RAI 12.A:

Description of Deficiency: Staff can't complete its evaluation of NUREG-1569, Acceptance Criterion 2.9.3(1).

Basis for Request: 10 CFR Part 40, Appendix A, Criterion 7, requires: "At least one full year prior to any major site construction, a preoperational monitoring program must be conducted to provide complete baseline data on a milling site and its environs. Throughout the construction and operating phases of the mill, an operational monitoring program must be conducted to measure or evaluate compliance with applicable standards and regulations; to evaluate performance of control systems and procedures; to evaluate environmental impacts of operation; and to detect potential long-term effects."

RG 4.14 provides guidance on preoperational environmental monitoring at uranium mills. NUREG-1569, Acceptance Criterion 2.9.3(1), states: "Monitoring programs to establish background radiological characteristics, including sampling frequency, sampling methods, and sampling location and density are established in accordance with pre-operational monitoring guidance provided in Regulatory Guide 4.14, Revision 1, Section 1.1 (NRC, 1980). Air monitoring stations are located in a manner consistent with the principal wind directions reviewed in Section 2.5 of the standard review plan."

During its review, staff found multiple examples of gaps in data presentation on the proposed preoperational effluent environmental monitoring program for the MEA. Staff requires additional information on, or clarification of, noted deficiencies in the background radiological section to draw its safety conclusions.

Request for Additional Information: Please address the following issues regarding the proposed preoperational environmental monitoring program for the MEA:

A. Please provide criteria consistent with RG 4.14, Regulatory Position 1.1.1, used for determining air monitoring locations, or indicate where this information can be found in the application.

RAI 12.A Response (09/25/14):

Section 7.3.3.2 and Section 7.3.3.3 (pages 7-38 and 7-39) were revised to remove the term "invited" from these sections.

- The highest cumulative MEA boundary dose rate was 55 mRem/yr at the south property boundary.
- The highest cumulative dose rate at the nearest Residence #2 (unoccupied) was 27 mRem/yr.
- The highest cumulative dose rate from all existing and proposed ISR facilities at cities and towns within a 50-mile (80-km) radius from the MEA was 6.0 mRem/year at Crawford, and 3 mRem/yr at both the Towns of Hemingford and Marsland.
- The 10 CFR 190 dose rate was 0 mRem/yr which was below the 10 mRem/yr dose limit for emissions that exclude radon and its progeny.
- The total population effective dose rate was 411 person-rem/year.

For comparison naturally occurring background radiation, from cosmic and terrestrial sources, is approximately 365 mRem/yr.

The radiation doses from the production wells and from the wells in restoration are identical. See **Appendix M** for production well doses, restoration well doses, and new well doses.

7.3.3.2 MILDOS Output – Public and Occupational Radiation Dose Rates

Dose rates for the ~~invited~~ public inside the license boundary apply to delivery personnel, regulatory inspectors, visitors, or other personnel that may spend up to 10 hours per month on site. Occupational dose rates apply to personnel that may spend an estimated 2,000 hours per year working on site such as company employees or contractors.

Table 7.3.2 shows the MEA ~~invited~~ public and occupational dose rates. At maximum flow during years nine through twenty, the maximum dose rate to the ~~invited~~ public attributable to Marsland was 0.16 mRem/yr, and the maximum occupational dose rate to employees and contractors was 32 mRem/yr with an average of 17 mRem/yr.

In addition, ranchers holding the leases for the MEA may graze cattle and cut hay within the license boundary, but only outside the perimeter monitor well ring. For simplicity, and to ensure a conservative result, we will assume that the rancher will perform the grazing and haying at the point 1.5 km southeast of the satellite plant where the maximum dose is expected. This will not occur as this location is within a mine unit and will be off limits. Regardless, it is reasonable to assume a rancher will spend 416 hours per year attending grazing cattle (8 hours per day, 1 day per week, 52 weeks per year and up to 160 hours per year cutting hay (8 hours per day, 5 days/week, 4 weeks per year).

At the point 1.5km southeast of the plant the incremental dose to the rancher would be 8.5mrem/year for grazing and 3.3mrem/year for haying. As noted earlier, this situation cannot occur and any dose to ranchers performing these activities will be significantly less.

7.3.3.3 Radon Release Points

The radiation dose rates from typical operations used the following:

- 25 percent radon released from the MU wellhouse
- 75 percent radon released from the satellite plant vent stack

That distribution has been used historically in MILDOS assessments. For comparison, dose rates were calculated using:

- 10 percent radon released from the MU wellhead houses.
- 90 percent radon released from the satellite plant vent stack.

The dose rates from both distributions are presented in **Appendix M**. A comparison of the 25 percent/75 percent distribution of radon in column 2 with the 10 percent/90 percent distribution of radon release shows that the averages and standard distributions are nearly identical. That similarity suggests that, within the range of values selected for the radon distribution between releases at the mine units and releases at the satellite plant, the distribution is not important to assessing the doses to people around the MEA site.

A MILDOS sensitivity analysis was conducted. Such an analysis identifies how input parameters affect the calculated radiation dose. Input parameters and variables are discussed in **Appendix M.**

The sensitivity analysis demonstrated that:

- Neither the occupational or public dose rates exceeded 100 mRem/yr.
- Radiation doses calculated using a 25 percent/75 percent distribution of radon released from the MU wellhouses and from the satellite plant did not appear to be significantly different from the doses calculated using a 10 percent/90 percent distribution, respectively.
- The maximum dose to the ~~invited~~ public on site 10 hours/month is 0.12 mRem/yr.
- The average and maximum occupational dose rates to employees and contractors on site 2,000 hours/yr is 17 and 32 mRem/yr, respectively.

7.3.4 Exposure to Flora and Fauna

There are two primary potential pathways for radiological exposures to flora and fauna: radon emissions and accidental spills of radiological containing fluids (e.g., lixiviant).

7.3.4.1 Radon Releases

Radon emissions at satellite uranium *in-situ* facilities such as the proposed satellite facility (i.e., no yellowcake dryer and associated facilities) are considered the primary air contaminant during operations. Radon emissions during normal operations are considered the most important pathway for exposure to flora and fauna due to deposition of radon-222 decay products on surface water, surface soils, and vegetation. The MILDOS-AREA model provides an estimate of surface deposition rate as a function of distance from the source for the radon-222 decay products and calculates surface concentrations.

The exposure to flora and fauna was evaluated in the Environmental Report submitted in September of 1987 (Ferret Exploration Company of Nebraska 1987), and the doses were found to be negligible. Based on this evaluation, the proposed MEA, TCEA, and NTEA projects are not expected to have a measurable impact on dose to flora and fauna.