



February 28, 2013

**ATTN: Document Control Desk**

Mr. Keith J. McConnell, Deputy Director  
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**CERTIFIED MAIL # RETURN RECEIPT REQUESTED**

**RE: NRC License SUA-1548, Docket No. 40-8964, Semi-Annual Effluent and Environmental Monitoring Report, July 1 through December 31, 2012**

Dear Mr. McConnell:

In accordance with 10 CFR 40.65 and per License Condition No. 12.2 of Source Materials License SUA-1548, please find enclosed the Semi-Annual Effluent and Environmental Monitoring Report for the period July 1 through December 31, 2012. Copies of this report are also being forwarded to Mr. Douglas Mandeville, USNRC Headquarters and Mr. Roy Caniano, Division Director, Division of Nuclear Material Safety, Region IV.

If you have questions regarding the report, please contact me at (307) 316-7588

Sincerely,

A handwritten signature in black ink, appearing to read 'JL' followed by a stylized flourish.

Josh Leftwich  
Director, SHEQ  
Cameco Resources

**Attachments: Semi-Annual Effluent and Environmental Monitoring Report**

JL/sab

cc: Mr. Doug Mandeville, NRC w/att  
R. Caniano, DDNMS w/att

**POWER RESOURCES, INC.  
D/B/A CAMECO RESOURCES**

**USNRC SOURCE MATERIAL LICENSE  
NO. SUA-1548**

**DOCKET NO. 40-8964**

**SEMI-ANNUAL EFFLUENT AND  
ENVIRONMENTAL MONITORING  
REPORT**

**FOR THE PERIOD**

**JULY 1 THROUGH  
DECEMBER 31, 2012**

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**1.0 RESULTS FROM EMPLOYEE URINALYSES IF AN EXPOSURE EXCEEDS ACTION LEVELS DESCRIBED IN THE OPERATIONS PLAN OF THE APPROVED LICENSE APPLICATION**

No bio-assays exceeded the action level of 15 µg/L uranium during the report period.

**2.0 INJECTION RATES, RECOVERY RATES, AND INJECTION TRUNK-LINE PRESSURES FOR EACH SATELLITE FACILITY**

Tables 1A through 1D of Attachment A contain rate and pressure data at the satellite facilities for the period of the report.

**2.1 Satellite No. 1**

Satellite No. 1 did not operate during the report period, as restoration activities in the A and B Wellfield are complete. Mine Unit-B is awaiting NRC approval of restoration, and surface reclamation will begin with approval of a decommissioning plan. Therefore, no injection or recovery rates are available for the report period, as shown in Table 1A.

**2.2 Satellite No. 2, Satellite No. 3, Central Processing Plant, Satellite SR-1, Satellite SR-2**

The injection rates, recovery rates, and injection pressure data for Satellite No. 2, Satellite No. 3, Satellite SR-1, Satellite SR-2, and the Central Processing Plant (CPP) are contained in Tables 1B, 1C, and 1D. The injection rates represent the total recovery rates minus the purge (clean-out circuit) flow. The purge flow from Satellites No. 2 and No. 3 is treated for uranium, radium and selenium removal and pumped to Purge Storage Reservoir #2 (PSR-2) prior to disposal by irrigation at the Satellite No. 2 Land Application Facility (Irrigator #2). Waste water brine from the reverse osmosis (RO) system at Satellite No. 2 is disposed by deep injection through a permitted waste disposal well, or treated and pumped to PSR-2 prior to disposal by irrigation at Irrigator #2. Purge flow from Satellites SR-1 and SR-2, and the CPP is disposed by deep well injection through permitted waste disposal wells.

**3.0 RESULTS OF EFFLUENT AND ENVIRONMENTAL MONITORING INCLUDING WATER QUALITY ANALYSES AND MONITORING REQUIRED BY THE WDEQ PERMIT FOR THE OPERATING IRRIGATION SYSTEMS**

**3.1 Stack Emission Surveys**

All yellowcake processing activities (elution, drying and packaging) were conducted at the Smith Ranch CPP. The dryers at the CPP are zero emission vacuum dryers and do not require stack testing.

When the Central Processing Facility (CPF) at the Highland Uranium Project was operational, Cameco Resources (CR) monitored the yellowcake dryer and packaging scrubber exhaust stacks to determine the emission rate of particulates, uranium, radium and thorium. The Highland CPF has been in non-operating stand-by status since the second half of 2002. The building is currently undergoing refurbishment and the dryer has been removed and will be replaced with two zero-emission vacuum dryers, which will not require stack testing.

### 3.2 Air Particulate, Radon, and Gamma Radiation Monitoring

Cameco maintains an air monitoring program at six locations on and around the licensed area. The air monitoring stations are used to monitor air particulates, passive radon gas, and passive gamma radiation. Two of these stations (AS-4 and AS-5) were previously used to monitor downwind conditions of the Highland CPF and were operated only when yellowcake processing operations were active at the Highland CPF. The stations were reactivated in January 2012 to monitor conditions during construction activities at the Highland CPF. One additional station (AS-6) will be used to monitor conditions downwind of the Reynolds Ranch Satellite Facility once the facility is constructed and becomes operational. Monitoring conditions at AS-6 will commence during construction of the facility and before it becomes operational. The monitoring results for each radionuclide are averaged and compared to background, for use in calculating annual dose to the public.

The air stations are located as follows:

- Air Station No. 1 (AS-1; Dave's Water Well): This station monitors background conditions, upwind of both the Smith Ranch and HUP wellfields and yellowcake processing facilities.
- Air Station No. 2 (AS-2; Smith Ranch Restricted Area): This station monitors conditions downwind of the Smith Ranch CPP Restricted Area Boundary.
- Air Station No. 3 (AS-3; Vollman Ranch): This station monitors the nearest downwind resident to the Smith Ranch CPP Restricted Area.
- Air Station No. 4 (AS-4; HUP Restricted Area): This station monitors conditions downwind of the HUP CPF Restricted Area Boundary.
- Air Station No. 5 (AS-5; Fowler Ranch): This station monitors the nearest downwind resident to the HUP CPF Restricted Area.
- Air Station No. 6 (AS-6; Reynolds Ranch Satellite Area): This station will

monitor conditions downwind of the Reynolds Ranch Satellite Facility once the facility is constructed and becomes operational.

Monitoring at station AS-6 was not conducted during the report period since the Reynolds Ranch Satellite Facility has not been constructed. Monitoring of conditions at AS-6 will commence during construction of the facility and before it becomes operational.

Table 2 shows the air particulate and radon data collected at stations AS-1 through AS-5 during the report period. Review of data collected during the report period shows that the concentrations of all parameters are significantly less than the 10 CFR 20, Appendix B, Effluent Concentration Limits.

Table 3 shows the gamma radiation data collected at stations AS-1 through AS-5 during the report period. Review of data collected during the report period shows that gamma radiation levels were within the range of previously reported values.

### 3.3 Water Sampling Data

#### 3.3.1 *Groundwater and Surface Water Monitoring Stations*

During the report period, monitoring was completed at 11 water wells. All 10 stock ponds were dry for the entire reporting period, and there was no water available for sampling. Water samples are collected from the water wells and stock ponds on a quarterly basis for analysis of uranium and radium-226. Table 4 provides the analytical data for samples collected during the report period. The monitoring data shows that samples were limited during the report period due to ponds that remained dry, and water wells that did not operate during the report period. One water well, GW-17, was removed by the landowner sometime in the 4<sup>th</sup> quarter and can no longer be sampled. A review of data collected from the available water wells shows that the concentrations of uranium and radium-226 are well below the 10 CFR 20, Appendix B, Effluent Concentration Limits of 3.0E-07  $\mu\text{Ci/mL}$  and 6.0E-08  $\mu\text{Ci/mL}$ , respectively.

### 3.4 Wastewater Land Application Facilities Monitoring

#### 3.4.1 *Soil and Vegetation Sampling*

In accordance with License Condition 12.2 and the WDEQ permits for the Satellite No. 1 and Satellite No. 2 Wastewater Land Application Facilities, soil and vegetation sampling of the irrigation areas is conducted in late summer of each year. The soil and vegetation data are collected to monitor and evaluate any adverse effects to the irrigation areas. The 2012 soil and vegetation sampling at the irrigation areas was performed in August.

Soil data from the Satellite No. 1 and Satellite No. 2 Wastewater Land Application

Facilities are provided in Tables 5 and 6, respectively. Comparison of data from the report period with previous data shows an increase in the concentrations of uranium in the zero to six-inch depth at Satellite No.1. Uranium concentrations at the zero to six-inch depth remain elevated above baseline conditions. Uranium concentrations at the six to twelve-inch depth and radium-226 concentrations at both depth intervals remain near baseline. The approved license applications for the facilities predicted that, at the end of operations, uranium concentrations in soil would be elevated above baseline, while radium concentrations would remain near baseline. Therefore, Cameco does not anticipate any problems with meeting the criteria in 10 CFR 40 during decommissioning of the facilities.

Vegetation data from the Satellite No. 1 and Satellite No. 2 Wastewater Land Application Facilities are provided in Tables 7A and 7B, respectively. Comparison of data from the report period with previous data does not indicate any significant changes. Uranium and radium-226 concentrations remain elevated above baseline conditions.

#### *3.4.2 Irrigation Fluid*

Cameco monitors the treated irrigation fluid that is disposed of at both irrigation facilities per the approved license application and the WDEQ Wastewater Land Application permits. Grab samples are collected at the discharge of PSR-2 during each month of operation and analyzed for various parameters. As noted in Table 8, Irrigator No. 1 did not operate during the report period.

Irrigation fluid data collected at Irrigator No. 2 is provided in Table 9. A review of the data indicates that the concentrations of uranium in the monthly grab samples were less than the 10 CFR 20, Appendix B, Effluent Concentration Limit of  $3.0 \text{ E-}7 \text{ } \mu\text{Ci/ml}$ , and the estimate of  $1.4\text{E-}6 \text{ } \mu\text{Ci/ml}$  provided in the original license application for the facility. The concentrations of radium-226 were below the 10 CFR 20, Appendix B, Effluent Concentration Limit of  $6.0\text{E-}08 \text{ } \mu\text{Ci/ml}$ .

#### *3.4.3 Radium Treatment Systems*

Cameco collects grab samples each month to ensure that the radium-226 treatment systems are adequately treating wastewater from Satellites No. 2 and No. 3 prior to discharge into PSR-2. No samples were collected from the Satellite No. 1 radium treatment system since Satellite No. 1 did not operate during the report period. The monthly radium-226 grab samples for Satellite No. 2 and No. 3 are collected at the discharge point of the selenium treatment plant. Review of the monitoring data provided in Table 10 shows that radium-226 concentrations were less than the 10 CFR 20, Appendix B, Effluent Concentration Limit of  $6.00\text{E-}8 \text{ } \mu\text{Ci/ml}$ .

#### *3.4.4 Soil Water*

In accordance with approved license application and the WDEQ Wastewater Land

Application Permits, Cameco collects soil water samples at the irrigation areas in June of each year and analyzes them for various parameters. A discussion of soil water monitoring for 2012 was presented in the previous Semi-Annual Effluent and Environmental Monitoring Report.

#### *3.4.5 Satellite No. 1 Purge Storage Reservoir Monitor Well*

A shallow monitor well, located southwest of the Satellite No. 1 Purge Storage Reservoir (PSR-1) is monitored at least weekly for potential seepage from the reservoir. There was no evidence of seepage during the report period. PSR-1 was dry for the entire period and it is not anticipated that water will be diverted to PSR-1 in the near future.

#### *3.4.6 Satellite No. 2 Purge Storage Reservoir Shallow Wells*

Water levels are measured on a quarterly basis and ground water samples are required on a semi-annual basis from the two shallow monitoring wells located adjacent to PSR-2. Cameco conducts quarterly sampling of both wells. Shallow Wells No. 1 and No. 2 are located adjacent to the south and east sides of the reservoir, respectively. In addition, four new monitoring wells were installed around the perimeter of PSR-2 for supplemental internal investigation regarding PSR-2. The wells are designated MW-1S (west), MW-2S (north), MW-3S (south) and MW-4S (east). Monitoring of the wells was conducted on September 19, and November 8, 2012. Table 11 contains the data for samples collected during the report period.

## **4.0 ANNUAL DOSE TO THE PUBLIC (2012)**

10 CFR 20.1301 requires that each NRC licensee conduct their operations in such a manner that the total effective dose equivalent (TEDE) to members of the public does not exceed 0.1 rem (100 mrem) in a year, and that the dose from external sources in any unrestricted area does not exceed 0.002 rem (2 mrem) in any one hour.

Additionally, 10 CFR 20.1302 requires that each NRC licensee annually show compliance with the above described dose limits by demonstrating one of the following:

- 1) Show by actual measurement or calculation that the TEDE to the public does not exceed 100 mrem; or
- 2) Show that the annual average concentrations of radioactive effluents released at the restricted area boundary do not exceed the values in Table 2 of Appendix B to 10 CFR 20 and that the external dose to an individual continuously present in an unrestricted area would not exceed 2 mrem in an hour and 50 mrem in a year.

Table 12 compares the 2012 annual average concentrations of radioactive effluents from the Smith Ranch-Highland Uranium Project to the 10 CFR 20, Table 2 limits of Appendix B.



The table also shows the calculated TEDE at an unrestricted area sampling location (Vollman-Nearest Downwind Residence) and two Restricted Area locations (Fenceline and HUP Restricted Area) assuming a person was continuously in the area for the entire year. As shown in Table 12, all measured concentrations of radioactive effluents are less than the Table 2 limits of Appendix B, confirming compliance with 10 CFR 20.1302(b)(2)(i) and (ii). Additionally, the calculated TEDE for the two locations confirms compliance with 10 CFR 20.1302(b)(1).

## **5.0 SAFETY AND ENVIRONMENTAL EVALUATIONS**

All safety and environmental evaluations made by the Safety and Environmental Review Panel (SERP) and resulting changed pages to the Operations Plan and Reclamation Plan of the approved license must be submitted on an annual basis. During the period January 1 through December 31, 2012 CR completed the following Safety and Environmental Evaluations

1. SERP No. 08/11-1 : Highland Renovation and Operation (Approved 7/19/2012)  
The SERP approved the renovation and operation of a Central Processing Plant at Cameco's Highland site. However, the SERP concluded that there are several items which need to be completed prior to operation of the CPP, such as a pre-operational inspection of the facility by the NRC as outlined in Source Material License SUA-1548 License Condition 10.1.2(c). The Operations plan of the approved license application will be revised to reflect the changed operational status of the Highland facility once all approvals are made. The changed pages will be submitted to the NRC for review and approval with Cameco's 2013 second semi-annual report.
2. SERP No. 10/11-5 : Mine Unit 4a Restoration Plan (Approved 1/24/2012)  
The SERP approved the proposed Groundwater Restoration Plan for Mine Unit 4/4a, as required by Source Material License SUA-1548 License Condition 10.1.9(b).
3. SERP No. 02/12-1 : Approval of Health Physics Tech (Approved 2/13/2012)  
Mindy Griffiths was approved for acceptance as a Health Physics Technician. Her qualifications met the requirements outlined in NRC's Regulation Guide 8.31 for a Health Physics Technician.
4. SERP No. 02/12-4 : Mine Unit K-North Wellfield Approval (Approved 2/24/2012)  
The SERP approved the commencement of uranium recovery activities in the K-North Wellfield, as required by Source Material License SUA-1548 License Condition 10.1.9.
5. SERP No. 03/12-1 : Change in Frequency of Collection of Air Sampling Filters (Approved 3/27/2012)  
The SERP approved changing the required frequency of collecting the filters from air sampling pumps. The air sampling pumps are part of Cameco's effluent monitoring program. The collected filters are sent to an outside laboratory for analysis of the concentration of particulates in the air. The laboratory requested Cameco to lengthen the

sampling time for each filter such that there would be a higher concentration of particulates on the filters. A minor revision to the wording in the Operations plan of the approved license application was made on page 5-9.

6. SERP No. 04/12-1 : North Butte Satellite Construction (Approved 5/15/2012)  
The SERP approved the construction and operation of a Satellite facility at the North Butte site as the facility falls within the envelope of NRC approved Environmental Assessments and Plan of Operations previously conducted.
7. SERP No. 05/12-2 : Construction of Surge Pond at North Butte (Approved 6/13/2012)  
The SERP approved the construction and operation of a surge pond at the North Butte site as the design of the surge pond is more conservative than that previously assessed and approved by the NRC.
8. SERP No. 08/12-2 : Change to the Maximum Flow Rate in Satellites (Approved 9/12/2012)  
The SERP approved increasing the listed maximum flow rate for Satellite 3 in the Operations plan of the approved license application. The maximum flow rate was listed at 4,500 gallons per minute (gpm) and has been changed to 6,000 gpm to allow the Satellite to process a greater volume of water. As other satellite buildings are not processing water at their respective listed maximum flow rates, Cameco will remain in compliance with Source Material License SUA-1548 License Condition 10.1.1. Weekly verification is done to ensure the average monthly flow rate through the Central Processing Plant and Satellite buildings will not exceed 20,000 gpm, exclusive of restoration flow. A minor revision to the wording in the Operations plan of the approved license application was made on pages 3-6 and 3-7 to reflect the new maximum flow rate for Satellite 3 and to make the description of Satellite SR-2 current.
9. SERP No. 10/12-1 : Approval of Health Physics Tech (Approved 10/29/2012)  
Nikolas Roche was approved for acceptance as a Health Physics Technician. His qualifications met the requirements outlined in NRC's Regulation Guide 8.31 for a Health Physics Technician.

Consistent with License Conditions 9.4(e), the above Safety and Environmental Evaluations and, if applicable, changed pages to the Operations plan of the approved license application, are included in Attachment B. The following page changes were made:

- From SERP 3/12-1: Chapter 5, Section 5.3.2, Page 5-9 (minor revision).
- From SERP 8/12-2: Chapter 3, Section 3.2.3, Pages 3-6 and 3-7 (minor revision).

## **6.0 GAS HILLS, RUTH AND NORTH BUTTE ISL PROJECTS**

The Gas Hills, Ruth and North Butte ISL Projects are licensed for commercial ISL uranium recovery activities as satellite facilities to the Smith Ranch-Highland Uranium Project. The projects remained non-operational during the report period. Effluent and environmental

monitoring conducted during the report period consisted of baseline gamma, radon and air monitoring at the Gas Hills and North Butte Sites.

Construction activities at North Butte included: road up-grades, completion of a deep disposal well, burying and testing of the main trunk pipeline, completion of surge ponds, completion of well field 1 pump test and baseline sampling for determination of upper control limits, ongoing installation of well field 1 injection and production wells, ongoing construction of the satellite facility, header houses and supporting inter-structure. The anticipated start-up of the North Butte satellite is anticipated for the second quarter 2013.

Other activities conducted during the report period consisted of quarterly inspections of the Ruth evaporation ponds in accordance with License Condition 10.2.2 of SUA-1548. Inspection of the perimeter fence, pond embankments, and pond liners yielded no deficiencies during the report period.

**ATTACHMENT A**  
**DATA TABLES 1-12**

**TABLE 1A**

**SATELLITE NO.1 INJECTION RATES, RECOVERY RATES, INJECTION PRESSURES  
2012**

MONTH	Injection Pressure (PSI)			Groundwater Sweep GPM	Radium Ponds GPM	RO Feed GPM	Injection GPM	RO Concentrate GPM	Purge Flow GPM
	RO #1	RO #2	RO #3						
Jul-12	0	0	0	0	0	0	0	0	0
Aug-12	0	0	0	0	0	0	0	0	0
Sep-12	0	0	0	0	0	0	0	0	0
Oct-12	0	0	0	0	0	0	0	0	0
Nov-12	0	0	0	0	0	0	0	0	0
Dec-12	0	0	0	0	0	0	0	0	0

**TABLE 1B**

**AVERAGE INJECTION RATES (GPM)  
2012**

MONTH	Satellite No. 2	Satellite No. 3	Central Processing Plant	Satellite SR-1	Satellite SR-2
Jul-12	1,341	4,966	1,453	3,805	2,918
Aug-12	1,486	5,192	1,598	3,950	2,940
Sep-12	1,474	5,095	1,577	3,781	2,796
Oct-12	1,479	4,951	1,579	3,520	2,742
Nov-12	1,455	4,900	1,526	3,515	2,567
Dec-12	1,448	4,828	1,496	3,558	2,746

**TABLE 1C**

**AVERAGE RECOVERY RATES (GPM)  
2012**

MONTH	Satellite No. 2	Satellite No. 3	Central Processing Plant	Satellite SR-1	Satellite SR-2
Jul-12	1,389	5,028	1,461	3,827	2,934
Aug-12	1,535	5,254	1,607	3,972	2,959
Sep-12	1,524	5,158	1,585	3,802	2,814
Oct-12	1,528	5,013	1,587	3,540	2,759
Nov-12	1,505	4,963	1,534	3,534	2,583
Dec-12	1,498	4,886	1,504	3,579	2,764

**TABLE 1D**

**INJECTION TRUNK LINE PRESSURES (PSI)  
2012**

MONTH	Satellite No. 2	Satellite No. 3	Central Processing Plant	Satellite SR-1	Satellite SR-2
Jul-12	76	92	140	74	180
Aug-12	102	102	144	71	180
Sep-12	102	106	128	53	180
Oct-12	96	107	129	56	172
Nov-12	101	117	143	66	166
Dec-12	103	114	132	61	180

**TABLE 2**  
**AIR SAMPLING DATA**  
**ENVIRONMENTAL MONITORING SITES**  
**3rd & 4th Quarters 2012**

SAMPLE LOCATION	SAMPLE PERIOD	RADIONUCLIDE ( $\mu\text{Ci/ml}$ )	CONCENTRATION ( $\mu\text{Ci/ml}$ )	ERROR EST. +/- ( $\mu\text{Ci/ml}$ )	L.L.D. ( $\mu\text{Ci/ml}$ )	10 CFR 20	% EFF. CONC. LIMIT %	
						App. B, Table 2 Values ( $\mu\text{Ci/ml}$ )		
<b>AS-1</b> <b>DAVE'S WATER WELL</b> Air Station Background Site	3rd Quarter	U-Nat	9.00E-17	N/A	1.00E-16	9.00E-14	0.1	
		Th-230	2.00E-16	6.00E-17	1.00E-16	3.00E-14	0.7	
		Ra-226	2.00E-16	1.00E-16	1.00E-16	9.00E-13	0.0	
		Pb-210	2.00E-14	1.00E-15	2.00E-15	6.00E-13	3.3	
	4th Quarter	U-Nat	5.00E-17	N/A	1.00E-16	9.00E-14	0.1	
		Th-230	6.00E-17	3E-17	1.00E-16	3.00E-14	0.2	
		Ra-226	3.00E-17	6E-17	1.00E-16	9.00E-13	0.0	
		Pb-210	1.00E-14	8E-16	2.00E-15	6.00E-13	1.7	
	All Period	Rn-222	1.30E-09	7.00E-11	3.00E-10	1.00E-08	13.0	
	<b>AS-2</b> <b>FENCE LINE</b> Air Station Restricted Area Boundary	3rd Quarter	U-Nat	6.00E-16	N/A	1.00E-16	9.00E-14	0.7
			Th-230	8.00E-17	6.00E-17	1.00E-16	3.00E-14	0.3
			Ra-226	4.00E-16	1.00E-16	1.00E-16	9.00E-13	0.0
			Pb-210	2.00E-14	1.00E-15	2.00E-15	6.00E-13	3.3
4th Quarter		U-Nat	5.00E-16	N/A	1.00E-16	9.00E-14	0.6	
		Th-230	1.00E-16	4E-17	1.00E-16	3.00E-14	0.3	
		Ra-226	3.00E-16	1E-16	1.00E-16	9.00E-13	0.0	
		Pb-210	2.00E-14	8E-16	2.00E-15	6.00E-13	3.3	
All Period		Rn-222	1.60E-09	8.00E-11	3.00E-10	1.00E-08	16.0	
<b>AS-3</b> <b>VOLLMAN RANCH</b> Air Station Downwind Nearest Residence		3rd Quarter	U-Nat	1.00E-16	N/A	1.00E-16	9.00E-14	0.1
			Th-230	3.00E-17	3.00E-17	1.00E-16	3.00E-14	0.1
			Ra-226	1.00E-16	1.00E-16	1.00E-16	9.00E-13	0.0
			Pb-210	1.00E-15	1.00E-15	2.00E-15	6.00E-13	0.2
	4th Quarter	U-Nat	8.00E-17	N/A	1.00E-16	9.00E-14	0.1	
		Th-230	1.00E-16	4E-17	1.00E-16	3.00E-14	0.3	
		Ra-226	6.00E-17	7E-17	1.00E-16	9.00E-13	0.0	
		Pb-210	1.00E-14	8E-16	2.00E-15	6.00E-13	1.7	
	All Period	Rn-222	1.60E-09	8.00E-11	3.00E-10	1.00E-08	16.0	
	<b>AS-4</b> <b>HUP RESTRICTED AREA</b>	3rd Quarter	U-Nat	5.00E-16	N/A	1.00E-16	9.00E-14	0.6
			Th-230	8.00E-17	5E-17	1.00E-16	3.00E-14	0.3
			Ra-226	3.00E-16	1E-16	1.00E-16	9.00E-13	0.0
			Pb-210	2.00E-14	1E-15	2.00E-15	6.00E-13	3.3
4th Quarter		U-Nat	9.00E-17	N/A	1.00E-16	9.00E-14	0.1	
		Th-230	3.00E-17	3E-17	1.00E-16	3.00E-14	0.1	
		Ra-226	9.00E-18	6.00E-17	1.00E-16	9.00E-13	0.0	
		Pb-210	2.00E-14	9.00E-16	2.00E-15	6.00E-13	3.3	
All Period		Rn-222	2.40E-09	1E-10	3.00E-10	1.00E-08	24.0	
<b>AS-5</b> <b>FOWLER RANCH</b>		3rd Quarter	U-Nat	1.00E-16	N/A	1.00E-16	9.00E-14	0.1
			Th-230	6.00E-17	4.00E-17	1.00E-16	3.00E-14	0.2
			Ra-226	2.00E-16	1.00E-16	1.00E-16	9.00E-13	0.0
			Pb-210	1.00E-14	1.00E-15	2.00E-15	6.00E-13	1.7
	4th Quarter	U-Nat	1.00E-16	N/A	1.00E-16	9.00E-14	0.1	
		Th-230	7.00E-17	3.00E-17	1.00E-16	3.00E-14	0.2	
		Ra-226	2.00E-17	6.00E-17	1.00E-16	9.00E-13	0.0	
		Pb-210	2.00E-14	8.00E-16	2.00E-15	6.00E-13	3.3	
	All Period	Rn-222	1.70E-09	8.00E-11	3.00E-10	1.00E-08	17.0	

**TABLE 3****DIRECT RADIATION (GAMMA) MEASUREMENT DATA  
ENVIRONMENTAL MONITORING SITES  
3rd & 4th QUARTERS 2012**

<b>SAMPLE LOCATION</b>	<b>SAMPLE PERIOD</b>	<b>EXPOSURE RATE (mR/qtr)</b>
<b>AS-1</b>		
<b>DAVE'S WATER WELL</b>	3rd Quarter	33
Air Station		
Background	4th Quarter	39
Site		
<b>AS-2</b>		
<b>FENCE LINE</b>	3rd Quarter	40
Air Station		
Restricted Area	4th Quarter	53
Boundary		
<b>AS-3</b>		
<b>VOLLMAN'S RANCH</b>	3rd Quarter	30
Air Station		
Downwind	4th Quarter	40
Nearest Residence		
<b>AS-4</b>	3rd Quarter	35
<b>HUP RESTRICTED AREA</b>	4th Quarter	45
<b>AS-5</b>	3rd Quarter	35
<b>FOWLER RANCH</b>	4th Quarter	54
<b>AS-6</b>	<b>NOT</b>	
<b>REYNOLDS SATELLITE</b>	<b>CONSTRUCTED</b>	
<b>CONTROL</b>	3rd Quarter	42
	4th Quarter	41

**TABLE 4**  
**WATER SAMPLING DATA**  
**ENVIRONMENTAL MONITORING SITES**  
**3rd & 4th QUARTERS 2012**

SAMPLE LOCATION	SAMPLE DATE	RADIONUCLIDE	CONCENTRATION (mg/L)	CONCENTRATION (pCi/L)	ERROR EST. +/- (pCi/L)	CONCENTRATION (µCi/ml)	10 CFR 20	% EFF. CONC. LIMIT
							App. B, Table 2 Values (µCi/ml)	
<b>SW-1</b> Stock Pond Section 3 T35N, R74W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-2</b> Stock Pond Section 2 T35N, R74W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-3</b> Stock Pond Section 35 T36N, R74W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-4</b> Stock Pond Section 36 T36N, R74W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-5</b> Stock Pond Section 21 T36N, R73W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-6</b> Stock Pond Section 22 T36N, R73W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	



**TABLE 4**  
**WATER SAMPLING DATA**  
**ENVIRONMENTAL MONITORING SITES**  
**3rd & 4th QUARTERS 2012**

SAMPLE LOCATION	SAMPLE DATE	RADIONUCLIDE	CONCENTRATION (mg/L)	CONCENTRATION (pCi/L)	ERROR EST. +/- (pCi/L)	CONCENTRATION (µCi/ml)	10 CFR 20	
							App. B, Table 2 Values (µCi/ml)	% EFF. CONC. LIMIT
<b>SW-7</b> Stock Pond Section 22 T36N, R73W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-8</b> Stock Pond Section 18 T36N, R72W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-9</b> Stock Pond Section 18 T36N, R72W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-10</b> Stock Pond Section 19 T36N, R72W	3rd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>GW-1</b> Windmill Section 1 T35N, R74W	3rd Quarter	U-Nat Ra-226	0.0286	0.81	0.22	1.9E-08 8.6E-10	3.0E-07 6.0E-08	6.5 1.4
	4th Quarter	U-Nat Ra-226	0.0261	1.50	0.25	1.8E-08 8.6E-10	3.0E-07 6.0E-08	5.9 1.4
<b>GW-2</b> Water Well Section 35 T36N, R74W	3rd Quarter	U-Nat Ra-226	0.0332	0.86	0.23	2.2E-08 8.6E-10	3.0E-07 6.0E-08	7.5 1.4
	4th Quarter	U-Nat Ra-226	0.0299	0.76	0.18	2.0E-08 8.6E-10	3.0E-07 6.0E-08	6.7 1.4
<b>GW-3</b>	3rd Quarter	U-Nat	0.16			1.1E-07	3.0E-07	36.1

**TABLE 4**  
**WATER SAMPLING DATA**  
**ENVIRONMENTAL MONITORING SITES**  
**3rd & 4th QUARTERS 2012**

SAMPLE LOCATION	SAMPLE DATE	RADIONUCLIDE	CONCENTRATION (mg/L)	CONCENTRATION (pCi/L)	ERROR EST. +/- (pCi/L)	CONCENTRATION (µCi/ml)	10 CFR 20	% EFF. CONC.
							App. B, Table 2 Values (µCi/ml)	LIMIT
Windmill Section 27 T36N, R74W	4th Quarter	Ra-226		1.5	0.29	1.5E-09	6.0E-08	2.5
		U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	0.0 0.0
GW-4 Windmill Section 23 T36N, R74W	3rd Quarter	U-Nat Ra-226	0.082			5.6E-08 2.4E-10	3.0E-07 6.0E-08	18.5 0.4
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
GW-5 Windmill Section 30 T36N, R73W	3rd Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
GW-6 Windmill Section 28 T36N, R73W	3rd Quarter	U-Nat Ra-226	0.0613			4.2E-08 3.7E-10	3.0E-07 6.0E-08	13.8 0.6
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
GW-8 Windmill Section 23 T36N, R73W	3rd Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	

**TABLE 4**  
**WATER SAMPLING DATA**  
**ENVIRONMENTAL MONITORING SITES**  
**3rd & 4th QUARTERS 2012**

SAMPLE LOCATION	SAMPLE DATE	RADIONUCLIDE	CONCENTRATION (mg/L)	CONCENTRATION (pCi/L)	ERROR EST. +/- (pCi/L)	CONCENTRATION (µCi/ml)	10 CFR 20	% EFF. CONC. LIMIT
							App. B, Table 2 Values (µCi/ml)	
GW-9 Windmill Section 14 T36N, R73W	3rd Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
GW-10 Water Well Section 14 T36N, R73W	3rd Quarter	U-Nat Ra-226	0.0022	0.45	0.16	1.5E-09 2.8E-10	3.0E-07 6.0E-08	0.5 0.5
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
GW-11 Water Well Section 11 T36N, R73W	3rd Quarter	U-Nat Ra-226	0.0005	0.28	0.12	3.4E-10 2.8E-10	3.0E-07 6.0E-08	0.1 0.5
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
GW-12 Water Well Section 7 T36N, R72W	3rd Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
GW-13 Water Well Section 9 T36N, R72W	3rd Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	0.0 0.0
	4th Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
GW-14 Water Well Section 10 T36N, R72W	3rd Quarter	U-Nat Ra-226	0.018	1.10	0.25	1.2E-08 1.1E-09	3.0E-07 6.0E-08	4.1 1.8
	4th Quarter	U-Nat Ra-226	0.0069	0.90	0.22	4.7E-09 1.1E-09	3.0E-07 6.0E-08	1.6 1.8

**TABLE 4**  
**WATER SAMPLING DATA**  
**ENVIRONMENTAL MONITORING SITES**  
**3rd & 4th QUARTERS 2012**

SAMPLE LOCATION	SAMPLE DATE	RADIONUCLIDE	CONCENTRATION (mg/L)	CONCENTRATION (pCi/L)	ERROR EST. +/- (pCi/L)	CONCENTRATION (µCi/ml)	10 CFR 20	
							App. B, Table 2 Values (µCi/ml)	% EFF. CONC. LIMIT
GW-15 Water Well Section 15 T36N, R72W	3rd Quarter	U-Nat Ra-226	0.0214			1.4E-08 9.4E-10	3.0E-07 6.0E-08	4.8 1.6
	4th Quarter	U-Nat Ra-226	0.021	0.94 0.80	0.22 0.25	1.4E-08 9.4E-10	3.0E-07 6.0E-08	4.7 1.6
GW-16 Water Well Section 11 T36N, R72W	3rd Quarter	U-Nat Ra-226	0.138			9.3E-08 8.6E-10	3.0E-07 6.0E-08	31.1 1.4
	4th Quarter	U-Nat Ra-226	0.165	1.5	0.30	1.1E-07 8.6E-10	3.0E-07 6.0E-08	37.2 1.4
GW-17 Water Well Section 8 T36N, R72W	3rd Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	REMOVED BY LANDOWNER				3.0E-07 6.0E-08	
GW-18 Water Well Section 2 T36N, R72W	3rd Quarter	U-Nat Ra-226	NOT RUNNING				3.0E-07 6.0E-08	
	4th Quarter	U-Nat Ra-226	0.0186	0.99	0.23	1.3E-08 8.6E-10	3.0E-07 6.0E-08	4.2 1.4
GW-20 Water Well Section 27 T36N, R73W	3rd Quarter	U-Nat Ra-226	ND			0.0E+00 3.0E-10	3.0E-07 6.0E-08	0.0 0.5
	4th Quarter	U-Nat Ra-226	ND	0.51	0.20	0.0E+00 3.0E-10	3.0E-07 6.0E-08	0.0 0.5

**TABLE 5**  
**SATELLITE No. 1**  
**LAND APPLICATION FACILITY (IRRIGATOR 1)**  
**ANNUAL SOIL DATA**  
**2012**

SAMPLE ID	SAMPLE DATE	Sat %	CONDUCTIVITY (mmhos/cm)	pH SAT. PASTE (std. Units)	CALCIUM SOLUBLE (meq/L)	MAGNESIUM SOLUBLE ( meq/L)	SODIUM SOLUBLE (meq/L)	SAR	BARIUM ABDTPA (mg/kg-dry)	POTASSIUM SOLUBLE (mg/kg-dry)	BORON CACL2 (mg/kg-dry)	ARSENIC ABDTPA (mg/kg-dry)	SELENIUM ABDTPA (mg/kg-dry)	Uranium mg/kg	RADIUM 226 ( $\mu$ Ci/g-dry)	TOTAL ERROR ESTIMATE $\pm$ (pCi/g-dry)
S.E. Location 1 0-6"	8/29/2012	62.8	0.50	6.5	2.40	1.2	1.78	1.3	63	12	0.50	0.045	0.14	25.30	1.0E-06	0.06
S.E. Location 1 6-12"	8/29/2012	62.7	0.85	6.7	3.23	1.8	4.10	2.6	79	7	0.45	0.031	0.05	1.94	9.0E-07	0.05
S.E. Location 2 0-6"	8/29/2012	69.3	0.65	6.2	3.19	1.6	2.03	1.3	63	12	0.65	0.035	0.40	33.30	1.0E-06	0.06
S.E. Location 2 6-12"	8/29/2012	64.4	0.65	7.1	2.64	1.3	3.14	2.2	66	5	<.43	0.024	0.29	3.86	1.0E-06	0.05
S.E. Location 3 0-6"	8/29/2012	65.3	0.48	6.8	2.48	1.1	1.49	1.1	47	12	0.54	0.039	0.23	25.20	9.0E-07	0.05
S.E. Location 3 6-12"	8/29/2012	67.5	0.57	7.1	2.15	1.1	2.90	2.3	69	6	0.66	0.031	0.14	3.89	9.0E-07	0.05
S.W. Location 4 0-6"	8/29/2012	69.2	0.55	6.5	2.79	1.3	1.80	1.3	79	10	1.00	0.011	0.39	40.70	1.0E-06	0.06
S.W. Location 4 6-12"	8/29/2012	64.1	0.49	7.2	1.89	0.9	2.57	2.2	73	4	0.70	0.009	0.26	2.33	1.0E-06	0.06
S.W. Location 5 0-6"	8/29/2012	55.9	0.69	6.6	3.36	1.6	2.72	1.7	39	14	1.00	0.012	0.30	31.20	1.0E-06	0.06
S.W. Location 5 6-12"	8/29/2012	76.8	2.06	6.6	10.30	5.7	8.44	3.0	23	14	0.99	0.007	0.32	1.84	1.0E-06	0.06
S.W. Location 6 0-6"	8/29/2012	64.8	0.57	6.6	3.18	1.4	1.68	1.1	44	13	1.00	0.013	0.16	23.60	9.0E-07	0.05
S.W. Location 6 6-12"	8/29/2012	71.4	0.97	6.6	4.07	2.2	4.13	2.3	59	8	0.92	0.007	0.11	4.27	9.0E-07	0.05
S.W. Location 7 0-6"	8/29/2012	65.2	0.42	6.4	1.86	0.9	1.85	1.6	71	10	0.86	0.012	0.11	19.70	1.0E-06	0.06
S.W. Location 7 6-12"	8/29/2012	64.6	0.52	7.1	1.64	0.9	2.91	2.6	69	5	0.73	0.006	0.12	2.80	9.0E-07	0.05
N.W. Location 8 0-6"	8/29/2012	60.9	0.52	6.4	1.95	1.0	2.24	1.8	64	9	1.00	0.008	0.11	16.60	9.0E-07	0.05
N.W. Location 8 6-12"	8/29/2012	69.1	2.32	6.6	15.60	7.7	6.82	2.0	32	12	0.85	0.009	0.09	3.30	9.0E-07	0.05
N.W. Location 9 0-6"	8/29/2012	69.8	0.50	6.3	2.23	1.1	1.81	1.4	72	12	1.10	0.012	0.13	13.50	1.0E-06	0.05
N.W. Location 9 6-12"	8/29/2012	68.3	0.48	6.8	1.54	0.9	2.49	2.3	71	7	0.91	0.008	0.15	1.81	1.1E-06	0.06
N.W. Location 10 0-6"	8/29/2012	54.2	0.44	6.1	2.48	1.2	0.55	0.4	33	19	0.57	0.013	0.10	25.30	7.0E-07	0.05
N.W. Location 10 6-12"	8/29/2012	58.4	0.49	6.5	1.49	0.8	2.74	2.6	59	4	0.89	0.008	0.05	2.33	1.0E-06	0.06
N.E. Location 11 0-6"	8/29/2012	48.4	0.31	6.0	1.62	0.8	0.68	0.6	32	10	0.51	0.009	0.10	26.40	8.0E-07	0.05
N.E. Location 11 6-12"	8/29/2012	59.0	0.40	6.2	1.11	0.6	2.40	2.6	73	4	0.97	0.008	0.07	1.58	1.0E-06	0.06
N.E. Location 12 0-6"	8/29/2012	68.5	0.63	5.9	2.95	1.5	2.41	1.6	69	15	0.99	0.012	0.17	44.70	1.1E-06	0.06
N.E. Location 12 6-12"	8/29/2012	56.7	0.48	6.4	1.32	0.7	2.83	2.8	69	6	0.89	0.006	0.15	7.28	1.0E-06	0.06
N.E. Location 13 0-6"	8/29/2012	61.1	0.40	6.2	2.00	1.0	1.79	1.5	75	9	0.99	0.008	0.11	35.60	1.1E-06	0.06
N.E. Location 13 6-12"	8/29/2012	58.0	0.37	6.4	1.12	0.6	2.23	2.4	70	4	0.86	0.007	0.06	7.25	1.0E-06	0.06
N.E. Location 14 0-6"	8/29/2012	52.3	0.39	6.0	2.07	1.0	1.39	1.1	54	9	0.75	0.009	0.13	27.60	7.0E-07	0.06
N.E. Location 14 6-12"	8/29/2012	61.7	0.73	6.9	2.99	1.7	3.63	2.4	85	6	0.67	0.004	0.04	1.42	1.0E-06	0.05
Average 0-6"		61.98	0.50	6.3	2.47	1.2	1.73	1.3	58	12	0.82	0.017	0.18	27.76	9.4E-07	0.06
Average 6-12"		64.48	0.81	6.7	3.65	1.9	3.67	2.5	64	7	0.81	0.012	0.14	3.28	9.7E-07	0.06
Background 0-6"	8/29/2012	54.4	0.31	6.3	1.10	0.8	1.64	1.7	57	3	0.48	0.007	0.03	1.75	1.0E-06	0.06
Background 6-12"	8/29/2012	58.3	0.48	7.3	1.41	1.1	3.06	2.7	59	2	0.56	0.005	<.02	1.14	9.0E-07	0.05

**TABLE 6**  
**SATELLITE No. 2**  
**LAND APPLICATION FACILITY (IRRIGATOR 2)**  
**ANNUAL SOIL DATA**  
**2012**

SAMPLE ID	SAMPLE DATE	Sat %	CONDUCTIVITY (mmhos/cm)	pH SAT. PASTE (std. Units)	CALCIUM SOLUBLE (meq/L)	MAGNESIUM SOLUBLE ( meq/L)	SODIUM SOLUBLE (meq/L)	SAR	BARIUM ABDTPA (mg/kg-dry)	POTASSIUM SOLUBLE (mg/kg-dry)	BORON CACL2 (mg/kg-dry)	ARSENIC ABDTPA (mg/kg-dry)	SELENIUM ABDTPA (mg/kg-dry)	Uranium mg/kg	RADIUM 226 (µCi/g-dry)	TOTAL ERROR ESTIMATE± (pCi/g-dry)	URANIUM - NATURAL TOTAL (µCi/g-dry)
Location 1 0-6"	8/29/2012	81.9	3.75	6.8	33.60	15.80	5.77	1.2	11	24	0.99	0.019	0.25	16.70	1.00E-06	0.06	
Location 1 6-12"	8/29/2012	78.9	4.06	7.4	32.40	13.60	9.25	1.9	12	7	0.59	0.012	0.32	3.66	9.00E-07	0.05	
Location 2 0-6"	8/29/2012	58.7	0.38	6.3	2.25	1.30	0.55	0.4	60	4	<.43	0.034	0.03	3.95	1.00E-06	0.06	
Location 2 6-12"	8/29/2012	66.7	0.46	7.4	2.34	1.50	1.85	1.3	93	2	<.43	0.024	<.02	1.31	1.20E-06	0.06	
Location 3 0-6"	8/29/2012	67.9	0.74	7.1	6.09	2.30	0.76	0.4	73	5	<.43	0.026	0.02	3.02	1.00E-06	0.06	
Location 3 6-12"	8/29/2012	65.1	0.41	7.9	2.45	1.00	1.57	1.2	65	2	<.44	0.009	<.02	1.44	1.00E-06	0.06	
Location 4 0-6"	8/29/2012	70.8	4.28	6.8	36.20	19.40	7.37	1.4	13	29	1.30	0.029	0.48	18.80	1.00E-06	0.06	
Location 4 6-12"	8/29/2012	65.9	3.51	7.2	30.80	15.20	5.87	1.2	11	8	<.44	0.024	0.14	6.58	1.10E-06	0.06	
Location 5 0-6"	8/29/2012	66.8	4.00	6.9	34.10	18.50	6.17	1.2	9	27	0.96	0.027	0.85	17.00	9.00E-07	0.05	
Location 5 6-12"	8/29/2012	62.6	3.54	7.6	29.20	15.50	6.29	1.3	11	10	<.44	0.015	0.32	3.68	8.00E-07	0.05	
Location 6 0-6"	8/29/2012	67.6	0.68	6.8	5.32	2.20	0.75	0.4	70	5	<.43	0.034	0.03	3.73	1.00E-06	0.06	
Location 6 6-12"	8/29/2012	63.7	0.44	7.8	2.63	1.10	1.50	1.1	70	2	<.43	0.016	<.02	1.22	9.00E-07	0.05	
Location 7 0-6"	8/29/2012	65.3	0.82	6.6	5.30	2.30	2.08	1.1	49	5	<.43	0.030	0.03	5.59	9.00E-07	0.05	
Location 7 6-12"	8/29/2012	67.8	0.86	7.6	3.94	1.70	4.11	2.4	49	2	0.70	0.018	0.02	1.05	9.00E-07	0.05	
Location 8 0-6"	8/29/2012	61.6	0.80	6.5	5.74	2.80	1.03	0.5	60	7	<.44	0.034	0.03	6.42	8.00E-07	0.05	
Location 8 6-12"	8/29/2012	66.0	0.62	7.2	3.34	1.70	1.61	1.0	68	2	<.43	0.019	<.02	1.15	1.00E-06	0.06	
Location 9 0-6"	8/29/2012	57.6	0.63	5.9	3.78	2.10	0.69	0.4	54	6	0.65	0.037	0.03	8.92	7.00E-07	0.05	
Location 9 6-12"	8/29/2012	63.2	0.68	6.9	3.30	1.90	2.25	1.4	74	2	<.44	0.026	<.02	1.11	9.00E-07	0.05	
Location 10 0-6"	8/29/2012	70.7	3.87	6.6	32.60	17.60	4.97	1.0	8	29	1.10	<.002	0.15	20.50	9.00E-07	0.05	
Location 10 6-12"	8/29/2012	67.1	3.28	7.2	28.50	15.00	4.95	1.1	11	14	<.43	0.018	0.32	6.40	9.00E-07	0.05	
Location 11 0-6"	8/29/2012	54.4	1.77	5.9	12.40	6.50	2.02	0.7	23	16	1.60	0.039	0.10	8.96	8.00E-07	0.04	
Location 11 6-12"	8/29/2012	59.6	1.37	5.9	7.24	4.90	2.89	1.2	26	4	1.20	0.041	0.05	1.26	7.00E-07	0.05	
Location 12 0-6"	8/29/2012	51.5	0.76	6.1	4.40	2.60	1.03	0.5	21	14	1.10	0.036	0.06	7.04	7.00E-07	0.05	
Location 12 6-12"	8/29/2012	58.7	0.84	6.3	3.54	3.00	1.87	1.0	30	5	1.10	0.035	0.03	0.99	1.10E-06	0.06	
Location 13 0-6"	8/29/2012	51.7	0.73	6.1	4.42	2.40	0.94	0.5	23	10	0.67	0.037	0.05	4.71	7.00E-07	0.05	
Location 13 6-12"	8/29/2012	47.7	0.74	6.0	3.84	2.30	1.39	0.8	20	4	0.55	0.031	0.03	0.76	7.00E-07	0.05	
Location 14 0-6"	8/29/2012	67.5	3.87	6.7	33.50	18.80	5.58	1.1	9	32	0.91	0.025	0.89	8.80	9.00E-07	0.05	
Location 14 6-12"	8/29/2012	66.7	3.26	6.9	29.50	13.00	4.87	1.1	8	15	0.59	0.021	0.15	6.57	9.00E-07	0.05	
Location 15 0-6"	8/29/2012	72.7	1.48	6.7	10.70	4.7	1.86	0.7	33	12	0.67	0.028	0.06	6.36	8.00E-07	0.05	
Location 15 6-12"	8/29/2012	67.0	1.36	7.5	8.80	3.4	3.33	1.3	33	4	0.81	0.014	0.04	0.92	9.00E-07	0.05	
Location 16 0-6"	8/29/2012	84.4	3.68	6.5	32.90	15.0	4.86	1.0	12	38	1.60	0.025	0.25	18.60	9.00E-07	0.05	
Location 16 6-12"	8/29/2012	77.4	4.09	7.3	33.00	14.6	8.28	1.7	9	12	0.71	0.014	0.33	5.01	9.00E-07	0.05	
Average 0-6"		65.7	2.02	6.5	16.46	8.3	2.90	0.8	33	16	1.05	0.031	0.21	9.94	8.63E-07	0.05	5.84E-13
Average 6-12"		65.3	1.85	7.1	14.05	6.8	3.87	1.3	37	6	0.78	0.021	0.16	2.69	9.25E-07	0.05	6.26E-13
Background 0-6"	8/29/2012	45.7	0.50	6.6	3.63	1.6	0.24	0.2	47	5	<.43	0.026	0.02	1.60	9.00E-07	0.05	
Background 6-12"	8/29/2012	47.8	0.35	6.9	2.41	1.3	0.31	0.2	62	2	<.44	0.022	<.02	1.42	1.00E-06	0.06	

TABLE 7A

SATELLITE NO. 1  
LAND APPLICATION FACILITY (IRRIGATOR #1)  
ANNUAL VEGETATION DATA  
2012

SAMPLE SITE SAMPLE DATE	8/29/2012	Quarter 1 (NW)	Quarter 2 (NE)	Quarter 3 (SE)	Quarter 4 (SW)	Background
TRACE METALS (mg/kg): SW6020 Dry Ash Extracted	Lower Limit of Detection					
Arsenic	0.05	ND	ND	ND	ND	ND
Barium	0.05	31.2	30.3	26.4	30.1	26.9
Boron	5	6.2	5.0	4.1	8.2	3.5
Selenium	0.05	9.1	10.1	5.3	32.8	1.3
RADIOMETRIC ( $\mu$ Ci/kg): E903.0						
U-Nat		2.7E-03	9.0E-03	7.5E-03	3.6E-03	3.1E-04
U-Nat RL		5.4E-07	1.0E-06	4.5E-07	4.6E-07	7.4E-07
Ra226		2.9E-05	9.4E-05	2.7E-05	2.5E-05	4.8E-05
Ra226 ERR. EST. +/-		1.4E-06	4.0E-06	1.2E-06	1.4E-06	2.5E-06
Ra226 MDC		2.4E-07	7.5E-07	2.1E-07	2.8E-07	5.8E-07

TABLE 7B

SATELLITE NO. 2  
LAND APPLICATION FACILITY (IRRIGATOR #2)  
ANNUAL VEGETATION DATA  
2012

SAMPLE SITE SAMPLE DATE	8/29/12	Quarter 1 (NW)	Quarter 2 (NE)	Quarter 3 (SE)	Quarter 4 (SW)	Background
TRACE METALS (mg/kg): SW6020 Dry Ash Extracted	Lower Limit of Detection					
Arsenic	0.05	ND	ND	ND	ND	ND
Barium	0.05	10.5	10.7	14.6	9.5	24.7
Boron	5	12.9	11.6	13.0	11.7	4.1
Selenium	0.05	2.9	2.1	2.8	3.2	1.2
RADIOMETRIC ( $\mu$ Ci/kg): E903.0						
U-Nat		5.50E-03	4.7E-03	2.9E-03	1.3E-03	1.7E-04
U-Nat RL		6.50E-07	6.7E-07	5.5E-07	5.9E-07	3.9E-07
Ra226		4.90E-05	2.4E-05	1.7E-05	1.7E-05	1.6E-05
Ra226 ERR. EST. +/-		3.20E-06	2.1E-06	1.5E-06	1.6E-06	9.9E-07
Ra226 MDC		8.00E-07	7.1E-07	4.9E-07	6.1E-07	2.4E-07

**TABLE 8**

**SATELLITE NO. 1  
LAND APPLICATION FACILITY (IRRIGATOR NO. 1)  
MONTHLY IRRIGATION FLUID DATA  
2012**

**IRRIGATION CYCLE**

**VOLUME (AF)**

**DATE SAMPLED**

Jul-12

Aug-12

Sep-12

Oct-12

Nov-12

Dec-12

**MAJOR IONS (mg/L)**

Reporting  
Limit

Calcium

1.0

Magnesium

1.0

**IRRIGATOR**

**IRRIGATOR**

**IRRIGATOR**

**IRRIGATOR**

**IRRIGATOR**

**IRRIGATOR**

Sodium

1.0

**DID NOT**

**DID NOT**

**DID NOT**

**DID NOT**

**DID NOT**

**DID NOT**

Potassium

1.0

**OPERATE**

**OPERATE**

**OPERATE**

**OPERATE**

**OPERATE**

**OPERATE**

Bicarbonate

1.0

Sulfate

1.0

Chloride

1.0

**NON-METALS**

TDS @ 180° C (mg/L)

11.0

pH (standard units)

0.01

SAR

0.01

**TRACE METALS (mg/L)**

Arsenic

0.001

Barium

0.10

Boron

0.10

Selenium

0.001

**RADIOMETRIC**

U-nat (µCi/mL)

2.03E-10

Ra-226 (µCi/mL)

2.00E-10

Ra Err. Est. +/-



**TABLE 9**

**SATELLITE NO. 2  
LAND APPLICATION FACILITY (IRRIGATOR NO. 2)  
MONTHLY IRRIGATION FLUID DATA  
2012**

**IRRIGATION CYCLE**

<b>VOLUME (AF)</b>		15.1					
<b>DATE SAMPLED</b>		Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
	Reporting						
<b>MAJOR IONS (mg/L)</b>	Limit						
Calcium	1.0	266					
Magnesium	1.0	130					
Sodium	1.0	96					
Potassium	1.0	30					
Bicarbonate	1.0	120					
Sulfate	1.0	995					
Chloride	1.0	271					
<b>NON-METALS</b>							<b>IRRIGATOR DID NOT OPERATE</b>
TDS @ 180° C (mg/L)	10.0	2100					
pH (standard units)	0.010	8.12					
SAR	0.01	1.2					
<b>TRACE METALS (mg/L)</b>							
Arsenic	0.001	ND					
Barium	0.1	ND					
Boron	0.10	0.20					
Selenium	0.001	0.006					
<b>RADIOMETRIC</b>							
U-nat (µCi/mL)	2.03E-10	1.33E-07					
Ra-226 (µCi/mL)	2.00E-10	5.0E-09					
Ra Err. Est. +/-		3.9E-10					

TABLE 10

SELENIUM PLANT  
RADIUM TREATMENT SYSTEM DISCHARGE  
MONTHLY RADIUM GRAB SAMPLES  
2012

SAMPLE DATE	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
<b>RADIOMETRIC</b>						
Ra-226 ( $\mu\text{Ci/mL}$ )	4.80E-09	2.10E-09	5.70E-09	7.30E-10	2.40E-09	2.50E-09
Ra Err. Est.+/-	4.30E-10	3.00E-10	4.30E-10	1.90E-10	3.90E-10	3.00E-10
Eff. Con. Limit	6.00E-08					

TABLE 11

SATELLITE NO. 2  
 PURGE STORAGE RESERVOIR (PSR-2)  
 SHALLOW MONITORING WELLS  
 WATER LEVEL AND WATER QUALITY DATA  
 3rd and 4th Quarters 2012

SAMPLE SITE		Shallow Well No. 1 (South)		Shallow Well No. 2 (East)		MW-1S (West)		MW-2S (North)		MW-3S (South)		MW-4S (East)	
		9/19/12	11/8/12	9/19/12	11/8/12	9/19/12	11/8/12	9/19/12	11/8/12	9/19/12	11/8/12	9/19/12	11/8/12
<b>SAMPLE DATE</b>													
<b>WATER LEVEL (DTW)</b>	Laboratory Reporting	13.2	13.2	10.8	11.3	21.3	24.2	23.0	23.2	24.0	23.8	33.6	33.5
<b>MAJOR IONS (mg/L)</b>	Limit												
Bicarbonate	1.0	NOT	NOT	312	NOT	381	348	380	373	479	483	468	504
Sulfate	1.0	ENOUGH	ENOUGH	397	ENOUGH	1980	1900	68	67	367	364	158	157
Chloride	1.0	WATER	WATER	2410	WATER	314	318	247	247	1090	1070	1600	1720
		TO	TO		TO								
		SAMPLE	SAMPLE		SAMPLE								
<b>NON-METALS</b>													
Cond (µmho/cm)	1.0			5130		4490	4400	1170	1150	3290	3210	3570	3740
pH (standard units)	0.01			7.15		7.19	7.28	7.41	7.39	7.37	7.36	7.06	7.07
<b>TRACE METALS (mg/L)</b>													
Barium	0.001			ND		ND	ND	ND	ND	ND	ND	ND	ND
Selenium	0.0025			0.015		2.18	2.29	0.003	0.002	0.218	0.2	0.978	1.18
Arsenic	0.0010			0.001		ND	ND	0.001	0.003	ND	0.004	ND	0.002
<b>RADIOMETRIC</b>													
U-nat (µCi/mL)	6.77E-10			3.58E-08		3.98E-08	3.34E-08	1.69E-09	1.35E-09	6.40E-07	6.3E-07	1.52E-07	1.52E-07
Ra-226 (µCi/mL)	2.00E-10			1.00E-09		1.00E-09	3.90E-09	3.00E-10	2.10E-09	7.00E-10	1.70E-10	4.00E-09	3.70E-09
Ra-226 Err. Est. +/- (µCi/mL)				3.00E-10		2.00E-10	3.40E-10	2.00E-10	2.60E-10	2.00E-10	1.20E-10	4.00E-10	3.30E-10

**TABLE 12  
2012 DOSE TO PUBLIC CALCULATIONS**

<u>Monitoring Location/Parameter</u>	<u>Average Concentration/Annual Gamma Dose</u>	<u>Average Concentration/Annual Gamma Dose Above Background</u>	<u>10 CFR 20 App. B, Table 2 Values</u>	<u>Dose to the Public mrem/yr<sup>1</sup></u>
<b><u>Dave's Water Well</u></b> (Background)				
Uranium (µCi/ml)	7.50E-17		9.00E-14	
Thorium-230 (µCi/ml)	7.50E-17		2.00E-14	
Radium-226 (µCi/ml)	1.58E-16		9.00E-13	
Lead-210 (µCi/ml)	1.50E-14		6.00E-13	
Radon-222 (µCi/ml)	2.20E-09		1.00E-08	
Gamma (mrem/yr)	36		--	
<b>TEDE (mrem/yr)</b>				<b>Background</b>
<b><u>Fenceline</u></b> (Restricted Area Boundary)				
Uranium (µCi/ml)	6.50E-16	5.75E-16	9.00E-14	0.32
Thorium-230 (µCi/ml)	8.50E-17	1.00E-17	2.00E-14	0.03
Radium-226 (µCi/ml)	5.00E-16	3.43E-16	9.00E-13	0.02
Lead-210 (µCi/ml)	1.75E-14	2.50E-15	6.00E-13	0.21
Radon-222 (µCi/ml)	1.5E-09	0	1.00E-08	0.00
Gamma (mrem/yr)	45	9	--	9
<b>TEDE (mrem/yr)</b>				<b>9.6</b>
<b><u>Vollman</u></b> (Nearest Downwind Residence)				
Uranium (µCi/ml)	3.45E-16	2.70E-16	9.00E-14	0.15
Thorium-230 (µCi/ml)	5.50E-17	0	2.00E-14	0.00
Radium-226 (µCi/ml)	1.15E-16	0	9.00E-13	0.00
Lead-210 (µCi/ml)	7.75E-15	0	6.00E-13	0.00
Radon-222 (µCi/ml)	2.35E-09	1.50E-10	1.00E-08	0.75
Gamma (mrem/yr)	35	0	--	0.00
<b>TEDE (mrem/yr)</b>				<b>0.9</b>
<b><u>HUP</u></b> (Restricted Area)				
Uranium (µCi/ml)	2.475E-16	1.73E-16	9.00E-14	0.10
Thorium-230 (µCi/ml)	5.25E-17	0	2.00E-14	0.00
Radium-226 (µCi/ml)	1.27E-16	0	9.00E-13	0.00
Lead-210 (µCi/ml)	1.3E-14	0	6.00E-13	0.00
Radon-222 (µCi/ml)	2.05E-09	0	1.00E-08	0.00
Gamma (mrem/yr)	41	5	--	5
<b>TEDE (mrem/yr)</b>				<b>5.1</b>
<b><u>Fowler</u></b> (Nearest Downwind Residence HUP)				
Uranium (µCi/ml)	1.5E-16	7.50E-17	9.00E-14	0.04
Thorium-230 (µCi/ml)	5.25E-17	0	2.00E-14	0.00
Radium-226 (µCi/ml)	1.23E-16	0	9.00E-13	0.00
Lead-210 (µCi/ml)	1.5E-14	0	6.00E-13	0.00
Radon-222 (µCi/ml)	1.6E-09	0	1.00E-08	0.00
Gamma (mrem/yr)	42	6	--	6
<b>TEDE (mrem/yr)</b>				<b>6.0</b>

Notes: TEDE Total Effective Dose Equivalent (mrem/yr)  
 < One or more of the Lower Limits of Detection (LLD) used to determine average concentration.  
 1 Dose from radionuclides (mrem/yr) =  $\frac{\text{Avg concentration above background in } \mu\text{Ci/ml}}{10 \text{ CFR 20 AppB, Table 2 value in } \mu\text{Ci/ml}} * 50 \text{ mrem}$

# **ATTACHMENT B**

## **SAFETY AND ENVIRONMENTAL EVALUATIONS PAGE CHANGES (2012)**

### 3.2.3 Satellite Buildings

The Satellite buildings house the ion exchange columns, water treatment equipment, resin transfer facilities, pumps for injection of lixiviant, a small laboratory and an employee break room. Bulk carbon dioxide and oxygen are stored in compressed form adjacent to each Satellite building or in the wellfield. Gaseous carbon dioxide is added to the lixiviant as the fluid leaves the Satellite building for the wellfield or at headerhouses.

The locations of Satellite buildings and associated structures are shown on Plate 1. There are five Satellite buildings in operation. There is one Satellite building planned for the Reynolds Ranch amendment area. Satellite No. 1 is located in the NW ¼ Section 21, T36N, R72W. The building occupies approximately 8,000 ft<sup>2</sup>. The layout of Satellite No. 1 is shown on Figure 3-7. Satellite No. 1 serves the A and B-Wellfields (Section 21, 20-Sand and Section 21, 30-Sand Wellfields, respectively). Since July 1991 Satellite No. 1 has only been used for ground water restoration activities at the A and B-Wellfields. During production operations this facility had a capacity of approximately 1800 gpm.

Satellite No. 2 is located in the NE ¼ Section 14, T36N, R73W (see Plate 1). The building occupies approximately 13,000 ft<sup>2</sup>. Satellite No. 2 serves the C-Wellfield (Section 14, 50-Sand Wellfield), D-Wellfield (Section 22/23, 40-Sand Wellfield), E-Wellfield, and the H-Wellfield, and the I-Wellfield. The Satellite No. 2 facility is designed to operate with a maximum through-flow of 3200 gpm and vessel pressures of 150 psi during production operations. As of March 2003 the A, B, and C-Wellfields are undergoing ground water restoration while the D, D-Extension, E, F, and H, and I-Wellfields are still in production. The layout of Satellite No. 2 is shown on Figure 3-8.

Satellite No. 3 is located in the SE ¼, Section 20, T36N, R73W (see Plate 1). Satellite No. 3 and associated facilities serve the D-Extension and F-Wellfields and additional wellfields proposed for western portions of the permit area. The building occupies approximately 13,000 ft<sup>2</sup>. The Satellite No. 3 facility is designed to operate with a maximum through-flow of 6,000 gpm and vessel pressures of 150 psi during production operations. The layout of Satellite No. 3 is shown on Figure 3-9.

Satellite No. SR-1 is located in the SE ¼ Section 27, T36N, R74W (see Plate 1). The building occupies approximately 13,000 ft<sup>2</sup>. Currently (March 2006), this facility serves Wellfield 3, portions of Wellfield No. 4 and planned future wellfield areas. The Satellite No. SR-1 facility is designed to operate with a maximum through-flow of 4500 gpm and vessel pressures of 150 psi during production operations. The layout of Satellite No. SR-1 is shown on Figure 3-10.

The proposed Reynolds Ranch Satellite will be located in the SE 1/4 of Section 35, T37N, R74W. The building will occupy approximately 19,000 ft<sup>2</sup>. This Satellite will serve all wellfields planned for the Reynolds Ranch amendment area. This Satellite facility is designed to operate with a maximum through-flow of 4500 gpm and vessel pressures of 150 psi during production operations. The layout of the Reynolds Ranch Satellite is shown on Figure 3-11.

Satellite No. SR-2 is located in SW 1/4 NE 1/4 Section 17, T35N, R74W (see Plate 1). The building occupies approximately 19,000 ft<sup>2</sup>. Satellite No. SR-2 serves Wellfield 9, and planned future wellfields. The Satellite No. SR-2 facility is designed to operate with a maximum through-flow of 4500 gpm and vessel pressures of 150 psi during production operations. The layout of Satellite No. SR-2 is shown on Figure 3-17.

The average monthly flow rate through the Central Processing Plant and Satellite buildings will not exceed 20,000 gpm, exclusive of restoration flow.

The Boner storage building, which covers approximately 5,000 ft<sup>2</sup>, is located just east of Satellite No. 2 (see Plate 1) and is used for wellfield equipment and materials storage and fabrication of various structures predominately used in the construction of wellfields.

### 3.2.4 Wellfields

#### 3.2.4.1 Ore Deposits

The ore deposits in the SR-HUP and Reynolds Ranch amendment area generally occur at depths of 450 feet to 1,000 feet below the surface in long narrow trends varying from a few hundred to several thousand feet long and 20 to 300 feet wide. The depth depends on the local topography, the dip of the formation and stratigraphic horizon. At Smith Ranch, the shallower ore deposits are contained within the Q-Sand and the mineable ore in this sand occurs at depths of 450 to 500 feet. At the Reynolds Ranch amendment area, the shallower ore deposits are contained within the U/S-Sand and the mineable ore in this sand occurs at approximate depths of 380 to 525 feet. Most of the remaining uranium mineralization at the Smith Ranch and Reynolds Ranch occurs in the O-sand formation at a depth of 700 to 900 feet. The Q-Sand pilot and O-Sand pilot were conducted at depths of approximately 500 feet and 750 feet respectively. These ore body sands are synonymous with the 30, 40, 50, and 60-Sands located at Highland.

A typical stratigraphic interval to be mined by the in situ mining method is shown by the geologic cross sections of the Production Wellfields as found in the Wellfield #1, #3, #4, and #4A Pre-Operational Data Submittals, dated May 27, 1999, June 1, 1998, April 26, 1999, and July 18, 2000, respectively. The designations of the intervals identified on the cross sections are Company designations. For an ISL

area will continue. The declining trend will be maintained until the concentrations of excursion parameters in the monitor well(s) have returned to concentrations less than respective UCLs.

If an excursion is controlled, but the fluid which moved out of the production zone during the excursion has not been recovered within 60 days following confirmation of the excursion, the operator will submit within 90 days following confirmation of the excursion a plan and compliance schedule meeting the requirements of LQD Rules and Regulations, Chapter 13, Section 13(b).

A monthly report on the status of an excursion shall be submitted to the administrator beginning the first month the excursion is confirmed and continuing until the excursion is over. The monthly report shall contain the requirements described in LQD Rules and Regulations, Chapter 12, Section 12(e).

### **5.3 EFFLUENT AND ENVIRONMENTAL MONITORING**

#### **5.3.1 General**

PRI maintains a detailed environmental and radiological program to monitor any releases from the SR-HUP and Reynolds Ranch operations to the environment. The program scope encompasses monitoring of air, ground water, surface water, and direct radiation. Soils and vegetation are also monitored at the irrigation facilities. The program is designed to meet the requirements of NRC's 10 CFR 40.65. Monitoring results are reported semi-annually to the NRC in the 40.65 Semi-Annual Reports. PRI has SOPs in place that detail the various monitoring programs. Many years of monitoring data collected at both the Smith Ranch and HUP operations have shown no significant adverse impacts to the environment or any increased health risks to the public.

#### **5.3.2 Continuous Air Particulate Monitoring**

To ensure compliance with 10 CFR 20.1301, 20.1302 and 20.1501, PRI maintains a continuous air monitoring program at five separate locations. These monitoring locations contain high flow air pumps which continuously collect particulate matter on paper filters. The filters are exchanged at least monthly but not more than weekly, composited for analysis on a quarterly basis, and are analyzed for uranium, radium-226, and thorium-230 and lead-210. Results of the analyses are reported to the NRC in the Semi-Annual Report. The locations of the Air Monitoring Stations are shown on Plate 1 and are as follows:

1. Air Station No. 1 (Dave's Water Well): This station monitors background conditions, upwind of both the Smith Ranch and HUP wellfields and yellowcake processing facilities. The site is located adjacent to Dave's Water Well in the SW $\frac{1}{4}$  NW $\frac{1}{4}$  Section 8, T35N, R74W.