Rio Tinto

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19 August 2013

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

Dear Mr. Persinko:

**SUBJECT: Sweetwater Uranium Project - Docket Number 40-8584
Source Materials License SUA-1350 - Semiannual 10 CFR 40.65 Report
Airborne Effluents**

Enclosed is Kennecott Uranium Company's Semiannual 10 CFR 40.65 Report for the first half of 2013 for airborne effluents. This report addresses the requirements of License Condition 11.5 of SML #SUA-1350, as well as the requirements of 10 CFR 40.65(a)(1).

Kennecott Uranium Company is only required to monitor for ambient gamma and airborne particulates at the downwind location (Air 4A) and radon at the upwind (Air 2) and downwind (Air 4A) locations as long as operations remain suspended as per License Condition 11.5. Kennecott is not required to perform stack, soil, sediment or vegetation sampling as long as operations remain suspended.

Kennecott Uranium Company has examined the data included in this report, calculated the dose to the nearest resident in millirems per year for the first half of 2013 from the licensed activities and concluded that the dose does not exceed the 100 mrem per year dose limit. A copy of the calculation sheet as well as an explanation of the calculation method is included. This is being done at the request of Elaine Brummett, previously of your staff, in an email dated September 7, 2001.

Should you have any questions, please contact me at (307) 328-1476.

Sincerely yours,

Oscar Paulson
Facility Supervisor

cc: James Webb, Project Manager
Director - USNRC DNMS, Region IV (w/o enc.)
Rich Atkinson

FSME21

KENNECOTT URANIUM COMPANY
SWEETWATER URANIUM PROJECT
Source Material License SUA-1350

2013
RadTrak Radon Monitor
(pCi/L)

DATE	LOCATION	RADIONUCLIDE	CONCENTRATION	ERROR ESTIMATE	LOWER LIMIT OF DETECTION (LLD)	
				pCi/L	pCi/L-Days	pCi/L
1/2/13 – 4/1/13	Downwind - Air 4A	Radon	1.4 pCi/L	+/- 0.08	6.0	0.06
1/2/13 – 4/1/13	Upwind - Air 2-A[1]	Radon	2.2 pCi/L	+/- 0.11	6.0	0.06
1/2/13 – 4/1/13	Upwind – Air 2-B[1]	Radon	2.1 pCi/L	+/- 0.11	6.0	0.06
	Average – Air 2		**2.1 pCi/L**			
4/2/13 – 7/1/13	Downwind - Air 4A	Radon	3.3 pCi/L	+/- 0.13	6.0	0.06
4/2/13 – 7/1/13	Upwind - Air 2-A[1]	Radon	3.8 pCi/L	+/- 0.14	6.0	0.06
4/2/13 – 7/1/13	Upwind – Air 2-B[1]	Radon	2.3 pCi/L	+/- 0.11	6.0	0.06
	Average – Air 2		**3.1 pCi/L**			
	Downwind - Air 4A	Radon				
	Upwind - Air 2-A[1]	Radon				
	Upwind – Air 2-B[1]	Radon				
	Average – Air 2					
	Downwind - Air 4A	Radon				
	Upwind - Air 2-A[1]	Radon				
	Upwind – Air 2-B[1]	Radon				
	Average – Air 2					

[1] A second RadTrak was deployed at the upwind Air 2 location during all four (4) quarters of 2012 for comparative and quality assurance/quality control purposes. The results from both RadTraks were averaged to generate the final values for the first quarter of 2013 for monitoring station Air 2 (upwind air).

Mark Salasky
Landauer, Inc.

Has satisfactorily fulfilled the requirements set forth by the
National Radon Proficiency Program and is therefore certified as a:

Analytical Laboratory Certification
NRPP ID # 101146 AL Expires 6/30/2015

In Witness Whereof,
I have subscribed my name as a
Representative of NRPP

Valid for specific activities or measurement devices, which can be verified with NRPP.
State and local agencies may have additional requirements.

Angel Anderson Price

Angel Anderson Price
NRPP Executive Director

Pat Quinn
Governor

State of Illinois

Jonathon E. Monken
Director

IEMA Division of Nuclear Safety

Pursuant to the Radon Industry Licensing Act, 420 ILCS 44 et seq. and 32 Illinois Administrative Code 422, Licensing of Radon Detection and Mitigation Services, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued.

This is to certify that Landauer, Inc.

License Number RNL99201

has met the requirements for Laboratory Analysis

Issued - Expires 02/07/2013 - 03/31/2014

Limited to Analyzing the radon or radon progeny concentrations with passive devices, or the act of calibrating radon or radon progeny measurement devices, or the act of exposing radon or radon progeny devices to known concentrations of radon or radon progeny.

SEAL OF THE STATE OF ILLINOIS AUG. 26TH 1818

13381000

Patrick I. Daniels, Radon Program

KENNECOTT URANIUM COMPANY
SWEETWATER URANIUM PROJECT
Source Material License SUA-1350

2013
DIRECT RADIATION MEASUREMENTS

Location	Date	Exposure Rate (mr/Qtr)	Lower Limit of Detection (LLD) Millirems
Environmental Dosimeter			
0000 – Deploy Control	1/2/13 – 4/1/13	37.8	1[1]
0004 - Air 4A	1/2/13 – 4/1/13	43.5	1[1]
Security Trailer	1/2/13 – 4/1/13	43.8	1[1]
Environmental Dosimeter			
0000 – Deploy Control	4/2/13 – 7/1/13	38.4	1[1]
0004 - Air 4A	4/2/13 – 7/1/13	45.7	1[1]
Security Trailer	4/2/13 – 7/1/13	46.5	1[1]
Environmental Dosimeter			
0000 – Deploy Control			1[1]
0004 - Air 4A			1[1]
Security Trailer			1[1]
Environmental Dosimeter			
0000 – Deploy Control			1[1]
0004 - Air 4A			1[1]
Security Trailer			1[1]

[1] Please see the following copy of a brochure from Landauer, Inc. containing information on Lower Limits of Detection (LLDs).

Note: The Deploy Control dose used on this form and in this report is the dose listed on the Environmental Dosimetry Report as Control Dose Used. Landauer, Inc. no longer provides labeled Deploy and Transit Control doses.

LANDAUER®

InLight® Systems Dosimeters

InLight dosimeters provide x, gamma, and beta radiation monitoring with optically stimulated luminescence (OSL) technology. OSL technology is the newest advancement in passive radiation protection dosimetry. Inlight dosimeters are engineered to be read out by an InLight reader.

InLight dosimeters are designed for the client with extensive data management capabilities who prefers to independently maintain data and issue dose reports. Dosimeters are provided for use with Landauer's dosimetry service that provides accredited processing and analysis, with dose results electronically transmitted to client; and as a direct sale in combination with InLight readers for a total turnkey solution enabling an in-house accredited dosimetry program.

For personnel, area/environmental, and emergency response monitoring, clinical dose measurements or any radiation assessment application.

Landauer Holder Design

Operational Advantages

Complete reanalysis capabilities

- Nondestructive read out allows for dose verification
- Dosimeter archiving made possible
- Track exposure over time—take incremental dose assessments

Dosimeter preparation eliminated

- No annealing
- No element correction factors required
- Engraved 2D bar code identifies dosimeter sensitivity

No fade

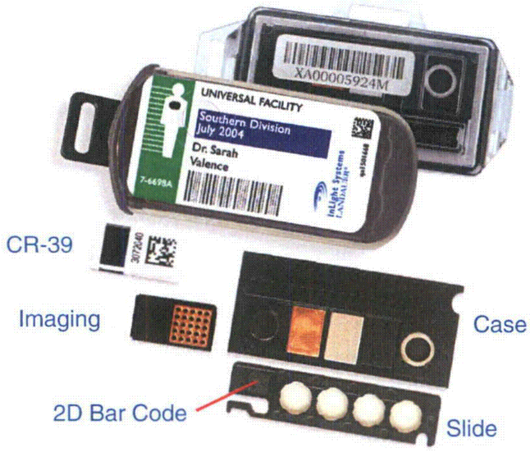
- Longer wear frequencies

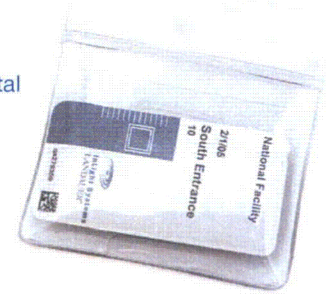
Advanced Design

InLight dosimeters are built on an assembly of a case component with metal and plastic filters along with a four-positioned aluminum oxide detector slide component. Both the case and slide are uniquely bar coded with serial numbers for chain of custody and sensitivity identification. InLight dosimeters offer reanalysis capabilities, precision with a wide dynamic range of measurement, and long-term stability. The InLight Basic dosimeter consists of the principle assembly of the case and slide for use with a clear plastic holder.

The enhanced Landauer holder is designed to accommodate the optional CR-39 for neutron detection, the optional imaging component, client defined labels, and the principle assembly of the case and slide. The case component has an open window, with aluminum, copper, and plastic filters. The imaging component renders unique filter patterns to provide qualitative information about conditions during exposure. Dosimeter labels can be vertical or horizontal and offer numerous graphic and text fields definable by the client to meet the administrative needs of a radiation monitoring program.

The environmental dosimeter is designed to meet ANSI N545 Standard and HPS Draft Standard N13.29. The case has copper and plastic filters, and is sealed along with the slide component in a waterproof plastic pouch. Labels can be vertical or horizontal and offer numerous graphic and text fields definable by the client.





Environmental

InLight Systems and OSL Technology

The InLight System measures radiation exposure with aluminum oxide detectors (Al_2O_3:C) read out by optically stimulated luminescence (OSL) technology. The read out process uses a light emitting diode (LED) array to stimulate the detectors, and the light emitted by the OSL material is detected and measured by a photomultiplier tube (PMT) using a high sensitivity photon counting system. The amount of light released during optical stimulation is directly proportional to the radiation dose and the intensity of stimulation light. A dose calculation algorithm is then applied to the measurement to determine exposure results.

Technical Specifications

- Linear from 10 μSv (1 mrem) to in excess of 10 Sv (1,000 rem)
- Energy range from 5 keV to 20 MeV
- Gamma, x-ray, beta minimal reporting: 50 μSv (5 mrem)
- Neutron detection with a CR-39, processed with Track Etch® technology minimal reporting:
  - Fast: 200 μSv (20 mrem)
  - Thermal/Intermediate: 100 μSv (10 mrem)

LANDAUER®

InLight® Systems Readers

Onsite Scalable Systems
- Single portable microStar reader
- A network of microStars with a common database
- Automatic 200 or 500 readers for high volume analysis

User-Friendly Operations
- Menu-driven software—read out, analysis, database maintenance, QC procedures, reporting
- Simple calibration process—no source required
- Cleaner, less complicated equipment—reduced maintenance

Efficient Processing
- Fast 12-13 second read
- No heat induced artifacts causing false readings
- No detector element corrections factors—sensitivities provided
- Dosimeter serial number bar coded—facilitates chain of custody

Non-Destructive Read Out
- Reanalysis for dose verification
- Intermittent analysis while maintaining total dose
- Dose archives

Multiple Dosimeter Configurations
- InLight case and slide whole body or environmental
- nanoDot single-point dose measurement (microStar)

Onsite Applications
- Access control points
- Laboratories that process their own dosimetry
- Laboratories requiring immediate reading of dosimetry
- Laboratories requiring confidence in the dose measurement(s)

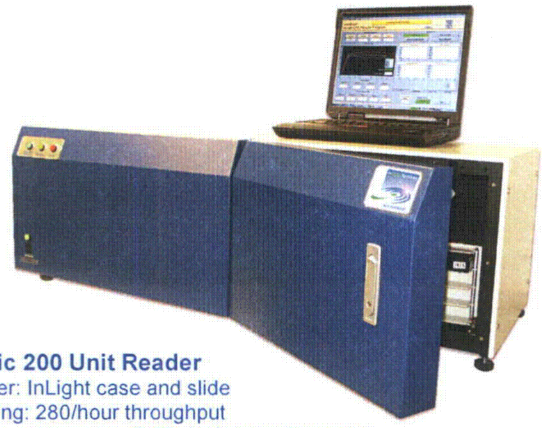
InLight Systems are turnkey solutions for onsite dosimetry using Landauer's optically stimulated luminescence (OSL) technology. Systems are scalable, and can be configured to complement your current dosimetry program, or can enable you to maintain your own in-house accredited dosimetry program (dose algorithms meet NVLAP and DOELAP accreditation requirements).

The microStar reader is a unique, portable dosimetry solution that can be easily moved throughout a facility. For volume processing, the automatic readers handle the heavy loads at 280 dosimeters per hour. Comprehensive software can exist on a stand-alone PC and/or a network.

InLight readers are exclusively for use with InLight dosimeters for whole body, environmental, and emergency response monitoring, or any single-point radiation dose measurement (microStar). InLight dosimeters measure radiation exposure with aluminum oxide detectors (Al_2O_3:C) and OSL technology. The read out process uses a light emitting diode (LED) array to stimulate the detectors, and the light emitted by the OSL material is detected and measured by a photomultiplier tube (PMT) using a high sensitivity photon counting system. The amount of light released during optical stimulation is directly proportional to the radiation dose and the intensity of stimulation light. The nondestructive OSL read out process of Al_2O_3:C enables reanalysis for dose verification, and intermittent analysis while maintaining total dose accumulation.

InLight readers include an external PC with menu-driven software that provides control over reader setup, analysis, and data recording enabling dosimeter read out, reporting, and the monitoring of reader performance.

microStar® Reader
- Portable
- Dosimeter: InLight case and slide; NanoDot™
- Capacity: 1 dosimeter
- Bar code input: keyboard; external bar code reader; file upload
- Dimensions: 4.3" H x 12.9" W x 9.1" D (109.5 x 327 x 231.8 mm)
- Weight: 17.7 lbs. (8.03 kg)



Automatic 200 Unit Reader
- Dosimeter: InLight case and slide
- Processing: 280/hour throughput
- Capacity: 4 cassettes @ 50 dosimeters/cassette
- Bar code input: internal optical reader
- Dimensions: 15" H x 44" W x 18" D (381 x 1118 x 457 mm)
- Weight: 75 lbs. (34 kg)

Automatic 500 Unit Reader
- Dosimeter: InLight case and slide
- Processing: 280/hour throughput
- Capacity: 10 cassettes @ 50 dosimeters/cassette
- Bar code input: internal optical reader
- Dimensions: 30.5" H x 43" W x 19.5" D (775 x 1092 x 495 mm)
- Weight: 125 lbs. (56.7 kg)

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100518-0

Landauer, Inc.
Glenwood, IL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

IONIZING RADIATION DOSIMETRY

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

2013-01-01 through 2013-12-31
Effective dates

For the National Institute of Standards and Technology

CONTINUOUS LOW-VOLUME AIR PARTICULATE ANALYSIS

STATION 4A – 2013

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/ml	*Error* Estimate µCi/ml	LLD µCi/ml	*Effluent* Conc.* µCi/ml	% Effluent Concentration
1st Quarter	U-nat	5.22 E-17	N/A	1E-16	9E-14	5.80 E-02
12/31/13–4/1/13	Th-230	2.97 E-17	1E-17	1E-16	3E-14	9.91 E-02
Air Vol in mLs	Ra-226	3.47 E-18	1E-17	1E-16	9E-13	3.86 E-04
4.56 E+10	Pb-210	2.16 E-14	3E-16	2E-15	6E-13	3.59 E+00
2nd Quarter	U-nat	6.48 E-17	N/A	1E-16	9E-14	7.20 E-02
4/1/13– 7/1/13	Th-230	8.23 E-17	1E-17	1E-16	3E-14	2.74 E-01
Air Vol in mLs	Ra-226	4.29 E-17	1E-17	1E-16	9E-13	4.76 E-03
4.57 E+10	Pb-210	1.87 E-14	4E-16	2E-15	6E-13	3.12 E+00
3rd Quarter	U-nat					
	Th-230					
Air Vol in mLs	Ra-226					
4.70 E+10	Pb-210					
4th Quarter	U-nat					
	Th-230					
Air Vol in mLs	Ra-226					
4.64 E+10	Pb-210					

LLD's are as published in Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

Radionuclide Releases
from the Sweetwater Uranium Project

The Sweetwater Mill is not operating, thus there are no releases from stacks related to the mill such as the dryer stack, exhausts from the Solvent Extraction (SX) Building, or any other stacks. There is no ore on the Ore Pad and the Ore Pad was cleaned following cessation of operations on April 15, 1983, thus there are no emissions (windblown ore dust or radon) from stockpiled ore. The tailings impoundment has been largely covered with fluid-filled, lined lagoons minimizing any windblown tailings. The attached map entitled **Tailings Impoundment – December 2009** and the most recent Google Earth image entitled **Tailings Impoundment – July 5, 2009** attest to the current water covered condition of the impoundment.

The impoundment is tested as required by 40 CFR Part 61 Subpart W annually to determine average Radon-222 flux, most recently on July 30 to July 31, 2013. In addition, concurrent with the test, the impoundment was surveyed to determine the total area of 11(e).2 byproduct material as well as the total water covered area. The results of the Method 115 Test and survey are as follows:

Area Description	**Area (square meters)**	**Radon-222 Flux (pCi/m^2-sec)**
Exposed tailings	61,186.1	22.02
Water covered areas	96,262.6	0
Total	157,448.7	8.56 (average)

The total area of 11(e).2 byproduct material of 157,448.7 square meters has an average flux rate of 8.56 pCi/m^2 –sec. This equates to a total annual Radon-222 release from the impoundment of:

(8.56 pCi/m^2–sec) (157,448.7 square meters) (365 days/year) (24 hours/day) (60 minutes/hour) (60 seconds/minute) = 4.25 $E+^{13}$ pCi = 42.5 curies of Radon-222 per year.

This average flux rate of 8.56 pCi/m^2–sec is lower than the average background flux rate of 18.85 pCi/m^2–sec based on five (5) background radon flux measurements taken concurrently with the 2013 Method 115 Test in undisturbed locations south and west of the facility. Radon-222 activities of air downwind of the facility averaged less than upwind Radon-222 activities in the first half of 2013. This situation (downwind average Radon-222 activities in air being less than upwind activities) has been consistently observed for the facility for at least the past two (2) decades.

No liquid effluents have been released from the facility in 2013. All contaminated liquids as well as pumpback water are placed in the tailings impoundment.

Internal memo

7 August 2013

To: File – 10 CFR 40.65 Report

Subject: Dose to the General Public in Millirems per Year as Represented by the Nearest Resident – First Half 2013

The following is a dose calculation for the nearest resident (the contract security guard) for the first half of 2013.

Calculation Assumptions:

1. The nearest resident for dose calculation purposes is considered to be the site security officer when he is not on duty and sleeping inside the Security Trailer. The site security officer is scheduled to be on site from 5:30 p.m. on Thursday of each week to 10:00 p.m. the following Sunday, on holidays and at times that the Senior Facility Technician is on vacation. In spite of the fact that the site security officer does not reside on site continuously, no occupancy factor is assigned to him and for dose calculation purposes he is assumed to reside on site continuously. The security officer's trailer is located immediately south of the site's southern chain link fence. As such, the calculated dose to the security officer would also apply to any member of the general public approaching the site fence. No member of the general public would be in close proximity to the site for as long as the security officer, whose dose is calculated based on continuous occupancy, in spite of the fact that he does not reside on site continuously. A map showing the location of the Security Trailer is attached.
2. Radon concentrations are measured in the Security Trailer with RadTrak detectors placed in the kitchen and bedroom and changed quarterly. The results from these detectors are averaged to derive a semiannual radon concentration in picoCuries per liter for the Security Trailer.
3. Radon decay product exposures in working levels are measured semiannually in the Security Trailer using a calibrated Buck Basic 12, Bendix BDX-44, MSA or Sensidyne GilAir II air pump and filter. The filter is read by the modified Kusnetz Method.
4. The radon concentration and exposure are used to calculate the equilibrium factor. The equilibrium factors calculated semiannually are averaged to derive a site equilibrium factor.
5. This equilibrium factor is applied to the upwind radon concentrations to derive a background radon dose and to the average semiannual radon concentration in the Security Trailer to derive a radon dose to the nearest resident. An equilibrium factor table is attached.
6. The dose from the semiannual downwind airborne particulate concentrations of natural uranium, radium-226 and thorium-230 are used to calculate the dose from airborne particulates in the Security Trailer in spite of the fact that the Security Trailer is not downwind of the facility. The use of airborne particulate data from downwind of the facility provides conservative particulate concentrations.
7. Beginning in the third quarter of 2010 an environmental dosimeter was placed in the Security Trailer and exchanged quarterly to directly measure actual gamma dose in the trailer.
8. The doses from radon-222, airborne particulate radionuclides and gamma radiation are summed to produce a dose to the nearest resident (the Security Trailer).
9. The radon concentrations measured at the upwind air monitoring stations during the two (2) quarters for a given semiannual period are averaged, corrected for the site equilibrium factor and converted to a background radon dose for the facility.

10. This background radon dose is summed with the background gamma radiation dose (from the revised Environmental Report – dated August 1994) and the doses derived from the background airborne particulate concentrations (natural uranium, radium-226 and thorium-230 as described in the revised Environmental Report dated August 1994) to yield a background radiation dose for the facility for the given semiannual period.
11. The background dose is subtracted from the calculated dose to the nearest resident (Security Trailer) to derive a dose to the nearest resident from the facility.
12. This method was discussed with James Webb, Project Manager, of the Nuclear Regulatory Commission in an email dated Wednesday, January 19, 2011. In an email dated Monday, February 28, 2011, he replied that Kennecott Uranium Company should continue to follow the methods identified in the semiannual effluent (10 CFR 40.65) reports until directed otherwise. The emails are included in this report.

BACKGROUND

		Average Concentration	Dose (mrem)
Gamma Exposure:			200.70 (approx. 22.9 uR/hr)
Airborne Particulates:			
	U nat	6.2 E-16 µCi/ml	0.34
	Ra-226	3.9 E-16 µCi/ml	0.22
	Th-230	3.9 E-16 µCi/ml	0.65
	Gases:		
	Radon-222	2.62 pCi/l	175.6
Total			**377.5**

Notes:

1. An equilibrium factor of 0.152 was used for radon based on thirty-three (33) comparisons of radon-222 and radon-222 daughter concentrations over twenty (20) years. Please see attached sheet entitled "Equilibrium Factors for Nearest Resident".
2. Gamma and airborne particulate background data is from the revised Environmental Report (August 1994).
3. The average background radon concentration of the RadTraks deployed at Air 2 in the first and second quarters of 2013 of 2.62 pCi/L was used for the first half 2013 radon concentration.
4. Calculation: (Radon concentration (pCi/l))*(Equilibrium factor)*(0.44 rems/pCi/l) = Dose (rems)

SECURITY TRAILER

		Average Concentration	Dose (mrem)
Gamma Exposure:			180.6
Airborne Particulates:			
	U nat	E-17 µCi/ml	0.033
	Ra-226	E-17 µCi/ml	0.001
	Th-230	E-16 µCi/ml	0.093
Gases:			
	Radon-222	1.57 pCi/l	104.9
	Total		**285.6**

Notes:

1. An equilibrium factor of 0.152 was used for radon based on thirty-three (33) comparisons of radon-222 and radon-222 daughter concentrations over twenty (20) years.
2. Downwind airborne particulate concentrations for the first and second quarters of 2013 were used for the security trailer. These doses were converted to millirems per year (mrem/yr).
3. Radon concentration was measured in the security trailer for the first and second quarters of 2013 and is based on an average of RadTrak units located in two (2) locations; the kitchen and the bedroom.
4. The gamma exposure for the Security Trailer is based upon an environmental dosimeter placed in the Security Trailer and exchanged quarterly.

First Half – 2013		
	First Quarter	**Second Quarter**
Kitchen	1.4 pCi/L	1.4 pCi/L
Bedroom	2.1 pCi/L	1.4 pCi/L
Trailer Average:		**1.57 pCi/L**

5. The annual gamma dose rate is calculated by doubling the sum of the first and second quarter dosimeter readings, converting them to an annual dose rate.

The calculated net (dose to the nearest resident minus background dose) annual TEDE from the licensed operations for the first half of 2013 is **0.0** mrem/year, which is below the 100 mrem/year dose limit to members of the general public.

Oscar A Paulson

Oscar Paulson
Avg dose.doc

Kennecott Uranium Company
Sweetwater Uranium Project
Equilibrium Factor for Nearest Residence
(Security Guard Trailer)

Date	Radon Concentration (pCi/L)	Exposure (WL)	Equilibrium Factor
1/1/93 – 6/30/93	3.20	0.009	0.28
1/1/97 – 6/30/97	1.50	0.003	0.20
7/1/97 – 12/31/97	2.20	0.002	0.09
1/1/98 – 6/30/98	1.65	0.003	0.18
1/1/99 – 6/30/99	1.90	0.009	0.47
7/1/99 – 12/31/99	3.25	0.002	0.06
1/1/00 – 6/30/00	2.12	0.004	0.19
7/1/00 – 12/31/00	3.05	0.009	0.30
1/1/01 – 6/30/01	3.60	0.012	0.33
7/1/01 – 12/31/01	2.78	0.013	0.47
1/1/02 – 6/30/02	2.48	0.009	0.36
7/1/02 – 12/31/02	2.80	0.003	0.11
1/1/03 – 6/30/03	2.40	0.004	0.17
7/1/03 – 12/31/03	3.75	0.006	0.16
1/1/04 – 6/30/04	2.08	0.003	0.14
7/1/04 – 12/31/04	3.00	0.0005	0.017
1/1/05 – 6/30/05	2.55	0.0013	0.051
7/1/05 – 12/31/05	3.22	0.0035	0.109
1/1/06 – 6/30/06	2.40	0	0.00
7/1/06 – 12/31/06	2.13	0.014	0.66
1/1/07 – 6/30/07	1.65	0	0.00
6/30/07 – 12/31/07	2.10	0.0001	0.005
1/1/08 – 6/30/08	3.28	0	0.00
6/30/08 - 12/31/08	2.83	0	0.00
1/1/09 - 6/30/09	2.25	0	0.00
6/30/09 - 12/31/09	2.03	0.002	0.10
1/1/10 - 6/30/10	2.13	0.002	0.09
7/1/10 - 12/31/10	1.63	0.002	0.12
1/1/11 - 6/30/11	0.95	0.0015	0.16
7/1/11 - 12/31/11	1.90	0	0.00
1/1/12 - 6/30/12	1.50	0.003	0.20
6/30/12 - 12/31/12	1.98	0	0.00
1/1/2013 - 6/30/13	1.57	0	0.00
Average			**0.152**

[1] This value is based upon an average of three (3) RadTrak detectors. The second quarter RadTrak detector in the Security Trailer bedroom was lost.

[2] Average of two (2) measurements

[3] Fourth quarter 2003 concentration only. Landauer, Inc. lost the third quarter 2003 RadTrak units.

[4] This value is based upon an average of three (3) RadTrak detectors. The fourth quarter RadTrak detector in the Security Trailer kitchen was lost.

[5] A single radon progeny measurement for the Security Trailer for the first half of 2012 collected in the bedroom was used. The measurement collected in the kitchen was not used since it appeared abnormally low and use of a conservative value is desireable.

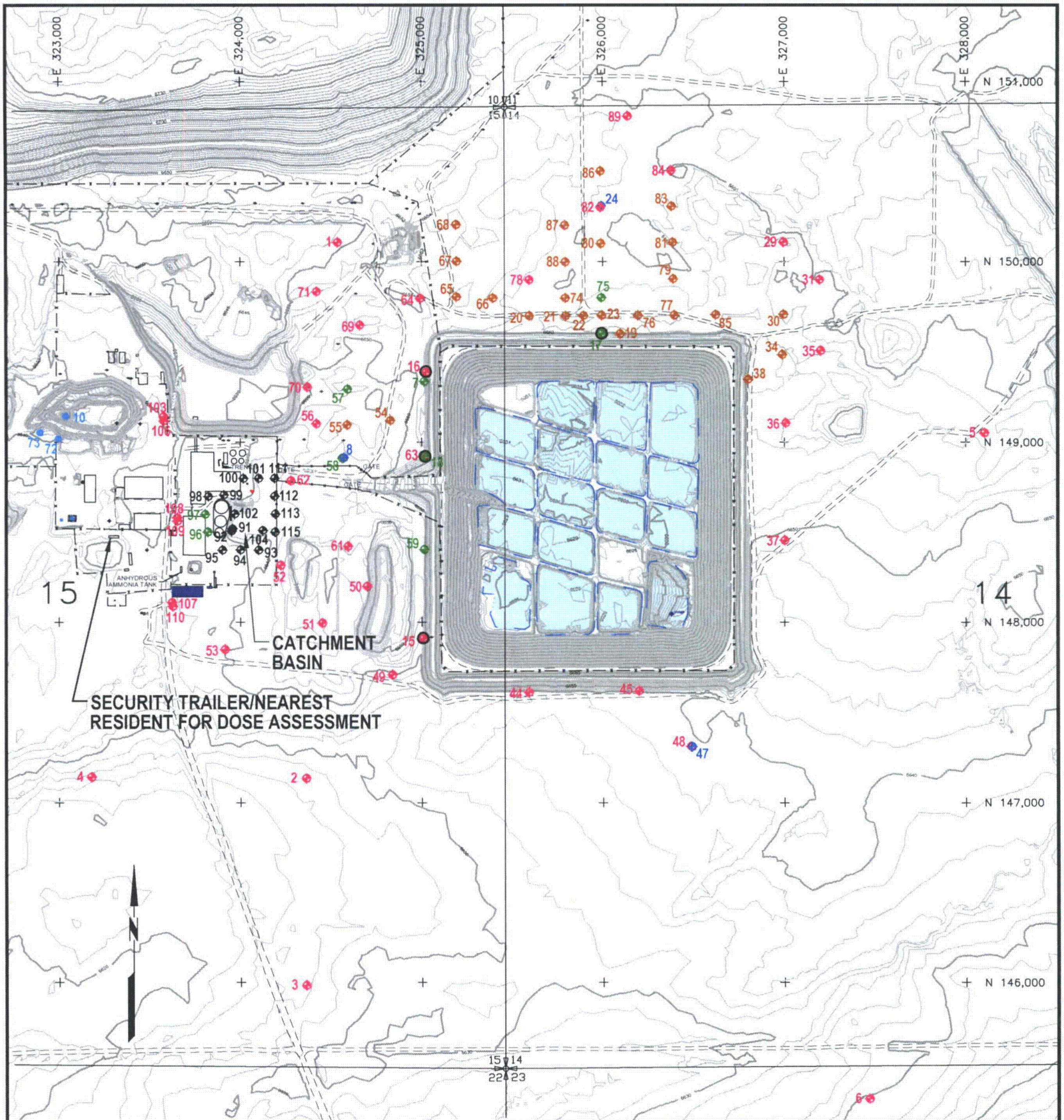
Calculation Parameters

1. Radon concentrations in the Security Trailer are calculated based upon the results of two (2) RadTrak detectors (one in the kitchen and one in the bedroom) that are changed quarterly. The radon concentration for a given semiannual period is an average of the results of four (4) RadTrak detections, one in the kitchen and one in the bedroom, changed quarterly.

2. Radon exposures (radon daughters concentrations measured in Working Levels) are taken semiannually in the trailer in two (2) locations (kitchen and bedroom) using a Buck Basic 12, Bendix BDX-44, MSA or Sensidyne GilAir II air pump and a filter. The filter is evaluated using the modified Kusnetz Method.

3. The equilibrium factor is calculated.

Radon Dose (rems) = (Radon Concentration (pCi/L)) * (Equilibrium Factor) * (0.44 rem/pCi/L)
An occupancy factor may be added as required.
1 WL ~ 100 pCi/L with daughters present (100% equilibrium)
Equilibrium Factor Formula: Equilibrium Factor = Exposure (WL) * 100 / Concentration (pCi/L)
Source: National Council on Radiation Protection (NCRP) Report #97



SCALE IN FEET

0 800

TOPOGRAPHY UPDATED JULY 2009
BY ROBERT JACK SMITH & ASSOC.
INC. CONSULTING LAND
SURVEYORS
P.O. BOX 1104, 1015 HARSHMAN ST.
RAWLINS, WY 82301

NOTE:
ALL WELLS HAVE A TMW PREFIX (TYP.)

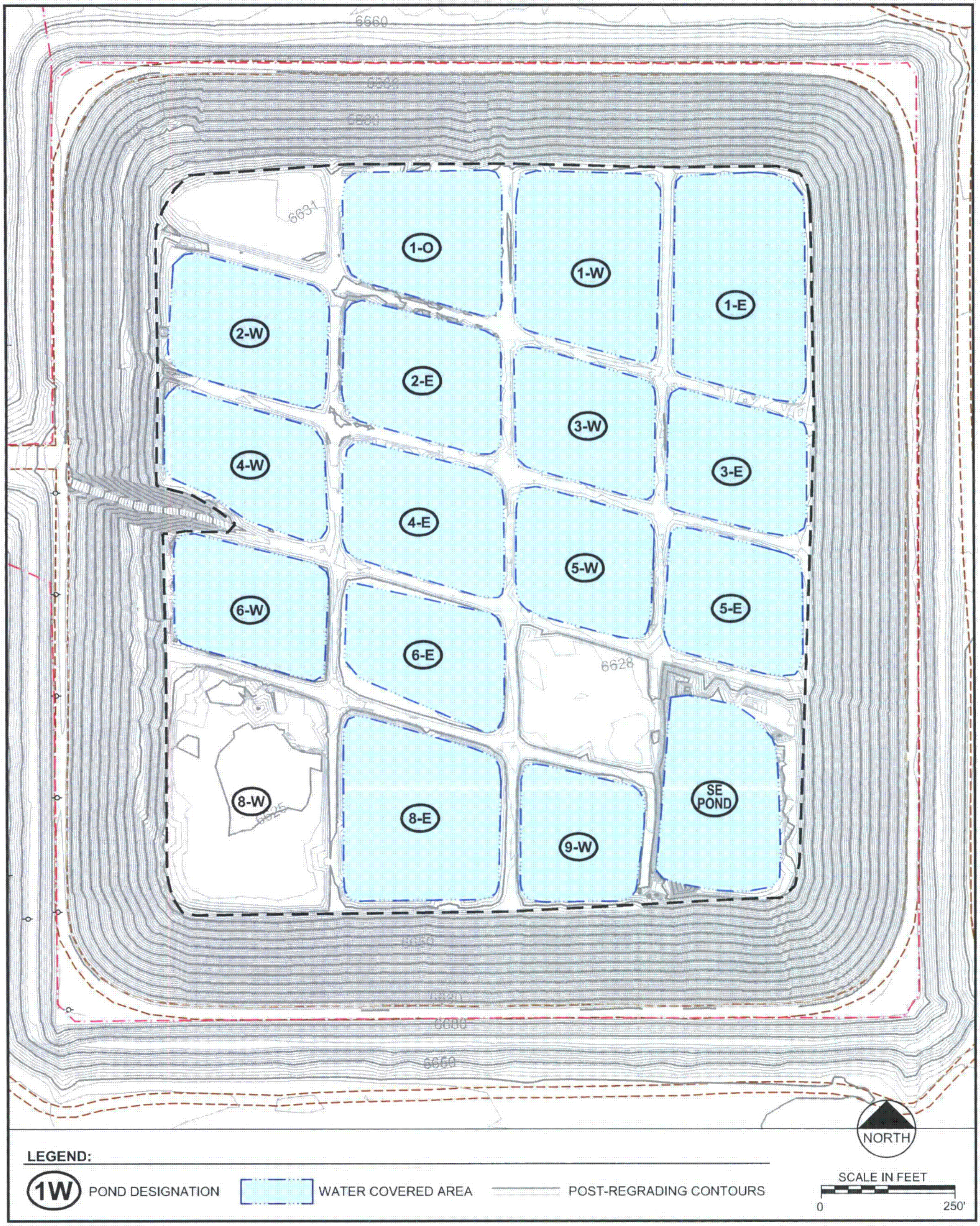
LEGEND

- SHALLOW WELLS (PERCHED)
- DEEP AQUIFER WELLS
- AQUIFER WELLS
- PUMPBACK WELLS, AQUIFER
- COMPLIANCE MONITORING WELLS
- POINT OF COMPLIANCE (POC) WELLS (TAILINGS IMPOUNDMENT)
- CONTAMINATED SOIL EXCAVATION MONITOR WELLS

RioTinto

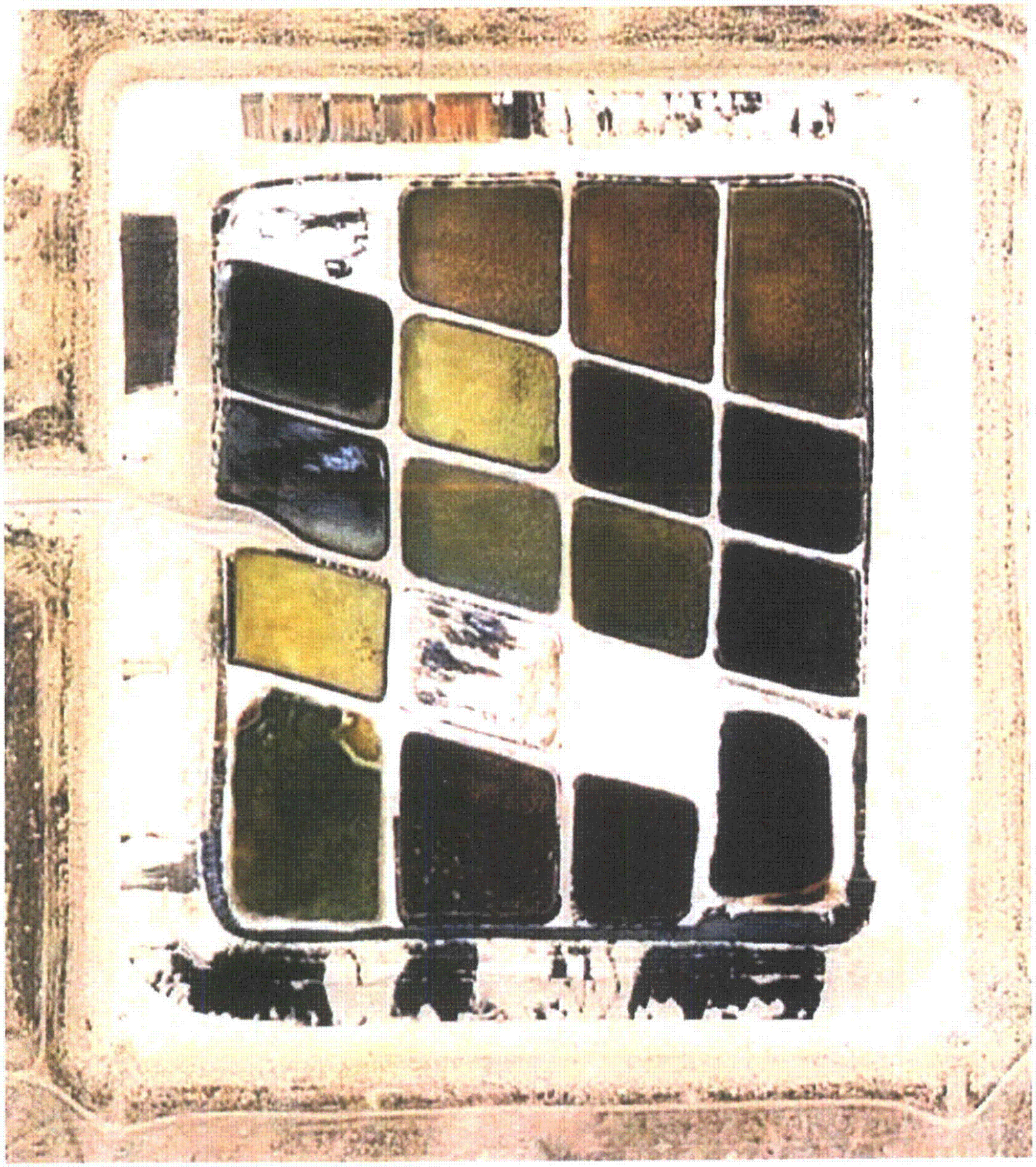
SWEETWATER URANIUM PROJECT
NEAREST RESIDENT LOCATION MAP
SEMIANNUAL 10 CFR 40.65 REPORT

Date:	FEBRUARY 2012
Project:	06-442\REP2012
File:	2012-Nearest



SWEETWATER URANIUM FACILITY
TAILINGS IMPOUNDMENT – DECEMBER 2009

Date:	FEBRUARY 2010
Project:	06-442\REP2010\
File:	Tailings 2009-Dec.dwg



Tailings Impoundment – July 5, 2009
Image from Google Earth

Schutterle, Shelley (RTE)

From: Paulson, Oscar (CCC)
Sent: Wednesday, January 19, 2011 5:47 PM
To: Webb, James
Cc: Schutterle, Shelley (CCC); Haag, Kelly (RTEA-Temp)
Subject: Source Material License SUA-1350 Docket Number: 40-8584 Calculation of the Dose from Radon and Radon Decay Products to the Nearest Resident/Member of the General Public

Follow Up Flag: Follow up
Flag Status: Completed

James Webb:

On Wednesday, January 12, 2011, Duane Schmidt of the Nuclear Regulatory Commission (NRC) gave a presentation that included a discussion of the calculation of dose from radon and its decay products to members of the general public and to the nearest resident from licensed uranium recovery facilities. In it, he cited the preamble to the revised 10 CFR 20 (Federal Register Volume 56, Number 98 - Tuesday, May 21, 1991 - Rules and Regulations - page 23375) which states:

The Commission is aware that some categories of licensees, such as uranium mills and in situ uranium mining facilities, may experience difficulties in determining compliance with the values in appendix B to Part 20.1001 – 20.2401, Table 2, for certain radionuclides, such as radon-222. Provision has been made for licensees to use air and water concentration limits for protection of members of the general public that are different from those in Appendix B to Part 20.1001 – 20.2401, table 2, if the licensee can demonstrate that the physiochemical properties of the effluent justify such modification and the revised value is approved by the NRC. For example, uranium mill licensees could, under this provision, adjust the table 2 value for radon (with daughters) to take into account the actual degree of equilibrium present in the environment.

At the Sweetwater Uranium Project, the nearest resident is the security guard who lives in a trailer adjacent to the facility. He is considered a member of the public/resident during times that he is on site but not being paid. Two (2) RadTrak/TrackEtch units are installed in the trailer in which he stays to measure radon concentrations. These are exchanged quarterly. In addition, air samples are collected in the trailer by the two (2) RadTrak/TrackEtch units twice each year. These air sample filters are analyzed by the modified Kusnetz Method to determine radon decay product concentrations in working levels. This data is maintained in a spreadsheet and equilibrium factors for radon and its decay products have been calculated for each six (6) month period (January to June and July to December) for each year for over a decade. These equilibrium factors are averaged to generate an average equilibrium factor for the trailer over time. This spreadsheet containing the equilibrium factors along with the entire dose calculation method is provided in each semiannual 10 CFR 40.65 Report that is submitted to the Commission.

During the August 2009 inspection, you examined the site's 10 CFR 40.65 Report and specifically examined the method used to calculate the dose to the nearest resident/member of the general public (the security guard) from radon and its decay products and stated that you concurred with the method being used. The inspection report documents this review stating:

The inspectors reviewed annual effluent reports for 2007 – 2008 to assess doses to the general public. Doses were assessed for individuals at the background station and at the security trailer. During 2007 – 2008 does at the security trailer were below the background station measurements. Therefore, the inspectors concluded that doses to the public were below the limits specified in 10 CFR 20.1301 and 10 CRFR 1302.

During his presentation, Duane Schmidt stated that use of a site specific equilibrium factor for radon and its decay products requires "*approval of a member of NRC staff.*"

While the use of a site specific equilibrium factor was discussed with members of Commission staff in the past, for example Elaine Brummett in an e-mail dated September 7, 2001 specifically requested that a copy of the calculation sheet and explanation of the method for calculation of does to the nearest resident be included for her review in each 40.65

Report that is submitted, no recent written approval by a member of Commission staff exists on file for the use of site specific equilibrium factors for radon and radon decay products at the Sweetwater Uranium Project.

Given that you reviewed and concurred with the use of site specific equilibrum factors for radon and its decay products and with the dose calculation method during the August 2009 inspection, Kennecott Uranium Company is requesting that you provide concurrence with the use of site specific equilibrum factors for radon and its decay products and with the dose calculation method used at the Sweetwater Uranium Project in a reply to this e-mail so that a current approval is on file at the site.

This issue was discussed with you in a telephone conversation on the afternoon of Wednesday, January 19, 2011. The dose calculation method and equilibrium factor spreadsheet can be reviewed in the facility's most recent 40.65 Report which was submitted at the end of August 2010.

If you have any questions please do not hesitate to contact me.

Oscar Paulson

Facility Supervisor
Kennecott Uranium Company
Sweetwater Uranium Project
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E-mail: oscar.paulson@riotinto.com

Paulson, Oscar (CCC)

From: Webb, James [James.Webb@nrc.gov]
Sent: Monday, February 28, 2011 11:53 AM
To: Paulson, Oscar (CCC)
Cc: Schmidt, Duane; Gersey, Linda
Subject: Radon and Radon Decay Products Response

Mr. Oscar Paulson
Facility Supervisor
Kennecott Uranium Company
Sweetwater Uranium Project
P.O. Box 1500
Rawlins, WY 82301-1500

Dear Mr. Paulson,

NRC staff reviewed your request to provide concurrence with the use of site specific equilibrium factors for radon and its decay products and with the calculation method used at the Sweetwater Uranium Project. NRC staff notes that these methods are described in each semi-annual effluent (10 CFR 40.65) reports submitted to the NRC. Because of the nature of your request, and the industry interest in this particular issue, NRC staff has determined that this issue should be addressed in a future guidance on radon developed by the NRC. Your email was placed in ADAMS (ML1102602791) for future reference. Kennecott should continue to follow the methods identified in your semi-annual effluent (10 CFR 40.65) reports until directed otherwise.

Sincerely,

James Webb
Project Manager
USNRC
Washington D.C.