

August 29, 2013

Attn: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Mr. Drew Persinko, Deputy Director  
Decommissioning & Uranium Recovery Licensing Directorate  
Division of Waste Management & Environmental Protection  
Office of Federal and State Materials &  
Environmental Management Programs  
11545 Rockville Pike  
Rockville, MD 20852-2738

**Subject: License SUA-1314  
Docket No. 040-08502  
Willow Creek Project  
ALARA Report  
Semi-Annual Effluent and  
Environmental Monitoring Report**

Dear Mr. Persinko:

In accordance with 10 CFR 40.65 and per license conditions 12.1 and 12.3 of Source Materials License SUA-1341, please find enclosed the Semi-Annual Effluent and Environmental Monitoring Report for the period of January 1 through June 30, 2013.

Please contact me should you have any questions regarding this report. (307) 696-8113.

Sincerely,



Tim McCullough  
Manager Site SHE

cc: L. Arbogast  
J. Winter  
S. Schierman

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**Uranium One USA, Inc.  
Irigaray and Christensen Ranch Projects**

**2013 SEMI-ANNUAL EFFLUENT AND MONITORING REPORT (NRC)**

**August 28, 2013**

**INTRODUCTION**

In accordance with Sections 12.1 and 12.3 of the Nuclear Regulatory Commission (NRC) Source License No. SUA-1341, Uranium One USA, Inc. hereby submits the 2013 Semi-Annual Effluent and Monitoring Report. This document summarizes the required operational and environmental monitoring conducted at the Irigaray (IR) and Christensen Ranch (CR) projects from January 1, 2013 through June 30, 2013.

**1.0 Results from Employee Urinalyses.**

- 1.1** During the report period no bio-assay samples exceeded the 15 µg/l uranium action level. Samples are collected on a monthly basis from Plant operators, wellfield operators, laboratory personal, wellfield maintenance personal and Electricians at the Christensen Ranch Site. At the Irigaray Process Plant samples are collected on a monthly basis from the plant operators except during yellowcake drying operations, samples are collected once per shift every four days. Sample analysis is conducted by an outside laboratory. Review of the bioassay data shows that administration of the bioassay program is consistent with Reg. Guide 8.22 as referenced in license condition 10.12.

**2.0 Operational Monitoring**

**2.1 Groundwater Volumes Injected and Recovered**

During this reporting period an overall wellfield bleed was maintained at 1.0%. A total of 1,466,004,871 gallons were injected and 1,481,295,354 gallons were recovered during this period. This data is summarized in Table 1 and is located in Appendix A of this report.

**2.2 Injection Manifold Pressures**

Injection manifold pressures at the CR project are limited to 140 psi during wellfield operations and 168 psi during maintenance tasks, as per License Condition 11.1. License Condition 11.1 requires that the injection manifold pressures be recorded daily. A pressure chart recorder is installed in every Wellfield Module Building and the pressure data is continuously logged on the recorder chart graphs. This data is summarized in Table 2 and is located in Appendix A of this report.

The 140psi limit was exceeded on three separate occasions. Module Building 7-1 had a spike in pressure to 145 psi on April 7, 2013 due to the booster pump for the building tripping the main breaker. Module 5-2 had a spike in pressure to 150 psi on April 25, 2013 due to some wells pressuring up and needing to be bled. A flow adjustment was additionally made in the associated booster building to address the rising pressure of the manifold. Module 5-2 had a spike in pressure to 142 psi on May 11, 2013 due to some wells pressuring up and plugged bag filters associated with the building.

### **3.0 Environmental Monitoring**

#### **3.1 Regional Ranch Wells**

During the reporting period Quarterly groundwater samples were collected from five ranch wells near the CR project and one ranch well near IR. The samples were analyzed for Uranium, Thorium-230, Radium-226, Lead-210 and Polonium-210. All analytical results for radionuclides were at or near minimum detection levels (MDLs) which are consistent with historical data. Review of the analytical data indicates no upward trends were observed. Sampling was consistent with the requirements of License Condition 11.3 and Section 5.8 of the License Renewal Application. This data is summarized in Table 3 and is located in Appendix A of this report.

#### **3.2 Surface Water Monitoring**

During the reporting period Surface Water samples were collected across the Willow Creek Project. Willow Creek is the only source of surface water present within and adjacent to the permit boundaries of both the IR and CR projects. Willow Creek is an ephemeral stream which was sampled on a quarterly basis. Three sample locations are designated at both project sites; upstream, downstream and within the permit boundary. The Powder River is also sampled annually at the Brubaker Ranch, which is approximately 4.5 miles downstream from its confluence with Willow Creek. All radionuclide data was at or near minimum detection levels, and no exceedances of NRC 10 CFR 20, Appendix B effluent limits occurred. Review of the analytical data does not indicate any upward trends for radionuclide or chemical parameter concentrations. This data is summarized in Table 4 and is located in Appendix A of this report.

#### **3.3 Spill and Leak Reports**

There were two reportable spills during this report period. Emails, written notifications and summary reports were submitted to the NRC and WDEQ regarding these events and will not be duplicated in this report.

#### **3.4 Soil Sampling**

Annual soil sampling at the Willow Creek environmental locations occurred during the reporting period. The samples were taken from 5 locations at the Irigaray Project and 4 locations from the Christensen Project. Samples IR-13 (Employee house trailer) and AS-5A (CR Plant Upwind S. E.) were inadvertently

missed during the sampling event and will be sampled during the 3<sup>rd</sup> Quarter of 2013. The results of the referenced missed samples will be included in the 2013 Annual Effluent and Monitoring Report in January 2014. This data is summarized in Table 5 and is located in Appendix A of this report.

### **3.5 Vegetation Sampling**

Annual soil sampling at the Willow Creek environmental locations occurred during the reporting period. The samples were taken from 5 locations at the Irigaray Project and 4 locations from the Christensen Project. This data is summarized in Table 6 and is located in Appendix A of this report.

## **4.0 Air Monitoring**

### **4.1 Environmental Radon Monitoring**

Radon gas is monitored continuously at six environmental air sampling locations at or near the Irigaray Project and at five locations at or near the Christensen Ranch Project. Passive outdoor radon detectors are exchanged and analyzed quarterly by Landauer, Inc., a NVLAP accredited company. No trends or abnormal results were noted and all concentrations were well below the 10 CFR Parts 20, Appendix B effluent limit for radon of 1E-10uCi/ml. This data is summarized in Table 7 and is located in Appendix A of this report.

### **4.2 Dryer Stack Emissions**

The semiannual Dryer Stack Emission testing was performed on June 27, 2013 by Western Environmental Services and Testing Services. Uranium One has not received the report for this testing as of this reporting date and will submit the results in the 2013 Annual Effluent and Monitoring Report in January 2014.

### **4.3 Environmental Airborne Radionuclides**

During dryer operations, continuous airborne radionuclide sampling is required at the five specified environmental air sampling locations at the IR project. The yellowcake dryer was in operation during the 1<sup>st</sup> and 2<sup>nd</sup> Quarter of 2013. This data is summarized in Table 8 and is located in Appendix A of this report.

### **4.4 Environmental Gamma Radiation Monitoring**

Gamma radiation is monitored continuously at six environmental air locations surrounding the Irigaray Project and at five locations surrounding the Christensen Ranch Project. TLDs are exchanged and analyzed quarterly by Landauer Dosimetry Services, a NVLP accredited company. No trends or abnormal results were noted. This data is summarized in Table 9 and is located in Appendix A of this report.

### **4.5 Public Dose**

Public dose determination is calculated for the "off-shift" operations personnel that utilize the man-camps at Irigaray and Christensen is used to demonstrate compliance with public dose limits as these individuals have been identified as

the member of the public likely to receive the highest dose from the Willow Creek Operations. This data is summarized annually and will be included in the 2013 Annual Effluent Report and submitted in January 2014.

## **5.0 OTHER INFORMATION REQUIRED BY SECTION 12.6 - NRC LICENSE**

### **5.1 ALARA Audit**

The 2012 As Low As Reasonably Achievable (ALARA) audit was conducted by Krista Wenzel (CHP) of Wenzel Consults LLC on February 18 and 19, 2013. The ALARA report was submitted to the NRC attached to a letter dated July 17, 2013.

### **5.2 Land Use Survey**

The primary use of surrounding lands at both IR and CR projects continues to be rural sheep and cattle ranching. Livestock actively graze these lands, but fencing prevents access to the evaporation ponds, plant sites and wellfields.

The secondary use of surrounding lands continues to be petroleum production from wells dispersed throughout the region. The closest oil well at the CR project is located approximately one third of a mile west of the CR plant. The closest oil well at the IR site is located approximately one half mile east of the PU 9 wellfield. To our knowledge, no new oil wells have been drilled in close proximity to either project during 2013.

Over the past several years (2001 - 2012) some additional interest has developed in the immediate areas of the IR and CR projects in the development of coal bed methane (CBM) gas. Several CBM wells were drilled within a half-mile of CR MU 5 & 6 during 2012. At present these wells are in production.

The nearest residence to the IR site is 4 miles to the north (the Brubaker ranch) and the nearest residence to CR is the John Christensen ranch located 3 miles southeast of the CR plant site. Both are ranch housing with a population of 6 or less. One new residence has been added at the Christensen ranch site. This is the man camp for the CR operators to stay in during off shift hours.

### **5.3 January 1 through June 30, 2013 Site Inspections**

**5.3.1** During the report period no O.S.H.A. inspections were held.

**5.3.2** During the reporting period the NRC held one inspection. On January 29 – 31, 2013 the NRC conducted an “unannounced routine” inspection at the Willow Creek Project. One Severity Level IV violation of NRC requirements was identified for failure to complete decommissioning of Irigaray Mine Units 8 and 9 within 24 months following the initiation of decommissioning and failed to request an alternate decommissioning schedule.

The corrective actions and alternate decommissioning schedule detailing planned activities commencing in the 3<sup>rd</sup> Quarter of 2013 was submitted to the NRC in a letter dated August 6, 2013 to address the referenced violation.

**5.3.3** During the reporting period there were no inspections held by the WDEQ-LQD.

**5.4 January 1 through June 30, 2013 SERP Summary**

Uranium One's Safety and Environmental Review Panel (SERP) [NRC License Condition 9.4 (C)] conducted one review during the first half of 2013. A summary of the SERPs is located in Table 10 of Appendix A.

**5.5 Daily Walk –Through Inspections**

Daily walk – through inspections are conducted at the Irigaray and Christensen Ranch locations. Routinely minor Corrective Actions are summarized on the Inspection Forms and promptly addressed. This data is summarized as Table 11 located in Appendix A.



# **APPENDIX A**

## **Tables 1-11**

**Table 1****Page 1 of 2**

**Uranium One USA, Inc. - Willow Creek Project**  
**2013 Semi-Annual Effluent and Monitoring Report**  
**Groundwater Volumes Injected and Recovered**

<b>Date</b>	<b>MU 5-2 Monthly Totals</b>			
	<b>Production (gallons)</b>	<b>Injection (gallons)</b>	<b>Bleed (gallons)</b>	<b>% Bleed</b>
January 2013	13,751,016	13,058,713	692,303	5.0 %
February 2013	10,407,741	10,068,973	338,768	3.3 %
March 2013	9,849,600	9,488,200	361,400	3.7 %
April 2013	9,567,360	9,253,440	313,920	3.3 %
May 2013	10,502,040	9,783,450	718,590	6.8 %
June 2013	11,400,911	10,753,904	647,007	5.7 %
<b>Totals</b>	<b>65,478,668</b>	<b>62,406,680</b>	<b>3,071,988</b>	<b>4.7 %</b>

<b>Date</b>	<b>MU 7 Monthly Totals</b>			
	<b>Production (gallons)</b>	<b>Injection (gallons)</b>	<b>Bleed (gallons)</b>	<b>% Bleed</b>
January 2013	98,767,636	96,605,815	2,161,821	2.2 %
February 2013	87,829,672	88,006,355	-176,683	-0.2 %
March 2013	100,062,600	99,697,300	365,300	0.4 %
April 2013	96,911,600	96,733,500	178,100	0.2 %
May 2013	95,946,800	95,010,000	936,800	1.0 %
June 2013	95,611,800	94,815,100	796,700	0.8 %
<b>Totals</b>	<b>575,130,108</b>	<b>570,868,070</b>	<b>4,262,038</b>	<b>0.7 %</b>

<b>Date</b>	<b>MU 8 Monthly Totals</b>			
	<b>Production (gallons)</b>	<b>Injection (gallons)</b>	<b>Bleed (gallons)</b>	<b>% Bleed</b>
January 2013	97,284,617	98,042,340	-757,723	-0.8 %
February 2013	89,826,744	88,971,257	855,487	1.0 %
March 2013	100,861,440	100,390,550	470,890	0.5 %
April 2013	94,918,970	94,458,120	460,850	0.5 %
May 2013	93,959,550	93,754,290	205,260	0.2 %
June 2013	94,879,830	94,066,450	813,380	0.9 %
<b>Totals</b>	<b>571,731,151</b>	<b>569,683,007</b>	<b>2,048,144</b>	<b>0.4 %</b>

**Table 1****Page 2 of 2**

**Uranium One USA, Inc. - Willow Creek Project  
2013 Semi-Annual Effluent and Monitoring Report  
Groundwater Volumes Injected and Recovered**

<b>Date</b>	<b>MU 10A Monthly Totals</b>			
	<b>Production (gallons)</b>	<b>Injection (gallons)</b>	<b>Bleed (gallons)</b>	<b>% Bleed</b>
January 2013	9,023,815	8,839,245	184,570	2.0 %
February 2013	35,031,152	33,858,589	1,172,563	3.3 %
March 2013	40,474,120	39,748,680	725,440	1.8 %
April 2013	37,239,090	36,632,880	606,210	1.6 %
May 2013	36,163,570	35,533,150	630,420	1.7 %
June 2013	37,905,980	37,584,890	321,090	0.8 %
<b>Totals</b>	<b>195,837,727</b>	<b>192,197,434</b>	<b>3,640,293</b>	<b>1.9 %</b>

<b>Date</b>	<b>MU 10B Monthly Totals</b>			
	<b>Production (gallons)</b>	<b>Injection (gallons)</b>	<b>Bleed (gallons)</b>	<b>% Bleed</b>
January 2013	(not in operation)			
February 2013	(not in operation)			
March 2013	9,606,413	8,246,705	1,359,708	14.2 %
April 2013	19,899,707	19,463,045	436,662	2.2 %
May 2013	21,776,620	21,438,130	338,490	1.6 %
June 2013	21,834,960	21,701,800	133,160	0.6 %
<b>Totals</b>	<b>73,117,700</b>	<b>70,849,680</b>	<b>2,268,020</b>	<b>3.1 %</b>

<b>Overall</b>	<b>1,481,295,354</b>	<b>1,466,004,871</b>	<b>15,290,483</b>	<b>1.0 %</b>
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Table 2

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Uranium One USA, Inc. - Willow Creek Project  
 2013 Semi-Annual Effluent and Monitoring Report  
 Injection Manifold Pressures

**Mine Unit 7**

Week Ending	Weekly Maximum injection Pressure (Maximum Permissible 140 psi)					
	Module 7-1	Module 7-2	Module 7-3	Module 7-4	Module 7-5	Module 7-6
1/5/2013	110	113	105	107	100	75
1/12/2013	112	125	103	109	105	84
1/19/2013	100	130	85	116	118	80
1/26/2013	100	125	87	125	112	75
2/2/2013	98	120	90	115	97	81
2/9/2013	115	118	105	115	100	98
2/16/2013	113	131	116	120	105	97
2/23/2013	102	135	115	116	107	95
3/2/2013	120	135	110	125	110	105
3/9/2013	110	135	97	115	112	110
3/16/2013	110	138	108	105	125	110
3/23/2013	117	140	102	110	132	137
3/30/2013	115	134	95	106	138	138
4/6/2013	145	138	90	138	137	120
4/13/2013	130	140	105	120	135	120
4/20/2013	133	138	105	115	130	120
4/27/2013	126	140	98	132	135	119
5/4/2013	118	133	92	133	130	120
5/11/2013	122	137	105	126	130	113
5/18/2013	121	135	105	122	124	107
5/25/2013	130	130	102	102	125	107
6/1/2013	135	120	117	120	126	106
6/8/2013	135	124	118	131	130	108
6/15/2013	135	130	125	113	134	117
6/22/2013	140	126	123	115	124	122
6/29/2013	138	122	118	116	124	123

**Table 2**  
**Page 2 of 3**  
**Uranium One USA, Inc. - Willow Creek Project**  
**2013 Semi-Annual Effluent and Monitoring Report**  
**Injection Manifold Pressures**

**Mine Unit 8**

<b>Week Ending</b>	<b>Weekly Maximum injection Pressure (Maximum Permissible 140 psi)</b>					
	<b>Module 8-1</b>	<b>Module 8-2</b>	<b>Module 8-3</b>	<b>Module 8-4/5</b>	<b>Module 8-6</b>	<b>Module 8-7</b>
<b>1/5/2013</b>	117	120	68	72	125	78
<b>1/12/2013</b>	100	115	75	73	123	75
<b>1/19/2013</b>	91	115	113	65	105	68
<b>1/26/2013</b>	88	115	65	63	100	94
<b>2/2/2013</b>	87	112	83	73	100	75
<b>2/9/2013</b>	82	115	72	75	78	75
<b>2/16/2013</b>	80	115	71	75	75	90
<b>2/23/2013</b>	80	113	66	67	78	80
<b>3/2/2013</b>	90	115	70	70	79	92
<b>3/9/2013</b>	90	115	70	72	75	92
<b>3/16/2013</b>	92	118	74	75	72	94
<b>3/23/2013</b>	97	118	80	82	75	104
<b>3/30/2013</b>	90	120	75	74	70	89
<b>4/6/2013</b>	85	117	70	68	65	90
<b>4/13/2013</b>	83	123	80	72	66	88
<b>4/20/2013</b>	83	115	66	64	67	90
<b>4/27/2013</b>	98	120	70	67	67	92
<b>5/4/2013</b>	89	123	68	68	66	97
<b>5/11/2013</b>	90	115	73	75	67	97
<b>5/18/2013</b>	88	117	73	71	68	91
<b>5/25/2013</b>	85	112	68	75	70	95
<b>6/1/2013</b>	89	116	70	80	80	98
<b>6/8/2013</b>	85	121	69	78	82	100
<b>6/15/2013</b>	85	118	68	78	80	99
<b>6/22/2013</b>	77	116	68	83	78	102
<b>6/29/2013</b>	81	119	71	80	78	101

Table 2

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Uranium One USA, Inc. - Willow Creek Project  
 2013 Semi-Annual Effluent and Monitoring Report  
 Injection Manifold Pressures

**Mine Unit 8 (Cont.), Mine Unit 5-2 & Mine Unit 10**

Week Ending	Weekly Maximum injection Pressure (Maximum Permissible 140 psi)					
	Module 8-8	Module 8-9	Module 5-2	Module 10-1	Module 10-2	Module 10-3
1/5/2013	110	110	130	45	not in operation	not in operation
1/12/2013	95	101	135	47	not in operation	not in operation
1/19/2013	100	107	125	63	48	not in operation
1/26/2013	90	93	130	70	68	not in operation
2/2/2013	80	92	128	118	139	not in operation
2/9/2013	90	93	140	74	137	not in operation
2/16/2013	85	95	135	67	132	not in operation
2/23/2013	85	94	120	75	108	not in operation
3/2/2013	90	91	125	75	117	87
3/9/2013	92	93	120	76	120	102
3/16/2013	93	96	130	85	120	110
3/23/2013	92	105	140	94	135	122
3/30/2013	84	95	123	98	125	117
4/6/2013	88	98	135	100	122	117
4/13/2013	87	90	140	93	126	107
4/20/2013	85	89	135	91	126	110
4/27/2013	87	96	150	97	126	117
5/4/2013	84	100	122	96	122	97
5/11/2013	86	107	142	95	130	92
5/18/2013	86	110	140	95	128	92
5/25/2013	88	95	130	95	128	80
6/1/2013	90	100	137	108	126	93
6/8/2013	90	104	140	110	126	100
6/15/2013	82	95	140	107	112	90
6/22/2013	88	101	140	100	106	92
6/29/2013	85	105	140	108	127	92

**Table 3****Page 1 of 2****Uranium One USA, Inc. - Willow Creek Project****2013 Semi-Annual Effluent and Monitoring Report****Regional Ranch Wells**

<b>Sample Location</b>	<b>Christensen Ranch House #3</b>		<b>Christensen Ellendale #4</b>	
<b>Sample Date</b>	1st quarter March 13, 2013	2nd quarter June 5, 2013	1st quarter March 13, 2013	2nd quarter June 5, 2013
Uranium	5.8E-9 (µCi/ml)	7.9E-9 (µCi/ml)	6.1E-10 (µCi/ml)	4.0E-10 (µCi/ml)
Thorium-230	N/D	N/D	N/D	N/D
Radium-226	8.0E-10 (µCi/ml)	1.3E-9 (µCi/ml)	2.0E-10 (µCi/ml)	3.0E-10 (µCi/ml)
Lead-210	N/D	1.3E-9 (µCi/ml)	1.5E-9 (µCi/ml)	N/D
Polonium-210	N/D	1.2E-9 (µCi/ml)	N/D	N/D

<b>Sample Location</b>	<b>Christensen Middle Artesian</b>		<b>Christensen Del Gulch Lower #13</b>	
<b>Sample Date</b>	1st quarter March 13, 2013	2nd quarter June 5, 2013	1st quarter March 14, 2013	2nd quarter June 5, 2013
Uranium	N/D	7.8E-9 (µCi/ml)	N/D	2.0E-10 (µCi/ml)
Thorium-230	N/D	N/D	N/D	N/D
Radium-226	6.0E-10 (µCi/ml)	5.0E-10 (µCi/ml)	3.0E-10 (µCi/ml)	4.0E-10 (µCi/ml)
Lead-210	1.0E-9 (µCi/ml)	1.2E-9 (µCi/ml)	N/D	N/D
Polonium-210	N/D	1.1E-9 (µCi/ml)	N/D	1.6E-9 (µCi/ml)

<b>Sample Location</b>	<b>Christensen Willow Corral #32</b>		<b>Irigaray Willow # 2</b>	
<b>Sample Date</b>	1st quarter March 13, 2013	2nd quarter June 5, 2013	1st quarter March 13, 2013	2nd quarter June 5, 2013
Uranium	N/D	N/D	N/D	N/D
Thorium-230	N/D	N/D	N/D	N/D
Radium-226	N/D	2.0E-10 (µCi/ml)	N/D	2.0E-10 (µCi/ml)
Lead-210	N/D	N/D	N/D	N/D
Polonium-210	N/D	N/D	N/D	N/D

**Table 3****Page 2 of 2****Uranium One USA Inc.- Willow Creek Project****2013 Semi-Annual Effluent and Monitoring Report****Regional Ranch Wells**

<b>Sample Location</b>	<b>Christensen First Artesian Well #1</b>	
<b>Sample Date</b>	1st quarter March 13, 2013	2nd quarter June 5, 2013
Uranium	N/D	N/D
Thorium-230	N/D	N/D
Radium-226	N/D	N/D
Lead-210	1.0E-9 (μCi/ml)	N/D
Polonium-210	N/D	N/D

**LLD's**

Uranium 2.0E-10 μCi/ml

Thorium-230 2.0E-10 μCi/ml

Radium-226 2.0E-10 μCi/ml

Lead-210 1.0E-9 μCi/ml

Polonium-210 1.0E-9 μCi/ml

N/D = NON DETECTABLE



**Table 4**  
**Page 1 of 1**  
**Uranium One Inc. - Willow Creek Project**  
**2013 Semi-Annual Effluent and Monitoring Report**  
**Surface Water Monitoring**

	Date	Uranium ( $\mu\text{Ci/ml}$ )	Thorium 230 ( $\mu\text{Ci/ml}$ )	Radium 226 ( $\mu\text{Ci/ml}$ )	Lead 210 ( $\mu\text{Ci/ml}$ )	Polonium 210 ( $\mu\text{Ci/ml}$ )	Total Alkalinity (mg/L)	Chloride (mg/L)	TDS (mg/L)	Specific Conductivity ( $\mu\text{mhos/cm}$ )	Sulfate (mg/L)	pH (s.u.)	Arsenic (mg/L)	Selenium (mg/L)	Estimated Flow Rate:
<b>Willow Creek IR-9 Downstream</b>															
1st Quarter 2013	3/14/2013	9.9E-09	N/D	N/D	1.2E-09	N/D	372	804	5280	4090	2050	8.1	N/D	N/D	Low
2nd Quarter 2013	5/23/2013	7.4E-09	N/D	N/D	N/D	N/D	382	621	4240	6010	1680	8.1	N/D	0.011	Low
Reporting Limit		2.0E-10	2.0E-10	2.0E-10	1.0E-09	1.0E-09	5	1	10	5	1	0.1	0.005	0.005	
<b>Willow Creek IR-14 Upstream</b>															
1st Quarter 2013	3/14/2013	3.6E-09	N/D	2.0E-10	1.9E-09	N/D	1210	7	1650	2010	195	8.7	N/D	N/D	Low
2nd Quarter 2013	5/23/2013	1.4E-09	N/D	6.0E-10	1.3E-09	N/D	2010	9	2250	3680	76	8.8	N/D	N/D	Low
Reporting Limit		2.0E-10	2.0E-10	2.0E-10	1.0E-09	1.0E-09	5	1	10	5	1	0.1	0.005	0.005	
<b>Willow Creek IR-17 Mine Site</b>															
1st Quarter 2013	3/14/2013	2.0E-08	N/D	N/D	N/D	N/D	582	17	2780	2540	1420	8.4	N/D	N/D	Low
2nd Quarter 2013	5/23/2013	1.5E-08	N/D	N/D	N/D	N/D	845	18	2980	4520	1520	8.3	N/D	N/D	Low
Reporting Limit		2.0E-10	2.0E-10	2.0E-10	1.0E-09	1.0E-09	5	1	10	5	1	0.1	0.005	0.005	
<b>Powder River (Sampled Annually)</b>															
	5/23/2013	1.7E-09	N/D	N/D	N/D	N/D	116	54	560	923	197	8.2	N/D	N/D	Med
Reporting Limit		2.0E-10	2.0E-10	2.0E-10	1.0E-09	1.0E-09	5	1	10	5	1	0.1	0.005	0.005	
<b>Willow Creek GS-01 Downstream</b>															
1st Quarter 2013	No sample was taken - all dry														
2nd Quarter 2013	No sample was taken - all dry														
Reporting Limit															
<b>Willow Creek CG-05 Upstream</b>															
1st Quarter 2013	3/14/2013	1.2E-08	N/D	N/D	N/D	N/D	198	5	1380	1340	691	8.3	N/D	N/D	Low
2nd Quarter 2013	5/23/2013	9.6E-09	N/D	N/D	N/D	N/D	368	12	2530	3390	1480	8.2	N/D	N/D	Low
Reporting Limit		2.0E-10	2.0E-10	2.0E-10	1.0E-09	1.0E-09	5	1	10	5	1	0.1	0.005	0.005	
<b>Willow Creek GS-03 Mine Site</b>															
1st Quarter 2013	No sample was taken - all dry														
2nd Quarter 2013	5/30/2013	1.6E-07	N/D	2.0E-10	6.7E-09	N/D	149	274	7280	8040	7940	8.0	N/D	0.055	Low
Reporting Limit		2.0E-09	2.0E-10	2.0E-10	1.0E-09	1.0E-09	5	1	10	5	1	0.1	0.005	0.005	

**Estimated Flow Rate:**

Low = &lt;5cfs

Medium = 5 - 50 cfs

High = &gt; 50 cfs

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Uranium One USA, Inc. - Willow Creek Project

2013 Semi-Annual Effluent and Monitoring Report

Soil Sampling

Location	Uranium * μCi / gram	Th-230 μCi / gram	Ra-226 μCi / gram	Pb-210 μCi / gram
IRIGARAY PROJECT				
IR-1 (Downwind of Restricted Area)	3.68E-08	1.20E-09	2.40E-09	2.40E-09
IR-3 (Upwind of Restricted Area)	8.50E-08	9.00E-10	1.20E-09	1.50E-09
IR-4 (North Road - Background)	1.11E-08	8.00E-10	1.30E-09	1.10E-09
IR-5 (Irigaray Ranch - nearest resident)	5.10E-09	4.00E-10	8.00E-10	1.50E-09
IR-6 (Ridge Road S.E.)	8.40E-09	8.00E-10	1.00E-09	1.30E-09
IR-13 (Employee house trailer)	(This sample was missed during the sampling event)			
CHRISTENSEN PROJECT				
AS-1 (Table Mountain - Background))	5.60E-09	7.00E-10	8.00E-10	2.10E-09
AS-5A (CR Plant Upwind S.E.)	(This sample was missed during the sampling event)			
AS-5B (CR Plant Downwind N.W.)	1.17E-08	9.00E-10	1.40E-09	1.50E-09
AS-6 (Christensen Ranch-Nearest Resident)	1.10E-08	7.00E-10	1.10E-09	1.50E-09
AS-7 (Christensen Employee house trailer)	5.70E-09	6.00E-10	1.30E-09	1.20E-09

Analyses performed by Inter-Mountain Labs (IML), Sheridan, Wyoming

\* The activity for uranium is a mathematical calculation based on a chemical analysis, therefore, no precision estimate (error) is given.

The Inter-Mountain Lab reporting limit (RL) is listed below are based on the weight of the samples.

RL's ( $\mu\text{Ci} / \text{Kg}$ ): Uranium = 2.00E-10  
 Th-230 = 2.00E-10  
 Ra-226 = 2.00E-10  
 Pb-210 = 1.00E-9

**Table 6****Page 1 of 1****Uranium One USA, Inc. - Willow Creek Project****2013 Semi-Annual Effluent and Monitoring Report****Vegetation Sampling**

Location	Uranium * $\mu\text{Ci} / \text{Kg}$	Th-230 $\mu\text{Ci} / \text{Kg}$	Ra-226 $\mu\text{Ci} / \text{Kg}$	Pb-210 $\mu\text{Ci} / \text{Kg}$
<b>IRIGARAY PROJECT</b>				
IR-1 (Downwind of Restricted Area)	2.8E-04	1.5E-05	6.2E-05	1.7E-04
IR-3 (Upwind of Restricted Area)	5.0E-04	8.5E-06	1.1E-05	8.7E-05
IR-4 (North Road)	5.3E-04	1.0E-05	3.2E-05	9.9E-05
IR-5 (Irigaray Ranch - nearest resident)	3.5E-05	2.9E-05	3.8E-05	2.1E-04
IR-6 (Ridge Road S.E.-IR Background)	3.2E-05	9.0E-06	1.5E-05	4.1E-04
<b>CHRISTENSEN PROJECT</b>				
AS-1 (Table Mountain - Background))	2.8E-05	2.7E-05	4.6E-05	4.3E-04
AS-5A (CR Plant Upwind S.E.)	1.1E-05	1.2E-06	2.9E-05	8.8E-05
AS-5B (CR Plant Downwind N.W.)	3.9E-05	1.1E-04	4.8E-05	2.5E-04
AS-6 (Christensen Ranch-Nearest Resident)	1.8E-05	1.3E-05	2.1E-05	1.9E-04

Analyses performed by Inter-Mountain Laboratories, (IML), Sheridan, Wyoming

\* The activity for uranium is a mathematical calculation based on a chemical analysis, therefore, no precision estimate (error) is given.  
 The Inter-Mountain Lab reporting limit (RL) is listed below are based on the weight of the samples.

RL's ( $\mu\text{Ci} / \text{Kg}$ ): Uranium = 2.0 E-7  
 Th-230 = 2.0 E-7  
 Ra-226 = 2.0 E-7  
 Pb-210 = 1.0 E-6

**Table 7**  
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**Uranium One USA, Inc. - Willow Creek Project**  
**2013 Semi-Annual Effluent and Monitoring Report**  
**Environmental Radon Monitoring**

<b>Location</b>	<b>1st Quarter 2013 μCi/ml</b>	<b>2nd Quarter 2013 μCi/ml</b>	<b>Location Average 2012 μCi/ml</b>
<b>IRIGARAY PROJECT</b>			
IR-1 (Downwind of Restricted Area)	4.00E-10	1.00E-09	7.00E-10
IR-3 (Upwind of Restricted Area)	5.00E-10	9.00E-10	7.00E-10
IR-4 (North Road)	4.00E-10	7.00E-10	5.50E-10
IR-5 (Irigaray Ranch)	3.00E-10	2.00E-10	2.50E-10
IR-6 (Ridge Road - S.E. - Background)	2.00E-10	6.00E-10	4.00E-10
IR-13 (IR Employee House Trailer)	5.00E-10	6.00E-10	5.50E-10
(IR-13 / nearest residence)			
<b>CHRISTENSEN PROJECT</b>			
AS-1 (Table Mountain - Background)	1.10E-09	3.00E-10	7.00E-10
AS-5A (CR Plant Upwind S.E.)	7.00E-10	5.00E-10	6.00E-10
AS-5B (CR Plant Downwind N.W)	8.00E-10	8.00E-10	8.00E-10
AS-6 (Christensen Ranch)	1.20E-09	7.00E-10	9.50E-10
AS-7 (CR Employee House Trailer)	1.00E-09	7.00E-10	8.50E-10
(AS-7 / nearest residence)			

**LLD = 0.3 pCi/l**

**Table 8**  
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**Uranium One USA, Inc. - Willow Creek Project**  
**2013 Semi-Annual Effluent and Monitoring Report**  
**Environmental Airborne Radionuclides**

<b>1<sup>st</sup> Quarter 2013 Data</b>				
	Uranium $\mu\text{Ci/ml}$	Th-230 $\mu\text{Ci/ml}$	Ra-226 $\mu\text{Ci/ml}$	Pb-210 $\mu\text{Ci/ml}$
IR-1 Downwind	4.7E-15	2.8E-16	2.6E-16	1.9E-14
%of Pt, App. B Effluent Limit	0.2%	0.0%	0.0%	3.2%
IR-3 Upwind	1.6E-14	3.2E-16	2.0E-16	1.7E-14
%of Pt, App. B Effluent Limit	0.8%	0.0%	0.0%	2.8%
IR-5 Brubaker Ranch	2.8E-15	3.1E-16	2.5E-16	2.1E-14
%of Pt, App. B Effluent Limit	0.1%	0.0%	0.0%	3.5%
IR-6 Background	2.9E-15	4.2E-16	4.1E-16	1.7E-14
%of Pt, App. B Effluent Limit	0.1%	0.0%	0.0%	2.8%
IR-13 Employee House Trailer	3.9E-15	2.6E-16	2.2E-16	1.7E-14
%of Pt, App. B Effluent Limit	0.2%	0.0%	0.0%	2.8%

<b>10 CFR Pt. 20, App. B, Effluent Limits (<math>\mu\text{Ci/ml}</math>)</b>
Uranium = 1.95E-12 (50%D & 50%W)
Th-230 = 3.0E-14 (Y)
Ra-226 = 9.0E-13 (W)
Pb-210 = 6.0E-13 (D)

<b>Lab LLD's</b>
Uranium = 1.0E-16
Th-230 = 1.0E-16
Ra-226 = 1.0E-16
Pb-210 = 2.0E-15

N/D =Non Detectable

<b>2<sup>nd</sup> Quarter 2013 Data</b>				
	Uranium $\mu\text{Ci/ml}$	Th-230 $\mu\text{Ci/ml}$	Ra-226 $\mu\text{Ci/ml}$	Pb-210 $\mu\text{Ci/ml}$
IR-1 Downwind	6.5E-15	N/D	1.1E-16	1.1E-14
%of Pt, App. B Effluent Limit	0.3%		0.0%	1.8%
IR-3 Upwind	2.2E-14	N/D	N/D	9.8E-15
%of Pt, App. B Effluent Limit	1.1%			1.6%
IR-5 Brubaker Ranch	1.4E-15	N/D	N/D	1.0E-14
%of Pt, App. B Effluent Limit	0.1%			1.7%
IR-6 Background	9.9E-16	1.1E-16	1.3E-16	8.8E-15
%of Pt, App. B Effluent Limit	0.1%	0.0%	0.0%	1.5%
IR-13 Employee House Trailer	4.5E-15	N/D	N/D	1.4E-14
%of Pt, App. B Effluent Limit	0.2%			2.3%

<b>10 CFR Pt. 20, App. B, Effluent Limits (<math>\mu\text{Ci/ml}</math>)</b>
Uranium = 1.95E-12 (50%D & 50%W)
Th-230 = 3.0E-14 (Y)
Ra-226 = 9.0E-13 (W)
Pb-210 = 6.0E-13 (D)

<b>Lab LLD's</b>
Uranium = 1.0E-16
Th-230 = 1.0E-16
Ra-226 = 1.0E-16
Pb-210 = 2.0E-15

N/D =Non Detectable

**Table 9****Page 1 of 1**

**Uranium One USA, Inc. - Willow Creek Project  
2013 Semi-Annual Effluent and Monitoring Report  
Environmental Gamma Radiation Monitoring**

<b>Location</b>	<b>1st Quarter 2013 mrem/quarter</b>	<b>2nd Quarter 2013 mrem/quarter</b>	<b>Location Average mrem/quarter</b>
<b>IRIGARAY PROJECT</b>			
IR-1 (Downwind of Restricted Area)	9.6	11.0	10.3
IR-3 (Upwind of Restricted Area)	22.2	28.9	25.6
IR-4 (North Road)	6.0	11.4	8.7
IR-5 (Irigaray Ranch)	3.6	4.5	4.1
IR-6 (Ridge Road S.E. - Background)	6.7	10.4	8.6
IR-13 (I.R. Employee House Trailer (nearest residence))	7.4	8.9	8.2
Quarterly Average	9.3	12.5	10.9
<b>CHRISTENSEN PROJECT</b>			
AS-1 (Table Mountain - Background)	6.3	9.1	7.7
AS-5A(CR Plant Upwind S.E. )	14.0	15.1	14.6
AS-5B (CR Plant Downwind N.W. )	8.1	9.3	8.7
AS-6 (Christensen Ranch )	10.5	17.4	14.0
AS-7 (C.R. Employee House Trailer (nearest residence))	2.8	-1.5	0.7
Quarterly Average	8.3	9.9	9.1

**Table 10**  
**Page 1 of 1**  
**Uranium One USA, Inc. – Willow Creek Project**  
**SERP Summary**

Number and Date	Description	Revisions to License Application Text
<b><u>SERP 13-01</u></b> <b>(1-15-13)</b>	The purpose of this evaluation by the Uranium One SERP Committee is to review the addition of bi-carbonate injection system at the Mine Unit Header Houses	
<b><u>SERP 13-02</u></b> <b>(2-12-13)</b>	<p>The purpose of this evaluation by the Uranium One SERP Committee is to review and approve Mine Unit 10B for operations.</p> <p>WDEQ-LQD approval for Mine Unit 10B is pending with the submittal of the Mine Unit 10 Wellfield Data Package to WDEQ-LQD on January 17, 2013.</p>	
<b><u>SERP 13-03</u></b> <b>(4-11-13)</b>	The purpose of this evaluation by the Uranium One SERP Committee is to review a controlled test on the Irigaray Plant Dryer by increasing the operating temperatures and increasing the product feed rate at the elevated temperatures to see if the increased temperatures on the dryer will improve the moisture content of the product and increase production. Testing of the dried yellowcake product characteristics will additionally be performed to determine product solubility characteristics for the varying temperature setting and to determine if the class of the yellow cake materials will change.	
<b><u>SERP 13-04</u></b> <b>(5-8-13)</b>	The purpose of this evaluation by the Uranium One SERP Committee is to review the qualifications of the proposed Willow Creek RST against the specifications in the Radioactive Materials License SUA-1341 and the Approved 2008 License Renewal Application.	

**Table 11**  
**Page 1 of 1**  
**Uranium One USA, Inc. - Willow Creek Project**  
**2013 Semi-Annual Effluent and Monitoring Report**  
**Daily Walk-Through Inspections**

Irigaray Site				Christensen Site			
Date: Week	YES	NO	COMMENTS	Date: Week	YES	NO	COMMENTS
1/5/2013	X			1/2/2013	X		
1/12/2013	X			1/9/2013	X		
1/19/2013	X			1/16/2013	X		
1/26/2013	X			1/23/2013	X		
2/2/2013	X			2/6/2013	X		
2/9/2013	X			2/13/2013	X		
2/16/2013	X			2/20/2013	X		
2/23/2013	X			2/27/2013	X		
3/2/2013	X			3/6/2013	X		
3/9/2013	X			3/13/2013	X		
3/16/2013	X			3/20/2013	X		
3/23/2013	X			3/27/2013	X		
3/30/2013	X			3/27/2013	X		
4/6/2013	X			4/3/2013	X		
4/13/2013	X			4/10/2013	X		
4/20/2013	X			4/17/2013	X		
4/27/2013	X			4/24/2013	X		
5/4/2013	X			5/1/2013	X		
5/11/2013	X			5/8/2013	X		
5/18/2013	X			5/15/2013	X		
5/25/2013	X			5/22/2013	X		
6/1/2013	X			6/5/2013	X		
6/8/2013	X			6/12/2013	X		
6/15/2013	X			6/19/2013	X		
6/22/2013	X			6/26/2013	X		
6/29/2013	X			6/26/2013	X		