Attachment A

List of Acronyms Used in the Appendix:

AF-B	Alternate Feed Materials received in bulk
AF-C	Alternate Feed Materials received in containers
AS Ores	Arizona Strip Ores
CP Ores	Colorado Plateau Ores
DWMRC	Utah Division of Waste Management and Radiation Control
Division	Utah Division of Waste Management and Radiation Control
EPA	U.S. Environmental Protection agency
Licensee	Energy Fuels Resources, Inc.
MILDOS	MILDOS-Area, version 3.10
Mill	White Mesa Uranium Mill
NESHAPS	U.S. Environmental Protection Agency's, "*National Emission Standards for Hazardous Air Pollutants*." 40 CFR Part 61, Subpart W
NRC	U.S. Nuclear Regulatory Commission
Pb-210	Lead-210
Ra-226	Radium-226
Reg. Guide 3.59	U.S. Nuclear Regulatory's Regulatory Guide 3.59, "*Methods for Estimating Radioactive and Toxic Airborne Source Terms for Uranium Milling Operations*"
Rn-222	Radon-222
SAER	Semi-Annual Environmental Report
Th-230	Thorium-230
Th-232	Thorium-232
U-238	Uranium-238
U_3O_8	triuranium octoxide

BACKGROUND

The Division, formerly the Utah Division of Radiation Control, used MILDOS to independently assess the licensee's compliance with dose limits to the public from licensed activities at the White Mesa Uranium Mill. MILDOS uses activity inputs for U-238, Th-230, Ra-226, and Pb-210 to conduct calculations related to dose estimates to individual members of the public. The additional radioisotopes in the U-238 decay chain, are handled implicitly in the MILDOS code. MILDOS assumes secular equilibrium for the ores received and processed by the Mill. Secular equilibrium occurs when sufficient time has passed to allow the progeny's activity to equal the activity of the parent radionuclide. This works well for natural ores, but does not work as well for alternate feed materials that have been previously processed and no longer are in secular equilibrium. The Division attempted to address this issue by calculating separate activities for U-238, Th-230, Ra-226, and Pb-210 for alternate feed materials instead of assuming secular equilibrium for these radionuclides. Since MILDOS assumes secular equilibrium, the remaining radionuclides in the U-238 decay chain handled within the MILDOS code would still be addressed by assuming secular equilibrium.

Denison Mines submitted an assessment of the dose estimate from the Mill operations in their 2007 license renewal application. Shortly after the renewal application was submitted, the Mill was purchased by Energy Fuels Inc. In 2008, the licensee submitted an amendment request to add Tailings Cell 4B. The amendment request included a new assessment of the estimated doses from the Mill's operations to demonstrate that the addition of the new tailings cell would not cause the Mill to exceed the applicable regulatory dose limits.

The Division completed the initial review of the renewal application in 2011. During the public comment period, one commenter stated that the Division had not conducted an independent analysis of the estimated dose and the licensee had not included alternate feed materials in their analysis. Although not required to complete an independent MILDOS analysis, the Division determined that in this instance, the Division would conduct a dose estimate assessment.

The licensee had used MILDOS, version 2.20β, to conduct their assessment of the dose estimates from the Mill operations. In 2012, when the Division began their independent assessment, MILDOS, version 3.10, was being used. The later version updated a number of the coefficients and internal models used to calculate the estimated doses; therefore, the previous submissions from the licensee cannot be directly compared with this assessment of the estimated doses from the Mill operations.

MILDOS, version 3.10, did not include a means to input activities for Th-232 and its decay products. Since the alternate feeds that the licensee is approved to receive that contain high concentrations of Th-232 were not received and processed in 2007 through 2014, there is no issue with a potential for an additional dose contribution that was not included in the estimate from Th-232 and its progeny.

MILDOS calculates the dispersion of airborne radionuclides using a sector averaged Gaussian Plume Model. The code calculates the transport of radionuclide emissions in the standard sectors of a standard 16 sector wind rose. MILDOS considers but does not limit consideration of transport mechanisms to mechanisms such as deposition of radionuclides from stack plumes, resuspension of the deposited radionuclides, radioactive decay, ingrowth of daughter products, and deposition of radionuclides from wind erosion of tailings or stored ores and resuspension of the radionuclides. Multiple pathways are also considered in the MILDOS code. MILDOS considers the following pathways: inhalation; ingestion of vegetables, milk, and meat; external exposure from cloud immersion in airborne releases or resuspension of radionuclides that had been deposited on the ground; and external exposure from ground shine (from deposited radionuclides). MILDOS is capable of calculating estimated doses including and excluding radon. This is necessary to demonstrate compliance with those requirements that exclude radon and those that include radon in the stated limit. The MILDOS code assumes that the Mill is operating 365 days a year and that radionuclide emissions are constant over the course of the year. The Mill does not operate for 365 days a year; however, the particulate and radon emissions from the area sources would be constant for the entire period. MILDOS assumes that the ore that is placed on the ore storage pad remains on the storage pad over the entire year even though the ore would need to be removed to be processed. Regardless, the particulate emissions and radon emissions from the ore storage pad are assumed to be released over the entire time frame of the year under assessment. The point sources would not release radionuclides 365 days a year since the Mill would not be operational for that entire period.

Since the MILDOS code limits each run to three different radionuclide mixes, numerous runs must be made for each assessment year to account for the different ores and alternates feeds and their respective grades along with the various point and area sources, and receptor locations (both resident and non-resident). The Division ran 10 separate runs for each assessment year and summed the estimated doses from each run to obtain a total estimated dose for the year. The estimated doses are conservative due to various assumptions and inputs made by the Division. Knowingly, the Division included both the particulate and Rn-222 emissions from Tailings Cells 2, 3, and 4A multiple times per assessment year. Tailings Cell 2 was included in about six runs for each assessment year. Tailings Cells 3 and 4A were included in about two runs for each assessment year. The particulate emissions and Rn-222 emissions for the ore storage pad were also included multiple times for the assessment period. The particulate emissions from the ore storage pad were included, at minimum, twice for each type of ore received in the year being assessed. One hundred percent of the Rn-222 emissions from each type of ore, including AF-B, was included each time that the ore storage pad was included in the run (two, four, or six times). Including 100 percent of the Rn-222 emissions from the ore storage pad adds to the overestimate of the estimated dose calculated by MILDOS because only about 20 percent of the Rn-222 would be released on the ore storage pad according to NUREG-0706, Appendix G-1. Additionally, Reg. Guide 3.59 indicates that for the crushing/grinding process, the Rn-222 released would be less than 10 percent of the Rn-222 emissions calculated for the ore storage pad. Even though it is greater than that stated in the Reg. Guide, the Division calculated the Rn-222 emissions for the grizzly baghouse/sag mill stack as being 10 percent of the Rn-222 emissions for the ore storage pad. The calculated Rn-222 emissions from the grizzly baghouse/sag mill stack were included in the MILDOS calculations six times for each year assessed.

Attachment A

Table 1: Percentage of Time Mill Operated Annually*

	2007	2008	2009	2010	2011	2012	2013	2014
Percent of days the Mill was operational in the year	42 %	64 %	38 %	56%	68 %	31 %	36 %	68%

* These values are estimates based on the number of days that the grizzly/feed conveyor/sag mill were operated. This does not mean that the Mill's yellowcake dryers were running for the same length of time since the Mill will process materials until a certain level is reached before the dryers are put into operation. Additionally, the dryers must be preheated before the yellowcake can be dried.

The typical ores processed at the Mill are CP Ores and AS Ores. In addition to these ores, the Mill processes various alternate feed materials that meet the criteria in Attachment 2 of the NRC's Regulatory Issues Summary document, RIS-2000-023, and have also been approved by the Division. Alternate feed materials may be received by the Mill in bulk (AF-B) or in containers (AF-C). AF-C materials are received and stored in containers; therefore, they do not contribute to particulate emissions or radon releases while on the ore storage pad. Since AF-C materials have previously been processed, they do not need to be processed through the sag mill to reduce the materials in size. Instead, AF-C materials are processed through a separate alternate feed circuit where the AF-C containers are opened under solution which eliminates the release of particulates from these materials until the materials reach a portion of the processing where they may be released in the stack emissions (yellowcake dryers). Therefore, the AF-C materials do not contribute to the particulate or Rn-222 emissions from the ore storage pad or the grizzly baghouse/sag mill stack.

The licensee provided the Division with the amount of ores and alternate feed materials received each year (Table 2) and the corresponding grade for each individual source of ore or alternate feed materials. Using this information the Division calculated a weighted average concentration for U-238 for CP Ore and AS Ore (Tables 3 and 4) and U-238, Th-230, Ra-226, and Pb-210 for AF-B and AF-C materials (Tables 5 and 6).

Table 2: Ores/AF Received (tons)

Year	CP Ores	AS Ores	AF - Bulk	AF - Container
2007	0	0	40877	1202
2008	246503	0	0	0
2009	144434	0	0	171
2010	217430	17037	0	291
2011	149719	24826	10069	1969
2012	37879	39455	0	6631
2013	105920	18370	0	3661
2014	0	2052	22	1207

Table 3: Calculated Weighted Average Grades Colorado Plateau Ores*
[pCi (U-238, Th-230, Ra-226, or Pb-210)/g ore]

Year	U-238	Th-230	Ra-226	Pb-210
2007	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2008	4.77E+02	4.77E+02	4.77E+02	4.77E+02
2009	3.52E+02	3.52E+02	3.52E+02	3.52E+02
2010	6.16E+02	6.16E+02	6.16E+02	6.16E+02
2011	5.87E+02	5.87E+02	5.87E+02	5.87E+02
2012	7.12E+02	7.12E+02	7.12E+02	7.12E+02
2013	5.89E+02	5.89E+02	5.89E+02	5.89E+02
2014	0.00E+00	0.00E+00	0.00E+00	0.00E+00

* The concentrations of all of the isotopes are assumed to be equal by the MILDOS Code (secular equilibrium). The concentrations are reported in pCi of isotope per gram of ore (pCi U-238/g ore). NOTE: When the concentration is reported as "0.00E00," there was no CS Ore received that year.

Table 4: Calculated Weighted Average Grades Arizona Strip Ores*
[pCi (U-238, Th-230, Ra-226, or Pb-210)/g ore]

Year	U-238	Th-230	Ra-226	Pb-210
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	1.76E+03	1.76E+03	1.76E+03	1.76E+03
2011	1.76E+03	1.76E+03	1.76E+03	1.76E+03
2012	1.76E+03	1.76E+03	1.76E+03	1.76E+03
2013	1.69E+03	1.69E+03	1.69E+03	1.69E+03
2014	1.25E+03	1.25E+03	1.25E+03	1.25E+03

* The concentrations of all of the isotopes are assumed to be equal by the MILDOS Code (secular equilibrium). The concentrations are reported in pCi of isotope per gram of ore (pCi U-238/g ore). NOTE: When the concentration is reported as "0.00E00," there was no AS Ore received that year.

Table 5: Calculated Weighted Average Grades for Containerized Alternate Feeds
[pCi (U-238, Th-230, Ra-226, or Pb-210)/g alternate feed]

Year	U-238	Th-230	Ra-226	Pb-210
2007	6.57E+03	1.40E+03	1.61E+02	3.90E+01
2008	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2009	2.87E+05	2.55E+03	1.56E+02	3.90E+01
2010	2.87E+05	2.55E+03	1.56E+02	3.90E+01
2011	1.82E+04	2.38E+04	9.89E+02	1.73E+02
2012	1.17E+04	9.02E+03	8.49E+02	2.02E+02
2013	1.85E+04	6.00E+03	4.55E+02	1.03E+02
2014	2.48E+05	2.99E+05	0.00E+00	3.91E+02

* Although the concentrations of all of the isotopes are assumed to be equal by the MILDOS Code, a concentration was calculated for each of the four radionuclides required for MILDOS input for the alternate feed materials. The concentrations are reported in pCi of isotope per gram of ore (ie: pCi U-238/g ore).

Table 6: Calculated Weighted Average Grades for Bulk Alternate Feeds
[pCi (U-238, Th-230, Ra-226, or Pb-210)/g alternate feed]

Year	U-238	Th-230	Ra-226	Pb-210
2007	6.05E+01	1.40E+03	1.61E+02	3.90E+01
2008	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2009	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2010	0.00E+00	0.00E+03	0.00E+00	0.00E+00
2011	9.77E+02	2.38E+04	9.89E+02	1.73E+02
2012	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2013	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2014	0.00E+00	0.00E+00	0.00E+00	0.00E+00

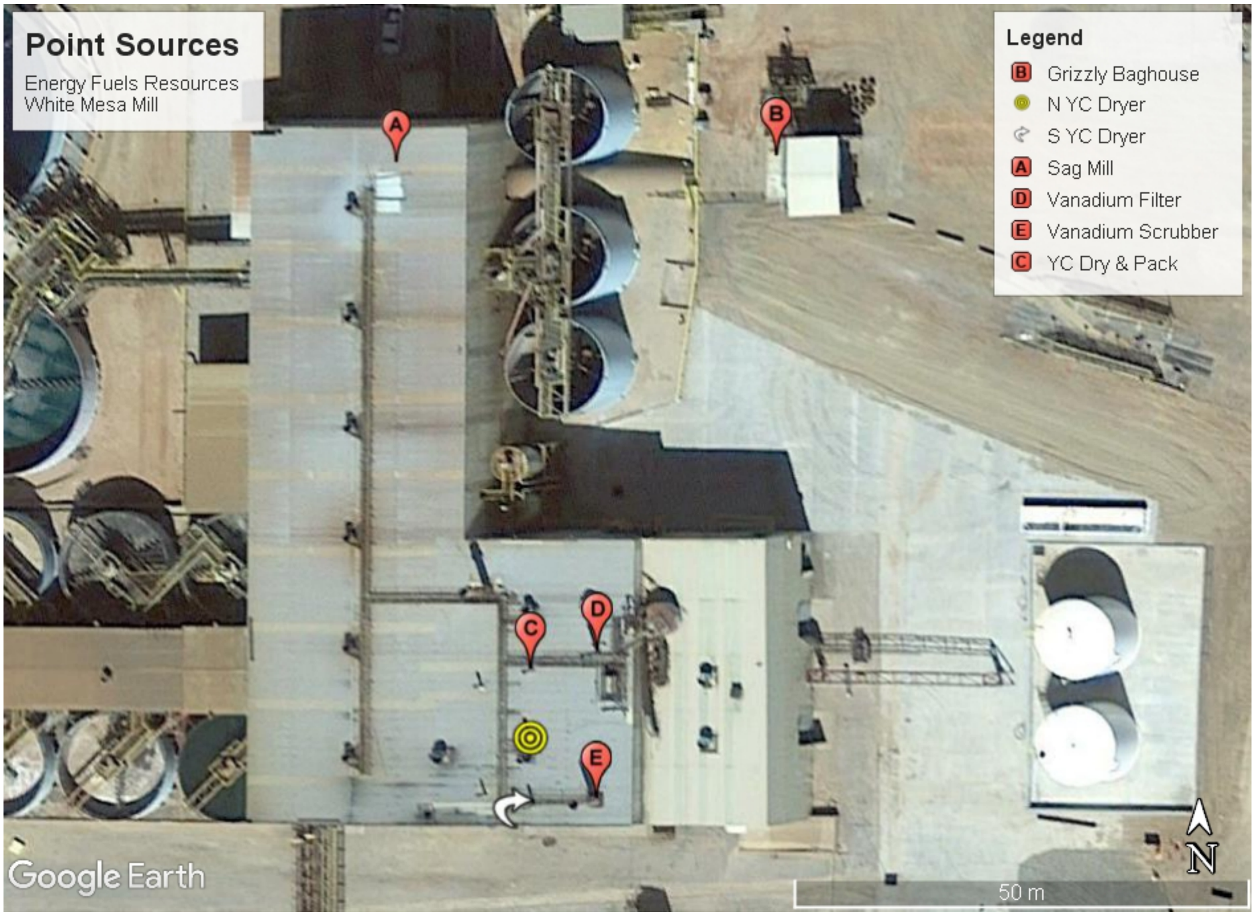
* Although the concentrations of all of radionuclides are assumed to be equal by the MILDOS Code, a concentration was calculated for each of the four radionuclides required for MILDOS input for the alternate feed materials because they were previously processed and are not in secular equilibrium. The concentrations are reported in pCi of isotope per gram of ore (ie: pCi U-238/g ore).

According to the licensee, the Mill has an efficiency rate of approximately 94 percent for U-238 recovery. This means that approximately six percent of the U-238 initially present in the ores or alternate feeds is deposited in the tailings cells as waste. Additionally, as stated in Reg. Guide 3.59, approximately 99.9 percent of the Ra-226 initially present in the ores and alternate feeds is deposited in the tailings cells as waste. Therefore, there is only about 0.01 percent of the Ra-226 in the yellowcake as it is dried and packaged. Because of the low Ra-226 content of yellowcake, the Rn-222 released from the yellowcake stacks is negligible.

SOURCE TERMS

White Mesa Mill releases airborne emissions of radionuclides from point sources and area sources. The primary point sources releasing radionuclides are the yellowcake dryer stacks and the yellowcake dryer/packaging stack. To a lesser extent, emissions are also emitted from the grizzly baghouse/sag mill stack, the vanadium scrubber stack, and the vanadium cartridge filter stack (see Figure 1). For the assessment period, the primary area sources were the ore storage pad and three tailings cells (one closed and two operational). For particulate emissions from the area sources, an enrichment factor of 2.5 is used. This is the dust/bulk ore activity ratio given in Reg Guide 3.59 and represents an assumption that the content of U-238 and its progeny in dust or suspended particles (<100 µm in size) is up to 2.5 times higher than the content of U-238 in the bulk ore.

Figure 1: Emission Stack Locations



The CP Ores, AS Ores, AF-B and AF-C are received and stored on the ore storage pad. As stated above, the AF-C is stored in barrels until the barrels are taken to be opened in the alternate feed circuit. The natural ores and the AF-B are placed on the ore storage pad and stored there until the materials are moved into the Mill for processing. While on the storage pad, the licensee sprays the ores and the AF-B materials with liquids to suppress the dust and decrease the particulate emissions. Reg. Guide 3.59 indicates an emission reduction factor of 50 percent is allowed to be considered for the dust suppression mechanism (water spray) used by the licensee.

The licensee provided the Division with the tons of ores and alternate feed materials received each year (see Table 1) as well as the ore grades for each of the ores and alternate feeds. The tons per year were converted to activity of U-238 using this data and the specific activity of U-238. The specific activity of U-238 used for these conversions is 0.85 grams of U-238 per gram of U_3O_8. Since MILDOS assumes that ores are in secular equilibrium, the activity for the U-238 activity of the CP Ores and the AS Ores were calculated and the activities of Th-230, Ra-226, and Pb-210 were assumed to be equal to the calculated U-238 activity. The activities of these four radionuclides contained in AF-B and AF-C materials were calculated separately since the Division was given a separate grade for each radionuclide and the alternate feed materials are not in secular equilibrium when received by the licensee.

Radon is continuously released from the natural ores and AF-B stored on the ore storage pad; however, only about 20 percent of the total radon in the ores and AF-B on the ore storage pad is expected to be released (NUREG-0706, Appendix G-1). Once the ores are taken from the ore storage pad and grinding/crushing begins, Reg. Guide 3.59 states that less than 10 percent of the radon is released during the crushing/grinding process because of the short residence time in this portion of the process. The Division calculated the radon emissions from the ore storage pad assuming that 100 percent of the Rn-222 in the ore was released. Additionally, the Division took 10 percent of the radon emissions calculated for the storage pad and used it as the input for the grizzly/baghouse/sag mill stack radon emission rate. This was done for each assessment year. This provides an overestimate of the Rn-222 released from the ore storage pad and the crushing/grinding process because it assumes the release of 110% of the Rn-222 present in the natural ores and AF-B. The radon flux method in Reg. Guide 3.59 was used to calculate the Rn-222 emission rate from the grizzly baghouse/sag mill for each assessment year. The Rn-222 release rate for the ore storage pad was calculated using the Rn-222 Flux Method, but the result is then multiplied by 10 percent to determine the release rate for the grizzly baghouse/sag mill. An example of a calculation of the grizzly baghouse/sag mill Rn-222 emission rate using the Radon Flux Method is as follows:

Radon Flux Factor * Ra-226 concentration (pCi/g ore) * ore storage pad area (m^2) * conversion factor (s/yr) * conversion factor (Ci/pCi) * ten percent = Rn-222 Emission Rate (Ci/yr)

$$\frac{1\text{ pCi Rn-222/m}^2\text{s}}{1\text{ pCi Ra-226/g Ra-226}} * \frac{3.28\text{E01 pCi Ra-226}}{\text{g ore}} * 2.79\text{E03 m}^2 * \frac{3.156\text{E07 s}}{\text{yr}} * \frac{1\text{E-12 Ci} * 0.10}{\text{pCi}}$$

$$= \frac{0.289\ \text{Ci Rn-222}}{\text{yr}}$$

Particulate emissions for the truck unloading and ore storage on the ore storage pad were calculated using Reg. Guide 3.59 as guidance for each assessment year. An example of a particulate emissions calculation for truck unloading is as follows:

Truck unloading source term for U-238 = ore received/yr * Concentration of U-238 (pCi/g) * Process Emission Factor (lb/yd^3) * Dust/Bulk Ore Activity Ratio * Fraction of Particulates released * Bulk Density of Ore (yd^3/ton) * Conversion Factor (g ore/ US Ton ore) * Conversion Factor (Ci U-238/pCi U-238) = Ci U-238/yr

U-238 Truck Unloading Source Term = 40877 ton AF-B received/yr *
288.64 pCi U-238/g AF-B * 0.04 lb/yd^3 * 2.5 * 1.5 * 0.68 yd^3/ton * 9.07E05 g ore/ton ore *
1E-12 Ci U-238/pCi U-238
= 1.09 Ci/yr

Process emission factors for particular Mill processes and the factors regarding the fraction of particulates released are provided in Reg. Guide 3.59. The process emission factors are found in Appendix B of Reg. Guide 3.59. In the above example, the process considered is the ore loadout to the ore storage pad and to the grizzly. The process emission factor given in Reg. Guide 3.59 is 0.04 lb/yd^3. Appendix C of Reg. Guide 3.59 provides emission reduction factors. For the ore loadout from the truck to the storage pad, the Division assumed that no emission controls were used so 100 percent of the particulates would be released. By the time the ore is transferred from the ore storage pad to the grizzly, the licensee has sprayed the ores with water spray to control the emissions. Also, while unloading the ore through the grizzly, additional water spray may be used to suppress the dust. Appendix C indicates that water spray used during the loadout from the ore storage pad to the grizzly reduces the emissions by 50 percent. To account for both the loadout to the ore storage pad from the truck with no emission controls and the loadout from the ore storage pad through the grizzly with 50 percent emission control, the fraction of particulates released is represented by 1.5 (150 percent) in the above equation. The above equation was used for each type of ore received each year and the calculated U-238 releases for CP Ores, AS Ores, and AF-B materials are summed to determine the total U-238 (or other radionuclide of concern) is released for the year under assessment.

The above calculations are samples of the calculations used to calculate the source terms for specific processes for each year of assessment. The concentration levels would be different for each year and each radionuclide being considered. For CP Ores and AS Ores, the calculations would only be performed for U-238. Secular equilibrium would then be assumed and the U-238 emission rate would be applied to the other radionuclides. For AF-B and AF-C materials, separate concentrations would be available for each of the radionuclides so a calculation would be performed for each radionuclide (U-238, Th-230, Ra-226, and Pb-210) for each year assessed.

The other area sources at the Mill are the Tailing Cells. During the years of 2007 through 2014, Cell 2 was closed (end of 2007) and Cell 4A was opened (2009). As Cell 3 began to reach capacity, the Division approved Cell 4B; however, during the assessment period, no tailings materials were pumped into Cell 4B; therefore, Cell 4B was not reviewed in this assessment. Although Cell 2 closed during the assessment period, Rn-222 is still emitted from the covered cell and must be included in all dose estimates from the Mill's operations. Tailings cells contribute to radiation exposures through particulate emissions and Rn-222 emissions. For areas of the cells covered by liquid, it is assumed that emissions are negligible since the liquid keeps particulates from being wind blown and also impedes the dispersion of Rn-222. The "beach" areas of the cells are those areas along the edges of the tailings cells. In addition to the inherent moisture contained in slimes and in wet tailings, dust in the beach areas is controlled by spraying the beach areas with solution to further reduce airborne emissions from portions of the beach which are drying out. The covered area of the cell is the area covered by either temporary or final radon cover. The covered area is not subject to particulate emissions, but can emit Rn-222. Therefore, for tailings cells, particulate emissions are a concern from the beach areas, and Rn-222 emissions are a concern from both the beach areas and those areas that have been covered.

In 2013, the licensee collected samples of the tailings contained in Cell 2 and Cell 3. The samples were taken at varying depths of the cells and were analyzed for the concentrations of U-238, Th-230, Ra-226, and Pb-210. The Division averaged the results of the samples to determine an average concentration for each of the tailings cells. (See Table 7) These concentrations were used as input for the "Nuclide Mix" concentrations in MILDOS for each tailings cell. Since Tailings Cell 2 was totally covered in 2008, the radionuclide concentrations for Cell 2 were only used in the 2007 assessment. Due to the lack of actual data for Cell 4A, the Division assumed that the samples taken throughout the different depths of Cell 3 represented the tailings received for all of the years that Cell 3 was open through 2014. Since Cell 4A was opened in 2009 and was operated through 2014, the Division assumed that the samples were also representative of tailings wastes that would have been received in Cell 4A over the assessment period. Therefore, the radionuclide concentrations for Cell 4A were assumed to be equivalent to those found for Cell 3. In addition to the particulate emissions, the tailings cells have Rn-222 emissions. The Rn-222 emission rates for the tailings cells were not calculated, but were assumed to be the maximum allowed under NESHAPS requirements or from 2012 forward were estimated to be at levels higher than the limit due to the maximum allowable Rn-222 emission rate limit being exceeded for Cell 2 in 2012 (See Table 8).

Table 7: Average Concentrations for Radionuclides in Cells 2 and 3
[pCi (U-238, Th-230, Ra-226, or Pb-210)/g tailings]

Cell	U-238	Th-230	Ra-226	Pb-210
2	5.13E+01	4.65E+02	6.38E+02	7.12E+02
3	1.18E+02	7.22E+02	6.77E+02	5.84E+02

The NESHAPS limits apply to Tailings Cells 2 and 3, but not to Tailings Cells 4A and 4B. To meet NESHAPS limits, the average Rn-222 emission rates may not exceed 20 picocuries per square meter per second for Cells 2 and 3. From 2007 through 2011, the average Rn-222 emission rates in Cells 2 and 3 were below the NESHAPS limit, but the Division used the limit of 20 picocuries per square meter second for the MILDOS input even though the emissions were typically well below this limit. This was another means that the Division used to conservatively evaluate the estimated dose from the Mill's operation. In 2012, the licensee exceeded the NESHAP limit for Cell 2 which had Rn-222 emission rate of about 26 picocuries per square meter per second. Even though the licensee brought the Rn-222 emissions to just above the NESHAPs limit in 2013 (20.4 pCi/m^{2}s) and below the NESHAPS limit in 2014 for Cell 2, the Division used a higher Rn-222 emission rate (26 pCi/m^{2}s) for 2012 and (25 pCi/m^{2}s) for 2013 and 2014 to demonstrate that the licensee could still meet the dose limits if the Rn-222 emissions if these cells exceeded the limits. The Division also used the 25 pCi/m^{2}s Rn-222 emission rate for the covered areas of Cell 3 for 2012 through 2014 (Table 8). In addition to the NESHAPS limits or above being used as the inputs for the radon emission rates from the tailings cells, as stated above, the tailings cells, with the high inputs, were included multiple times in the estimated dose assessment for each year.

In 2011, the Cell 3 beach area had a reported Rn-222 emission rate of 31.4 picocuries per square meter per second in the licensee's NESHAPS report, but when averaged with the Rn-222 emission rate from Cell 3's covered area, the NESHAPS limit for Cell 3 was not exceeded. Since the NESHAPS limit for Cell 3 was not exceeded, the Division continued to use the NESHAPS limit of 20 pCi/m^{2}s for the Cell 3 beach area, but applied a higher Rn-222 emission rate of 26 pCi/m^{2}s to the covered area of Cell 3 in 2012. By doing this, the Rn-222 emissions for Cell 3 in 2012 are represented as exceeding the NESHAPS limit. Also, since the NESHAPS limits do not apply to Cell 4A, there were no NESHAPS reports regarding the Rn-222 emission rates for Cell 4A. The Division made the assumption that the beach area for Cell 4A had a composition similar to that of Cell 3 and used 31.4 pCi/m^{2}s for the input for Cell 4A's beach area from 2011 through 2014. In using these inputs, the Division conservatively assumed that all of the Tailings

Cells had Rn-222 emission rates that equaled or exceeded the NESHAPS limits for the entire time of the assessment period. (See Table 8)

Table 8: Assumed Radon Emission Rates From Cells 2, 3, and 4A [pCi/m²s]

Year	Cell 2		Cell 3		Cell 4**	
	Beach*	Cover	Beach	Cover	Beach	Cover
2007	20	20	20	20	N/A	N/A
2008	N/A	20	20	20	N/A	N/A
2009	N/A	20	20	20	20	N/A
2010	N/A	20	20	20	20	N/A
2011	N/A	20	20[+]	20	31.4[++]	N/A
2012	N/A	26	20	26	31.4	N/A
2013	N/A	25	20	25	31.4	N/A
2014	N/A	25	20	25	31.4	N/A

* Cell 2 was closed as of 2008 and emissions were limited to a covered cell.

** Cell 4A did not begin accepting tailings until 2009.

[+] The Rn-222 emission for the beach area of Cell 3 was reported as 31.4; however, the average Rn-222 for the entire cell did not exceed the NESHAPS limit of 20 pCi/m²s. Therefore, the value of 20 pCi/m²s was used for the beach and the cover area of Cell 3.

++ The value for Cell 4A is an estimate based on the measured emissions from the beach area of Cell 3.

The principle contributions to the estimated dose come from the point sources at the Mill. The point sources for the Mill are the various stacks used to vent the emissions from the Mill's operations. The point source stacks identified for the MILDOS assessment are the grizzly baghouse/sagmill stack, the vanadium scrubber stack, the vanadium cartridge filter stack, the north yellowcake dryer stack, the south yellowcake dryer stack, and the yellowcake drying and packaging stack.

The grizzly baghouse/sag mill stack collects the particulates that are released when the ores are unloaded through the grizzly and are transported by the feed conveyor to the sag mill. The apron for the feed conveyor, the feed conveyor, and the apron for feeding the materials into the sag mill are enclosed in an area beneath the grizzly and are under negative pressure. This area is under negative pressure and is vented through the grizzly baghouse/sag mill stack. Since the sag mill is a "wet process," the particulate emissions from the sag mill are negligible. After the materials are reduced in size in the sag mill, the materials are passed through the leaching and extraction processes. When the Mill is processing vanadium, the vanadium scrubber stack and the vanadium cartridge filter stack collect the vanadium particulate emissions and U-238 particles. For vanadium processing, the U-238 has been separated from the Th-230, Ra-226, and Pb-210. The Th-230, Ra-226, and Pb-210 will be transferred to the tailings cells. The emissions from processing vanadium are vented through the vanadium scrubber stack and the vanadium cartridge filter stack. During yellowcake production, the Mill typically operates only one of the yellowcake dryers at a time. After the yellowcake is dried to the point it can be packaged, the yellowcake is put into barrels but not sealed. The yellowcake is allowed to cool before the barrels are sealed and prepared for transport. The drying and cooling processes are completed under negative pressure. The emissions from the drying and cooling process are released through the North yellowcake dryer stack, the South yellowcake dryer stack, and the yellowcake dryer/packaging stack.

Although the locations of the point sources (See Figure 1) remained the same for each year of the Division's assessment of the estimated doses from the Mill's operations, the particulate emission rates differ each assessment year. The particulate emission rates for the point sources (See Table 9) change each year due to the tons and grades and mix of ore and alternate feed materials processed in the assessment year and the stack flow rate that was determined for the year. Due to the small number of grizzly baghouse/sag mill stack samples, the average emission rate for each radionuclide was averaged and used for each year of assessment. Stack flow rates were measured and reported in the licensee's SAERs. The Division used the reported flow rates to determine the stack flow rate for each point source. (See Table 9)

The licensee provided the Division with the amount of yellowcake (in pounds) produced each assessment year (Table 11). Particulate emissions from the point sources were calculated by taking the particulate emissions reported in the licensee's semi-annual environmental reports (SAER), converting the reported values to an hourly emission rate, determine the number of hours that the yellowcake and vanadium stacks were in operation and multiply the hourly emission rate by the number of hours in operation (Table 10). This value gives a more realistic estimate of the radionuclide emissions per year that are emitted from the stacks. The emissions from the vanadium stacks were determine in the same manner as stated above. As stated above, about 99.9 percent of the Ra-226 is separated from the yellowcake during processing and goes to the tailings cells as waste. Therefore, there is only about 0.01 percent of Ra-226 in yellowcake. This makes the presence of Rn-222 negligible.

Table 9: Particulate Release Rates for Point Sources

Year	Grizzly Baghouse/Sag Mill Stack				North Yellowcake Dryer Stack			
	U-238	Th-230	Ra-226	Pb-210	U-238	Th-230	Ra-226	Pb-210
2007	2.44E-05	5.9E-07	4.8E-07	8.22E-07	5.75E-04	2.18E-06	6.49E-07	3.72E-05
2008	2.44E-05	5.9E-07	4.8E-07	8.22E-07	5.93E-03	8.79E-06	4.66E-06	2.01E-05
2009	2.44E-05	5.9E-07	4.8E-07	8.22E-07	1.13E-02	2.92E-05	3.17E-06	2.43E-06
2010	2.44E-05	5.9E-07	4.8E-07	8.22E-07	3.35E-02	6.85E-05	1.07E-05	8.87E-06
2011	2.44E-05	5.9E-07	4.8E-07	8.22E-07	2.49E-02	7.40E-06	3.46E-07	3.72E-05
2012	2.44E-05	5.9E-07	4.8E-07	8.22E-07	2.51E-02	6.79E-06	8.61E-08	3.72E-05
2013	2.44E-05	5.9E-07	4.8E-07	8.22E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2014	2.44E-05	5.9E-07	4.8E-07	8.22E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 9: Particulate Release Rates for Point Sources (Continued)

Year	South Yellowcake Dryer Stack				Yellowcake Dryer/Packaging Stack			
	U-238	Th-230	Ra-226	Pb-210	U-238	Th-230	Ra-226	Pb-210
2007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.95E-05	1.36E-06	4.32E-07	2.40E-06
2008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-03	1.80E-06	3.04E-06	1.94E-07
2009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-03	1.42E-05	1.59E-06	4.05E-07
2010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-04	5.87E-06	3.38E-07	3.07E-07
2011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-03	1.58E-05	1.90E-07	8.30E-07
2012	9.03E-04	4.44E-07	2.44E-08	7.54E-07	2.58E-03	1.54E-05	1.62E-07	1.24E-06
2013	5.02E-03	6.67E-07	2.02E-07	2.32E-06	2.49E-02	2.99E-05	8.00E-07	2.40E-06
2014	1.88E-03	1.03E-07	1.29E-07	3.65E-06	8.20E-04	6.05E-07	2.16E-06	7.76E-07

Year	Vanadium Scrubber Stack				Vanadium Cartridge Filter Stack			
	U-238	Th-230	Ra-226	Pb-210	U-238	Th-230	Ra-226	Pb-210
2007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2008	4.74E-05	5.78E-08	4.20E-08	1.11E-07	2.48E-07	3.03E-10	2.20E-10	5.80E-10
2009	1.97E-05	6.87E-08	7.56E-09	4.49E-09	1.03E-07	3.60E-10	3.96E-11	2.35E-11
2010	1.08E-04	2.35E-07	3.49E-08	2.90E-08	5.61E-07	1.23E-09	1.82E-10	1.51E-10
2011	2.54E-05	2.11E-08	4.86E-10	3.46E-08	1.30E-07	1.09E-10	2.50E-12	1.78E-10
2012	1.03E-05	8.15E-09	9.82E-11	5.43E-09	5.54E-08	4.38E-11	5.28E-13	2.92E-11
2013	3.33E-06	3.40E-09	1.11E-10	5.25E-10	2.50E-08	2.56E-11	8.38E-13	3.95E-12
2014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 10: Stack Flow Rates for Point Sources *
(m^2/s)

Grizzly Baghouse/ Sag Mill Stack	North Yellowcake Stack	South Yellowcake Stack	Yellowcake Dryer/ Packaging Stack	Vanadium Scrubber Stack	Vanadium Cartridge Filter Stack
3.99	2.06	1.94	3.41	9.86	9.86

* The flow rates used for MILDOS were not the maximum flow rates. Stack flow rates have an inverse relationship to the estimated dose rates. Therefore, the minimum flow rate was used unless there was a question regarding the validity of the measurement because it was uncharacteristically low. In those cases, the average stack flow rate was used as input to MILDOS.

Table 11: Yellowcake Produced (in pounds)

Year	CP Ores	AS Ores	AF - Bulk	AF - Container
2007	0	0	83461.63	141372.37
2008	801314	0	0	0
2009	416146	0	0	186365
2010	700971.09	157334.91	0	299033
2011	566905.97	281614.03	46768.93	131013.07
2012	234236.17	603134.83	0	433218
2013	421811.06	233460.94	0	351323
2014	0	803621.08	0	102870

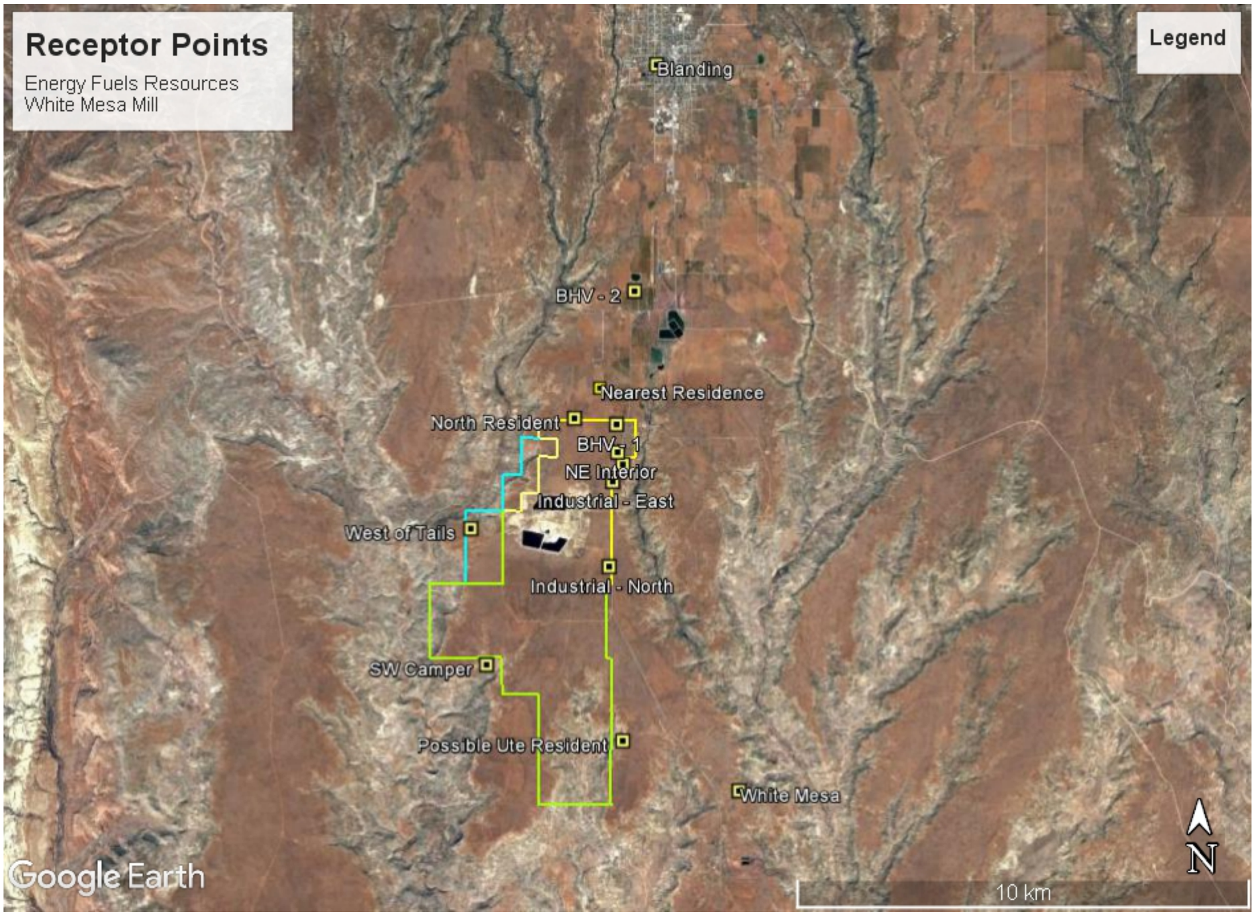
Receptors

For the purposes of this report, receptors are defined as locations where radiation doses are calculated by MILDOS. The Division chose some receptor locations for the evaluation as resident locations and some locations that are considered as non-resident. Resident locations are locations where someone may potentially be able to live 365 days a year, grow vegetables for consumption, raise dairy cows for milk to be used by the family, and raise beef cattle for meat consumption. For this report, non-resident locations are locations where an individual could not legally live for extended periods of time and where a residence cannot be legally built. The receptor locations are as follows:

- Three locations along the north of the Mill's property
- A location in the NE area of the Mill's property (within the boundaries of the Mill property.)
- Three locations along the east border of the Mill's property
- A location southwest of the Mill outside of but near the Mill's property boundary
- A location west of the tailings cells outside of but near the Mill's property boundary
- The location of the Mill's nearest resident which is located to the northeast of the Mill
- The city of Blanding
- A location on the northwestern edge of the Ute tribe's land adjacent to the southeastern edge of the Mill's property.
- A location on the northern edge of the town of White Mesa

These locations are shown in Figure 2. The same receptor locations were used for each year of the Division's assessment for estimated doses from the Mill's operations.

Figure 2: Receptor Points Used in the MILDOS-AREA Analysis



The results in Table 12 considers occupancy factors for the receptor locations. An occupancy factor is a normal factor used in calculating potential exposures or doses to an individual from a particular source of radiation. Using occupancy factors in calculating the amount of shielding necessary to meet regulatory limits regarding doses, to determine the amount of time that someone may be in a particular area before exceeding a certain dose, and to calculate other items regarding doses to individuals is a standard procedure in the health physics field. An occupancy factor accounts for the time that an individual is potentially exposed to the source of radiation. As an example, the amount of shielding required in a medical facility's wall to protect individuals walking down the hall beside the wall would be less than the amount of shielding required to protect individuals who would be sitting in chairs against the same wall if the area is a waiting room instead of a hallway; however, although the amount of shielding would be different and the instantaneous exposure to the individual in the hallway would be higher, the licensee would be compliant in both instances. This is an example of a calculation where an occupancy factor is consistently used in determining compliance with the limits for a dose to an individual from a source of radiation. For residential receptor points, like a home, the occupancy factor is considered to be 100 percent even though individuals do not typically stay in their homes 24 hours a day, 365 days a year. For non-resident receptor points, like a transient individual on a highway, occupancy is determined by an estimate of the time an individual will be at the receptor point since the individual will not be present at that location for the majority of the year. For the purposes of the Division's assessments, the receptor locations identified as "resident" locations were assigned an occupancy factor of 1 (100 percent occupancy). Non-residential receptor locations identified as, "industrial," were given occupancy factors equivalent to an individual working at the location for eight hours a day for 50 weeks of the year (this assumed a two week vacation per year). The remaining non-residential locations are on Federal lands and the assumption was made that an individual would stay at the location for 14 days which is the maximum time allowed by Federal agencies to camp or stay on Federal lands. Assuming that the Mill runs constantly throughout the year, the highest estimated doses at the receptor points, taking occupancy into account, for each limit per year are shown in Table 12.

WEATHER

The annual meteorological data from the Mill site was derived from the best site data available to the licensee and was provided to the Division by the licensee electronically in a STAR file format for use in MILDOS. The meteorological data is required for MILDOS to estimate the annual doses from Mill operations. The data represents the percentage of time that each wind direction spends in particular stability classes and wind speeds. The wind speed, stability class, and wind direction influence how emissions from the point and area sources are distributed and resuspended.

A different STAR file was provided for each year of operation except for 2014. Initially, the Division was assessing the dose estimates for 2007 through 2013. At the beginning of 2015, it was decided to add an assessment of the estimated dose for 2014. All of the necessary data for the 2014 MILDOS input was not available at the time the Division was working on the estimated dose. The meteorological data was one of the parameters that was not available. Since the general wind directions and speeds do not differ substantially from year to year, the Division used the data provided for 2013 for the year 2014. An example of the meteorological data is shown in Appendix 1 to this attachment.

PATHWAYS

In calculating the estimated dose to members of the public, MILDOS considers internal exposures as well as the external exposures. For the internal exposures, MILDOS considers both inhalation and ingestion.

For inhalation, MILDOS considers the size of the particulates and their course through the lungs in an individual. This includes the depth of penetration and the length of time spent in the lungs. The Division used the default particle size parameters for each assessment year. The particle size parameters define the percentage for particle sizes expected from certain processes or types of particulate emissions. For example, MILDOS assumes that for the yellowcake and vanadium stacks, 100 percent of the particles emitted are of respirable size.

For the ingestion pathways, the Division input food production rates that were specific to Utah. Annual food production rates used as input into MILDOS for vegetables, meat, and milk were 494, 106, and 461 kilograms per square kilometer year respectively. This information was taken from Table 4-8 (pages 39-40) of Argonne National Laboratory's, *MILDOS-Area: An Enhanced Version of MILDOS for Large-Area Sources.* The fraction of the total annual livestock feed requirement used in the calculation of estimated doses from ingestion pathways were left at 0.5 for pasture grass and 0.5 for hay. These are the default values provided by MILDOS. The default values represent that 50 percent of the livestock's feed is from hay and 50 percent is from grazing on vegetation on land at the receptor location.

These factors were used in MILDOS to calculate potential estimated doses for residents at a specified location from the ingestion of vegetables, meat, and milk assumed to have been produced at that location. The assumption that ingestion of contaminated vegetables, milk, and meat contribute to the estimated dose for an individual is based on the assumption that plants growing at the receptor location uptake dispersed emissions from the Mill. The plants which have absorbed some of the dispersed emissions may be directly consumed by residents as in the case of vegetables or may be indirectly ingested as in the case of milk or meat taken from cattle that have grazed at the specified receptor's location.

TIME PARAMETERS

Since the Division was assessing the estimated dose from the Mill's operations to compare against annual limits, the Division ran a separate assessment for each year. Therefore, the default time parameters were used for each assessment year.

ASSESSMENT

The Division conducted an independent assessment of the estimated annual dose to an individual from the Mill operations at specific locations surrounding the property boundary of the Mill. The Division determined that the licensee complies with the regulatory dose limits to individuals from Mill operations.

Assuming that the Mill runs constantly throughout the year, the highest estimated doses for each of the three applicable limits per year at the receptor points without respect to age class and taking occupancy into account, are shown in Table 12.

Table 12: Maximum Estimated Dose Compared to appropriate Limit Per Year

	Rule R313-15-301(1)(a) 100 mrem TEDE/year (mrem)	Rule R313-15-101(4) (air emissions no radon) 10 mrem/year (mrem)	40 CFR 190.10(a) 25 mrem whole body or 25 mrem any other organ/year* (mrem)
2007	1.43	.25	2.0
2008	1.73	.82	4.27
2009	2.60	1.09	6.10
2010	3.43	2.40	16.2
2011	6.17	2.95	14.8
2012	3.37	2.09	12.0
2013	2.27	1.6	10.9
2014	2.79	0.41	5.55
Maximum	**6.17 (2011)**	**2.95 (2011)**	**16.2 (2010)**

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.50E-03	3.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	1.70E-04	1.22E-03	7.30E-04	0.00E+00	0.00E+00	0.00E+00
C	2.40E-04	1.31E-03	1.54E-03	4.20E-04	0.00E+00	0.00E+00
D	4.60E-04	1.84E-02	1.78E-02	3.53E-03	1.12E-03	2.00E-04
E	3.66E-03	8.88E-03	1.26E-02	0.00E+00	0.00E+00	0.00E+00
F	1.72E-02	7.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: N

Direction: N

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.52E-03	3.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	2.70E-04	1.70E-03	6.10E-04	0.00E+00	0.00E+00	0.00E+00
C	3.40E-04	3.07E-03	1.10E-03	2.80E-04	0.00E+00	0.00E+00
D	5.60E-04	3.74E-02	1.70E-02	3.00E-03	8.60E-04	1.80E-04
E	4.63E-03	1.42E-02	1.35E-02	0.00E+00	0.00E+00	0.00E+00
F	1.81E-02	6.43E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction NNE

Direction: NNE

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.80E-03	5.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	3.80E-04	2.44E-03	8.90E-04	0.00E+00	0.00E+00	0.00E+00
C	2.80E-04	3.10E-03	1.25E-03	4.20E-04	0.00E+00	0.00E+00
D	5.40E-04	1.72E-02	5.26E-03	2.58E-03	8.80E-04	3.00E-05
E	3.21E-03	4.61E-03	1.46E-03	0.00E+00	0.00E+00	0.00E+00
F	1.79E-02	5.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: NE

Direction: NE

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.46E-03	4.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	1.60E-04	1.51E-03	5.90E-04	0.00E+00	0.00E+00	0.00E+00
C	9.00E-05	1.13E-03	7.40E-04	1.40E-04	0.00E+00	0.00E+00
D	1.90E-04	2.63E-03	1.78E-03	7.90E-04	1.40E-04	0.00E+00
E	1.04E-03	8.90E-04	1.80E-04	0.00E+00	0.00E+00	0.00E+00
F	1.55E-02	2.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: ENE

Direction: ENE

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.29E-03	4.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	1.40E-04	1.14E-03	5.40E-04	0.00E+00	0.00E+00	0.00E+00
C	7.00E-05	6.50E-04	7.50E-04	1.60E-04	0.00E+00	0.00E+00
D	1.20E-04	1.04E-03	1.24E-03	4.70E-04	8.00E-05	0.00E+00
E	8.20E-04	5.60E-04	1.10E-04	0.00E+00	0.00E+00	0.00E+00
F	1.20E-02	1.85E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: E

Direction: E

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.14E-03	5.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	5.00E-05	1.64E-03	8.50E-04	0.00E+00	0.00E+00	0.00E+00
C	4.00E-05	8.80E-04	9.10E-04	1.40E-04	0.00E+00	0.00E+00
D	2.00E-05	1.21E-03	2.05E-03	5.80E-04	7.00E-05	0.00E+00
E	7.50E-04	3.80E-04	1.00E-04	0.00E+00	0.00E+00	0.00E+00
F	9.02E-03	1.34E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: ESE

Direction: ESE

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.40E-03	1.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	7.00E-05	3.35E-03	3.45E-03	0.00E+00	0.00E+00	0.00E+00
C	7.00E-05	1.75E-03	3.41E-03	5.00E-04	0.00E+00	0.00E+00
D	1.00E-04	2.33E-03	3.78E-03	2.39E-03	3.40E-04	0.00E+00
E	6.00E-04	5.60E-04	1.00E-04	0.00E+00	0.00E+00	0.00E+00
F	9.61E-03	1.34E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: SE

Direction: SE

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.69E-03	1.47E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	1.20E-04	5.21E-03	6.55E-03	0.00E+00	0.00E+00	0.00E+00
C	4.00E-05	1.93E-03	5.59E-03	6.00E-04	0.00E+00	0.00E+00
D	1.40E-04	2.74E-03	3.71E-03	1.49E-03	1.90E-04	2.00E-05
E	8.20E-04	6.00E-04	2.30E-04	0.00E+00	0.00E+00	0.00E+00
F	8.21E-03	1.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: SSE

Direction: SSE

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.83E-03	1.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	3.20E-04	7.50E-03	1.03E-02	0.00E+00	0.00E+00	0.00E+00
C	2.10E-04	2.28E-03	1.11E-02	1.50E-03	0.00E+00	0.00E+00
D	3.30E-04	4.10E-03	5.67E-03	6.83E-03	2.67E-03	9.50E-04
E	1.19E-03	8.60E-04	7.90E-04	0.00E+00	0.00E+00	0.00E+00
F	7.11E-03	1.47E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: S

Direction: S

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.97E-03	1.57E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	3.00E-04	6.65E-03	1.01E-02	0.00E+00	0.00E+00	0.00E+00
C	2.60E-04	2.38E-03	1.45E-02	2.68E-03	0.00E+00	0.00E+00
D	3.50E-04	4.38E-03	5.47E-03	1.07E-02	4.62E-03	2.02E-03
E	1.34E-03	8.60E-04	1.15E-03	0.00E+00	0.00E+00	0.00E+00
F	7.41E-03	1.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: SSW

Direction: SSW

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.31E-03	1.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	2.30E-04	4.03E-03	6.13E-03	0.00E+00	0.00E+00	0.00E+00
C	1.80E-04	1.67E-03	9.10E-03	2.42E-03	0.00E+00	0.00E+00
D	2.10E-04	3.01E-03	4.25E-03	8.92E-03	3.40E-03	1.51E-03
E	8.90E-04	6.90E-04	8.60E-04	0.00E+00	0.00E+00	0.00E+00
F	6.17E-03	1.22E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: SW

Direction: SW

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	9.90E-04	5.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	1.20E-04	1.69E-03	2.45E-03	0.00E+00	0.00E+00	0.00E+00
C	1.60E-04	8.50E-04	4.07E-03	1.80E-03	0.00E+00	0.00E+00
D	1.90E-04	1.88E-03	4.02E-03	8.28E-03	2.57E-03	5.60E-04
E	4.50E-04	6.00E-04	7.20E-04	0.00E+00	0.00E+00	0.00E+00
F	5.13E-03	1.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: WSW

Direction: WSW

Read Met File

Save Cancel Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	9.50E-04	4.23E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	1.40E-04	1.35E-03	1.52E-03	0.00E+00	0.00E+00	0.00E+00
C	1.40E-04	6.70E-04	2.82E-03	1.09E-03	0.00E+00	0.00E+00
D	2.10E-04	2.34E-03	4.09E-03	5.26E-03	1.46E-03	4.30E-04
E	4.50E-04	8.70E-04	7.60E-04	0.00E+00	0.00E+00	0.00E+00
F	5.64E-03	1.56E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: W

Direction: W

Read Met File

Save | Cancel | Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	8.50E-04	3.05E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	1.20E-04	8.70E-04	1.32E-03	0.00E+00	0.00E+00	0.00E+00
C	9.00E-05	5.40E-04	2.55E-03	5.60E-04	0.00E+00	0.00E+00
D	2.00E-04	2.75E-03	3.92E-03	2.35E-03	6.20E-04	1.20E-04
E	6.70E-04	9.40E-04	7.10E-04	0.00E+00	0.00E+00	0.00E+00
F	6.97E-03	1.88E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: WNW

Direction: WNW

Read Met File

Save | Cancel | Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.22E-03	2.91E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	2.00E-04	9.50E-04	1.25E-03	0.00E+00	0.00E+00	0.00E+00
C	1.70E-04	6.10E-04	3.52E-03	1.26E-03	0.00E+00	0.00E+00
D	2.60E-04	4.22E-03	9.95E-03	1.01E-02	3.80E-03	5.80E-04
E	2.54E-03	1.70E-03	2.27E-03	0.00E+00	0.00E+00	0.00E+00
F	1.39E-02	3.42E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: NW

Direction: NW

Read Met File

Save | Cancel | Clear Met Data

Wind Speed (mph)

Stability Class	1.5	5.5	10.0	15.5	21.5	28.0
A	1.17E-03	3.06E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	1.70E-04	9.10E-04	1.34E-03	0.00E+00	0.00E+00	0.00E+00
C	1.80E-04	8.10E-04	2.66E-03	9.50E-04	0.00E+00	0.00E+00
D	2.40E-04	6.05E-03	1.73E-02	1.17E-02	4.34E-03	7.10E-04
E	3.21E-03	2.46E-03	4.03E-03	0.00E+00	0.00E+00	0.00E+00
F	1.55E-02	5.28E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Direction: NNW

Direction: NNW

Read Met File

Save | Cancel | Clear Met Data