RAI 12.C:

Description of Deficiency: The information provided in TR Section 2.6 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Section 2.6.2 and using acceptance criteria in Section 2.6.3 of NUREG-1569.

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

C. Please submit the results of the preoperational/preconstruction monitoring program described in TR Section 2.9, including the survey discussed in TR Section 2.9.5.2, or a revised schedule for these items.

RAI 12.C Response (02/04/15):

Figure 2.9-1 has been revised to reflect the current schedule.

Table 2.9-41 (Previously submitted as Table 2.9-37) has been revised to reflect pre-operational / pre-construction monitoring program.

Section 2.9-9 has been revised to reflect radon flux baseline monitoring status.

Figure 2.9-1 Marsland Expansion Area Preoperational/Preconstruction Monitoring Program Timeline

Task	Start	Finish	2013												2014												2015					
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Surface Water (Niobrara River N-1 & N-2)	Sep-13	Sep-14																														
Surface Water (Ephemeral Drainages)	Apr-13	Continuing																														
Vegetation (Forage)	Jun-13	Sep-13																														
Food (Fish)	May-14	Sep-14																														
Food (Livestock)	Mar-14	Mar-14																														
Food (Crops/Alternate Soil Sampling)	Aug-13	Aug-13																														
Soil	Jun-14	Nov-14																														
Sediment (MED-1 through MED-6)	Oct-13	May-14																														
Sediment (MED-7)	Oct-14	Apr-15																														
Direct Radiation	May-14	Nov-14																														

Samples will be collected when water flow becomes available

Sampling completed

Scheduled for completion Q2 2015

Table 2.9-41 ~~37~~Marsland Expansion Area Preoperational/Preconstruction Monitoring Program

	Sample Collection				Sample Analysis	
Type of Sample	**Number**	**Location**	**Method**	**Frequency**	**Frequency**	**Type of Analysis**
Air Particulates	3	On MEA ~~nort~~southern boundary	Continuous	Weekly filter change	Quarterly composites of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
	1	Nearest Resident	Continuous	Weekly filter change	Quarterly composites of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
	1	Control background location ~~west~~east of MEA License Boundary	Continuous	Weekly filter change	Quarterly composites of weekly samples	Natural uranium, Ra-226, Th-230, and Pb-210
Radon Gas	3	On MEA ~~nor~~southern boundary	Continuous	Quarterly	Quarterly	Rn-222
	1	Nearest Resident	Continuous	Quarterly	Quarterly	Rn-222
	1	Control background location ~~west~~east of MEA License Boundary	Continuous	Quarterly	Quarterly	Rn-222
Groundwater	1	Wells within MEA license boundary and 2 km radius: • Private Wells • MEA Arikaree Wells • MEA Brule Wells • MEA Ore Zone Wells ~~(See Figures 2.7-6 and 2.9-3)~~	Grab	Quarterly	Quarterly	Suspended & Dissolved Natural Uranium, Ra-226, Th-230, ~~Th-230~~ Pb-210 & Po-210
Surface Water	2 [a]	Niobrara River (N-1 and N-2) Ephemeral Drainages	Grab	Monthly	Monthly	Suspended & Dissolved Natural Uranium, Ra-226, Th-230~~,~~
			Grab	Semiannually	Semiannually	Suspended & Dissolved Pb-210 & Po-210
Vegetation	3	Grazing areas near the site in different sectors that will have the highest predicted air particulate concentrations during milling operations	Grab	3 times during grazing season	3 Times	Natural Uranium, Ra-226, Th-23~~2~~0, Pb-210, & P~~o~~b-210
Food	3	Crops (alternate of garden soil sampling used)	Grab	Time of Harvest or Slaughter	1	Natural Uranium, Ra-226, Th-230, Pb-210, & Po-210
	3	Livestock			1	
	~~3~~	~~Private Garden Vegetables (alternate of garden soil sampling to be used)~~			~~1~~	

Table 2.9-41 ~~37~~Marsland Expansion Area Preoperational/Preconstruction Monitoring Program

	Sample Collection				Sample Analysis	
Type of Sample	**Number**	**Location**	**Method**	**Frequency**	**Frequency**	**Type of Analysis**
Fish	Each Body of Water	~~Collection of fish from Niobrara River (N-1 & N-2)~~Box Butte Reservoir	Grab	Semiannually	2	Natural Uranium, Ra-226, Th-230, Pb-210, & Po-210
Surface Soil [b]	Up to 40	300 meter intervals to a distance of 1500 meters in each of 8 directions from center-point of satellite facility; additional transects through wellfields	Grab	Once prior to construction. Repeat for location disturbed by excavation, leveling or contouring	1	All samples for Ra-226, 10% of samples natural uranium, Th-230 & Pb-210
	5	Same location used for collection of air particulates	Grab	Once prior to construction	1	Natural Uranium, Ra-226, Th-230 & Pb-210
Subsurface Soil [c]	5	At center-point of satellite facility & at distances of 750 meters in each of 4 directions	Grab	Once prior to construction. Repeat for location disturbed by construction	1	Ra-226 (all samples) Natural Uranium, Th-230~~203~~ & Pb-210 (one set of samples)
Sediment [d]	1 from each stream (2) & ephemeral drainage (76) sampling points	Up and down gradient samples from ephemeral drainages (total of 76 samples) & Niobrara River (N-1 & N-2)	Grab (Composite samples)	Once following spring runoff & late summer following period of extended low flow	2	Natural Uranium, Ra-226, Th-230 & Pb-210
Direct Radiation (Survey)	Up to 80	150 meter intervals to a distance of 1500 meters in each of 8 directions from center-point of satellite facility	Grab	Once prior to construction. Repeat for areas disturbed by site preparation or construction	1	Gamma exposure using sodium iodide scintillometer
Direct Radiation (Continuous)	5	Same location used for collection of air particulates	Grab	Once prior to construction	1	Gamma exposure using a continuous integrating device
Radon Flux [e]	-	-	-	-	-	-

[a] Two samples from the Niobrara River per sampling event and one (1) from each sampling point (total of 76) located on ephemeral streams (**Figure 2.7-4**) .
[b] Surface soil samples collected to a depth of 5 cm using a consistent technique.
[c] Subsurface soil samples collected to a depth of 1 meter; samples divided into 3 equal sections for analysis.
[d] Sediment sample locations shown in Figure 2.7-4
[e] Radon Flux measurements are not applicable to ISR facilities.
~~Revised November 2014~~

Monitoring has been conducted by placing the OSLDs provided by Landauer, Inc. quarterly at the air particulate monitoring sites (**Figure 2.9-2**). The monitors were located approximately 1 meter above ground level. They were exchanged with new monitors quarterly, and the exposed monitors were returned to the vendor for processing. These devices provide an integrated exposure for the period between annealing and processing.

The PPMP and operational monitoring plan has been designed to meet the criteria outlined in RG 4.14 (NRC 1980). As with air particulate and radon-220 monitoring, gamma monitoring began in the fourth quarter of 2011 and was completed in the fourth quarter of 2012 (five quarters of data). The proposed PPMP and operational monitoring program is shown in **Tables 2.9-41 and 5.7-1**.

The results of gamma measurements conducted at the air particulate monitoring stations (MAR-1 through MAR-5) for the fourth quarter of 2011 through the fourth quarter 2012 are presented in **Table 2.9-40**. The gross and net measurements for all sampling locations over the entire sampling period ranged from 19.9 to 40.9 (average of 33.3) and 4.5 to 14.5 (average of 8.0) mRems ambient dose equivalent, respectively. The range of the gross and net measurements for MAR-1 through MAR-4 was 19.9 through 40.9 (average of 33.8) and 4.6 to 14.5 (average of 8.5), respectively, compared to MAR-5 with a range of 20.9 through 38.1 (average of 31.8) and 4.5 to 7.7 (average of 6.2), respectively. The gamma laboratory records are provided in **Appendix V-3**.

The average background gamma level in the Western Great Plains has been reported to be 0.014 milli-Roentgens per hour (mR/hr; NRC 1979).

NRC RG 4.14 guidance recommends a combination of direct gamma radiation measurements and exposure measurements made with integrating devices (i.e., OSLDs) during the PPMP.

In addition to the environmental gamma monitors, NRC recommends that the background gamma radiation in the area of the facility be measured with a scintillometer. As per RG 4.14, CBR will perform PPMP gamma radiation measurements at 150-meter intervals as discussed above. Note that some alternate sampling locations may be employed as discussed in Section 2.9.6. These measurements will be made once prior to construction and be repeated for area disturbed by site preparation or construction.

2.9.9 Preoperational/Preconstruction Baseline Monitoring Program Summary

The MEA PPMP is summarized on **Table 2.9-41.** It should be noted that the baseline monitoring program did not include radon flux. Radon flux sampling is of use for conventional mills where tailings impoundments are required and must meet radon flux standards as required in 10 CFR 40 Appendix A. As the ISR method does not involve generation of conventional tailings impoundments, radon flux measurements are not applicable to ISR facilities. The remaining monitoring tasks and completion timelines are presented on **Figure 2.9-1.**

2.10 References

Alexander, J.S., Zelt, R.B., and Schaepe, N.J. 2010. Hydrogeomorphic Segments and Hydraulic Microhabitats of the Niobrara River, Nebraska – with Special Emphasis on the Niobrara National Scenic River, U.S. Geological Survey Scientific Investigations Report 2010-5141, 62 p.