

RAI 38: Description of Deficiency: The applicant did not provide the criteria used for determining the proposed locations for the airborne effluent monitoring stations.

Basis for Request: NUREG-1569, Acceptance Criterion 5.7.7.3(2), states: “The proposed locations of the airborne effluent monitoring stations are consistent with guidance in Regulatory Guide 4.14, Sections 1.1.1 and 2.1.2 (NRC, 1980). The license applicant adequately considers site-specific aspects of climate and topography in determining the number and locations of off-site airborne monitoring stations and environmental sampling areas. The criteria used in selecting sampling locations should be given. All sampling locations should be clearly shown relative to the proposed facility, nearest residences, and population centers on topographic maps of the appropriate scale.”

Request for Additional Information: Consistent with NUREG-1569, Acceptance Criterion 5.7.7.3(2), please provide the criteria used for determining the proposed locations for the airborne effluent monitoring stations.

RAI 38 Response (10/10/14):

Section 2.9.2.1 has been revised to provide this clarification.

Figures 2.9-2 and 7.3-2 have been revised accordingly.

Technical Report Marland Expansion Area



In regard to collection of air particulate samples, RG-4.14 states that air particulates should be:

- Collected continuously at a minimum of three locations at or near the site boundary
- Collected continuously at or near the residence or occupiable structure within 10 kilometers of the site that is most likely to be impacted by the milling operation
- Collected from a remote location representing background, usually upwind from the project site and milling operation

RG-4.14 also enumerates five criteria that should be considered when determining the sampling locations:

1. Average meteorological conditions
2. Prevailing wind direction
3. Site boundaries nearest to mill
4. Direction of nearest occupiable structure
5. Location of estimated maximum concentrations of radioactive materials

In accordance with these criteria, **Figure 2.9-2** shows the locations of the five sampling stations (MAR-1, MAR-2, MAR-3, MAR-4, and MAR-5) ~~three sampling sites were located at~~ the project boundary (Sites MAR-1, MAR-3 and MAR-4 ~~and MAR-3~~). MAR-2, near the project boundary, was located directly south of the proposed mill. Due to landowner preference, MAR-2 was placed 2,891 ft. south and 1,371 ft. west of the permit boundary. ~~One of these (Site MAR-1) also coincides with the nearest, and most likely to be impacted, occupiable structure. A fifth~~ fourth sampling site (Site MAR-5) ~~was intended~~ selected to represent background conditions. Because the on-site wind rose indicates northeasterly winds to be the least frequent, this background monitoring site ~~was~~ is located southwest of the project boundary at a distance of approximately 4 miles (6.4 km). A summary of monitor locations and elevations for each of the monitors is shown in **Table 2.9-1**.

~~During baseline monitoring, Site MAR-2 was located directly south of the proposed mill, and slightly outside the project boundary. For operational monitoring Site MAR-2 is being relocated, as described below. Sites MAR-3 and MAR-4 on the southernmost boundary of the project represent prominent downwind locations.~~ The on-site wind rose shows north-northwesterly, northwesterly, and northerly winds to be the most frequent, accounting for more than 25 percent of the time. Hence, these three monitoring sites (MAR-2, MAR-3 and MAR-4) are located south-southeast, southeast and south of the proposed milling operation. The wind roses are shown in **Figures 7.3-2, 2.5-20 and 2.5-21**.

When selecting air monitor locations, it was expected that the maximum short-term concentrations of radioactive materials would be found in the vicinity of the combined satellite facility and mine unit source terms. Similarly, long-term maximum concentrations are also expected in the vicinity of the satellite plant, given the larger proportion source term present at that location. In addition, maximum concentrations were expected where the radon has the longest residence time with the least mixing, allowing the ingrowth of Radium 226. It was believed that this would occur where the wind was less frequent and at lower velocity. Based upon the wind rose, this would occur WSW and SW of the satellite facility. That information was considered in selecting the location for MAR-1.



Following completion of preoperational baseline monitoring, the ~~Mildos~~-MILDOS Area assessment was significantly refined. Those revisions are now included as part of Section 7. The location of estimated maximum contaminant concentrations due to dose associated with radon progeny is located approximately 1.5 km southeast of the Satellite Plant (see **Figure 5** in Appendix M).— ~~During operational monitoring, To satisfy RG 4.14, for operational air monitoring a new station (MAR-6) will be added air monitoring station MAR-2 will be relocated according to criteria 5, noted above (Figure 7.3-2).~~

The wind rose was developed from data generated at an MEA onsite MET station. The MET monitoring station monitored temperature, precipitation, evaporation, wind speed and direction, and the standard deviation of the wind direction. The local meteorological station was operated from August 28, 2010 through August 29, 2011. From this information, joint frequency data were compiled. Further information on meteorological conditions is provided in Section 2.5.

2.9.2.2 Air Particulate Monitoring Program

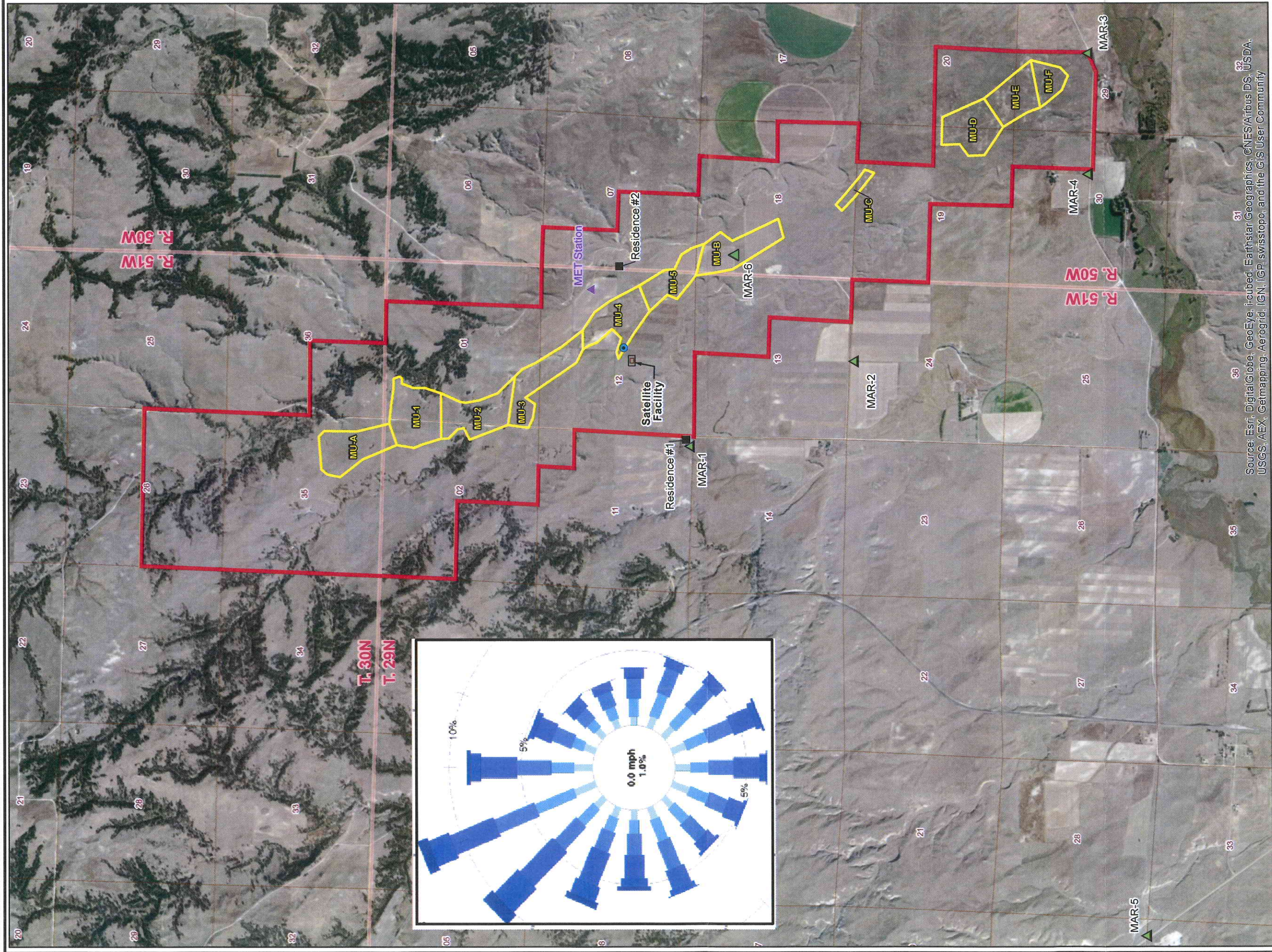
RG 4.14 recommends that a total of five particulate monitoring stations be established as discussed above in Section 2.9.2.1. The locations of the air particulate samplers are shown on **Figure 2.9.2**. There are no operations at the satellite facility that could cause a significant release of airborne particulate radionuclides (e.g., lack of yellowcake drying). Therefore, radiological-contaminated air particulates are expected to be minimal.

Five quarters of air particulate monitoring have been conducted and are discussed in this section. The PPMP monitoring program will be incorporated into the operations monitoring program. The results of the air monitoring data at sampling sites MAR-1 through MAR-5 for the fourth quarter of 2011 through the fourth quarter 2012 are presented in **Table 2.9-2** are summarized as follows:

- Lead 210 measurements were a consistent $2\text{E}-14$ microCuries per milliliter ($\mu\text{Ci}/\text{ml}$) at all monitor sites (reporting limit of $2\text{E}-15$ $\mu\text{Ci}/\text{ml}$) for all quarters except for the second quarter of 2012, when the lead level was $1\text{E}-14$ $\mu\text{Ci}/\text{ml}$ (reporting limit of $2\text{E}-15$ $\mu\text{Ci}/\text{ml}$).
- Radium 226 levels at all monitor sites for all quarters exhibited a level at or less than $1\text{E}-16$ $\mu\text{Ci}/\text{ml}$ (reporting limit of $1\text{E}-16$ $\mu\text{Ci}/\text{ml}$), except for the third quarter of 2012 when the radium-226 $\mu\text{Ci}/\text{ml}$ level was $5\text{E}-10$ $\mu\text{Ci}/\text{ml}$. Thorium 230 levels at monitor sites M-1 through M-4 for all quarters were at or less than $1\text{E}-16$ $\mu\text{Ci}/\text{ml}$, while the thorium 230 level at M-3 was $2\text{E}-16$ $\mu\text{Ci}/\text{ml}$ (reporting limit of $1\text{E}-16$ $\mu\text{Ci}/\text{ml}$).
- Uranium levels all monitor sites for all quarters were measured at $<1\text{E}-16$ $\mu\text{Ci}/\text{ml}$ (reporting limit of $1\text{E}-16$ $\mu\text{Ci}/\text{ml}$), with the exception of the first quarter of 2012, when levels of $3\text{E}-16$ $\mu\text{Ci}/\text{ml}$ (reporting limit of $1\text{E}-16$ $\mu\text{Ci}/\text{ml}$) were measured at MA-2, MA-3 and MA-4, with MA-5 exhibiting a level of $2\text{E}-16$ $\mu\text{Ci}/\text{ml}$ (reporting limit of $1\text{E}-16$ $\mu\text{Ci}/\text{ml}$).

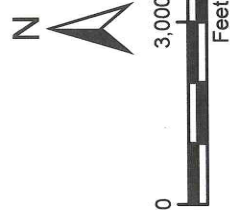
The air sampling analytical laboratory reports and QA/QC summary reports are shown in **Appendix U**.

The airborne particulate samples are collected on the inlet filter of a regulated vacuum pump on a Type A/E 47 mm glass fiber filter paper. The low volume air samplers employed is the F&J



LEGEND

- Proposed Deep Disposal Well
- Pre-operational Baseline/Operational Air Sampling Station
- Residence
- Mine Unit
- Proposed Marsland Expansion Area



PROJECTION: NAD1983,
STATE PLANE NEBRASKA NORTH, FIPS 2600
SOURCES: USDA NAIP IMAGERY 2010

Map Updated on: 10/9/2014



**CROW BUTTE
RESOURCES, INC.**

**FIGURE 2.9-2
LOCATION OF ENVIRONMENTAL AIR
SAMPLING STATIONS AT MARSLAND
EXPANSION AREA**

PROJECT: CO001636

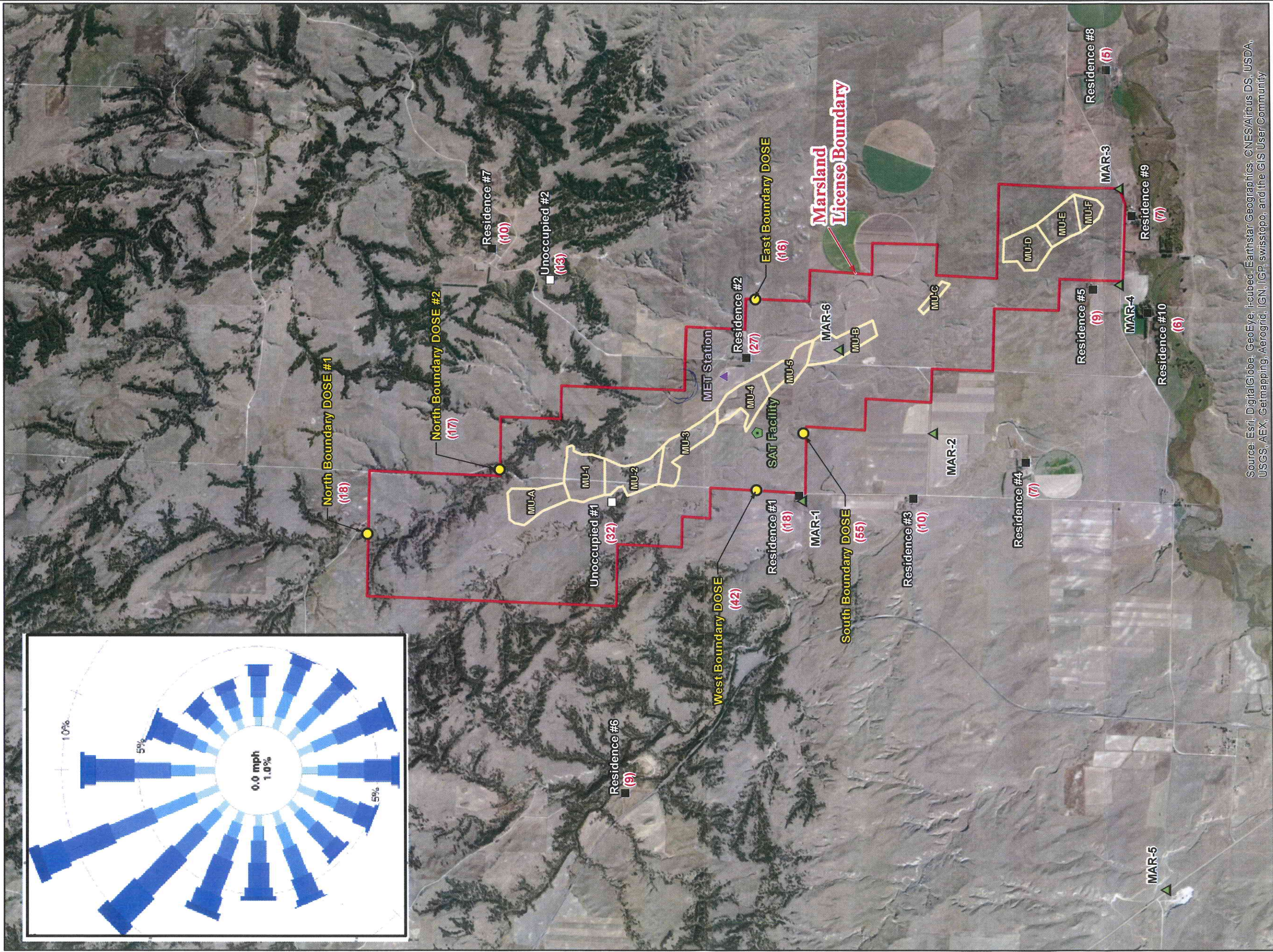
MAPPED BY: JC

CHECKED BY: MS

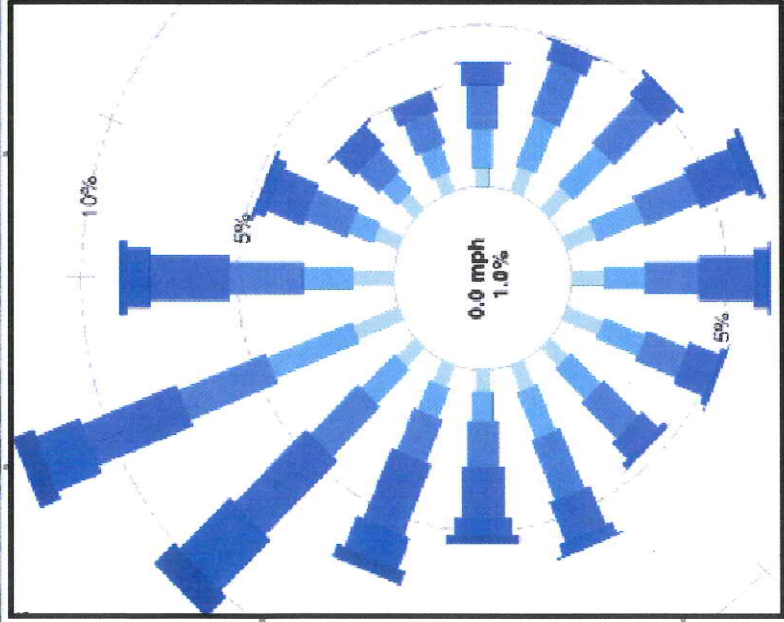


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Source: Esri, DigitalGlobe, GeoEye, iStock, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

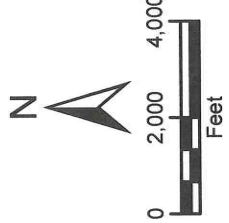


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



LEGEND

- Air Sample Station
- Boundary Dose Point
- Residence (Occupiable)
- Unoccupied Structure (Unoccupiable)
- Proposed Satellite Plant Location
- MEA Met Station
- Project Boundary
- Mine Unit
- MEA Mildos Estimated Radiation Dose Rate (in mrem/yr)
- MEA = Marsland Expansion Area
mrem = millirems per year



PROJECTION: NAD1983,
STATE PLANE NEBRASKA NORTH, FIPS 2600
SOURCES: USDA NAIP IMAGERY 2010

Map Updated on: 10/9/2014



**FIGURE 7.3-2
MILDOS RECEPTORS
RESIDENCES AND DESIGNATED MEA
LICENSE BOUNDARY LOCATIONS**

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