each point must be given separately.*
- *Information which shows that the discharge can be controlled and will not migrate into or adversely affect the quality of any other waters of the state, including the applicable surface water quality standards, that the discharge is compatible with the receiving ground water, and that the discharge will comply with the applicable class TDS limits, ground water quality standards, class protection levels or an alternate concentration limit proposed by the facility.*
- *For areas where the ground water has not been classified by the Board, information on the quality of the receiving ground water sufficient to determine the applicable protection levels.*

- *A proposed sampling and analysis monitoring plan which conforms to EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5 (EPA/600/R-98/018, February 1998) and includes a description, where appropriate, of the following:*

  - ✓ *Ground water monitoring to determine ground water flow direction and gradient, background quality at the site, and the quality of ground water at the compliance monitoring point;*
  - ✓ *Installation, use and maintenance of monitoring devices;*
  - ✓ *Description of the compliance monitoring area defined by the compliance monitoring points including the dimensions and hydrologic and geologic data used to determine the dimensions;*
  - ✓ *Monitoring of the vadose zone;*
  - ✓ *Measures to prevent ground water contamination after the cessation of operation, including post-operational monitoring;*
  - ✓ *Monitoring well construction and ground water sampling which conform where applicable to the Handbook of Suggested Practices for Design and Installation of Ground-Water Monitoring Wells (EPA/600/4-89/034, March 1991), ASTM Standards on Ground Water and Vadose Investigations (1996), Practical Guide for Ground Water Sampling EPA/600/2-85/104, (November 1985) and RCRA Ground Water Monitoring Technical Enforcement Guidance Document (1986), unless otherwise specified by the Executive Secretary;*
  - ✓ *Description and justification of parameters to be monitored;*
  - ✓ *Quality assurance and control provisions for monitoring data.*

- *The plans and specifications relating to construction, modification, and operation of discharge systems.*
- *The description of the ground water most likely to be affected by the discharge, including water quality information of the receiving ground water prior to discharge, a description of the aquifer in which the ground water occurs, the depth to the ground water, the saturated thickness, flow direction, porosity, hydraulic conductivity, and flow systems characteristics.*
- *For any existing facility, a corrective action plan or identification of other response measures to be taken to remedy any violation of applicable ground water quality standards, class TDS limits or permit limit established under R317-6-6.4E. which has resulted from discharges occurring prior to issuance of a ground water discharge permit.*
- *Contingency plan for regaining and maintaining compliance with the permit limits and for reestablishing best available technology as defined in the permit.*
- *A closure and post closure management plan demonstrating measures to prevent ground water contamination during the closure and post closure phases of an operation.*

Provide information including narrative descriptions, figures, table, drawings, analyses, and supporting documentation to demonstrate that:

- *Applicable class TDS limits, ground water quality standards and protection levels will be met if the proposed amendment is granted.*
- *The monitoring plan, including sampling and reporting commitments, are adequate to determine compliance with applicable requirements.*
- *DUSA utilizes treatment and discharge minimization technology commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology.*
- *DUSA projects that no impairment of present and future beneficial uses of the ground water will result from the proposed amendment.*

Denison Response

The foregoing interrogatories are addressed in detail in the 2009 GWDP Renewal Application.

The Amendment Request is not in support of an application for the GWDP or renewal of the GWDP as a whole, which are addressed in the 2009 GWDP Renewal Application.

The construction and operation of Cell 4B will not add any new hazards or risks to human health and the environment created by potential constituents of concern over and above existing licensed facilities at the Mill. The physical, chemical and radiological make up of the tailings is not expected to be significantly different from that of existing tailings or from the assumptions in the GWDP. Cell 4B will have a similar double liner/leak detection/slimes drain system as Cell 4A, which is designed not to release tailings solutions to the environment. Any potential releases will be detected by the Mill's groundwater monitoring program and remediated before there could be any impact on the public. See Appendix B to the 2008 ER for Denison's proposed additions to the site's groundwater monitoring program to accommodate Cell 4B.

2.34 *INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.9-37/01: PERMIT COMPLIANCE MONITORING*

INTERROGATORY STATEMENT:

2.34.1 Provide information demonstrating that the proposed groundwater monitoring system, including the proposed new monitoring wells (MW-33 and MW-34) installed downgradient of future Cell 4B, together with well MW-14 and MW-15 (if preserved), and the other existing downgradient monitoring wells, are sufficient in number, are properly located, and are properly designed to provide reasonable assurance of providing timely, reliable, and representative data for detecting potential future releases from the disposal cells, including Cell 4B, considering the potential distribution of fractures and/or joints, and uncemented intervals/higher permeability zones in the subsurface geologic units underlying/downgradient of the disposal cells area.

Denison Response

A detailed analysis of site hydrology, including permeability values and other aquifer properties, groundwater flow pathways and flow rates, is set out in the Report entitled *Site Hydrogeology Estimation of Groundwater Travel Times and Recommended Additional Monitoring Wells for*

Proposed Tailings Cell 4B, White Mesa Uranium Mill Site Near Blanding, Utah, dated January 8, 2008, prepared by Hydro Geo Chem, Inc. A similar Report, with updated site information is entitled *Site Hydrogeology and Estimation of Groundwater Travel Times in the Perched Zone White Mesa Uranium Mill Site Near Blanding, Utah*, dated August 27, 2009, prepared by Hydro Geo Chem, Inc., a copy of which is included as Appendix B to the Reclamation Plan, Rev. 4.0.

Those Reports provide information demonstrating that the proposed groundwater monitoring system, including the proposed new monitoring wells (MW-33 and MW-34) installed downgradient of future Cell 4B, together with well MW-14 and MW-15, and the other existing downgradient monitoring wells, are sufficient in number, are properly located, and are properly designed to provide reasonable assurance of providing timely, reliable, and representative data for detecting potential future releases from the disposal cells, including Cell 4B.

As discussed in Section 2.32.2 above, there are no observed un-cemented fractures or joints in the Mill vicinity that impact the conclusions in those Reports.

2.34.2 Evaluate whether an alternative conceptual model or models (such as one incorporating "preferential" flow through fractures, joints, uncemented/higher permeability zones, etc., and/or different hypothetical future source term [leakage] locations, such as from beneath one or more sumps in one or more of the disposal cells including Cell 4B), if considered, would affect the locations, screened interval(s), and/or required number of POC wells for providing timely/reliable detection of potential releases from the disposal cells area.

Denison Response

See the discussion in Sections 2.32.2 and 2.34.1 above. An alternate conceptual model is not necessary and would be inappropriate given the studies and empirical evidence to date.

2.35 *INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.10-38/01: BACKGROUND WATER QUALITY DETERMINATION*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.36 *INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.12-40/01: SUBMISSION OF DATA*

INTERROGATORY STATEMENT:

2.36.1 Provide evidence demonstrating that all laboratory analysis of samples collected to determine compliance with groundwater protection standards have been performed in accordance

with standard procedures by the Utah Division of Laboratory Services or by a laboratory certified by the Utah Department of Health.

Denison Response

All site groundwater data generated since the date of issue of the GWDP have been reported in quarterly monitoring reports that have been filed with the Executive Secretary. Each of those reports contains a QA/QC analysis to determine, among other things, that the analysis of samples collected has been performed in accordance with standard procedures by a Utah certified laboratory. Those quarterly reports, including the QA/QC analysis are inspected by DRC.

The Mill is also subject to the QAP, which sets out detailed sampling, analysis and QA/QC procedures that must be followed by Mill staff in conducting all water sampling at the site.

Data collected prior to the issuance of the GWDP were subject to a thorough QA/QC analysis in the Background Reports. See Section 4.0 of the Existing Well Background Report, Section 5.0 of the New Well Background Report and Section 6.5 of the Regional Background Report.

2.36.2 Provide evidence demonstrating that all field analyses to determine compliance with groundwater protection standards have been conducted in accordance with standard procedures specified in R317-6-6.3.L.

Denison Response

All site groundwater data generated since the date of issue of the GWDP have been reported in quarterly monitoring reports that have been filed with the Executive Secretary. Each of those reports contains a QA/QC analysis to determine, among other things, that all field analysis to determine compliance with groundwater protection standards has been conducted in accordance with procedures that have been approved by the Executive Secretary, including the QAP. Those quarterly reports, including the QA/QC analysis are inspected by DRC.

Data collected prior to the issuance of the GWDP were subject to a thorough QA/QC analysis in the Background Reports. See Section 4.0 of the Existing Well Background Report, Section 5.0 of the New Well Background Report and Section 6.5 of the Regional Background Report.

2.37 *INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.13-41/01: REPORTING OF MECHANICAL PROBLEMS OR DISCHARGE SYSTEM FAILURES*

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.38 ***INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.10-42/01: CORRECTION OF ADVERSE EFFECTS***

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.39 ***INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.10-43/01: OUT-OF-COMPLIANCE STATUS***

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

2.40 ***INTERROGATORY WHITE MESA CELL 4B UAC R317-6-6.10-44/01: PROCEDURE WHEN A FACILITY IS OUT-OF-COMPLIANCE***

INTERROGATORY STATEMENT:

To Be Determined.

Denison Response

No comment at this time.

If you should have any questions or require additional information, please contact the

undersigned.

Yours very truly,

DENISON MINES (USA) CORP.

By:

David C. Frydenlund
Vice President, Regulatory Affairs and Counsel

cc: Ron F. Hochstein
Harold R. Roberts
Steven D. Landau
David E. Turk

REFERENCES

Dames and Moore, 1978, "Environmental Report, White Mesa Uranium Project, San Juan County, Utah." Prepared for Energy Fuels Nuclear, Inc., January 1978.

Denison Mines (USA) Corp, February 28, 2007. White Mesa Uranium Mill License Renewal Application State of Utah Radioactive Materials License No. UT1900479.

Denison Mines (USA) Corp, February 28, 2007. White Mesa Uranium Mill Environmental Report In Support of the License Renewal Application State of Utah Radioactive Materials License No. UT1900479.

Denison Mines (USA) Corp, September 2009. White Mesa Uranium Mill, Renewal Application, State of Utah Ground Water Discharge Permit No. UGW370004.

Denison Mines (USA) Corp., November 2009. Reclamation Plan, White Mesa Mill, Blanding Utah, Revision 4.0.

Division of Radiation Control, Utah, December 1, 2004. Statement of Basis for a Uranium Milling Facility at White Mesa, South of Blanding, Utah, Owned and Operated by International Uranium (USA) Corporation.

Division of Radiation Control, Utah, September 2009. Statement of Basis for a Uranium Milling Facility South of Blanding, Utah, Owned and operated by Denison Mines (USA) Corp.

Hydro Geo Chem, Inc., 2001. Update to Report "Investigation of Elevated Chloroform Concentrations in Perched Groundwater at the White Mesa Uranium Mill Near Blanding, Utah".

Hydro Geo Chem, Inc., 2002. Hydraulic Testing at the White Mesa Uranium Mill Near Blanding, Utah During July, 2002.

Hydro Geo Chem, Inc., 2005. Perched Monitoring Well Installation and Testing at the White Mesa Uranium Mill, April Through June, 2005.

Hydro Geo Chem, Inc., 2007. Preliminary Corrective Action Plan, White Mesa Mill Near Blanding, Utah, August 27, 2007.

Hydro Geo Chem, Inc., 2007. Contamination Investigation Report, White Mesa Mill Near Blanding, Utah, December 21, 2007.

Hydro Geo Chem, Inc., 2008. Site Hydrogeology, Estimation of Groundwater Travel Times and Recommended Additional Monitoring Wells for Proposed Tailings Cell 4B, White Mesa Uranium Mill Site Near Blanding, Utah, January 8, 2008.

Hydro Geo Chem, Inc., August 27, 2009. Site Hydrogeology and Estimation of Groundwater Travel Times in the Perched Zone, White Mesa Uranium Mill Site Near Blanding, Utah.

INTERA, Inc., October 2007. Revised Background Groundwater Quality Report: Existing Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah.

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

INTERA, Inc., April 30, 2008. Revised Addendum: -- Background Groundwater Quality Report: New Wells For Denison Mines (USA) Corp.'s White Mesa Mill Site, San Juan County, Utah.

National Oceanic and Atmospheric Administration (NOAA), 1977. Probable Maximum Precipitation Estimates, Colorado River and Great Basin Drainages. Hydrometerological Report (HMR) No. 49.

NUREG-1140, January 1988. A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and other Radioactive Materials Licensees, S.A. McGuire.

Titan Environmental Corporation, 1994a. Hydrogeologic Evaluation of White Mesa Uranium Mill, July 1994.

Titan Environmental Corporation, 1994b. Points of Compliance, White Mesa Uranium Mill, September 1994.

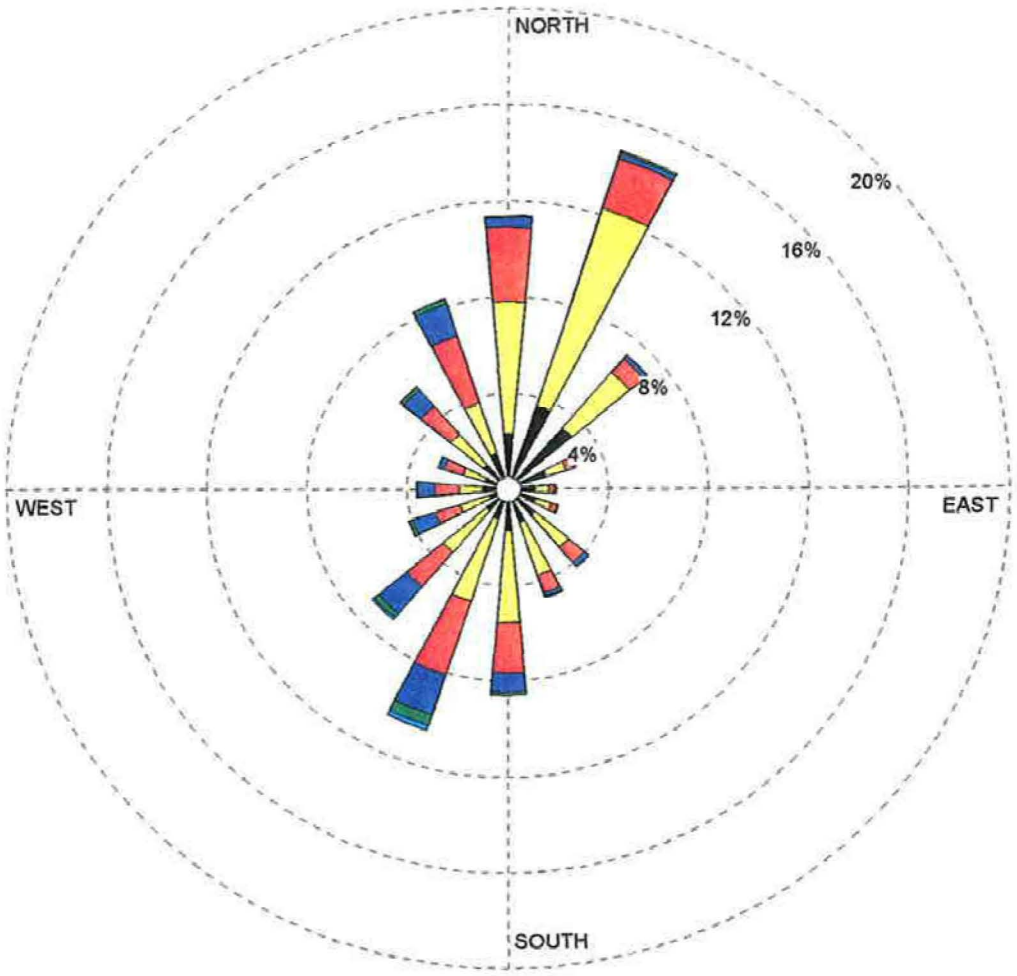
University of Utah, Department of Geophysics (T. Grant Hurst and D. Kip Solomon), May 2008. Summary of work completed, data results, interpretations and recommendations for the July 2007 Sampling Event at the Denison Mines, USA, White Mesa Uranium Mill Near Blanding Utah.

U.S. Department of Energy, 1993, "Environmental Assessment of Remedial Action at the Slick Rock Uranium Mill Tailings Sites, Slick Rock, Colorado." UMTRA Project Office, Albuquerque, New Mexico, February.

U. S. Nuclear Regulatory Commission, 1979. Final Environmental Statement - White Mesa Uranium Project, NUREG-0556.

Figures

White Mesa Mill - Blanding, Utah	Wind Speed Direction (blowing from)

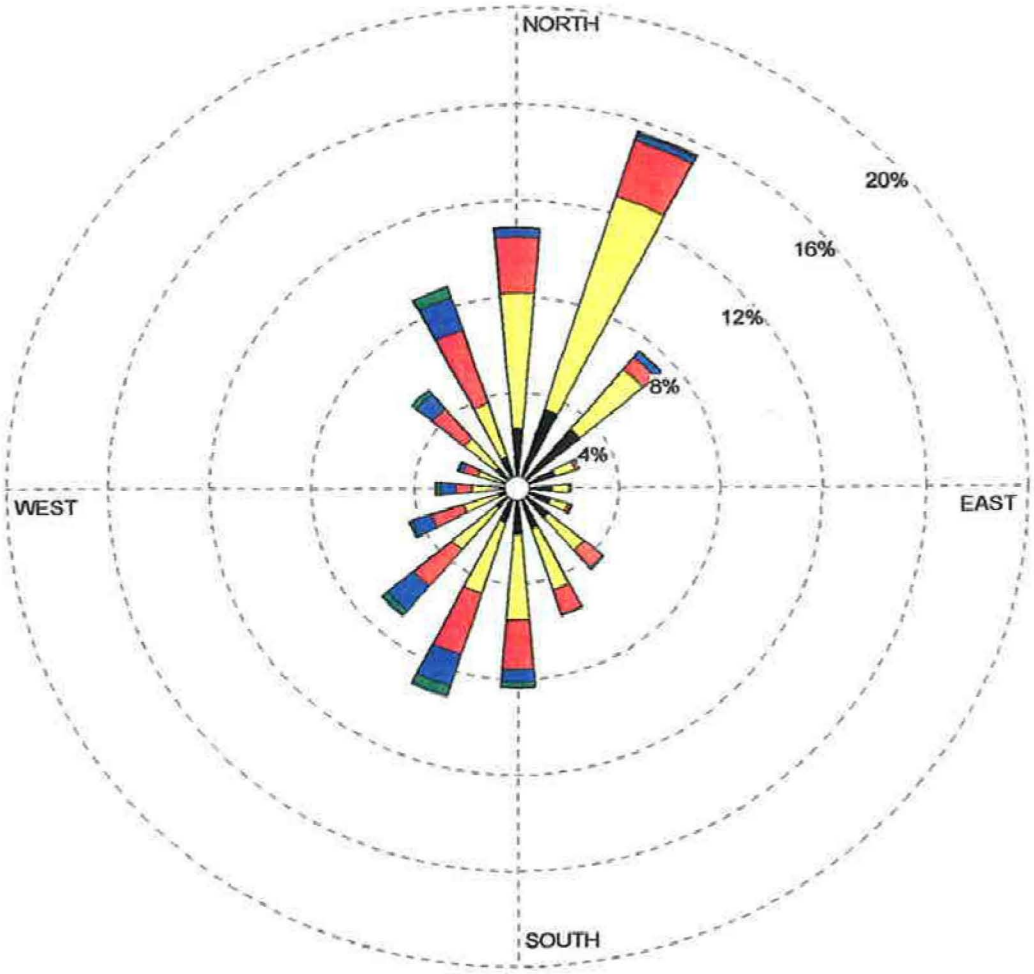


COMMENTS:	DATA PERIOD:	COMPANY:	
	2004 Jan 1 - Dec 31 00:00 - 23:00	International Uranium Corporation	
		PREPARED BY: McVehil-Monnett Associates	
	CALM WINDS: 0.15%	TOTAL COUNT: 8456 hrs.	FIGURE 2.1-1
	AVG. WIND SPEED: 3.43 m/s	DATE: 1/19/2005	PROJECT NO.: 1721-03

WRPLOT View - Lakes Environmental Software

White Mesa Mill
Blanding, Utah

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.1
- 8.8 - 11.1
- 5.7 - 8.8
- 3.6 - 5.7
- 2.1 - 3.6
- 0.5 - 2.1

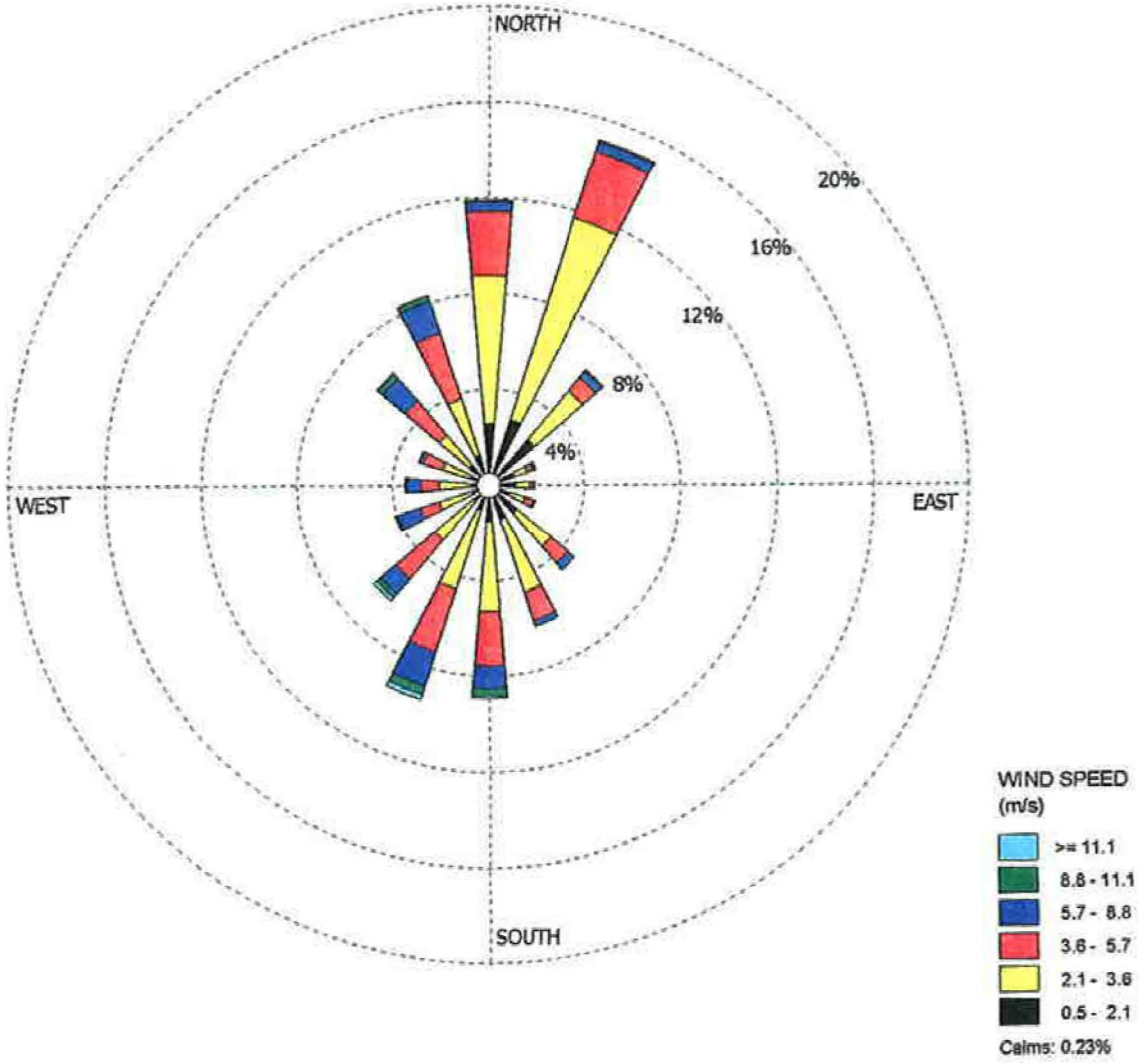
Calms: 0.47%

COMMENTS:	DATA PERIOD: 2005 Jan 1 - Dec 31 00:00 - 23:00	COMPANY NAME: International Uranium Corporation	
		MODELER: McVehil-Monnett Associates	FIGURE 2.1-2
	CALM WINDS: 0.47%	TOTAL COUNT: 7178 hrs.	
	AVG. WIND SPEED: 3.37 m/s	DATE: 2/21/2006	PROJECT NO.: 1868-05

WRPLOT View - Lakes Environmental Software

White Mesa Mill
Blanding, Utah

Wind Speed
Direction (blowing from)

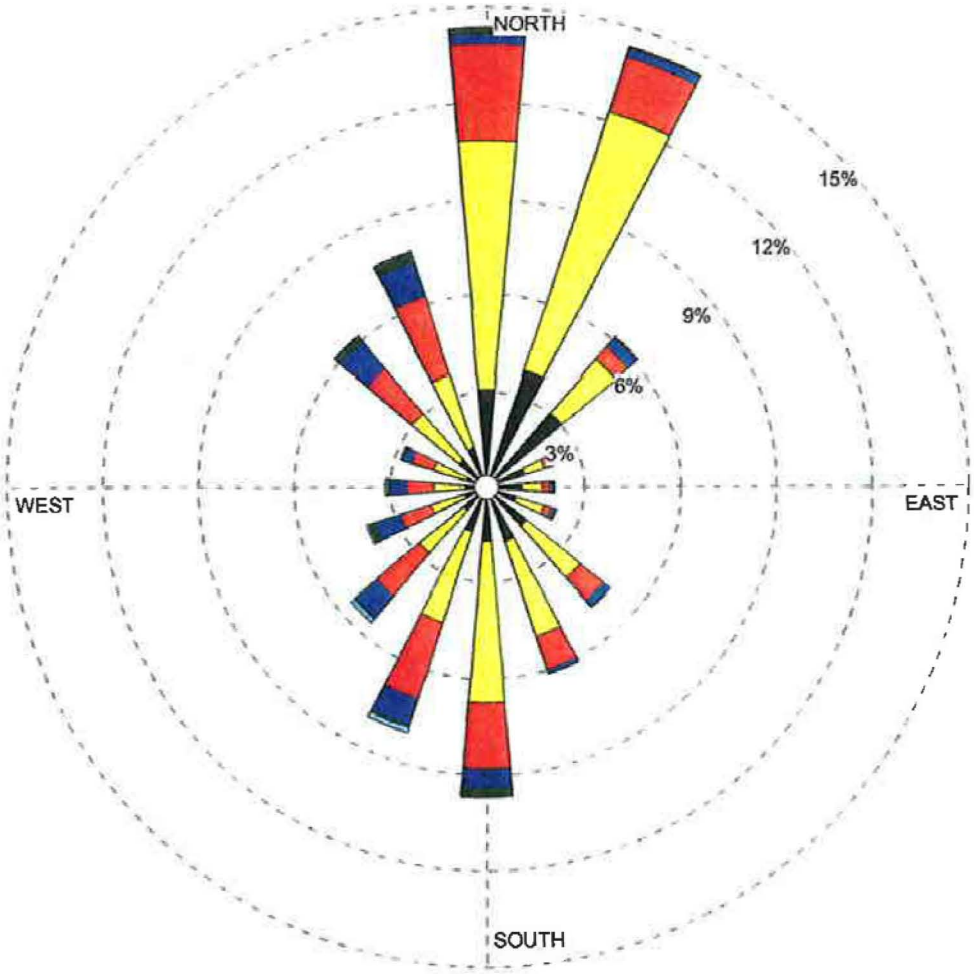


DATA PERIOD: 2006 Jan 1 - Dec 31 00:00 - 23:00	COMPANY NAME: Denison Mines	
	MODELER: McVehil-Monnett Associates	FIGURE 2-1-3
CALM WINDS: 0.23%	TOTAL COUNT: 8149 hrs.	
AVG. WIND SPEED: 3.53 m/s		PROJECT NO.: 2018-06

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:
White Mesa Mill
Blanding, Utah

DISPLAY:
Wind Speed
Direction (blowing from)

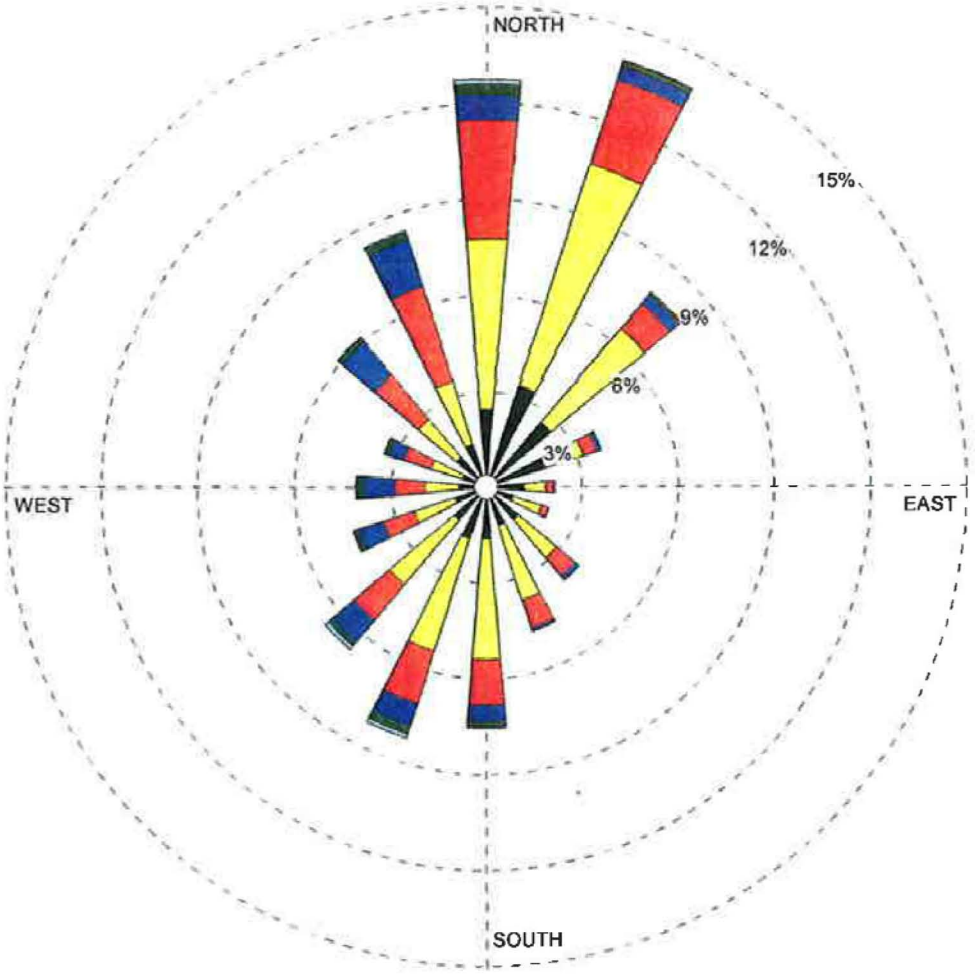


COMMENTS:	DATA PERIOD: 2007 Jan 1 - Dec 31 00:00 - 23:00	COMPANY NAME: **Denison Mines (USA) Corporation**	
		MODELER: **McVehil-Monnett Associates**	FIGURE 2-1-4
	CALM WINDS: **0.65%**	TOTAL COUNT: **8753 hrs.**	
	AVG. WIND SPEED: **3.36 m/s**	DATE: **2/4/2008**	PROJECT NO.: **2018-06**

WRPLOT View - Lakes Environmental Software

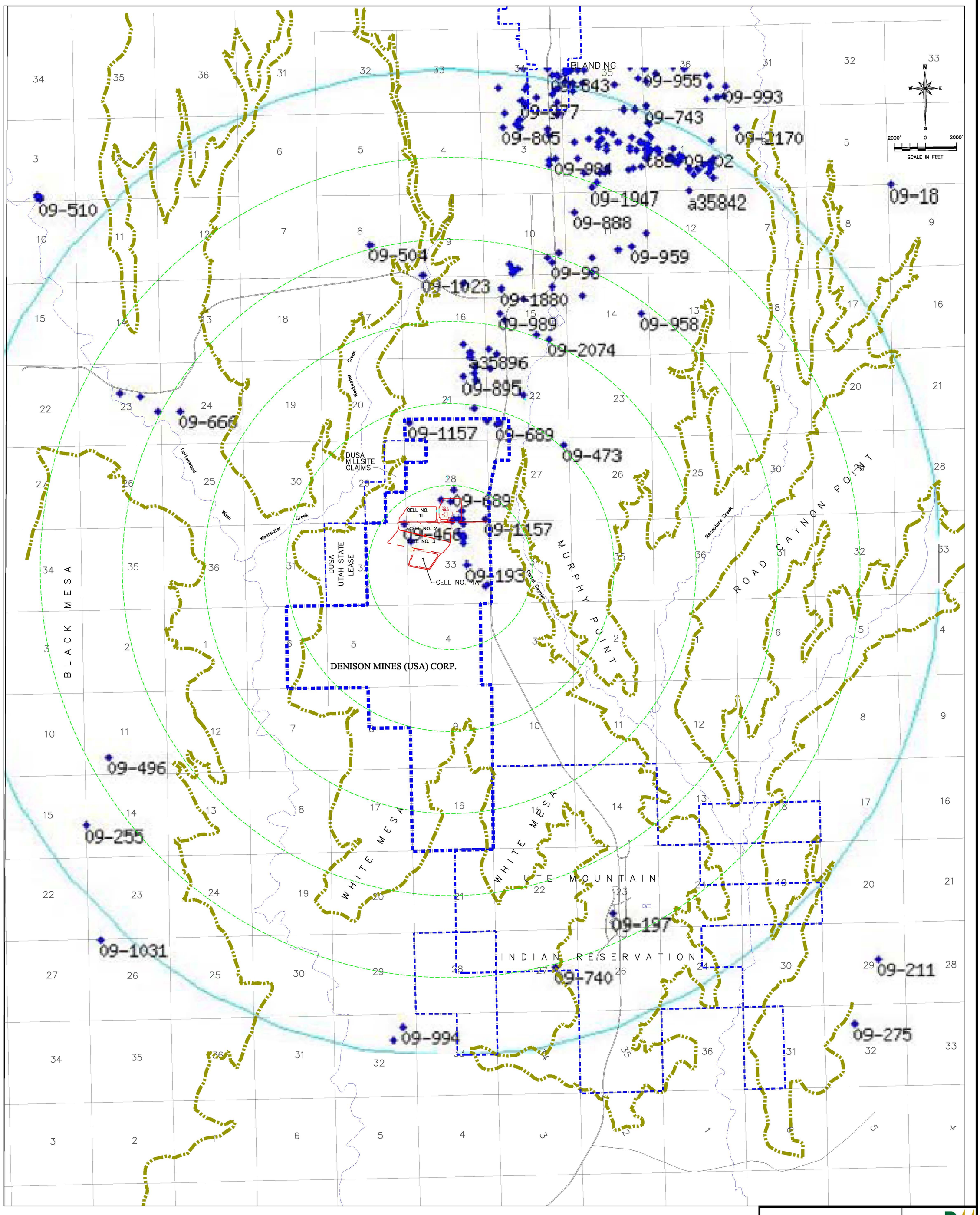
WIND ROSE PLOT:
White Mesa Mill
Blanding, Utah

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2008 Jan 1 - Dec 31 00:00 - 23:00**	COMPANY NAME: **Denison Mines (USA) Corporation**	
		MODELER: **McVehil-Monnett Associates**	FIGURE 2.1-5
	CALM WINDS: **0.09%**	TOTAL COUNT: **8779 hrs.**	
	AVG. WIND SPEED: **3.50 m/s**	DATE: **1/9/2009**	PROJECT NO.: **2239-08**

WRPLOT View - Lakes Environmental Software



W:\USA\Utah\Mill\dwgs\Reclamation Plans\Figure 2.2.1-1 Goundwater Approp.dwg Fig 2.2.1-1 22/12/2009 dsledd

Denison Mines (USA) Corp.	DENISON MINES
REVISIONS Date / By	Project: White Mesa Mill
	County: / State: Utah
	Location:
	FIGURE 2.2.1-1 GROUNDWATER APPROPRIATIONS WITHIN A 5-MILE RADIUS OF THE WHITE MESA MILL
	Author: unknown / Drafted By: D.Sledd

PROPERTY BOUNDARY

WESTWATER CREEK

US 191 TO BLANDING

MW-01

MW-18

PIEZ-1

MW-19

PIEZ-2

MW-27

PIEZ-3

TW4-25

MILL SITE

TW4-21

CELL NO. 1

MW-24

MW-28

TW4-24

TW4-19

TW4-18

MW-02

TW4-22

TW4-20

OTW4-5

MW-26

TW4-10

OTW4-9

OTW4-3

OTW4-12

CELL NO. 2

MW-29

MW-30

OTW4-16

OTW4-11

OTW4-13

CELL NO. 3

MW-31

OTW4-2

MW-04

TW4-7

OTW4-8

MW-32

MW-23

OTW4-1

MW-12

MW-05

OTW4-4

OTW4-14

MW-11

TW4-23

OTW4-6

MW-25

CELL NO. 4B (PROPOSED)

MW-16 (abandoned)

CELL NO. 4A

PIEZ-4

MW-15

MW-14

PIEZ-5

MW-17

MW-03A

MW-21

MW-20

MW-22

29

28

33

32

4

T37S

T38S

N

0

3000

SCALE IN FEET

US 191 TO WHITE MESA

EXPLANATION

MW-20 — perched monitoring well

TW4-19 — temporary perched monitoring well

PIEZ-1 — perched piezometer

TW4-23 — new temporary perched monitoring well installed May,2007

wildlife pond

Denison Mines (USA) Corp.	DENISON MINES
Project: WHITE MESA MILL	
County: San Juan	State: Utah

FIGURE 2.2.3-1

WHITE MESA MILL
GROUNDWATER MONITORING WELL
LOCATION MAP

Date:	Design:	Drafted By:
11/10/09		SJS

W:\USA\Utah\Mill\dwgs\Reclamation Plans\Fig 2.2.3-1 Groundwater Monitoring Wells.dwg CO Lineament 23/12/2009 dsledd

LEGEND

+5582.6	EXISTING SPOT ELEVATION
5612	ELEVATION OF TOP OF COVER
5612	ELEVATION OF TOP OF COVER CELL 4B
~5560—	EXISTING GROUND CONTOUR

NOTES

1. THE COVER WILL MEET THE GROUND WITH A DOWNWARD SIDE SLOPE OF 5H:1V.
2. ELEVATION OF THE BERMS SHOULD BE ADJUSTED TO MATCH WITH THOSE OF THE COVER.
3. A PORTION OF CELL 1–I WILL BE USED FOR PERMENANT STORAGE OF CONTAMINATED MATERIALS UPON FINAL SITE DECOMMISSIONING. (3)
4. TOPOGRAPHY BY KLH ENGINEERING FROM AERIAL PHOTOGRAPHY DATED AUGUST 23, 1993. CONTOUR INTERVAL IS 2 FT.
5. SEE FIGURES 3 AND 4 FOR CROSS SECTIONS AND DETAILS.
6. EXISTING GROUND SURFACES SHALL BE REGRADED TO CONSTRUCT THE COVER WITH A FINAL SURFACE THAT IS CONSISTENT WITH THE RECLAMATION COVER GRADING PLAN.

SCALE
200 0 200 400 FEET

After Titan Environmental, 1996

REV. No.	DATE	BY	REVISIONS
1	11/18/98	RAH	Add rock apron at toe of slopes, increase width of breach in Cell 4A dike & change to IUC title block
2	4/5/99	RAH	Add section lines through the breach in Cell 4A dike & change to IUC title block
3	6/30/00	DLS	Add Cell 1–I Disposal Area
4	3/25/08	dmf	Add Cell 4A Reclamation Cap
5	4/8/08	dmf	Add Cell 4B Reclamation Cap

DENISON MINES — White Mesa Mill

FIGURE 2.4.1–1
Reclamation Cover Grading Plan for Cell 4B

DESIGN:	DRAWN: R. Van Horn	SHEET
CHKD BY:	DATE: Feb., 1997	of
APP:	SCALE: 1" = 200'	

Attachment 1

HYDRO GEO CHEM, INC.
Environmental Science & Technology

November 10, 2009

David Frydenlund, Esq.
Denison Mines (USA) Corporation
1050 17th Street, Suite 950
Denver, Colorado 80265

Dear Mr. Frydenlund,

This letter provides a response to a portion of the interrogatory statement regarding the Groundwater Discharge Permit for proposed tailing Cell 4B (Figure 1) at the White Mesa Uranium Mill site (the site). In particular, this letter addresses concerns over the possible fracturing in Dakota Sandstone and Burro Canyon Formation that will underlie Cell 4B.

Overview

The interrogatory expresses concern about "*the potential presence and distribution of fractures and/or joints and uncemented/higher permeability intervals in the unsaturated and saturated zone portions of the Dakota Sandstone and Burro Canyon geologic units underlying the site area.*" Logging of drill cuttings and core samples recovered during drilling, and hydraulic testing of numerous vertical and four angle borings at the site, have shown that relatively thin, higher permeability zones are associated with coarser grained and/or poorly cemented portions of these geologic units in localized areas. Known zones affecting perched groundwater flow have been identified primarily through hydraulic testing of monitoring wells screened within the Burro Canyon Formation, which hosts most of the perched groundwater beneath the site. The most continuous of these identified zones is associated with the elevated chloroform detected upgradient and cross-gradient (northeast and east) of the existing tailing cells. However, open fractures significant enough to impact groundwater movement in the perched zone have not been identified and are not considered to of concern in siting Cell 4B.

51 West Wetmore, Suite 101 Tucson, Arizona 85705-1678 520.293.1500 520.293.1550-Fax 800.727.5547-Toll Free

Past Findings

The interrogatory cites logs of two borings discussed in Dames and Moore, 1978[1]; boring #19 and boring #28 (not shown on Figure 1). Boring #19 is reported to be located near the proposed Cell 4B footprint and boring#28 about 2,200 feet south of the proposed Cell 4B footprint. Horizontal fracturing in one or more depth zones of the borings is discussed. Examination of the drill logs indicates that one interval reported to contain bedding plane fractures was logged in borehole #19, and a second deeper interval was ambiguously described as "*moderately well-cemented conglomerate or fractured sandstone*". Near-horizontal fractures were also reported at two intervals in boring #28. The reported fractures in three of the intervals were described as associated with limonite staining.

The reported features interpreted by Dames and Moore as bedding plane fractures are likely insignificant with respect to groundwater flow, and because they are sub-horizontal, could not serve as vertical conduits for fluid flow from the tailings cells to the perched groundwater zone. Furthermore, these features may not be actual fractures but may represent structurally weaker zones along bedding planes that appear as partings in core samples. Partings along bedding planes have been observed in cores at the site by Hydro Geo Chem, Inc (HGC) during drilling of perched zone monitoring wells (as will be described below). In some cases the partings were associated with limonite staining. In most cases this staining was consistent with a diagenetic origin.

HGC, 2001[2] discusses the results of a 1994 drilling program that consisted of the installation of three perched zone monitoring wells and four angle borings beneath cell #3 and cell #4A. Work (performed primarily by Peel Environmental Services) included coring, lithologic logging, geophysical logging, and video logging of the borings and field and laboratory permeability testing of the Dakota Sandstone, Burro Canyon Formation, and underlying Brushy Basin shale. Based on examination of core samples, the video logs, and interpretation of raw data collected during field permeability tests, the following observations were made:

1) The Dakota and Burro Canyon sandstones are predominantly composed of hard, fine- to medium-grained, locally cross-bedded sandstones with interbedded conglomeratic layers and layers of shale or claystone.
2) Few fractures are present in the cores or are observable in the video logs. Where present fractures in cores are closed and/or sealed with gypsum. Partings in the cores are primarily related to bedding planes and shale or clay interbeds.
3) Video logs show conglomeratic zones, occasional cross-bedding features, and scour features within planes perpendicular to the direction of drilling. These scour features, which often appear on only one side of the boring, are most likely related to scouring by the drill bit.

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[1] Dames and Moore. 1978. Environmental Report. White Mesa Uranium Project, San Juan County, Utah. Submitted to Energy Fuels Nuclear, Inc.

[2] Hydro Geo Chem, Inc. 2001. Letter to Mr. Harold Roberts, International Uranium (USA) Corporation.

4) Video logs also show washouts in claystones, small washouts parallel to bedding planes in sandstone, and smaller washouts of finer-grained matrix material surrounding clasts in conglomeratic zones.

With regard to subsurface water movement, HGC concluded that "*fluids present in the subsurface will be transmitted primarily via intergranular porosity, and that minor fractures, because they are few in number and are closed and/or filled with gypsum, are expected to have a negligible effect on fluid movement.*"

Drilling and hydraulic testing of eight new perched zone monitoring wells around the existing tailing cells and a replacement for MW-3 are consistent with these results as discussed HGC, 2005[3]. Core samples were collected during drilling of six of the new wells. Relatively thin intervals of limonite and hematite staining associated with low angle, bedding-plane partings at various depths were reported in these borings. Disseminated limonite staining associated with oxidized pyrite was also reported.

The limonite present in the thin zones associated with bedding plane features is likely of diagenetic origin. Fluid movement during post-depositional compaction could have mobilized iron present in the sediments and resulted in deposition of the iron oxides limonite and hematite along bedding planes. Because the sandstones underlying the site, especially the Burro Canyon Formation, are composed of alternating sequences of oxidized and reduced materials, pyrite that formed in reducing environments could have encountered oxidized diagenetic fluids that migrated from oxidized zones resulting in oxidation of the pyrite to limonite and hematite. The presence of these oxides does not necessarily indicate that significant fluid movement occurred in the vadose zone in the post-diagenetic environment, nor does it necessarily indicate the presence of fractures.

Data specific to the area of proposed Cell 4B

Wells in the immediate vicinity of proposed Cell 4B include MW-5, MW-12, MW-15, and MW-23. Former Well MW-16 (Figure 1) was located near the center of proposed Cell 4B, but was dry. Well MW-3 and adjacent well MW-3A are located downgradient of proposed Cell 4B. Detailed logs are available for wells MW-3A, MW-16, and MW-23.

Coring logs for MW-16 (UMETCO and PEEL, 1993[4]), MW-3A, and MW-24 indicate conditions that are similar to those described above. Limonite staining is described in relatively thin intervals at various depths. Occasional partings associated with shaly interbeds, bedding planes, and friable zones are reported. Partings associated with limonite staining are described as sub-horizontal. No fractures are reported in the logs for the three wells.

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[3] Hydro Geo Chem, Inc. 2005. Perched Monitoring Well Installation and Testing at the White Mesa Uranium Mill, April Through June, 2005. Submitted to International Uranium (USA) Corporation.

[4] UMETCO Minerals Corporation and PEEL Environmental Services. 1993. Groundwater Study. White Mesa Facility, Blanding, Utah.

Conclusions

The reported sub-horizontal, limonite-stained features interpreted by Dames and Moore as bedding plane fractures may not be actual fractures but may represent structurally weaker zones along bedding planes that appear as partings in core samples. Partings along bedding planes have been observed by HGC in cores collected at the site during drilling of perched zone monitoring wells, including well MW-3A, located downgradient of proposed Cell 4B, and well MW-23, adjacent to proposed Cell 4B. Similar features were reported by UMETCO and PEEL at former well MW-16, located near the center of proposed tailing Cell 4B. The observed partings were in some cases associated with limonite staining. In most cases this staining was consistent with a diagenetic origin.

Examination of core samples collected during drilling of angle borings beneath tailing cells #3 and #4-A indicate the presence of similar features. Where fractures were present in these cores, they were cemented with gypsum. Open fractures significant enough to impact groundwater movement in the perched zone were not identified in this investigation.

Furthermore, no fractures were reported in cores from MW-3A, MW-16, nor MW-23. This makes it even less likely that potentially undetected fractures could significantly affect subsurface fluid flow in the vicinity of proposed Cell 4B. Should the sub-horizontal features reported in Dames and Moore actually represent fractures, their subhorizontal nature would prevent them from acting as vertical conduits from the tailing cell to the perched groundwater.

Sincerely,

Stewart J. Smith
Associate Hydrogeologist

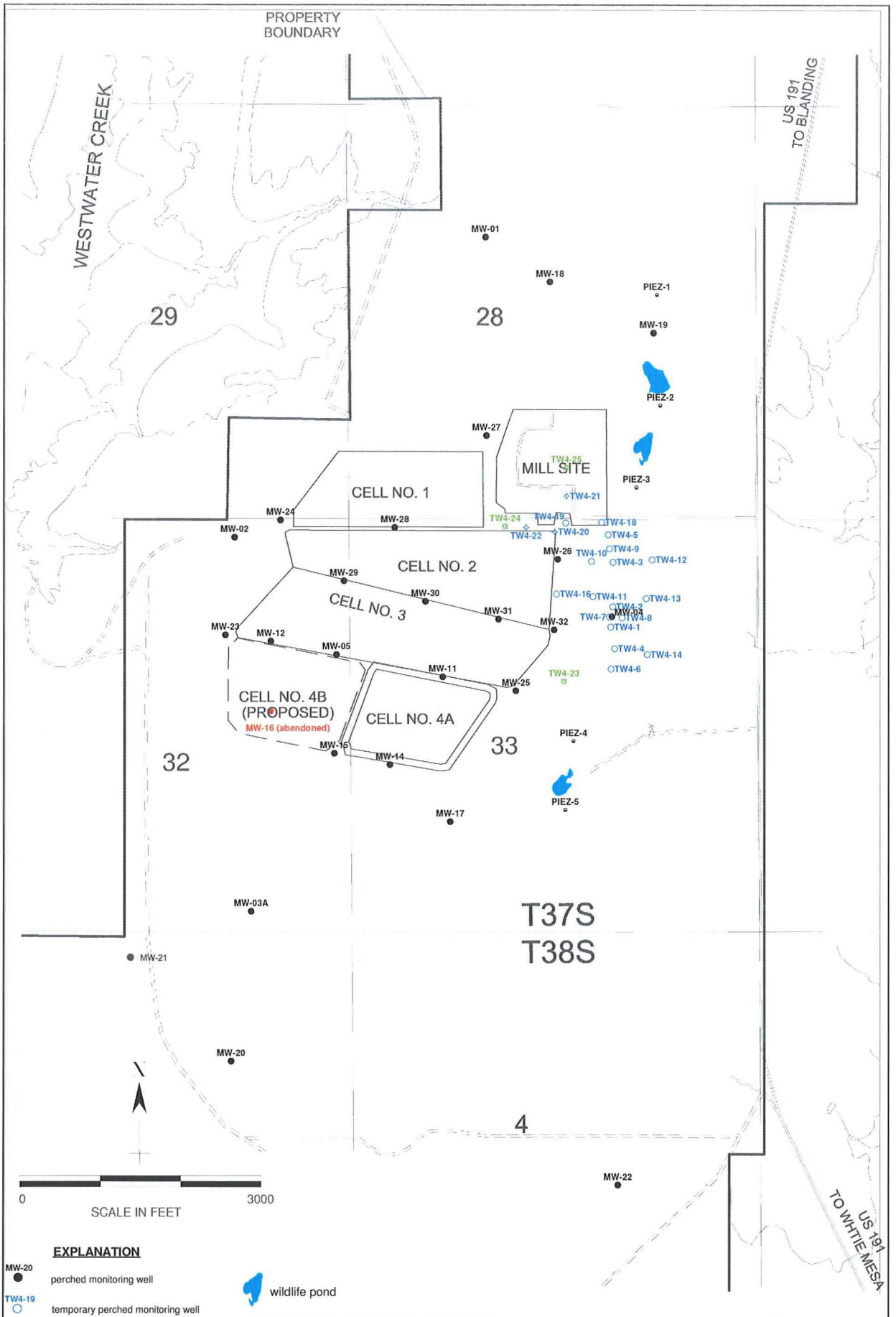
Attachment (1)

ATTACHMENTS

FIGURE

1 Site Plan Showing Perched Well Locations and Proposed Cell 4B

FIGURE



HYDRO GEO CHEM, INC.

SITE PLAN SHOWING PERCHED WELL LOCATIONS AND PROPOSED CELL 4B WHITE MESA SITE

APPROVED	DATE	REFERENCE	FIGURE
SJS	11/10/09	H:/718000/cell4b/cell4b.srf	1