



August 30, 2012

**ATTN: Document Control Desk**

Mr. Keith J. McConnell, Deputy Director  
Decommissioning and Uranium Recovery Licensing Directorate  
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CERTIFIED MAIL #7010 1870 0002 1233 7486 RETURN RECEIPT REQUESTED

RE: NRC License SUA-1548, Docket No. 40-8964, Semi-Annual Effluent and Environmental Monitoring Report, January 1 through June 30, 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 January 1 through June 30, 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) 316-7586.

Sincerely,

A handwritten signature in black ink, appearing to read "Scott A. Bakken".

Scott A. Bakken  
Manager, SHEQ Systems & Compliance  
Cameco Resources

Attachments: Semi-Annual Effluent and Environmental Monitoring Report

SB/sab

cc: Mr. Doug Mandeville, NRC w/att  
R. Caniano, DDNMS w/att File SR 4.6.4.1 w/att  
ec: CR-Cheyenne

**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**

**JANUARY 1 THROUGH  
JUNE 30, 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**

During the report period one bio-assay exceeded the 15 µg/l action level for Uranium. A random sample provided by a contract employee on June 4, 2012 at 7:22 a.m. tested positive for inhaled or ingested uranium at 103 µg/l. The sample was re-analyzed and results verified. Per standard procedure all samples are analyzed in triplicate. An albuminuria test was performed on the first sample and the results were reported as negative, indicating that no uranium passed through the worker's system.

Investigation revealed that the employee began working prior to providing his bio-assay sample. He did not have on clean clothes or gloves, which may have contaminated his hands. When he realized he had not performed his bio-assay, he came to the office to provide the sample, and likely transferred contamination to the sample in the process.

The worker was asked to provide another bio-assay sample the morning of the investigation, June 14, 2012. The sample was reported by the lab as non-detect on June 19, 2012.

A safety stand-down was conducted for all drilling contractors on June 18, 2012 and procedures reviewed with all workers. In addition, all drilling contractors participated in annual radiation refresher on June 23, 2012 and will participate in the task observation program to verify they understand how and when to survey.

## **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 the Satellite No. 2 Purge Storage Reservoir (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 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**

CR maintains an Air Monitoring Station program at six various 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 are active at the Highland CPF. The stations were re-activated in January of 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 and comparable to upwind background values at station AS-1.

### 3.3 Water Sampling Data

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

During the report period, monitoring was completed at thirteen water wells and six stock ponds throughout the permit area. 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. A review of data collected during the report period shows that four stock ponds (SW-2, SW-3, SW-5 and SW-7) were dry and there was no water available for sampling. Four water wells (GW-5, 8, 16, and 17) did not run during the report period. A review of data collected from the available water wells and stock ponds show that the concentrations of uranium and radium-226 are less than the effluent concentration limits, as shows in 10 CFR 20, Appendix B.

### 3.4 Wastewater Land Application Facilities Monitoring

#### 3.4.1 *Soil and Vegetation Sampling*

In accordance with the approved license application 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 will be conducted in August 2012 and results will be included with the July 1 through December 31, 2012 semi-annual report.

#### 3.4.2 *Irrigation Fluid*

CR 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 irrigator pivot during each month of operation and analyzed for various parameters. Irrigator No. 1 was not operational for the entire reporting period, as noted in Tables

5. Irrigation fluid data was collected at Irrigator No. 2 when it became operational beginning May, 2012. Results of sampling are provided in Table 6. A review of the data indicates that the concentration of uranium in the monthly grab sample was less than the 10 CFR 20, Appendix B, Effluent Concentration Limit of  $3.0 \text{ E-7 } \mu\text{Ci/ml}$  provided in the original license application for the facility. The concentration of radium-226 was below the 10 CFR 20, Appendix B, Effluent Concentration Limit of  $6.0\text{E-8 } \mu\text{Ci/ml}$ .

### 3.4.3 Radium Treatment Systems

CR 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 Purge Storage Reservoir No. 2 (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 7 shows that radium-226 concentrations were less than the 10 CFR 20, Appendix B, Effluent Concentration Limit of  $6.00\text{E-8 } \mu\text{Ci/ml}$ .

### 3.4.4 Soil Water

In accordance with the approved SUA1548 license and the WDEQ Wastewater Land Application Facility permits, CR collects soil water samples at the irrigation areas in June of each year and analyzes them for various parameters, including uranium and radium-226. CR employed a contractor to evaluate the lysimeters and it was determined that they will need to be replaced. A proposal was submitted to CR and is being evaluated. 2012 sampling will be postponed until the replacement is complete and new lysimeters are operational.

### 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. It is unlikely there will be any seepage from PSR-1 in the following reporting periods.

### 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. CR 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, 4 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 March 15, and June 6, 2012. Table 9 contains the data for samples taken during this period.

## 4.0 SAFETY AND ENVIRONMENTAL EVALUATIONS

Per License Conditions 9.4(e) and 12.2, 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. Along with one of the semi-annual effluent and environmental monitoring reports. All SERP evaluations completed during 2012 will be submitted in the next semi-annual report

## **5.0 NRC SEMI-ANNUAL INSPECTION**

A Semi-annual inspection was conducted February 27 through March 1, 2012. No violations resulted from this inspection.

## **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.

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 1-9**

**TABLE 1**

**RATES AND PRESSURES  
SATELLITE FACILITIES  
1st and 2nd Quarters 2012**

**TABLE 1A**

**SATELLITE NO. 1 INJECTION RATES, RECOVERY RATES, INJECTION PRESSURES  
(Satellite No. 1 has been non-operational since July 2004)**

MONTH	Injection Pressure (PSI)			Grounwater Sweep GPM	Radium Ponds GPM	RO Feed GPM	Injection GPM	RO Concentrate GPM	Purge Flow GPM
	RO #1	RO #2	RO #3						
Jan-12	0	0	0	0	0	0	0	0	0
Feb-12	0	0	0	0	0	0	0	0	0
Mar-12	0	0	0	0	0	0	0	0	0
Apr-12	0	0	0	0	0	0	0	0	0
May-12	0	0	0	0	0	0	0	0	0
Jun-12	0	0	0	0	0	0	0	0	0

**TABLE 1B**

**AVERAGE INJECTION RATES (GPM)**

MONTH	Satellite No. 2	Satellite No. 3	Central Processing Plant	Satellite SR-1	Satellite SR-2
Jan-12	1,707	3,782	2,432	3,201	3,039
Feb-12	1,613	3,833	2,338	3,148	2,954
Mar-12	1,424	4,482	2,326	3,260	2,914
Apr-12	1,387	4,877	2,018	3,344	2,738
May-12	1,284	5,023	1,555	3,727	2,741
Jun-12	1,213	4,986	1,460	3,780	2,807

**TABLE 1C**

**AVERAGE RECOVERY RATES (GPM)**

MONTH	Satellite No. 2	Satellite No. 3	Central Processing Plant	Satellite SR-1	Satellite SR-2
Jan-12	1,757	3,840	2,446	3,218	3,064
Feb-12	1,660	3,891	2,352	3,166	2,976
Mar-12	1,474	4,525	2,342	3,279	2,938
Apr-12	1,436	4,939	2,029	3,362	2,758
May-12	1,333	5,086	1,563	3,748	2,757
Jun-12	1,263	5,049	1,468	3,802	2,822

**TABLE 1D**

**INJECTION TRUNK LINE PRESSURES (PSI)**

MONTH	Satellite No. 2	Satellite No. 3	Central Processing Plant	Satellite SR-1	Satellite SR-2
Jan-11	90	76	153	66	180
Feb-11	87	79	155	61	180
Mar-11	68	79	143	54	180
Apr-11	62	89	150	62	180
May-11	62	92	140	69	180
Jun-11	62	95	149	77	180

**TABLE 2**  
**AIR SAMPLING DATA**  
**ENVIRONMENTAL MONITORING SITES**  
**1st and 2nd Quarters 2012**

<b>SAMPLE LOCATION</b>	<b>SAMPLE PERIOD</b>	<b>RADIONUCLIDE (<math>\mu\text{Ci}/\text{ml}</math>)</b>	<b>CONCENTRATION (<math>\mu\text{Ci}/\text{ml}</math>)</b>	<b>ERROR EST. +/- (<math>\mu\text{Ci}/\text{ml}</math>)</b>	<b>L.L.D. (<math>\mu\text{Ci}/\text{ml}</math>)</b>	<b>EFF. CONC. LIMIT (<math>\mu\text{Ci}/\text{ml}</math>)</b>	<b>% EFF. CONC. LIMIT %</b>	
<b>AS-1</b> <b>DAVE'S WATER WELL</b> Air Station Background Site	1st Quarter	U-Nat	9.00E-17	N/A	1.00E-16	9.00E-14	0.1	
		Th-230	2.00E-17	4E-17	1.00E-16	3.00E-14	0.1	
		Ra-226	3.00E-16	5E-17	1.00E-16	9.00E-13	0.0	
		Pb-210	1.00E-14	8.00E-16	2.00E-15	6.00E-13	1.7	
	2nd Quarter	U-Nat	7.00E-17	N/A	1.00E-16	9.00E-14	0.1	
		Th-230	2.00E-17	2E-17	1.00E-16	3.00E-14	0.1	
		Ra-226	1.00E-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	
	All Period	Rn-222	3.10E-09	1.20E-10	3.00E-10	1.00E-08	31.0	
	<b>AS-2</b> <b>FENCE LINE</b> Air Station Restricted Area Boundary (Background not deducted)	1st Quarter	U-Nat	1.00E-15	N/A	1.00E-16	9.00E-14	1.1
			Th-230	6.00E-17	3E-17	1.00E-16	3.00E-14	0.2
			Ra-226	3.00E-16	5E-17	1.00E-16	9.00E-13	0.0
Pb-210			1.00E-14	7.00E-16	2.00E-15	6.00E-13	1.7	
2nd Quarter		U-Nat	5.00E-16	N/A	1.00E-16	9.00E-14	0.6	
		Th-230	1.00E-16	3E-17	1.00E-16	3.00E-14	0.3	
		Ra-226	1.00E-15	3E-16	1.00E-16	9.00E-13	0.1	
		Pb-210	2.00E-14	2E-15	2.00E-15	6.00E-13	3.3	
All Period		Rn-222	1.30E-09	7.00E-11	3.00E-10	1.00E-08	13.0	
<b>AS-3</b> <b>VOLLMAN RANCH</b> Air Station Downwind Nearest Residence (Background not deducted)		1st Quarter	U-Nat	9.00E-16	N/A	1.00E-16	9.00E-14	1.0
			Th-230	7.00E-17	3E-17	1.00E-16	3.00E-14	0.2
			Ra-226	1.00E-16	4E-17	1.00E-16	9.00E-13	0.0
	Pb-210		1.00E-14	7.00E-16	2.00E-15	6.00E-13	1.7	
	2nd Quarter	U-Nat	3.00E-16	N/A	1.00E-16	9.00E-14	0.3	
		Th-230	2.00E-17	2E-17	1.00E-16	3.00E-14	0.1	
		Ra-226	2.00E-16	1E-16	1.00E-16	9.00E-13	0.0	
		Pb-210	1.00E-14	2E-15	2.00E-15	6.00E-13	1.7	
	All Period	Rn-222	1.10E-09	6.00E-11	3.00E-10	1.00E-08	11.0	
	<b>AS-4</b> <b>HUP RESTRICTED AREA</b> Air Station HUP Overlook (Background not deducted)	1st Quarter	U-Nat	2.00E-16	N/A	1.00E-16	9.00E-14	0.2
			Th-230	7.00E-17	5E-17	1.00E-16	3.00E-14	0.2
			Ra-226	1.00E-16	8E-17	1.00E-16	9.00E-13	0.0
Pb-210			1.00E-14	1.00E-15	2.00E-15	6.00E-13	1.7	
2nd Quarter		U-Nat	2.00E-16	N/A	1.00E-16	9.00E-14	0.2	
		Th-230	3.00E-17	3E-17	1.00E-16	3.00E-14	0.1	
		Ra-226	1.00E-16	1E-16	1.00E-16	9.00E-13	0.0	
		Pb-210	2.00E-15	2E-15	2.00E-15	6.00E-13	0.3	
All Period		Rn-222	1.70E-09	9.00E-11	3.00E-10	1.00E-08	17.0	
<b>AS-5</b> <b>FOWLER RANCH</b> Air Station Downwind (HUP) Nearest Residence (Background not deducted)		1st Quarter	U-Nat	2.00E-16	N/A	1.00E-16	9.00E-14	0.2
			Th-230	4.00E-17	3E-17	1.00E-16	3.00E-14	0.1
			Ra-226	2.00E-16	7E-17	1.00E-16	9.00E-13	0.0
	Pb-210		1.00E-14	2E-15	2.00E-15	6.00E-13	1.7	
	2nd Quarter	U-Nat				1.00E-16	9.00E-14	0.0
		Th-230				1.00E-16	3.00E-14	0.0
		Ra-226				1.00E-16	9.00E-13	0.0
		Pb-210				2.00E-15	6.00E-13	0.0
	All Period	Rn-222	1.50E-09	8.00E-11	3.00E-10	1.00E-08	15.0	
	<b>AS-6</b> <b>REYNOLDS SATELLITE</b>		<b>NOT CONSTRUCTED</b>					

**TABLE 3**

**DIRECT RADIATION (GAMMA) MEASUREMENT DATA  
ENVIRONMENTAL MONITORING SITES  
1st & 2nd 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>		
Air Station	1st Quarter	39
Background Site	2nd Quarter	33
<b>AS-2</b>		
<b>FENCE LINE</b>		
Air Station	1st Quarter	46
Restricted Area Boundary	2nd Quarter	42
<b>AS-3</b>		
<b>VOLLMAN'S RANCH</b>		
Air Station	1st Quarter	37
Downwind Nearest Residence	2nd Quarter	33
<b>AS-4</b>		
<b>HUP RESTRICTED AREA</b>		
Air Station	1st Quarter	43
HUP Overlook	2nd Quarter	39
<b>AS-5</b>		
<b>FOWLER RANCH</b>		
Air Station	1st Quarter	44
Downwind of HUP Nearest Residence	2nd Quarter	33
<b>AS-6</b>		
<b>REYNOLDS SATELLITE</b>	<b>NOT CONSTRUCTED</b>	
<b>CONTROL</b>		
	1st Quarter	39
	2nd Quarter	36

Background has not been deducted  
From any readings

TABLE 4

**WATER SAMPLING DATA  
ENVIRONMENTAL MONITORING SITES  
1st and 2nd Quarters 2012**

<b>SAMPLE LOCATION</b>	<b>SAMPLE DATE</b>	<b>RADIONUCLIDE</b>	<b>CONCENTRATION (mg/L)</b>	<b>CONCENTRATION (pCi/L)</b>	<b>ERROR EST. +/- (pCi/L)</b>	<b>CONCENTRATION (µCi/ml)</b>	<b>EFF. CONC. LIMIT (µCi/ml)</b>	<b>% EFF. CONC. LIMIT</b>
<b>SW-1</b> Stock Pond Section 3 T35N, R74W	1st Quarter	U-Nat Ra-226	0.0312			2.1E-08	3.0E-07	7.0
				0.29	1.80E-01	2.9E-10	6.0E-08	0.5
T35N, R74W	2nd Quarter	U-Nat Ra-226	0.0185			1.3E-08	3.0E-07	4.2
				0.09	1.70E-01	2.9E-10	6.0E-08	0.5
<b>SW-2</b> Stock Pond Section 2 T35N, R74W	1st Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-3</b> Stock Pond Section 35 T36N, R74W	1st Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-4</b> Stock Pond Section 36 T36N, R74W	1st Quarter	U-Nat Ra-226	0.00005			3.4E-11	3.0E-07	0.01
				0.04	9.00E-02	4.0E-11	6.0E-08	0.1
T36N, R74W	2nd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-5</b> Stock Pond Section 21 T36N, R73W	1st Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	

TABLE 4

**WATER SAMPLING DATA  
ENVIRONMENTAL MONITORING SITES  
1st and 2nd Quarters 2012**

<b>SAMPLE LOCATION</b>	<b>SAMPLE DATE</b>	<b>RADIONUCLIDE</b>	<b>CONCENTRATION (mg/L)</b>	<b>CONCENTRATION (pCi/L)</b>	<b>ERROR EST. +/- (pCi/L)</b>	<b>CONCENTRATION (µCi/ml)</b>	<b>EFF. CONC. LIMIT (µCi/ml)</b>	<b>% EFF. CONC. LIMIT</b>
<b>SW-6</b> Stock Pond Section 22	1st Quarter	U-Nat Ra-226	ND				3.0E-07 6.0E-08	
				ND				
T36N, R73W	2nd Quarter	U-Nat Ra-226	0.0012			8.1E-10 2.9E-10	3.0E-07 6.0E-08	0.3 0.5
				0.05	1.90E-01			
<b>SW-7</b> Stock Pond Section 22 T36N, R73W	1st Quarter	U-Nat Ra-226	ND				3.0E-07 6.0E-08	
				0.02	8.00E-02	2.0E-11		0.03
	2nd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-8</b> Stock Pond Section 18 T36N, R72W	1st Quarter	U-Nat Ra-226	0.0022			1.5E-09 1.2E-10	3.0E-07 6.0E-08	0.5 0.2
				0.12	1.20E-01			
	2nd Quarter	U-Nat Ra-226	0.0090			6.1E-09 2.9E-10	3.0E-07 6.0E-08	2.0 0.5
				0.41	2.40E-01			
<b>SW-9</b> Stock Pond Section 18 T36N, R72W	1st Quarter	U-Nat Ra-226	0.0007			4.7E-10 1.6E-10	3.0E-07 6.0E-08	0.2 0.3
				0.16	1.20E-01			
	2nd Quarter	U-Nat Ra-226	DRY				3.0E-07 6.0E-08	
<b>SW-10</b> Stock Pond Section 19 T36N, R72W	1st Quarter	U-Nat Ra-226	0.0005			3.4E-10 1.9E-10	3.0E-07 6.0E-08	0.1 0.3
				0.19	1.00E-01			
	2nd Quarter	U-Nat Ra-226	0.0013			8.8E-10 2.9E-10	3.0E-07 6.0E-08	0.3 0.5
				0.90	2.40E-01			

TABLE 4

WATER SAMPLING DATA  
 ENVIRONMENTAL MONITORING SITES  
 1st and 2nd Quarters 2012

SAMPLE LOCATION	SAMPLE DATE	RADIONUCLIDE	CONCENTRATION (mg/L)	CONCENTRATION (pCi/L)	ERROR EST. +/- (pCi/L)	CONCENTRATION (µCi/ml)	EFF. CONC. LIMIT (µCi/ml)	% EFF. CONC. LIMIT
GW-1 Windmill Section 1 T35N, R74W	1st Quarter	U-Nat Ra-226	0.0234			1.6E-08	3.0E-07	5.3
				2.90	0.46	2.9E-09	6.0E-08	4.8
GW-1 Windmill Section 1 T35N, R74W	2nd Quarter	U-Nat Ra-226	0.0234			1.6E-08	3.0E-07	5.3
				1.20	3.00E-01	2.9E-10	6.0E-08	0.5
GW-2 Solar Well Section 35 T36N, R74W	1st Quarter	U-Nat Ra-226	0.0340			2.3E-08	3.0E-07	7.7
				1.50	0.33	1.5E-09	6.0E-08	2.5
GW-2 Solar Well Section 35 T36N, R74W	2nd Quarter	U-Nat Ra-226	0.0438			3.0E-08	3.0E-07	9.9
				0.67	2.40E-01	2.9E-10	6.0E-08	0.5
GW-3 Windmill Section 27 T36N, R74W	1st Quarter	U-Nat Ra-226	0.1280			8.7E-08	3.0E-07	28.9
				3.20	4.60E-01	3.2E-09	6.0E-08	5.3
GW-3 Windmill Section 27 T36N, R74W	2nd Quarter	U-Nat Ra-226	0.1380			9.3E-08	3.0E-07	31.1
				1.70	3.20E-01	3.2E-09	6.0E-08	5.3
GW-4 Windmill Section 23 T36N, R74W	1st Quarter	U-Nat Ra-226	0.0658			4.5E-08	3.0E-07	14.8
				1.50	3.50E-01	1.5E-09	6.0E-08	2.5
GW-4 Windmill Section 23 T36N, R74W	2nd Quarter	U-Nat Ra-226	0.0727			4.9E-08	3.0E-07	16.4
				0.44	2.00E-01	3.2E-09	6.0E-08	5.3
GW-5 Windmill Section 30 T36N, R73W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07	
							6.0E-08	
GW-5 Windmill Section 30 T36N, R73W	2nd Quarter	U-Nat Ra-226	Not Running				3.0E-07	
							6.0E-08	

TABLE 4

**WATER SAMPLING DATA  
ENVIRONMENTAL MONITORING SITES  
1st and 2nd Quarters 2012**

<b>SAMPLE LOCATION</b>	<b>SAMPLE DATE</b>	<b>RADIONUCLIDE</b>	<b>CONCENTRATION (mg/L)</b>	<b>CONCENTRATION (pCi/L)</b>	<b>ERROR EST. +/- (pCi/L)</b>	<b>CONCENTRATION (µCi/ml)</b>	<b>EFF. CONC. LIMIT (µCi/ml)</b>	<b>% EFF. CONC. LIMIT</b>
<b>GW-6</b> Windmill Section 28 T36N, R73W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	0.0425	0.62	1.40E-01	2.9E-08 3.2E-09	3.0E-07 6.0E-08	9.6 5.3
<b>GW-8</b> Windmill Section 23 T36N, R73W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
<b>GW-9</b> Windmill Section 14 T36N, R73W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	0.0057	ND	1.20E-01	3.9E-09 2.9E-10	3.0E-07 6.0E-08	1.3 0.5
<b>GW-10</b> Water Well Section 14 T36N, R73W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	0.0021	0.44	2.00E-01	1.4E-09 2.9E-10	3.0E-07 6.0E-08	0.5 0.5
<b>GW-11</b> Water Well Section 11 T36N, R73W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	0.0007	0.26	2.00E-01	4.7E-10 2.9E-10	3.0E-07 6.0E-08	0.2 0.5



TABLE 4

**WATER SAMPLING DATA  
ENVIRONMENTAL MONITORING SITES  
1st and 2nd Quarters 2012**

SAMPLE LOCATION	SAMPLE DATE	RADIONUCLIDE	CONCENTRATION (mg/L)	CONCENTRATION (pCi/L)	ERROR EST. +/- (pCi/L)	CONCENTRATION (µCi/ml)	EFF. CONC. LIMIT (µCi/ml)	% EFF. CONC. LIMIT
GW-12 Water Well Section 7 T36N, R72W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	ND	0.11	1.50E-01	2.9E-10	3.0E-07 6.0E-08	0.5
GW-13 Water Well Section 9 T36N, R72W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	0.0016	1.30	3.10E-01	1.1E-09 2.9E-10	3.0E-07 6.0E-08	0.4 0.5
GW-14 Water Well Section 10 T36N, R72W	1st Quarter	U-Nat Ra-226	0.0061	2.30	4.20E-01	4.1E-09 2.3E-09	3.0E-07 6.0E-08	1.4 3.8
	2nd Quarter	U-Nat Ra-226	0.0036	1.00	2.70E-01	2.4E-09 2.3E-09	3.0E-07 6.0E-08	0.8 3.8
GW-15 Water Well Section 15 T36N, R72W	1st Quarter	U-Nat Ra-226	0.0185	2.30	3.80E-01	1.3E-08 2.3E-09	3.0E-07 6.0E-08	4.2 3.8
	2nd Quarter	U-Nat Ra-226	0.0208	1.60	3.00E-01	1.4E-08 2.3E-09	3.0E-07 6.0E-08	4.7 3.8
GW-16 Water Well Section 11 T36N, R72W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	

TABLE 4

**WATER SAMPLING DATA  
ENVIRONMENTAL MONITORING SITES  
1st and 2nd Quarters 2012**

<b>SAMPLE LOCATION</b>	<b>SAMPLE DATE</b>	<b>RADIONUCLIDE</b>	<b>CONCENTRATION (mg/L)</b>	<b>CONCENTRATION (pCi/L)</b>	<b>ERROR EST. +/- (pCi/L)</b>	<b>CONCENTRATION (µCi/ml)</b>	<b>EFF. CONC. LIMIT (µCi/ml)</b>	<b>% EFF. CONC. LIMIT</b>
<b>GW-17</b> Water Well Section 8 T36N, R72W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
<b>GW-18</b> Water Well Section 2 T36N, R72W	1st Quarter	U-Nat Ra-226	Not Running				3.0E-07 6.0E-08	
	2nd Quarter	U-Nat Ra-226	0.0174	1.50	3.10E-01	1.2E-08 2.3E-09	3.0E-07 6.0E-08	3.9 3.8
<b>GW-20</b> Water Well Section 27 T36N, R73W	1st Quarter	U-Nat Ra-226	ND	0.24	1.30E-01	2.4E-10	3.0E-07 6.0E-08	0.4
	2nd Quarter	U-Nat Ra-226	0.1600	0.15	2.20E-01	1.1E-07 2.9E-10	3.0E-07 6.0E-08	36.1 0.5

**TABLE 5**

**SATELLITE NO. 1  
LAND APPLICATION FACILITY (IRRIGATOR NO. 1)  
MONTHLY IRRIGATION FLUID DATA  
1st and 2nd Quarters 2012**

**IRRIGATION CYCLE**

**DATE SAMPLED**

**VOLUME (AF)**

**MAJOR IONS (mg/L)**

Reporting  
Limit

Calcium	1.0
Magnesium	1.0
Sodium	1.0
Potassium	1.0
Bicarbonate	1.0
Sulfate	1.0
Chloride	1.0

**IRRIGATOR DID NOT OPERATE ALL REPORTING PERIOD**

**NON-METALS**

TDS @ 180° C (mg/L)	10.0
pH (standard units)	0.010
SAR	0.01

**TRACE METALS (mg/L)**

Arsenic	0.001
Barium	0.10
Boron	0.10
Selenium	0.001

**RADIOMETRIC**

U-nat (uCi/mL)	2.03E-10
Ra-226 (uCi/mL)	2.00E-10
Ra Err. Est. +/-	

TABLE 6

SATELLITE NO. 2  
 LAND APPLICATION FACILITY (IRRIGATOR NO. 2)  
 MONTHLY IRRIGATION FLUID DATA  
 1st and 2nd Quarters 2012

IRRIGATION CYCLE

DATE SAMPLED	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12
<b>VOLUME (AF)</b>					26.10	48.2
<b>MAJOR IONS (mg/L)</b>	Reporting Limit					
Calcium	1.0				324	256
Magnesium	1.0				128	124
Sodium	1.0	Irrigator did not operate			93	92
Potassium	1.0				30	31.0
Bicarbonate	1.0				<b>218</b>	159
Sulfate	1.0				908	946
Chloride	1.0				253	256
<b>NON-METALS</b>						
TDS @ 180° C (mg/L)	10.0				2050	2010
pH (standard units)	0.010				8.09	8.07
SAR	0.01				1.1	1.1
<b>TRACE METALS (mg/L)</b>						
Arsenic	0.001				ND	ND
Barium	0.1				0.1	ND
Boron	0.10				0.20	0.2
Selenium	0.001				.012.	0.008
<b>RADIOMETRIC</b>						
U-nat (uCi/mL)	2.03E-10				1.77E-07	1.53E-07
Ra-226 (uCi/mL)	2.00E-10				2.9E-08	7.80E-10
Ra Err. Est. +/-					1.1E-09	1.90E-10

**TABLE 7**  
**SELENIUM PLANT**  
**RADIUM TREATMENT SYSTEM DISCHARGE**  
**MONTHLY RADIUM GRAB SAMPLES**  
**2012**

<b>SAMPLE DATE</b>	<b>Jan-12</b>	<b>Feb-12</b>	<b>Mar-12</b>	<b>Apr-12</b>	<b>May-12</b>	<b>Jun-12</b>
<b>RADIOMETRIC</b>						
Ra-226 ( $\mu\text{Ci/mL}$ )	4.30E-09	1.00E-09	1.80E-09	4.50E-09	8.40E-10	5.60E-09
Ra Err. Est. +/-	5.00E-10	2.30E-10	2.70E-10	4.20E-10	1.80E-10	4.70E-10
<b>Eff. Con. Limit</b>	<b>6.00E-08</b>					

**TABLE 8A**

**SATELLITE NO. 1  
LAND APPLICATION FACILITY (IRRIGATOR NO. 1)  
ANNUAL SOIL WATER DATA  
1st and 2nd Quarters 2012**

SAMPLE SITE	2'	4'	6'
	NW¼	NW¼	NW¼
	NE¼	NE¼	NE¼
	SW¼	SW¼	SW¼
	SE¼	SE¼	SE¼
	Lysimeter Composite	Lysimeter Composite	Lysimeter Composite

**SAMPLE DATE**

MAJOR IONS (mg/L)	LABORATORY REP. LIMIT
Bicarbonate	1.0
Sulfate	1.0
Chloride	1.0

Lysimeters under  
evaluation for repair  
or replacement

NON-METALS	LABORATORY REP. LIMIT
Cond (umho/cm)	1.0
pH (standard units)	0.010

TRACE METALS (mg/L)	LABORATORY REP. LIMIT
Boron	0.10
Selenium	0.001

RADIOMETRIC	LABORATORY REP. LIMIT
U-nat: (mg/L)	0.0003
Ra-226: (pCi/L)	0.2
Ra Err. Est. +/-	
U-nat: (uCi/mL)	2.03E-10
Ra-226: (uCi/mL)	2.00E-10
Ra Err. Est. +/-	

**TABLE 8B**

**SATELLITE NO. 2  
SATELLITE NO. 2 LAND APPLICATION FACILITY (IRRIGATOR NO. 2)  
ANNUAL SOIL WATER DATA  
1st and 2nd Quarters 2012**

SAMPLE SITE	2'	4'	6'
	NW¼	NW¼	NW¼
	NE¼	NE¼	NE¼
	SW¼	SW¼	SW¼
	SE¼	SE¼	SE¼
	Lysimeter Composite	Lysimeter Composite	Lysimeter Composite

**SAMPLE DATE**

MAJOR IONS (mg/L)	LABORATORY REP. LIMIT
Bicarbonate	1.0
Sulfate	1.0
Chloride	1.0

Lysimeters under  
evaluation for repair  
or replacement

NON-METALS	LABORATORY REP. LIMIT
Cond (umho/cm)	1.0
pH (standard units)	0.010

TRACE METALS (mg/L)	LABORATORY REP. LIMIT
Boron	0.10
Selenium	0.001

RADIOMETRIC	LABORATORY REP. LIMIT
U-nat: (mg/L)	0.0003
Ra-226: (pCi/L)	0.2
Ra Err. Est. +/-	
U-nat: (uCi/mL)	2.03E-10
Ra-226: (uCi/mL)	2.00E-10
Ra Err. Est. +/-	

TABLE 9

SATELLITE NO. 2  
PURGE STORAGE RESERVOIR (PSR-2)  
SHALLOW MONITORING WELLS  
WATER LEVEL AND WATER QUALITY DATA  
1st and 2nd 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)	
SAMPLE DATE		3/15/12	6/6/12	3/15/12	6/6/12	3/15/12	6/6/12	3/15/12	6/6/12	3/15/12	6/6/12	3/15/12	6/6/12
WATER LEVEL (DTW)	Laboratory Reporting	14.3	13.9	10.9	10.4	21.4	23.9	24.6	24.5	23.25	22.4	35.3	34.6
MAJOR IONS (mg/L)	Limit	<b>Not Enough</b>		<b>Water To Sample</b>									
Bicarbonate	1.0	309		268	337	360	372	357	366	444	456	434	427
Sulfate	1.0	2020		2320	2350	1990	1930	249	255	1030	1010	1400	1320
Chloride	1.0	427		359	401	316	298	68	67	368	342	143	141
<b>NON-METALS</b>													
Cond (µmho/cm)	1.0	4570		4880	5160	4310	4480	1130	1180	3140	3250	3130	3100
pH (standard units)	0.01	7.62		7.10	7.24	7.22	7.17	7.41	7.37	7.43	7.35	7.1	7.01
<b>TRACE METALS (mg/L)</b>													
Barium	0.001	ND		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	0.0025	1.750		0.027	0.026	2.3	2.2	0.004	0.005	0.152	0.19	0.61	0.401
<b>RADIOMETRIC</b>													
U-nat (uCi/mL)	6.77E-10	1.86E-07		3.34E-08	4.75E-08	3.8E-08	3.7E-08	1.8E-09	1.8E-09	6E-07	6.1E-07	1.9E-07	2E-07
Ra-226 (uCi/mL)	2.00E-10	7.30E-10		8.50E-10	3.10E-10	3.2E-10	9E-10	1.6E-10	4.7E-10	2.3E-10	4.1E-10	2.2E-09	3E-09
Ra-226 Err. Est. +/- (uCi/mL)		1.90E-10		1.60E-10	1.80E-10	1.1E-10	3E-10	1E-10	1.6E-10	1E-10	1.6E-10	2.7E-10	3.5E-10