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Kennecott Uranium Company's Comments on the Draft Interim Staff Guidance: Evaluations of Uranium Recovery Facility Surveys of Radon and Radon Progeny In Air and Demonstrations of Compliance with 10 CFR 20.1301
(Federal Register / Volume 76, Number 224 / Monday, November 21, 2011 / Notices)

Yours faithfully,

Oscar A Paulson
Oscar Paulson
Facility Supervisor

SUNSI Review Complete

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E-RIDS = ADM-03
Add = D. Schmidt (dws2)

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17 January 2012

Cindy Bladey
Chief, Rules, Announcements, and Directives Branch (RADB)
Office of Administration
Mail Stop: TWB–05–B01M
U.S. Nuclear Regulatory Commission
Washington, DC 20555–0001

Subject: Kennecott Uranium Company Comments on the Draft Interim Staff Guidance: Evaluations of Uranium Recovery Facility Surveys of Radon and Radon Progeny in Air and Demonstrations of Compliance with 10 CFR 20.1301 Docket ID: [NRC-2011-0266 – (Federal Register / Volume 76, Number 224 / Monday, November 21, 2011 / Notices)

Dear Ms. Bladey:

Kennecott Uranium Company is a uranium recovery licensee that owns the only remaining conventional uranium mill in Wyoming, the Sweetwater Uranium Project. This facility is located in Sweetwater County, Wyoming. In addition to the facility, Kennecott Uranium Company controls uranium resources around the Sweetwater Uranium Project

The following are Kennecott Uranium Company's comments on the *Draft Interim Staff Guidance: Evaluations of Uranium Recovery Facility Surveys of Radon and Radon Progeny in Air and Demonstrations of Compliance with 10 CFR 20.1301* :

General Comments as to Form, Organization and General Content

The document was overall difficult to follow, confusing and somewhat disorganized in spite of the fact that a flow chart was offered at the beginning of the document. The key issue being addressed by the document is radon and radon progeny in air. The document should begin with a clear, concise and well referenced introductory discussion of Radon-222 emissions from uranium recovery facilities as well as background Radon-222 and Radon-222 progeny in air. The reader should first be provided with a clear discussion of the problems in assessing the dose from Radon-222 progeny to members of the public. The document should also discuss the common methods used in the industry to assess Radon-222 and Radon-222 progeny in air and the problems related to distinguishing Radon-222 emissions from a facility from naturally occurring background. There also should be a clear discussion of the differences between modeling and actual measurement of doses from Radon-222 progeny in air. The reliance of models upon meteorological data should also be discussed.

Radon-222 and its Progeny

The document states:

> *Note that in this document, the term "radon," without specifying the isotope, is generally used to mean Radon-222, as that is generally the isotope of concern at the uranium recovery facilities currently licensed. As discussed later, radon progeny are addressed because most of the dose to people from releases of radon is actually due to exposure to the radon progeny. Here, radon progeny refers to the short-lived (half lives less than one-half hour) decay products of Rn-222, which are Po-218, Pb-214, Bi-214, and Po-214.*

A decay chain chart for Radon-222 should be included so the reader can see where the isotopes of concern lie within the decay chain.

Measurement of Radon-222 and Its Progeny

Radon-222 is a noble high density (9.73 grams per liter) gas that decays by alpha emission with a half life of 3.83 days. The document correctly states that *"...most of the dose to people from releases of radon is actually due to exposure to the radon progeny."* Radon-222 in the environment is generally measured using a RadTrak device. Appendix 1 contains a description of the RadTrak device manufactured by Landauer, Inc. Please note that the literature states that the "*minimum level of detection is 30 pCi/l days i.e., 0.33 pCi/l based on 90 days*". A client can request that the detectors be read to a higher resolution (at a higher cost) which reduces the Lower Limit of Detection (LLD) to 0.06 pCi/l (6.0 pCi/l-Days) based on a ninety (90) day exposure. This is the first problem with the estimation of dose from Radon-222 progeny.

10 CFR Part 2 Appendix B – Table 2 provides Effluent Concentration Limits that "*...are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (50 millirem or 0.5 millisieverts).*" The Effluent Concentration Limits for Radon-222 are as follows:

Radon-222

Atomic No.	Radionuclide	Class	Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion ALI (µCi)	Inhalation		Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
				ALI (µCi)	DAC (µCi/ml)			
86	Radon-222	With daughters removed	-	1E+4	4E-6	1E-8	-	-
		With daughters present	-	1E+2 (or 4 working level months)	3E-8 (or 0.33 working level)	1E-10	-	-

The concentration limit with daughters present is 1E-10 microCuries per milliliter which is equivalent to 0.1 pCi/l. In this case, 0.1 pCi/l of Radon-222 with daughters present is equivalent to 50 millirems of internal exposure. The problem is that the existing measurement technology has a minimum level of detection of 0.33 pCi/l based upon a 90 day exposure with reading at conventional resolution and 0.06 pCi/l based upon a 90 day exposure with reading at high resolution. When measuring Radon-222, the high resolution Lower Limit of Detection (LLD) of 0.06 pCi/l based upon a 90 day exposure is very close to the Effluent Concentration Limit of 0.1 pCi/l. In addition, the error estimates for the data provided for RadTrak detectors read at high resolution can vary between +/- 0.08 to +/-0.14 pCi/l (*Kennecott Uranium Company – Sweetwater Uranium Project SUA-1350 Semiannual 40.65 Report Second Half 2010* – February 24, 2011 ML110730197). The resolution and Lower Limit of Detection (LLD) of the existing technology for environmental Radon-222 measurement makes it very difficult to precisely measure doses from Radon-222.

Regarding this issue, the document states:

> *Typically, passive alpha-track detectors are used to measure environmental levels of radon. These detectors are relatively sensitive, but the minimum detectable concentration (MDC) is a concern for demonstrating compliance using a comparison to the Part 20, Appendix B, effluent value (0.1 pCi/L with progeny in equilibrium). For certain of these detectors, MDC is given as an time-integrated concentration (i.e., an integrated product of concentration and time at that concentration, for example with units pCi-days/L). The*

length of deployment of detectors can be increased to improve the MDC and reduce the uncertainty of the measurements (e.g., 6 months exposure results in a lower MDC than does 3 months exposure).

Doses to Radon-222 decay products are generally determined using the modified Kusnetz Method. This method is discussed in *Regulatory Guide 8.30 - HEALTH PHYSICS SURVEYS IN URANIUM RECOVERY FACILITIES:*

The modified Kusnetz method for measuring radon daughter working levels is a suitable method for UR facilities. The procedure consists of sampling radon daughters on a high-efficiency filter paper for 5 minutes and, after a delay of 40 to 90 minutes, measuring the alpha counts on the filter during a 1-minute interval. The original Kusnetz method measured the alpha count rate. In the modified Kusnetz method, the rate meter is replaced by a scaler. This improves the sensitivity to a practical lower limit of 0.03 working level for a 1-minute count on a 10-liter (0.01 cubic meter) sample. This is about a factor of 10 lower than that originally obtained using the original Kusnetz method. A 4-minute count gives a lower limit of about 0.003 working level (Ref. 3). High-efficiency membrane or glass fiber filters should be used to minimize loss of alpha counts by absorption in the filter. However, a correction factor to account for alpha absorption in the filter paper should still be used. Care should be taken to avoid contamination of the alpha counter.

This method is a good one in that testing is performed by the licensee on site and the method can be varied slightly to improve its Lower Limit of Detection (LLD). For example, the volume of air collected in (pumped through) the filter can be increased improving the Lower Limit of Detection (LLD) and reducing the error estimate.

The modified Kusnetz Method must be used in conjunction with Radon-222 RadTrak measurements to calculate equilibrium factors for Radon-222 and its decay products.

Determination of Background

The document discusses the establishment of background Radon-222 concentration in air stating:

Establishing background locations for outdoor radon measurements is difficult in many situations, complicated by spatially and temporally varying concentrations; impact of varying geology on the natural emissions of radon from soil into air; effects of topography on wind patterns, especially on patterns of low speed winds (e.g., down valley drainage); and potentially other nearby radon sources, particularly for sites located in heavily mined areas. Licensees should carefully determine background locations on a case-specific basis. When feasible, preoperational monitoring may provide a more complete understanding of background radon concentrations. Regulatory Guide 4.14 recommends one year of preoperational monitoring. However, annual average background radon concentrations outdoors may vary considerably year-to-year.

For cases of background monitoring performed concurrently with operational monitoring, NRC staff reviewers should be aware of the complexities of determining an appropriate background outdoor radon concentration that is representative of the receptor (or other monitoring) locations. A background location would typically need to be close to the monitoring locations, with geology similar to the site geology, so that the background location is representative of the monitoring location. But the background location should also be far enough from the facility that the radon concentration is not significantly impacted by radon releases from the facility. If onsite meteorological data are available, the data can be used to help determine if background locations are unimpacted or minimally impacted by site operations.

Background Radon-222 activities vary both temporally and spatially in air. Kennecott Uranium Company believes that background Radon-222 activities must be measured concurrently with operational monitoring since background Radon-222 activities vary temporally. In winter for example, when the ground is snow covered, background Radon-222 activities in air may be substantially reduced since Radon-222 generated in soils upwind of a site are unable to enter the air due to snow. Agricultural activities (plowing) upwind of the facility may elevate background Radon-222 activities in air.

Surface mining activities including uranium mining activities, vents from underground uranium mining operations, and other types of earth moving activities are non-licensed activities and part of background for the area. These activities can contribute to background Radon-222 activities in air as well. Because of these factors background Radon-222 activities in air must be measured concurrently with other operational monitoring. The document should be clear that Radon-222 from any mining activities are from sources not licensed by the Commission (non-licensed sources) and are part of the prevailing background for the area as is Radon-222 from mining related barium chloride treatment facilities (from removing radium from mine discharge water) and other non-licensed sources.

Background monitoring sites must be located upwind of the licensed facility as determined by the predominate prevailing wind direction. This should be made clear in the document.

For various site specific reasons, background (upwind) Radon-222 activities in air may exceed supposedly impacted downwind Radon-222 activities in air. This is true at the Sweetwater Uranium Project where downwind Radon-222 activities in air are indistinguishable from background regardless of whether the facility was operating or on standby. The facility operated from February 1981 to April of 1983. In April 1983 it went on standby and has remained on standby to the present day. The upwind and downwind radon data for the facility is presented in Appendix 3 and are summarized in the table below:

	Average Upwind Radon-222 Activity	Average Downwind Radon-222 Activity
	(pCi/liter)	(pCi/liter)
During Operations	1.56	0.99
Life of Project	3.07	2.57

Upwind (background) Radon-222 activity in air is on average higher than the downwind Radon-222 activity regardless of whether the facility was operating or not. In this case any Radon-222 contribution from the facility was lost in noise of background.

This is also true north of the Sweetwater Uranium Project at UR Energy's Lost Creek Project, the southern edge of which lies approximately three (3) miles north of the Sweetwater Uranium Project. Appendix 4 contains data for the Lost Creek Project. This data was generously provided by UR Energy. Based upon the project's wind rose, locations URPA-7 and URPA-10 would constitute the project's upwind and downwind sampling points respectively. No production has begun at this project so the readings from these stations are true background readings and yet the readings collected at the various sampling locations are very different. The data for their monitoring locations is shown in the table below:

Continues 5

Lost Creek Project
Ambient Radon Monitoring Data

Monitoring Period	URPA-7 West of Project (PicoCuries per liter)	URPA-8 Southeast of Project (PicoCuries per liter)	URPA-9 Center of Project (PicoCuries per liter)	URPA-10 Northeast of Project (PicoCuries per liter)	URPA-13 Southeast of Project (PicoCuries per liter)	URPA-1 Baroll (PicoCuries per liter)
Q1	1.5	2.7	3.8	2.1	N/A	0.5
Q2	0.7	1.3	0.8	1.2	2.0	0.3
Q3	1.6	2.1	1.5	1.8	1.5	0.9
Q4	2.8	3.2	2.8	1.0	2.5	0.6
Q5	N/A	N/A	1.7	2.0	2.7	0.8
Average:	1.7	2.3	2.1	1.6	2.2	0.6
Median:	1.6	2.4	1.7	1.8	2.3	0.6
Maximum:	2.8	3.2	3.8	2.1	2.7	0.9
Minimum:	0.7	1.3	0.8	1.0	1.5	0.3
Standard Deviation:	0.9	0.8	1.2	0.5	0.5	0.2

Source: UR Energy – Lost Creek Project – NRC Technical Report Revision 2 – April 2010

This data supports the data for the Sweetwater Uranium Project to the south. The upwind station (URPA-7) averages 1.7 PicoCuries per liter while the station on the project's border on the upwind (northeast) side averages 1.6 PicoCuries per liter which is slightly less. A distant location to the northeast (the Town of Bairoil) averages far less than the background (upwind) sample. It averages 0.6 PicoCuries per liter.

In the fourth quarter, for example, the Radon-222 activity in background air upwind of the proposed facility was 2.8 pCi/l, while downwind (northeast of the proposed project), it was 1.0 pCi/l.

Background Radon-222 activity in air can vary markedly both temporarily and spatially and in the case of the Sweetwater Uranium Project. Radon-222 activities in air, even in air not impacted by operations, is not homogeneous. Any method used to calculate a dose to the nearest resident or at the site boundary or a concentration at the site boundary must account for background and its variability.

Dose Modeling Versus Measurement

The document discusses in *Section 4.2 Alternative Survey Approaches for Radon-222 in Air* the measurement of operational process parameters or the measurement of Radon-222 emissions from stacks and other effluent points and the use of that information as inputs to a model (MILDOS-AREA is suggested) to determine Radon-222 activities in air at the site boundary. Kennecott Uranium Company believes that Radon-222 emissions from stacks and exhausts can be performed accurately and well via the use of RadTrak detectors placed in the vent/exhaust stacks and changed periodically (quarterly) to measure the Radon-222 activity of the air and measurement of the air flow rates in the stacks since this is precisely what is done to measure Radon-222 activities exhausted from uranium mine ventilation raises to assure compliance with 40 CFR Part 61 Subpart B. Kennecott Uranium Company has concerns regarding the ability to accurately model Radon-222 concentrations above background in air at the property boundary due to the variability of background as well as the variability of meteorological conditions. Kennecott Uranium Company believes that measurement of a dose above background to a specific receptor, a maximally exposed individual is the best means of addressing these issues. At a meeting between Commission uranium recovery staff and members of the uranium recovery industry in January 2011 in Denver, Colorado a presentation was given regarding dose estimation/calculation from Radon-222 and its decay products to members of the general public/nearest resident. Following this presentation, Kennecott Uranium Company sent an e-mail to James Webb a health physicist and member of the Commission's uranium recovery staff regarding the adequacy of the method used to calculate dose to the nearest resident used at the Sweetwater Uranium Project. That e-mail and the reply

are included in Appendix 2. The reply concludes by stating, "*Kennecott should continue to follow the methods identified in your semi-annual effluent (10 CFR 40.65) reports until directed otherwise.*"

The method by which Kennecott Uranium Company calculates dose to the nearest resident is described in the e-mail in Appendix 2. In summation, the dose is calculated for a maximally exposed individual residing in a trailer along the boundary fence of the site. Radon-222 activities in air are measured using RadTrak detectors placed in the trailer changed quarterly and Radon-222 decay product activities are measured semiannually in the trailer using the modified Kusnetz Method. The Radon-222 and Radon-222 decay products activities are compared to obtain an equilibrium factor for the trailer and the equilibrium factor plus the Radon-222 activity are used to calculate a dose to the occupant. A dose from Radon-222 and its decay products is then calculated for the upwind/background air monitoring station using the Radon-222 activity in air at the upwind/background air station and the equilibrium factor calculated for the trailer. The calculated background dose is subtracted from the dose in the trailer to obtain a dose to the nearest resident. Generally, because the measured Radon-22 activity in air at the upwind/background monitoring station is higher than the measured activity in the trailer the dose is zero. This method is simple, reliable and consistent. Kennecott Uranium Company requests that the final document clearly state that this type of method is acceptable.

Kennecott Uranium Company believes that any method used to calculate a dose to the nearest resident to or at the site boundary of a uranium recovery facility must be simple, easy to implement, involve as little calculation as possible and applied consistently year after year to assure that changes in methodology do not yield changes in the estimate of dose. Complex methods involving numerous inputs that may change over time may lead to results that may not be as reflective of the actual dose and/or activity at the site boundary. In keeping with the goal of simplicity, the term "land use census" in Section 3.3 should be changed to the term "land use survey" which is in keeping with current terminology included in uranium recovery licenses that require the preparation of annual land use reports.

Kennecott Uranium Company strongly agrees with the document when it states:

> *NRC staff reviewers need to assure that licensees document completely the assessments performed by licensees to demonstrate compliance, including:*
> - *Measurement methods should be clearly described.*
> - *Measurement locations used to represent background should be clearly described.*
> - *Results of measurements should be provided, with associated uncertainties.*

Any method used to complete these assessments should be documented in a Standard Operating Procedure (SOP).

Equilibrium Factors

The Statements of Consideration for the final revised 10 CFR Part 20 (Federal Register Volume 56, Number 98 - Tuesday, May 21, 1991 - Rules and Regulations - page 23375) 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.*

The document discusses acceptable equilibrium factors as per the table below:

Continues 7

Acceptable values of and approaches to determining the equilibrium factor.

Type of survey	*Receptor location*	*Equilibrium factor or approach*	*Notes*
Most conservative, always acceptable	*Indoors or outdoors*	*1.0*	
Generally acceptable	*outdoors **	*0.7*	*consistent with NCRP 160 approach*
	*indoors **	*0.5*	*based on RG 3.51, consistent with NCRP 160 approach*
	residential exposure	*0.5*	*see text for conditions on use*
Site-specific	*outdoors **	*ingrowth calculations based on travel time*	
	*indoors **	*measure radon and progeny separately and calculate equilibrium factor*	

** If receptors are exposed indoors and outdoors, it is acceptable to use separate equilibrium factor values for indoor and outdoor exposure time, or to use the more conservative equilibrium factor value.*

The equilibrium factors shown are high. Equilibrium factors for Radon-222 and its decay products have been calculated for the Security Trailer (the location of the nearest resident/receptor) at the Sweetwater Uranium Project located along the site fence since 1993. The average equilibrium factor for the trailer over twenty-nine (29) sets of readings is 0.166. This is lower than the 0.5 value discussed in the document when it states:

> *For Indoors exposures, Regulatory Guide 3.51 provides a generally acceptable equilibrium factor. Appendix C of Regulatory Guide 3.51 provides technical basis information used by NRC staff for a radon progeny inhalation dose conversion factor. The appendix states that a ratio of 5 × 10-6 WL per pCi/m3 of Rn-222 is established by the assumed indoor air concentration ratios of the individual radon progeny. The relationship between radon concentration, progeny concentration, and equilibrium factor is: progeny concentration (in WL) = radon concentration (in pCi/m3) × equilibrium factor × (1 WL per 100 pCi/L radon at equilibrium) × (1 × 10-3 m3/L). Based on this relationship, the value of progeny concentration per radon concentration in the appendix is equivalent to an assumption of an equilibrium factor of 0.5.*

The document also states:

> *Based on the substantial variability in radon progeny concentrations (diurnal, longer-term, and other variability), making grab sample measurements with sufficient frequency to estimate long-term averages may be quite tedious and expensive.*

The environmental measurement of radon progeny may be tedious and time consuming; however, it provides actual analytical data that can be used in the generation of equilibrium factors and in dose calculation.

Kennecott Uranium Company believes that it is important that licensees do not rely upon provided equilibrium factors but rather on site specific ones determined by the licensee. The Commission should encourage licenses to measure and calculate their own equilibrium factors rather than relying upon ones provided by others since the equilibrium factor is site specific.

Continues 8

Annual Average Concentrations

Kennecott Uranium Company supports the use of average annual concentrations since the limit specified in the regulations (10 CFR 20.1301) is an annual limit.

Workers Residing Onsite

The document states:

> *NRC staff note that some licensees provide onsite residences for workers; while off-duty, these people are considered members of the public.*

Kennecott Uranium Company agrees with this statement. At the Sweetwater Uranium Project security officers reside on site in the Security Trailer and when not working are considered the nearest resident/a member of the general public for Radon-222 dose assessment purposes.

Conclusions:

- Kennecott Uranium Company believes that the document could be better organized, clearer, and easier to understand. It should include a decay chain chart for Radon-222 to better orient the reader as well as a discussion regarding Radon-222 in air, background Radon-222 concentrations, sources of Radon-222 from licensed uranium recovery facilities, as well as modeling and measurement techniques.
- The document should discuss and emphasize the high variability both spatially and temporally of Radon-222 in air and provide ranges for background concentrations in air.
- The document should provide a discussion of the measurement techniques for Radon-222 and its progeny and provide information regarding the weaknesses of these techniques.
- The document should discuss the advantages and disadvantages of modeling versus measurement of doses from Radon-22 and its decay products.
- The document correctly addresses the issue of workers residing near the site boundary as well as the fact that the average annual concentrations may be used.
- Kennecott Uranium Company supports the statement regarding the need to document the methods used to calculate dose and/or activities at the site boundary.
- Kennecott Uranium Company believes that any method used to calculate a dose to the nearest resident to or at the site boundary of a uranium recovery facility must be simple, easy to implement, involve as little calculation as possible and applied consistently year after year to assure that changes in methodology do not yield changes in the estimate of dose.

Kennecott Uranium Company appreciates the opportunity to comment on this document. If you have any questions please do not hesitate to contact me.

Sincerely yours,

Oscar Paulson
Facility Supervisor

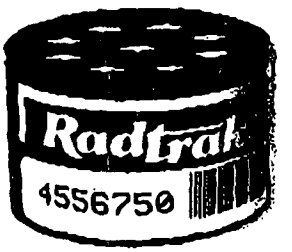
cc: Rich Atkinson
Katie Sweeney – National Mining Association (NMA)

Appendix 1

LANDAUER®

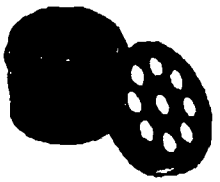
Radtrak® Long-Term Radon Monitoring

Radtrak is an alpha-track radon gas detector designed to monitor radon exposure for three months to one year to obtain a long-term average concentration over time. Landauer service includes the Radtrak detector, comprehensive analysis, and a confidential report of the findings. Radtrak can be packaged for indoor or outdoor area monitoring or personnel monitoring.



Landauer is the leader and pioneer in radon gas detection and monitoring service. Since 1954, our scientists have been involved with the development of radiation monitoring services for nuclear research centers and laboratories, hospitals, medical and dental offices, universities, and other industries where radiation might be present. This experience and technology have been incorporated into Landauer's highly accurate Radtrak radon detector using our exclusive Track-Etch® process. Radtrak radon detectors are used by the Environmental Protection Agency, the National Institutes of Health, the American Lung Association, and many other government and professional organizations.

Radtrak measures the average radon concentration at the location of the detector during the monitoring period. The alpha-track detector has, inside the plastic housing, a radiosensitive element that records alpha particle emissions (alpha tracks) from the natural radioactive decay of radon.



When the detector is returned to Landauer's laboratory, the alpha tracks are counted using computer-assisted image analysis equipment. The number of alpha tracks along with the deployment time period provides the basis for calculating the average radon concentration. The report with the radon gas measurement, reported in picocuries per liter of air (pCi/l), is mailed within seven to ten days after receipt of detector.

Thoron Proof Filter

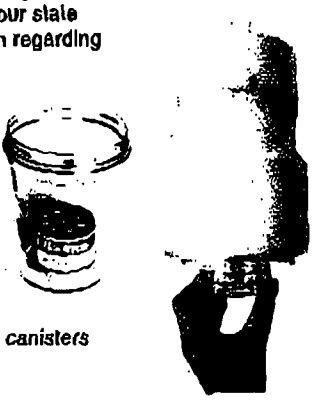
Upon request, a detector can be fitted with a thoron proof filter that provides measurement of Rn 222 only.

Technical Specifications

- The radiosensitive element is a CR-39 (allyl diglycol carbonate) based, passive alpha-track detector.
- The CR-39 is enclosed in a plastic housing composed of electrically conducting material with filtered openings to permit diffusion of radon gas only.
- Minimum level of detection is 30 pCi/l days i.e., 0.33 pCi/l based on 90 days.
- Detectors, before, during or after exposure, should not be in locations that exceed a temperature of 160°F (70°C).
- Radtrak detectors are packaged in film-foil bags that meet Military specification MIL-B-131, Class 1 to prevent exposure prior to use.
- A metallic label is provided for each detector to seal the filtered openings following the exposure period to minimize subsequent exposure to radon during the return shipment to Landauer's laboratory.
- Each detector is identified by a unique serial number laser engraved on the CR-39, printed and bar coded on the outside of Radtrak, and the film-foil bag.

Indoor Use

Monitoring indoors requires placing the detector in an upright position on a flat surface, or it may be hung from a joist or ceiling with the detector's hanger strip included with the shipment. The U.S. Environmental Protection Agency recommends the detector be placed in the lowest lived-in level of the home. It should be placed in a room that is used regularly but not a kitchen or bathroom. States or other organizations may have differing recommendations. Contact your state agency if you have a question regarding placement.



Outdoor Use

For monitoring outdoors, the detector is fastened to the bottom of a clear plastic cup. The cup is then installed inside a protective canister that has been attached to a post or other location. The protective canisters are sold separately.

Personnel Monitoring

The personnel monitor comes with a clip that easily attaches to the detector and securely fastens to clothing.

For more information on radon, refer to the U.S. Environmental Protection Agency's publication "A Citizen's Guide to Radon" at http://www.epa.gov/iaq/radon/pubs/citguide.html or contact your state department of health.

Appendix 2

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

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
P.O. Box 1500
42 Miles Northwest of Rawlins
Rawlins, Wyoming 82301-1500

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E-mail: oscar.paulson@riotinto.com

From: Webb, James [mailto: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.

Appendix 3

Kennecott Uranium Company - Sweetwater Uranium Facility

DOWNWIND RADON DATA

	START DATE	END DATE	DETECTOR TYPE	AIR 4 pCi/L	AIR 4A pCi/L	AIR 5A pCi/L	AIR 7 (RAWLINS) pCi/l
1981	01-Jan-81	01-Feb-81	PRM	0.39	-	0.26	0.10
	01-Feb-81	01-Mar-81	PRM	0.31	-	0.54	0.07
	01-Mar-81	01-Apr-81	PRM	0.30	-	0.48	0.11
	01-Apr-81	01-May-81	PRM	0.25	-	0.38	0.15
	01-May-81	01-Jun-81	PRM	0.18	-	0.24	0.02
	01-Jun-81	01-Jul-81	PRM	0.41	-	0.42	0.12
	01-Jul-81	01-Aug-81	PRM	0.92	-	0.96	0.08
	01-Aug-81	01-Sep-81	PRM	2.90	-	1.10	0.23
	01-Sep-81	01-Oct-81	PRM	2.30	-	0.76	0.32
	01-Oct-81	01-Nov-81	PRM	1.57	-	3.47	0.08
	01-Nov-81	01-Dec-81	PRM	0.31	-	1.30	0.36
	01-Dec-81	01-Jan-82	PRM	0.70	-	1.00	0.10
1982	01-Jan-82	01-Feb-82	PRM	2.37	-	2.15	0.52
	01-Feb-82	01-Mar-82	PRM	0.32	-	0.06	0.33
	01-Mar-82	01-Apr-82	PRM	1.90	-	0.73	0.13
	01-Apr-82	01-May-82	PRM	1.98	-	1.01	0.03
	01-May-82	01-Jun-82	PRM	0.99	-	0.81	0.42
	01-Jun-82	01-Jul-82	PRM	1.02	-	0.41	0.03
	01-Jul-82	01-Aug-82	PRM	1.02	-	0.41	0.03
	01-Aug-82	01-Sep-82	PRM	0.91	-	0.66	0.59
	01-Sep-82	01-Oct-82	PRM	0.36	-	0.03	0.03
	01-Oct-82	01-Nov-82	PRM	0.16	-	2.21	0.22
	01-Nov-82	01-Dec-82	PRM	0.25	-	0.58	0.18
	01-Dec-82	01-Jan-83	PRM	0.75	-	1.45	0.14
1983	01-Jan-83	01-Feb-83	PRM	0.88	-	0.70	0.05
	01-Feb-83	01-Mar-83	PRM	2.56	-	1.14	0.82
	01-Mar-83	01-Apr-83	PRM	0.40	-	1.09	0.05
	01-Apr-83	01-May-83	PRM	0.66	-	0.41	0.24
	01-May-83	01-Jun-83	PRM	0.70	-	0.47	0.32
	01-Jun-83	01-Jul-83	PRM	0.68	-	0.87	1.43
	01-Jul-83	01-Aug-83	PRM	-	-	0.83	-
	01-Aug-83	01-Sep-83	PRM	-	-	1.17	-
	01-Sep-83	01-Oct-83	PRM	-	-	3.92	-
	01-Oct-83	01-Nov-83	PRM	-	-	3.92	-
	01-Nov-83	01-Dec-83	PRM	-	-	0.62	-
	01-Dec-83	01-Jan-84	PRM	-	-	1.39	-
1984	01-Jan-84	01-Feb-84	PRM	-	-	0.96	-
	01-Feb-84	01-Mar-84	PRM	-	-	1.06	-
	01-Mar-84	01-Apr-84	PRM	-	1.56	-	-
	01-Apr-84	01-May-84	PRM	-	0.03	-	-
	01-May-84	01-Jun-84	PRM	-	1.44	-	-
	01-Jun-84	01-Jul-84	PRM	-	2.81	-	-
	01-Jul-84	01-Aug-84	PRM	-	1.14	-	-
	01-Aug-84	01-Sep-84	PRM	-	1.22	-	-
	01-Sep-84	01-Oct-84	PRM	-	2.76	-	-
	01-Oct-84	01-Nov-84	PRM	-	3.23	-	-
	01-Nov-84	01-Dec-84	PRM	-	1.07	-	-
	01-Dec-84	01-Jan-85	PRM	-	2.11	-	-
1985	01-Jan-85	01-Feb-85	PRM	-	3.10	-	-
	01-Feb-85	01-Mar-85	PRM	-	9.03	-	-

	01-Mar-85	01-Apr-85	PRM	-	2.40	-	-
	01-Apr-85	01-May-85	PRM	-	0.72	-	-
	01-May-85	01-Jun-85	PRM	-	2.32	-	-
	01-Jun-85	01-Jul-85	PRM	-	1.69	-	-
	01-Jul-85	01-Aug-85	PRM	-	1.48	-	-
	01-Aug-85	01-Sep-85	PRM	-	1.79	-	-
	01-Sep-85	01-Oct-85	PRM	-	1.07	-	-
	01-Oct-85	01-Nov-85	PRM	-	4.68	-	-
	01-Nov-85	01-Dec-85	PRM	-	1.04	-	-
	01-Dec-85	01-Jan-86	PRM	-	7.12	-	-
1986	01-Jan-86	01-Feb-86	PRM	-	0.03	-	-
	01-Feb-86	01-Mar-86	PRM	-	2.74	-	-
	01-Mar-86	01-Apr-86	PRM	-	0.48	-	-
	01-Apr-86	01-May-86	PRM	-	1.88	-	-
	01-May-86	01-Jun-86	PRM	-	0.30	-	-
	01-Jun-86	01-Jul-86	PRM	-	2.30	-	-
	01-Jul-86	01-Aug-86	PRM	-	1.76	-	-
	01-Aug-86	01-Sep-86	PRM	-	2.49	-	-
	01-Sep-86	01-Oct-86	PRM	-	0.94	-	-
	01-Oct-86	01-Nov-86	PRM	-	5.50	-	-
	01-Nov-86	01-Dec-86	PRM	-	1.26	-	-
	01-Dec-86	01-Jan-87	PRM	-	3.14	-	-
1987	01-Jan-87	01-Feb-87	PRM	-	1.80	-	-
	01-Feb-87	01-Mar-87	PRM	-	0.03	-	-
	01-Mar-87	01-Apr-87	PRM	-	1.06	-	-
	01-Apr-87	01-May-87	PRM	-	3.98	-	-
	01-May-87	01-Jun-87	PRM	-	1.05	-	-
	01-Jun-87	01-Jul-87	PRM	-	2.60	-	-
	01-Jul-87	01-Aug-87	PRM	-	2.32	-	-
	01-Aug-87	01-Sep-87	PRM	-	0.27	-	-
	01-Sep-87	01-Oct-87	PRM	-	0.03	-	-
	01-Oct-87	01-Nov-87	PRM	-	1.57	-	-
	01-Nov-87	01-Dec-87	PRM	-	3.17	-	-
	01-Dec-87	01-Jan-88	PRM	-	1.37	-	-
1988	01-Jan-88	01-Feb-88	PRM	-	1.02	-	-
	01-Feb-88	01-Mar-88	PRM	-	1.59	-	-
	01-Mar-88	01-Apr-88	PRM	-	1.19	-	-
	01-Apr-88	01-May-88	PRM	-	4.13	-	-
	01-May-88	01-Jun-88	PRM	-	0.64	-	-
	01-Jun-88	01-Jul-88	PRM	-	1.24	-	-
	01-Jul-88	01-Aug-88	PRM	-	0.00	-	-
	01-Aug-88	01-Sep-88	PRM	-	0.00	-	-
	01-Sep-88	01-Oct-88	PRM	-	0.00	-	-
	01-Oct-88	01-Nov-88	PRM	-	0.00	-	-
	01-Nov-88	01-Dec-88	PRM	-	0.00	-	-
	01-Dec-88	01-Jan-89	PRM	-	0.00	-	-
1989	01-Jan-89	01-Feb-89	PRM	-	3.04	-	-
	01-Feb-89	01-Mar-89	PRM	-	3.58	-	-
	01-Mar-89	01-Apr-89	PRM	-	4.00	-	-
	01-Apr-89	01-May-89	PRM	-	2.02	-	-
	01-May-89	01-Jun-89	PRM	-	3.62	-	-
	01-Jun-89	01-Jul-89	PRM	-	2.53	-	-
	01-Jul-89	01-Aug-89	PRM	-	2.69	-	-
	01-Aug-89	01-Sep-89	PRM	-	1.37	-	-
	01-Sep-89	01-Oct-89	PRM	-	5.28	-	-
	01-Oct-89	01-Nov-89	PRM	-	4.22	-	-
	01-Nov-89	01-Dec-89	PRM	-	2.19	-	-
	01-Dec-89	01-Jan-90	PRM	-	6.41	-	-

1990	01-Jan-90	01-Feb-90	PRM	-	1.20	-	-
	01-Feb-90	01-Mar-90	PRM	-	2.88	-	-
	01-Mar-90	01-Apr-90	PRM	-	0.94	-	-
	01-Apr-90	01-May-90	PRM	-	2.75	-	-
	01-May-90	01-Jun-90	PRM	-	2.64	-	-
	01-Jun-90	01-Jul-90	PRM	-	3.35	-	-
	01-Jul-90	01-Aug-90	PRM	-	1.91	-	-
	01-Aug-90	01-Sep-90	PRM	-	2.14	-	-
	01-Sep-90	01-Oct-90	PRM	-	1.60	-	-
	01-Oct-90	01-Nov-90	PRM	-	3.22	-	-
	01-Nov-90	01-Dec-90	PRM	-	0.96	-	-
	01-Dec-90	01-Jan-91	PRM	-	3.99	-	-
1991	01-Jan-91	01-Feb-91	PRM	-	1.19	-	-
	01-Feb-91	01-Mar-91	PRM	-	4.45	-	-
	01-Mar-91	01-Apr-91	PRM	-	1.78	-	-
	01-Apr-91	01-May-91	TRACKETCH	-	1.60	-	-
	01-May-91	01-Jun-91	TRACKETCH	-	1.60	-	-
	01-Jun-91	01-Jul-91	TRACKETCH	-	1.60	-	-
	01-Jul-91	01-Aug-91	TRACKETCH	-	2.60	-	-
	01-Aug-91	01-Sep-91	TRACKETCH	-	2.60	-	-
	01-Sep-91	01-Oct-91	TRACKETCH	-	2.60	-	-
	01-Oct-91	01-Nov-91	TRACKETCH	-	2.20	-	-
	01-Nov-91	01-Dec-91	TRACKETCH	-	2.20	-	-
	01-Dec-91	03-Jan-92	TRACKETCH	-	2.20	-	-
1992	10-Jan-92	07-Feb-92	TRACKETCH	-	4.66	-	-
	07-Feb-92	03-Mar-92	TRACKETCH	-	4.66	-	-
	03-Mar-92	02-Apr-92	TRACKETCH	-	4.66	-	-
	02-Apr-92	11-May-92	TRACKETCH	-	2.63	-	-
	11-May-92	01-Jun-92	TRACKETCH	-	2.63	-	-
	01-Jun-92	01-Jul-92	TRACKETCH	-	2.63	-	-
	01-Jul-92	01-Aug-92	TRACKETCH	-	2.87	-	-
	01-Aug-92	01-Sep-92	TRACKETCH	-	2.87	-	-
	01-Sep-92	06-Oct-92	TRACKETCH	-	2.87	-	-
	06-Oct-92	01-Nov-92	TRACKETCH	-	3.10	-	-
	01-Nov-92	01-Dec-92	TRACKETCH	-	3.10	-	-
	01-Dec-92	04-Jan-93	TRACKETCH	-	3.10	-	-
1993	04-Jan-93	01-Feb-93	TRACKETCH	-	2.90	-	-
	01-Feb-93	01-Mar-93	TRACKETCH	-	2.90	-	-
	01-Mar-93	01-Apr-93	TRACKETCH	-	2.90	-	-
	01-Apr-93	01-May-93	TRACKETCH	-	3.00	-	-
	01-May-93	01-Jun-93	TRACKETCH	-	3.00	-	-
	01-Jun-93	30-Jun-93	TRACKETCH	-	3.00	-	-
	30-Jun-93	01-Aug-93	TRACKETCH	-	4.20	-	-
	01-Aug-93	18-Aug-93	TRACKETCH	-	4.20	-	-
	18-Aug-93	01-Oct-93	TRACKETCH	-	4.20	-	-
	01-Oct-93	04-Nov-93	TRACKETCH	-	4.00	-	-
	04-Nov-93	30-Nov-93	TRACKETCH	-	4.00	-	-
	30-Nov-93	03-Jan-94	TRACKETCH	-	4.00	-	-
1994	03-Jan-94	31-Jan-94	TRACKETCH	-	4.00	-	-
	31-Jan-94	21-Feb-94	TRACKETCH	-	4.00	-	-
	21-Feb-94	31-Mar-94	TRACKETCH	-	4.00	-	-
	31-Mar-94	27-Apr-94	TRACKETCH	-	3.30	-	-
	27-Apr-94	31-May-94	TRACKETCH	-	3.30	-	-
	31-May-94	01-Jul-94	TRACKETCH	-	3.30	-	-
	01-Jul-94	03-Aug-94	TRACKETCH	-	3.30	-	-
	03-Aug-94	07-Sep-94	TRACKETCH	-	3.30	-	-
	07-Sep-94	03-Oct-94	TRACKETCH	-	3.30	-	-
	03-Oct-94	02-Nov-94	TRACKETCH	-	3.50	-	-

	02-Nov-94	01-Dec-94	TRACKETCH	-	3.50	-	-
	01-Dec-94	03-Jan-95	TRACKETCH	-	3.50	-	-
1995	03-Jan-95	01-Feb-95	TRACKETCH	-	1.70	-	-
	01-Feb-95	02-Mar-95	TRACKETCH	-	1.70	-	-
	02-Mar-95	31-Mar-95	TRACKETCH	-	1.70	-	-
	31-Mar-95	30-Apr-95	TRACKETCH	-	2.60	-	-
	30-Apr-95	31-May-95	TRACKETCH	-	2.60	-	-
	31-May-95	30-Jun-95	TRACKETCH	-	2.60	-	-
	30-Jun-95	31-Jul-95	TRACKETCH	-	3.90	-	-
	31-Jul-95	31-Aug-95	TRACKETCH	-	3.90	-	-
	31-Aug-95	30-Sep-95	TRACKETCH	-	3.90	-	-
	30-Sep-95	31-Oct-95	TRACKETCH	-	3.50	-	-
	31-Oct-95	30-Nov-95	TRACKETCH	-	3.50	-	-
	30-Nov-95	03-Jan-96	TRACKETCH	-	3.50	-	-
1996	03-Jan-96	01-Feb-96	TRACKETCH	-	1.90	-	-
	01-Feb-96	01-Mar-96	TRACKETCH	-	1.90	-	-
	01-Mar-96	01-Apr-96	TRACKETCH	-	1.90	-	-
	01-Apr-96	01-May-96	TRACKETCH	-	3.40	-	-
	01-May-96	01-Jun-96	TRACKETCH	-	3.40	-	-
	01-Jun-96	01-Jul-96	TRACKETCH	-	3.40	-	-
	01-Jul-96	01-Aug-96	TRACKETCH	-	3.10	-	-
	01-Aug-96	01-Sep-96	TRACKETCH	-	3.10	-	-
	01-Sep-96	30-Sep-96	TRACKETCH	-	3.10	-	-
	30-Sep-96	01-Nov-96	TRACKETCH	-	3.30	-	-
	01-Nov-96	01-Dec-96	TRACKETCH	-	3.30	-	-
	01-Dec-96	03-Jan-97	TRACKETCH	-	3.30	-	-
1997	03-Jan-97	01-Feb-97	TRACKETCH	-	1.10	-	-
	01-Feb-97	01-Mar-97	TRACKETCH	-	1.10	-	-
	01-Mar-97	01-Apr-97	TRACKETCH	-	1.10	-	-
	01-Apr-97	01-May-97	TRACKETCH	-	3.00	-	-
	01-May-97	01-Jun-97	TRACKETCH	-	3.00	-	-
	01-Jun-97	30-Jun-97	TRACKETCH	-	3.00	-	-
	30-Jun-97	01-Aug-97	TRACKETCH	-	2.40	-	-
	01-Aug-97	01-Sep-97	TRACKETCH	-	2.40	-	-
	01-Sep-97	01-Oct-97	TRACKETCH	-	2.40	-	-
	01-Oct-97	01-Nov-97	TRACKETCH	-	3.80	-	-
	01-Nov-97	01-Dec-97	TRACKETCH	-	3.80	-	-
1998	01-Dec-97	03-Jan-98	TRACKETCH	-	3.80	-	-
	03-Jan-98	01-Feb-98	TRACKETCH	-	2.30	-	-
	01-Feb-98	01-Mar-98	TRACKETCH	-	2.30	-	-
	01-Mar-98	01-Apr-98	TRACKETCH	-	2.30	-	-
	01-Apr-98	01-May-98	TRACKETCH	-	2.00	-	-
	01-May-98	01-Jun-98	TRACKETCH	-	2.00	-	-
	01-Jun-98	01-Jul-98	TRACKETCH	-	2.00	-	-
	01-Jul-98	01-Aug-98	TRACKETCH	-	2.40	-	-
	01-Aug-98	01-Sep-98	TRACKETCH	-	2.40	-	-
	01-Sep-98	30-Sep-98	TRACKETCH	-	2.40	-	-
	30-Sep-98	01-Nov-98	TRACKETCH	-	3.00	-	-
	01-Nov-98	01-Dec-98	TRACKETCH	-	3.00	-	-
	01-Dec-98	04-Jan-99	TRACKETCH	-	3.00	-	-
1999	04-Jan-99	01-Feb-99	TRACKETCH	-	2.40	-	-
	01-Feb-99	01-Mar-99	TRACKETCH	-	2.40	-	-
	01-Mar-99	11-Apr-99	TRACKETCH	-	2.40	-	-
	11-Apr-99	01-May-99	TRACKETCH	-	2.60	-	-
	01-May-99	01-Jun-99	TRACKETCH	-	2.60	-	-
	01-Jun-99	04-Jul-99	TRACKETCH	-	2.60	-	-
	04-Jul-99	01-Aug-99	TRACKETCH	-	3.50	-	-
	01-Aug-99	01-Sep-99	TRACKETCH	-	3.50	-	-

	01-Sep-99	03-Oct-99	TRACKETCH	-	3.50	-	-
	03-Oct-99	01-Nov-99	TRACKETCH	-	4.70	-	-
	01-Nov-99	01-Dec-99	TRACKETCH	-	4.70	-	-
2000	01-Dec-99	02-Jan-00	TRACKETCH	-	4.70	-	-
	02-Jan-00	01-Feb-00	TRACKETCH	-	2.40	-	-
	01-Feb-00	01-Mar-00	TRACKETCH	-	2.40	-	-
	01-Mar-00	04-Apr-00	TRACKETCH	-	2.40	-	-
	04-Apr-00	01-May-00	TRACKETCH	-	3.20	-	-
	01-May-00	01-Jun-00	TRACKETCH	-	3.20	-	-
	01-Jun-00	05-Jul-00	TRACKETCH	-	3.20	-	-
	05-Jul-00	01-Aug-00	TRACKETCH	-	4.20	-	-
	01-Aug-00	01-Sep-00	TRACKETCH	-	4.20	-	-
	01-Sep-00	02-Oct-00	TRACKETCH	-	4.20	-	-
	02-Oct-00	01-Nov-00	TRACKETCH	-	3.70	-	-
	01-Nov-00	01-Dec-00	TRACKETCH	-	3.70	-	-
	01-Dec-00	01-Jan-01	TRACKETCH	-	3.70	-	-
2001	02-Jan-01	01-Feb-01	TRACKETCH	-	3.90	-	-
	01-Feb-01	01-Mar-01	TRACKETCH	-	3.90	-	-
	02-Mar-01	01-Apr-01	TRACKETCH	-	3.90	-	-
	01-Apr-01	01-May-01	TRACKETCH	-	1.50	-	-
	01-May-01	01-Jun-01	TRACKETCH	-	1.50	-	-
	01-Jun-01	01-Jul-01	TRACKETCH	-	1.50	-	-
	01-Jul-01	01-Aug-01	TRACKETCH	-	2.50	-	-
	01-Aug-01	01-Sep-01	TRACKETCH	-	2.50	-	-
	01-Sep-01	01-Oct-01	TRACKETCH	-	2.50	-	-
	01-Oct-01	01-Nov-01	TRACKETCH	-	2.00	-	-
	01-Nov-01	01-Dec-01	TRACKETCH	-	2.00	-	-
	01-Dec-01	02-Jan-02	TRACKETCH	-	2.00	-	-
2002	02-Jan-02	02-Feb-02	TRACKETCH	-	2.70	-	-
	02-Feb-02	01-Mar-02	TRACKETCH	-	2.70	-	-
	01-Mar-02	31-Mar-02	TRACKETCH	-	2.70	-	-
	31-Mar-02	01-May-02	TRACKETCH	-	2.00	-	-
	01-May-02	01-Jun-02	TRACKETCH	-	2.00	-	-
	01-Jun-02	01-Jul-02	TRACKETCH	-	2.00	-	-
	01-Jul-02	01-Aug-02	TRACKETCH	-	2.20	-	-
	01-Aug-02	01-Sep-02	TRACKETCH	-	2.20	-	-
	01-Sep-02	01-Oct-02	TRACKETCH	-	2.20	-	-
	01-Oct-02	01-Nov-02	TRACKETCH	-	2.80	-	-
	01-Nov-02	01-Dec-02	TRACKETCH	-	2.80	-	-
	01-Dec-02	02-Jan-03	TRACKETCH	-	2.80	-	-
2003	02-Jan-03	01-Feb-03	TRACKETCH	-	1.40	-	-
	01-Feb-03	01-Mar-03	TRACKETCH	-	1.40	-	-
	01-Mar-03	31-Mar-03	TRACKETCH	-	1.40	-	-
	31-Mar-03	01-May-03	TRACKETCH	-	3.50	-	-
	01-May-03	01-Jun-03	TRACKETCH	-	3.50	-	-
	01-Jun-03	30-Jun-03	TRACKETCH	-	3.50	-	-
	30-Jun-03	01-Aug-03	TRACKETCH	-	NO DATA	-	-
	01-Aug-03	01-Sep-03	TRACKETCH	-	NO DATA	-	-
	01-Sep-03	01-Oct-03	TRACKETCH	-	NO DATA	-	-
	01-Oct-03	01-Nov-03	TRACKETCH	-	2.10	-	-
	01-Nov-03	01-Dec-03	TRACKETCH	-	2.10	-	-
	01-Dec-03	01-Jan-04	TRACKETCH	-	2.10	-	-
2004	01-Jan-04	01-Feb-04	TRACKETCH	-	2.70	-	-
	01-Feb-04	01-Mar-04	TRACKETCH	-	2.70	-	-
	01-Mar-04	01-Apr-04	TRACKETCH	-	2.70	-	-
	01-Apr-04	01-May-04	TRACKETCH	-	1.70	-	-
	01-May-04	01-Jun-04	TRACKETCH	-	1.70	-	-
	01-Jun-04	30-Jun-04	TRACKETCH	-	1.70	-	-

	30-Jun-04	01-Aug-04	TRACKETCH	-	3.10	-	-
	01-Aug-04	01-Sep-04	TRACKETCH	-	3.10	-	-
	01-Sep-04	03-Oct-04	TRACKETCH	-	3.10	-	-
	03-Oct-04	01-Nov-04	TRACKETCH	-	2.80	-	-
	01-Nov-04	01-Dec-04	TRACKETCH	-	2.80	-	-
	01-Dec-04	01-Jan-05	TRACKETCH	-	2.80	-	-
2005	01-Jan-05	01-Feb-05	TRACKETCH	-	1.80	-	-
	01-Feb-05	01-Mar-05	TRACKETCH	-	1.80	-	-
	01-Mar-05	04-Apr-05	TRACKETCH	-	1.80	-	-
	04-Apr-05	01-May-05	TRACKETCH	-	1.50	-	-
	01-May-05	01-Jun-05	TRACKETCH	-	1.50	-	-
	01-Jun-05	03-Jul-05	TRACKETCH	-	1.50	-	-
	03-Jul-05	01-Aug-05	TRACKETCH	-	3.00	-	-
	01-Aug-05	01-Sep-05	TRACKETCH	-	3.00	-	-
	01-Sep-05	01-Oct-05	TRACKETCH	-	3.00	-	-
	01-Oct-05	01-Nov-05	TRACKETCH	-	3.10	-	-
	01-Nov-05	01-Dec-05	TRACKETCH	-	3.10	-	-
	01-Dec-05	01-Jan-06	TRACKETCH	-	3.10	-	-
2006	01-Jan-06	01-Feb-06	TRACKETCH	-	2.40	-	-
	01-Feb-06	01-Mar-06	TRACKETCH	-	2.40	-	-
	01-Mar-06	03-Apr-06	TRACKETCH	-	2.40	-	-
	03-Apr-06	03-May-06	TRACKETCH	-	2.50	-	-
	03-May-06	03-Jun-06	TRACKETCH	-	2.50	-	-
	03-Jun-06	05-Jul-06	TRACKETCH	-	2.50	-	-
	05-Jul-06	05-Aug-06	TRACKETCH	-	3.10	-	-
	05-Aug-06	05-Sep-06	TRACKETCH	-	3.10	-	-
	05-Sep-06	02-Oct-06	TRACKETCH	-	3.10	-	-
	02-Oct-06	02-Nov-06	TRACKETCH	-	2.60	-	-
	02-Nov-06	02-Dec-06	TRACKETCH	-	2.60	-	-
	02-Dec-06	02-Jan-07	TRACKETCH	-	2.60	-	-
2007	02-Jan-07	02-Feb-07	TRACKETCH	-	2.00	-	-
	02-Feb-07	02-Mar-07	TRACKETCH	-	2.00	-	-
	02-Mar-07	02-Apr-07	TRACKETCH	-	2.00	-	-
	02-Apr-07	02-May-07	TRACKETCH	-	2.90	-	-
	02-May-07	02-Jun-07	TRACKETCH	-	2.90	-	-
	02-Jun-07	03-Jul-07	TRACKETCH	-	2.90	-	-
	03-Jul-07	01-Aug-07	TRACKETCH	-	3.70	-	-
	01-Aug-07	01-Sep-07	TRACKETCH	-	3.70	-	-
	01-Sep-07	03-Oct-07	TRACKETCH	-	3.70	-	-
	03-Oct-07	01-Nov-07	TRACKETCH	-	3.20	-	-
	01-Nov-07	01-Dec-07	TRACKETCH	-	3.20	-	-
	01-Dec-07	02-Jan-08	TRACKETCH	-	3.20	-	-
2008	02-Jan-08	01-Feb-08	TRACKETCH	-	2.10	-	-
	01-Feb-08	01-Mar-08	TRACKETCH	-	2.10	-	-
	01-Mar-08	01-Apr-08	TRACKETCH	-	2.10	-	-
	01-Apr-08	01-May-08	TRACKETCH	-	1.60	-	-
	01-May-08	01-Jun-08	TRACKETCH	-	1.60	-	-
	01-Jun-08	02-Jul-08	TRACKETCH	-	1.60	-	-
	02-Jul-08	01-Aug-08	TRACKETCH	-	2.90	-	-
	01-Aug-08	01-Sep-08	TRACKETCH	-	2.90	-	-
	01-Sep-08	01-Oct-08	TRACKETCH	-	2.90	-	-
	01-Oct-08	01-Nov-08	TRACKETCH	-	2.90	-	-
	01-Nov-08	01-Dec-08	TRACKETCH	-	2.90	-	-
	01-Dec-08	04-Jan-09	TRACKETCH	-	2.90	-	-
2009	04-Jan-09	01-Feb-09	TRACKETCH	-	2.70	-	-
	01-Feb-09	1-Mar-09	TRACKETCH	-	2.70	-	-
	1-Mar-09	31-Mar-09	TRACKETCH	-	2.70	-	-
	31-Mar-09	01-May-09	TRACKETCH	-	2.30	-	-

01-May-09	01-Jun-09	TRACKETCH	-	2.30	-	-
01-Jun-09	29-Jun-09	TRACKETCH	-	2.30	-	-
29-Jun-09	01-Aug-09	TRACKETCH	-	2.90	-	-
01-Aug-09	01-Sep-09	TRACKETCH	-	2.90	-	-
01-Sep-09	01-Oct-09	TRACKETCH	-	2.90	-	-
1-Oct-09	01-Nov-09	TRACKETCH	-	2.80	-	-
01-Nov-09	01-Dec-09	TRACKETCH	-	2.80	-	-
01-Dec-09	31-Dec-09	TRACKETCH	-	2.80	-	-
1-Jan-10	1-Feb-10	TRACKETCH	-	2.70	-	-
1-Feb-10	1-Mar-10	TRACKETCH	-	2.70	-	-
1-Mar-10	1-Apr-10	TRACKETCH	-	2.70	-	-
1-Apr-10	1-May-10	TRACKETCH	-	1.70	-	-
1-May-10	1-Jun-10	TRACKETCH	-	1.70	-	-
1-Jun-10	1-Jul-10	TRACKETCH	-	1.70	-	-
1-Jul-10	1-Aug-10	TRACKETCH	-	2.20	-	-
1-Aug-10	1-Sep-10	TRACKETCH	-	2.20	-	-
1-Sep-10	1-Oct-10	TRACKETCH	-	2.20	-	-
1-Oct-10	1-Nov-10	TRACKETCH	-	1.60	-	-
1-Nov-10	1-Dec-10	TRACKETCH	-	1.60	-	-
1-Dec-10	1-Jan-11	TRACKETCH	-	1.60	-	-
1-Jan-11	1-Feb-11	TRACKETCH	-	1.00	-	-
1-Feb-11	1-Mar-11	TRACKETCH	-	1.00	-	-
1-Mar-11	1-Apr-11	TRACKETCH	-	1.00	-	-
1-Apr-11	1-May-11	TRACKETCH	-	1.60	-	-
1-May-11	1-Jun-11	TRACKETCH	-	1.60	-	-
1-Jun-11	1-Jul-11	TRACKETCH	-	1.60	-	-
	AVERAGE		0.95	2.57	1.05	0.24
	MINIMUM		0.16	0.00	1.05	0.24
	MAXIMUM		2.90	9.03	1.05	0.24
	STD. DEV.		0.77	1.13	1.05	0.29
	VARIANCE		0.60	1.27	1.05	0.08

	Operating Period - Air 4
AVERAGE	0.99
MINIMUM	0.16
MAXIMUM	2.90
STD. DEV.	0.82
VARIANCE	0.67

1-IF MORE THAN ONE READING WAS TAKEN FOR THE PERIOD THEN THE RESULT SHOWN IS AN AVERAGE OF THE READINGS TAKEN

2-IF THREE (3) IDENTICAL READINGS FOR A SINGLE STATION APPEAR IN SUCCESSION AND ARE MARKED BY A SINGLE VERTICAL LINE IN ALL THREE MONTHS OF A GIVEN CALENDER QUARTER THEN THE DETECTOR WAS PLACED FOR THE ENTIRE QUARTER AND THE INDIVIDUAL MONTHLY READINGS ARE THE SINGLE QUARTERLY READING REPEATED FOR EACH MONTH

Kennecott Uranium Company - Sweetwater Uranium Facility

UPWIND RADON DATA

	START DATE	END DATE	DETECTOR TYPE	STATION AIR 2 - A pCi/L	STATION AIR 2 -B pCi/L	AIR 3A pCi/L
1981	1-Jan-81	01-Feb-81	PRM	0.66	-	0.12
	1-Feb-81	01-Mar-81	PRM	0.60	-	0.19
	1-Mar-81	01-Apr-81	PRM	0.52	-	0.24
	1-Apr-81	01-May-81	PRM	0.41	-	0.27
	1-May-81	01-Jun-81	PRM	0.22	-	0.28
	1-Jun-81	01-Jul-81	PRM	0.21	-	0.48
	1-Jul-81	01-Aug-81	PRM	1.00	-	0.54
	1-Aug-81	01-Sep-81	PRM	2.10	-	0.20
	1-Sep-81	01-Oct-81	PRM	0.73	-	0.90
	1-Oct-81	01-Nov-81	PRM	4.02	-	0.59
	1-Nov-81	01-Dec-81	PRM	1.07	-	1.65
	1-Dec-81	01-Jan-82	PRM	2.10	-	0.22
1982	1-Jan-82	01-Feb-82	PRM	0.04	-	1.09
	1-Feb-82	01-Mar-82	PRM	1.01	-	0.42
	1-Mar-82	01-Apr-82	PRM	1.68	-	1.07
	1-Apr-82	01-May-82	PRM	6.86	-	0.41
	1-May-82	01-Jun-82	PRM	0.91	-	0.45
	1-Jun-82	01-Jul-82	PRM	1.96	-	0.29
	1-Jul-82	01-Aug-82	PRM	1.96	-	0.29
	1-Aug-82	01-Sep-82	PRM	0.46	-	0.24
	1-Sep-82	01-Oct-82	PRM	0.85	-	0.37
	1-Oct-82	01-Nov-82	PRM	2.25	-	1.24
	1-Nov-82	01-Dec-82	PRM	5.23	-	1.04
	1-Dec-82	01-Jan-83	PRM	1.39	-	0.89
1983	1-Jan-83	01-Feb-83	PRM	1.85	-	0.20
	1-Feb-83	01-Mar-83	PRM	1.03	-	0.31
	1-Mar-83	01-Apr-83	PRM	0.44	-	1.21
	1-Apr-83	01-May-83	PRM	1.22	-	0.52
	1-May-83	01-Jun-83	PRM	0.56	-	2.95
	1-Jun-83	01-Jul-83	PRM	2.38	-	1.57
	1-Jul-83	01-Aug-83	PRM	-	-	1.72
	1-Aug-83	01-Sep-83	PRM	-	-	0.52
	1-Sep-83	01-Oct-83	PRM	-	-	2.04
	1-Oct-83	01-Nov-83	PRM	-	-	2.04
	1-Nov-83	01-Dec-83	PRM	-	-	0.20
	1-Dec-83	01-Jan-84	PRM	-	-	0.04
1984	1-Jan-84	01-Feb-84	PRM	-	-	1.32
	1-Feb-84	01-Mar-84	PRM	-	-	1.79
	1-Mar-84	01-Apr-84	PRM	-	-	1.18
	1-Apr-84	01-May-84	PRM	-	-	1.21

	1-May-84	01-Jun-84	PRM	-	-	1.10
	1-Jun-84	01-Jul-84	PRM	-	-	2.15
	1-Jul-84	01-Aug-84	PRM	-	-	-
	1-Aug-84	01-Sep-84	PRM	-	-	-
	1-Sep-84	01-Oct-84	PRM	-	-	-
	1-Oct-84	01-Nov-84	PRM	-	-	-
	1-Nov-84	01-Dec-84	PRM	-	-	-
	1-Dec-84	01-Jan-85	PRM	-	-	-
1985	1-Jan-85	01-Feb-85	PRM	-	-	-
	1-Feb-85	01-Mar-85	PRM	-	-	-
	1-Mar-85	01-Apr-85	PRM	-	-	-
	1-Apr-85	01-May-85	PRM	-	-	-
	1-May-85	01-Jun-85	PRM	-	-	-
	1-Jun-85	01-Jul-85	PRM	-	-	-
	1-Jul-85	01-Aug-85	PRM	-	-	-
	1-Aug-85	01-Sep-85	PRM	-	-	-
	1-Sep-85	01-Oct-85	PRM	-	-	-
	1-Oct-85	01-Nov-85	PRM	-	-	-
	1-Nov-85	01-Dec-85	PRM	-	-	-
	1-Dec-85	01-Jan-86	PRM	-	-	-
1986	1-Jan-86	01-Feb-86	PRM	-	-	-
	1-Feb-86	01-Mar-86	PRM	-	-	-
	1-Mar-86	01-Apr-86	PRM	-	-	-
	1-Apr-86	01-May-86	PRM	-	-	-
	1-May-86	01-Jun-86	PRM	-	-	-
	1-Jun-86	01-Jul-86	PRM	-	-	-
	1-Jul-86	01-Aug-86	PRM	-	-	-
	1-Aug-86	01-Sep-86	PRM	-	-	-
	1-Sep-86	01-Oct-86	PRM	-	-	-
	1-Oct-86	01-Nov-86	PRM	-	-	-
	1-Nov-86	01-Dec-86	PRM	-	-	-
	1-Dec-86	01-Jan-87	PRM	-	-	-
1987	1-Jan-87	01-Feb-87	PRM	-	-	-
	1-Feb-87	01-Mar-87	PRM	-	-	-
	1-Mar-87	01-Apr-87	PRM	-	-	-
	1-Apr-87	01-May-87	PRM	-	-	-
	1-May-87	01-Jun-87	PRM	-	-	-
	1-Jun-87	01-Jul-87	PRM	-	-	-
	1-Jul-87	01-Aug-87	PRM	-	-	-
	1-Aug-87	01-Sep-87	PRM	-	-	-
	1-Sep-87	01-Oct-87	PRM	-	-	-
	1-Oct-87	01-Nov-87	PRM	-	-	-
	1-Nov-87	01-Dec-87	PRM	-	-	-
	1-Dec-87	01-Jan-88	PRM	-	-	-
1988	1-Jan-88	01-Feb-88	PRM	-	-	-
	1-Feb-88	01-Mar-88	PRM	-	-	-
	1-Mar-88	01-Apr-88	PRM	-	-	-
	1-Apr-88	01-May-88	PRM	-	-	-
	1-May-88	01-Jun-88	PRM	-	-	-

	1-Jun-88	01-Jul-88	PRM	-	-	-
	1-Jul-88	01-Aug-88	PRM	-	-	-
	1-Aug-88	01-Sep-88	PRM	-	-	-
	1-Sep-88	01-Oct-88	PRM	-	-	-
	1-Oct-88	01-Nov-88	PRM	-	-	-
	1-Nov-88	01-Dec-88	PRM	-	-	-
	1-Dec-88	01-Jan-89	PRM	-	-	-
1989	1-Jan-89	01-Feb-89	PRM	-	-	-
	1-Feb-89	01-Mar-89	PRM	-	-	-
	1-Mar-89	01-Apr-89	PRM	-	-	-
	1-Apr-89	01-May-89	PRM	-	-	-
	1-May-89	01-Jun-89	PRM	-	-	-
	1-Jun-89	01-Jul-89	PRM	-	-	-
	1-Jul-89	01-Aug-89	PRM	-	-	-
	1-Aug-89	01-Sep-89	PRM	-	-	-
	1-Sep-89	01-Oct-89	PRM	-	-	-
	1-Oct-89	01-Nov-89	PRM	-	-	-
	1-Nov-89	01-Dec-89	PRM	-	-	-
	1-Dec-89	01-Jan-90	PRM	-	-	-
1990	1-Jan-90	01-Feb-90	PRM	-	-	-
	1-Feb-90	01-Mar-90	PRM	-	-	-
	1-Mar-90	01-Apr-90	PRM	-	-	-
	1-Apr-90	01-May-90	PRM	-	-	-
	1-May-90	01-Jun-90	PRM	-	-	-
	1-Jun-90	01-Jul-90	PRM	-	-	-
	1-Jul-90	01-Aug-90	PRM	-	-	-
	1-Aug-90	01-Sep-90	PRM	-	-	-
	1-Sep-90	01-Oct-90	PRM	-	-	-
	1-Oct-90	01-Nov-90	PRM	-	-	-
	1-Nov-90	01-Dec-90	PRM	-	-	-
	1-Dec-90	01-Jan-91	PRM	-	-	-
1991	1-Jan-91	01-Feb-91	PRM	2.00	-	-
	1-Feb-91	01-Mar-91	PRM	2.00	-	-
	1-Mar-91	01-Apr-91	PRM	2.00	-	-
	1-Apr-91	01-May-91	TRACKETCH	(3)	-	-
	1-May-91	01-Jun-91	TRACKETCH	(3)	-	-
	1-Jun-91	01-Jul-91	TRACKETCH	(3)	-	-
	1-Jul-91	01-Aug-91	TRACKETCH	4.20	-	-
	1-Aug-91	01-Sep-91	TRACKETCH	4.20	-	-
	1-Sep-91	01-Oct-91	TRACKETCH	4.20	-	-
	1-Oct-91	01-Nov-91	TRACKETCH	2.80	-	-
	1-Nov-91	01-Dec-91	TRACKETCH	2.80	-	-
	1-Dec-91	03-Jan-92	TRACKETCH	2.80	-	-
1992	10-Jan-92	07-Feb-92	TRACKETCH	3.90	-	-
	7-Feb-92	03-Mar-92	TRACKETCH	3.20	-	-
	3-Mar-92	02-Apr-92	TRACKETCH	5.93	-	-
	2-Apr-92	11-May-92	TRACKETCH	3.07	-	-
	11-May-92	01-Jun-92	TRACKETCH	3.07	-	-
	1-Jun-92	01-Jul-92	TRACKETCH	3.07	-	-

	1-Jul-92	01-Aug-92	TRACKETCH	3.80	-	-
	1-Aug-92	01-Sep-92	TRACKETCH	3.80	-	-
	1-Sep-92	06-Oct-92	TRACKETCH	3.80	-	-
	6-Oct-92	01-Nov-92	TRACKETCH	3.00	-	-
	1-Nov-92	01-Dec-92	TRACKETCH	3.00	-	-
	1-Dec-92	04-Jan-93	TRACKETCH	3.00	-	-
1993	4-Jan-93	01-Feb-93	TRACKETCH	3.20	-	-
	1-Feb-93	01-Mar-93	TRACKETCH	3.20	-	-
	1-Mar-93	01-Apr-93	TRACKETCH	3.20	-	-
	1-Apr-93	01-May-93	TRACKETCH	2.50	-	-
	1-May-93	01-Jun-93	TRACKETCH	2.50	-	-
	1-Jun-93	30-Jun-93	TRACKETCH	2.50	-	-
	30-Jun-93	01-Aug-93	TRACKETCH	4.80	-	-
	1-Aug-93	18-Aug-93	TRACKETCH	4.80	-	-
	18-Aug-93	01-Oct-93	TRACKETCH	4.80	-	-
	1-Oct-93	04-Nov-93	TRACKETCH	4.80	-	-
	4-Nov-93	30-Nov-93	TRACKETCH	4.80	-	-
	30-Nov-93	03-Jan-94	TRACKETCH	4.80	-	-
1994	3-Jan-94	31-Jan-94	TRACKETCH	5.30	-	-
	31-Jan-94	21-Feb-94	TRACKETCH	5.30	-	-
	21-Feb-94	31-Mar-94	TRACKETCH	5.30	-	-
	31-Mar-94	27-Apr-94	TRACKETCH	3.10	-	-
	27-Apr-94	31-May-94	TRACKETCH	3.10	-	-
	31-May-94	01-Jul-94	TRACKETCH	3.10	-	-
	1-Jul-94	03-Aug-94	TRACKETCH	3.70	-	-
	3-Aug-94	07-Sep-94	TRACKETCH	3.70	-	-
	7-Sep-94	03-Oct-94	TRACKETCH	3.70	-	-
	3-Oct-94	02-Nov-94	TRACKETCH	3.00	-	-
	2-Nov-94	01-Dec-94	TRACKETCH	3.00	-	-
	1-Dec-94	03-Jan-95	TRACKETCH	3.00	-	-
1995	3-Jan-95	01-Feb-95	TRACKETCH	3.10	-	-
	1-Feb-95	02-Mar-95	TRACKETCH	3.10	-	-
	2-Mar-95	31-Mar-95	TRACKETCH	3.10	-	-
	31-Mar-95	30-Apr-95	TRACKETCH	2.40	-	-
	30-Apr-95	31-May-95	TRACKETCH	2.40	-	-
	31-May-95	30-Jun-95	TRACKETCH	2.40	-	-
	30-Jun-95	31-Jul-95	TRACKETCH	4.50	-	-
	31-Jul-95	31-Aug-95	TRACKETCH	4.50	-	-
	31-Aug-95	30-Sep-95	TRACKETCH	4.50	-	-
	30-Sep-95	31-Oct-95	TRACKETCH	4.80	-	-
	31-Oct-95	30-Nov-95	TRACKETCH	4.80	-	-
	30-Nov-95	03-Jan-96	TRACKETCH	4.80	-	-
1996	3-Jan-96	01-Feb-96	TRACKETCH	2.20	-	-
	1-Feb-96	01-Mar-96	TRACKETCH	2.20	-	-
	1-Mar-96	01-Apr-96	TRACKETCH	2.20	-	-
	1-Apr-96	01-May-96	TRACKETCH	2.90	-	-
	1-May-96	01-Jun-96	TRACKETCH	2.90	-	-
	1-Jun-96	01-Jul-96	TRACKETCH	2.90	-	-
	1-Jul-96	01-Aug-96	TRACKETCH	4.10	-	-

	1-Aug-96	01-Sep-96	TRACKETCH	4.10	-	-
	1-Sep-96	30-Sep-96	TRACKETCH	4.10	-	-
	30-Sep-96	01-Nov-96	TRACKETCH	2.90	-	-
	1-Nov-96	01-Dec-96	TRACKETCH	2.90	-	-
	1-Dec-96	03-Jan-97	TRACKETCH	2.90	-	-
1997	3-Jan-97	01-Feb-97	TRACKETCH	1.70	-	-
	1-Feb-97	01-Mar-97	TRACKETCH	1.70	-	-
	1-Mar-97	01-Apr-97	TRACKETCH	1.70	-	-
	1-Apr-97	01-May-97	TRACKETCH	3.40	-	-
	1-May-97	01-Jun-97	TRACKETCH	3.40	-	-
	1-Jun-97	30-Jun-97	TRACKETCH	3.40	-	-
	30-Jun-97	01-Aug-97	TRACKETCH	2.70	-	-
	1-Aug-97	01-Sep-97	TRACKETCH	2.70	-	-
	1-Sep-97	01-Oct-97	TRACKETCH	2.70	-	-
	1-Oct-97	01-Nov-97	TRACKETCH	3.90	-	-
	1-Nov-97	01-Dec-97	TRACKETCH	3.90	-	-
	1-Dec-97	03-Jan-98	TRACKETCH	3.90	-	-
1998	3-Jan-98	01-Feb-98	TRACKETCH	2.40	-	-
	1-Feb-98	01-Mar-98	TRACKETCH	2.40	-	-
	1-Mar-98	01-Apr-98	TRACKETCH	2.40	-	-
	1-Apr-98	01-May-98	TRACKETCH	2.20	-	-
	1-May-98	01-Jun-98	TRACKETCH	2.20	-	-
	1-Jun-98	01-Jul-98	TRACKETCH	2.20	-	-
	1-Jul-98	01-Aug-98	TRACKETCH	3.00	-	-
	1-Aug-98	01-Sep-98	TRACKETCH	3.00	-	-
	1-Sep-98	30-Sep-98	TRACKETCH	3.00	-	-
	30-Sep-98	01-Nov-98	TRACKETCH	2.80	-	-
	1-Nov-98	01-Dec-98	TRACKETCH	2.80	-	-
	1-Dec-98	04-Jan-99	TRACKETCH	2.80	-	-
1999	4-Jan-99	01-Feb-99	TRACKETCH	2.60	-	-
	1-Feb-99	01-Mar-99	TRACKETCH	2.60	-	-
	1-Mar-99	11-Apr-99	TRACKETCH	2.60	-	-
	11-Apr-99	01-May-99	TRACKETCH	2.70	-	-
	1-May-99	01-Jun-99	TRACKETCH	2.70	-	-
	1-Jun-99	04-Jul-99	TRACKETCH	2.70	-	-
	4-Jul-99	01-Aug-99	TRACKETCH	3.90	-	-
	1-Aug-99	01-Sep-99	TRACKETCH	3.90	-	-
	1-Sep-99	03-Oct-99	TRACKETCH	3.90	-	-
	3-Oct-99	01-Nov-99	TRACKETCH	6.40	-	-
	1-Nov-99	01-Dec-99	TRACKETCH	6.40	-	-
	1-Dec-99	02-Jan-00	TRACKETCH	6.40	-	-
2000	2-Jan-00	01-Feb-00	TRACKETCH	1.80	-	-
	1-Feb-00	01-Mar-00	TRACKETCH	1.80	-	-
	1-Mar-00	04-Apr-00	TRACKETCH	1.80	-	-
	4-Apr-00	01-May-00	TRACKETCH	3.50	-	-
	1-May-00	01-Jun-00	TRACKETCH	3.50	-	-
	1-Jun-00	05-Jul-00	TRACKETCH	3.50	-	-
	5-Jul-00	01-Aug-00	TRACKETCH	5.70	-	-
	1-Aug-00	01-Sep-00	TRACKETCH	5.70	-	-

	1-Sep-00	02-Oct-00	TRACKETCH	5.70	-	-
	2-Oct-00	01-Nov-00	TRACKETCH	78.8	-	-
	1-Nov-00	01-Dec-00	TRACKETCH	78.8	-	-
	1-Dec-00	01-Jan-01	TRACKETCH	78.8	-	-
2001	2-Jan-01	01-Feb-01	TRACKETCH	6.20	-	-
	1-Feb-01	01-Mar-01	TRACKETCH	6.20	-	-
	1-Mar-01	01-Apr-01	TRACKETCH	6.20	-	-
	1-Apr-01	01-May-01	TRACKETCH	2.50	-	-
	1-May-01	01-Jun-01	TRACKETCH	2.50	-	-
	1-Jun-01	01-Jul-01	TRACKETCH	2.50	-	-
	1-Jul-01	01-Aug-01	TRACKETCH	3.10	-	-
	1-Aug-01	01-Sep-01	TRACKETCH	3.10	-	-
	1-Sep-01	01-Oct-01	TRACKETCH	3.10	-	-
	1-Oct-01	01-Nov-01	TRACKETCH	4.10	-	-
	1-Nov-01	01-Dec-01	TRACKETCH	4.10	-	-
	1-Dec-01	02-Jan-02	TRACKETCH	4.10	-	-
2002	2-Jan-02	01-Feb-02	TRACKETCH	2.70	-	-
	1-Feb-02	01-Mar-02	TRACKETCH	2.70	-	-
	1-Mar-02	31-Mar-02	TRACKETCH	2.70	-	-
	31-Mar-02	01-May-02	TRACKETCH	2.30	-	-
	1-May-02	01-Jun-02	TRACKETCH	2.30	-	-
	1-Jun-02	01-Jul-02	TRACKETCH	2.30	-	-
	1-Jul-02	01-Aug-02	TRACKETCH	3.30	-	-
	1-Aug-02	01-Sep-02	TRACKETCH	3.30	-	-
	1-Sep-02	01-Oct-02	TRACKETCH	3.30	-	-
	1-Oct-02	01-Nov-02	TRACKETCH	4.20	-	-
	1-Nov-02	01-Dec-02	TRACKETCH	4.20	-	-
	1-Dec-02	02-Jan-03	TRACKETCH	4.20	-	-
2003	2-Jan-03	02-Feb-03	TRACKETCH	2.60	-	-
	1-Feb-03	01-Mar-03	TRACKETCH	2.60	-	-
	1-Mar-03	31-Mar-03	TRACKETCH	2.60	-	-
	31-Mar-03	01-May-03	TRACKETCH	3.90	-	-
	1-May-03	01-Jun-03	TRACKETCH	3.90	-	-
	1-Jun-03	30-Jun-03	TRACKETCH	3.90	-	-
	30-Jun-03	01-Aug-03	TRACKETCH	NO DATA	-	-
	1-Aug-03	01-Sep-03	TRACKETCH	NO DATA	-	-
	1-Sep-03	01-Oct-03	TRACKETCH	NO DATA	-	-
	1-Oct-03	01-Nov-03	TRACKETCH	3.50	-	-
	1-Nov-03	01-Dec-03	TRACKETCH	3.50	-	-
	1-Dec-03	01-Jan-04	TRACKETCH	3.50	-	-
2004	1-Jan-04	01-Feb-04	TRACKETCH	2.70	-	-
	1-Feb-04	01-Mar-04	TRACKETCH	2.70	-	-
	1-Mar-04	01-Apr-04	TRACKETCH	2.70	-	-
	1-Apr-04	01-May-04	TRACKETCH	2.40	-	-
	1-May-04	01-Jun-04	TRACKETCH	2.40	-	-
	1-Jun-04	30-Jun-04	TRACKETCH	2.40	-	-
	30-Jun-04	01-Aug-04	TRACKETCH	3.60	-	-
	1-Aug-04	01-Sep-04	TRACKETCH	3.60	-	-
	1-Sep-04	03-Oct-04	TRACKETCH	3.60	-	-

	3-Oct-04	01-Nov-04	TRACKETCH	3.90	-	-
	1-Nov-04	01-Dec-04	TRACKETCH	3.90	-	-
	1-Dec-04	01-Jan-05	TRACKETCH	3.90	-	-
2005	1-Jan-05	01-Feb-05	TRACKETCH	2.30	-	-
	1-Feb-05	01-Mar-05	TRACKETCH	2.30	-	-
	1-Mar-05	04-Apr-05	TRACKETCH	2.30	-	-
	4-Apr-05	01-May-05	TRACKETCH	2.60	-	-
	1-May-05	01-Jun-05	TRACKETCH	2.60	-	-
	1-Jun-05	03-Jul-05	TRACKETCH	2.60	-	-
	3-Jul-05	01-Aug-05	TRACKETCH	4.30	-	-
	1-Aug-05	01-Sep-05	TRACKETCH	4.30	-	-
	1-Sep-05	01-Oct-05	TRACKETCH	4.30	-	-
	1-Oct-05	01-Nov-05	TRACKETCH	3.90	-	-
	1-Nov-05	01-Dec-05	TRACKETCH	3.90	-	-
	1-Dec-05	01-Jan-06	TRACKETCH	3.90	-	-
2006	1-Jan-06	01-Feb-06	TRACKETCH	2.60	-	-
	1-Feb-06	01-Mar-06	TRACKETCH	2.60	-	-
	1-Mar-06	03-Apr-06	TRACKETCH	2.60	-	-
	3-Apr-06	03-May-06	TRACKETCH	4.60	-	-
	3-May-06	03-Jun-06	TRACKETCH	4.60	-	-
	3-Jun-06	05-Jul-06	TRACKETCH	4.60	-	-
	5-Jul-06	05-Aug-06	TRACKETCH	3.60	-	-
	5-Aug-06	05-Sep-06	TRACKETCH	3.60	-	-
	5-Sep-06	02-Oct-06	TRACKETCH	3.60	-	-
	2-Oct-06	02-Nov-06	TRACKETCH	3.50	-	-
	2-Nov-06	02-Dec-06	TRACKETCH	3.50	-	-
	2-Dec-06	02-Jan-07	TRACKETCH	3.50	-	-
2007	2-Jan-07	01-Feb-07	TRACKETCH	16.9	-	-
	1-Feb-07	01-Mar-07	TRACKETCH	16.9	-	-
	1-Mar-07	02-Apr-07	TRACKETCH	16.9	-	-
	2-Apr-07	01-May-07	TRACKETCH	NO DATA	-	-
	1-May-07	01-Jun-07	TRACKETCH	NO DATA	-	-
	1-Jun-07	03-Jul-07	TRACKETCH	NO DATA	-	-
	3-Jul-07	01-Aug-07	TRACKETCH	3.90	-	-
	1-Aug-07	01-Sep-07	TRACKETCH	3.90	-	-
	1-Sep-07	03-Oct-07	TRACKETCH	3.90	-	-
	3-Oct-07	01-Nov-07	TRACKETCH	3.40	-	-
	1-Nov-07	01-Dec-07	TRACKETCH	3.40	-	-
	1-Dec-07	02-Jan-08	TRACKETCH	3.40	-	-
2008	2-Jan-08	01-Feb-08	TRACKETCH	3.40	-	-
	1-Feb-08	01-Mar-08	TRACKETCH	3.40	-	-
	1-Mar-08	01-Apr-08	TRACKETCH	3.40	-	-
	1-Apr-08	01-May-08	TRACKETCH	2.20	-	-
	1-May-08	01-Jun-08	TRACKETCH	2.20	-	-
	1-Jun-08	02-Jul-08	TRACKETCH	2.20	-	-
	2-Jul-08	01-Aug-08	TRACKETCH	5.10	-	-
	1-Aug-08	01-Sep-08	TRACKETCH	5.10	-	-
	6-Aug-08	1-Sep-08	TRACKETCH	NO DATA	2.00	-
	1-Sep-08	01-Oct-08	TRACKETCH	5.10	2.00	-

	1-Oct-08	01-Nov-08	TRACKETCH	3.20	3.60	-
	1-Nov-08	01-Dec-08	TRACKETCH	3.20	3.60	-
	1-Dec-08	04-Jan-09	TRACKETCH	3.20	3.60	-
2009	4-Jan-09	01-Feb-09	TRACKETCH	2.70	2.90	-
	1-Feb-09	01-Mar-09	TRACKETCH	2.70	2.90	-
	31-Mar-09	1-Apr-09	TRACKETCH	2.70	2.90	-
	1-Apr-09	01-May-09	TRACKETCH	2.50	2.60	-
	1-May-09	29-Jun-09	TRACKETCH	2.50	2.60	-
	29-Jun-09	01-Jul-09	TRACKETCH	2.50	2.60	-
	1-Jul-09	01-Aug-09	TRACKETCH	3.10	3.70	-
	1-Aug-09	01-Sep-09	TRACKETCH	3.10	3.70	-
	1-Sep-09	01-Oct-09	TRACKETCH	3.10	3.70	-
	1-Oct-09	01-Nov-09	TRACKETCH	3.40	4.10	-
	01-Nov-09	01-Dec-09	TRACKETCH	3.40	4.10	-
	01-Dec-09	31-Dec-09	TRACKETCH	3.40	4.10	-
	1-Jan-10	1-Feb-10	TRACKETCH	NO DATA	3.30	-
	1-Feb-10	1-Mar-10	TRACKETCH	NO DATA	3.30	-
	1-Mar-10	1-Apr-10	TRACKETCH	NO DATA	3.30	-
	1-Apr-10	1-May-10	TRACKETCH	1.70	1.70	-
	1-May-10	1-Jun-10	TRACKETCH	1.70	1.70	-
	1-Jun-10	1-Jul-10	TRACKETCH	1.70	1.70	-
	1-Jul-10	1-Aug-10	TRACKETCH	2.20	2.80	-
	1-Aug-10	1-Sep-10	TRACKETCH	2.20	2.80	-
	1-Sep-10	1-Oct-10	TRACKETCH	2.20	2.80	-
	1-Oct-10	1-Nov-10	TRACKETCH	1.90	2.40	-
	1-Nov-10	1-Dec-10	TRACKETCH	1.90	2.40	-
	1-Dec-10	1-Jan-11	TRACKETCH	1.90	2.40	-
	1-Jan-11	1-Feb-11	TRACKETCH	0.90	0.90	-
	1-Feb-11	1-Mar-11	TRACKETCH	0.90	0.90	-
	1-Mar-11	1-Apr-11	TRACKETCH	0.90	0.90	-
	1-Apr-11	1-May-11	TRACKETCH	1.70	1.90	-
	1-May-11	1-Jun-11	TRACKETCH	1.70	1.90	-
	1-Jun-11	1-Jul-11	TRACKETCH	1.70	1.90	-
	AVERAGE			**3.07**	**2.68**	**0.85**
	MINIMUM			**0.04**	**0.90**	**0.04**
	MAXIMUM			**6.86**	**4.10**	**2.95**
	STD. DEV.			**1.25**	**0.90**	**0.68**
	VARIANCE			**1.57**	**0.81**	**0.47**

	Operating Period Air 2
AVERAGE	1.56
MINIMUM	0.04
MAXIMUM	6.86
STD. DEV.	1.57
VARIANCE	2.45

1-IF MORE THAN ONE READING WAS TAKEN FOR THE PERIOD THEN THE RESULT SHOWN IS AN AVERAGE OF THE READINGS TAKEN

2-IF THREE (3) IDENTICAL READINGS FOR A SINGLE STATION APPEAR IN SUCCESSION AND ARE MARKED BY A SINGLE VERTICAL LINE IN ALL THREE MONTHS OF A GIVEN CALENDER QUARTER THEN THE DETECTOR WAS PLACED FOR THE ENTIRE QUARTER AND THE INDIVIDUAL MONTHLY READINGS ARE THE SINGLE QUARTERLY READING REPEATED FOR EACH MONTH

3-DETECTOR PROBLEM CAUSED ERRONEOUS READING WHICH IS NOT INCLUDED IN RESULTS

Appendix 4

Lost Creek Project
Ambient Radon Monitoring Data

Monitoring Period	URPA-7 West of Project (picocuries per liter)	URPA-8 Southeast of Project (picocuries per liter)	URPA-9 Center of Project (picocuries per liter)	URPA-10 Northeast of Project (picocuries per liter)	URPA-13 Southeast of Project (picocuries per liter)	URPA-1 Baroil (picocuries per liter)
Q1	1.5	2.7	3.8	2.1	N/A	0.5
Q2	0.7	1.3	0.8	1.2	2.0	0.3
Q3	1.6	2.1	1.5	1.8	1.5	0.9
Q4	2.8	3.2	2.8	1.0	2.5	0.6
Q5	N/A	N/A	1.7	2.0	2.7	0.8
Average:	1.7	2.3	2.1	1.6	2.2	0.6
Median:	1.6	2.4	1.7	1.8	2.3	0.6
Maximum:	2.8	3.2	3.8	2.1	2.7	0.9
Minimum:	0.7	1.3	0.8	1.0	1.5	0.3
Standard Deviation:	0.9	0.8	1.2	0.5	0.5	0.2

OAP:05/03/10
UR_Energy_spreadsheet.xls

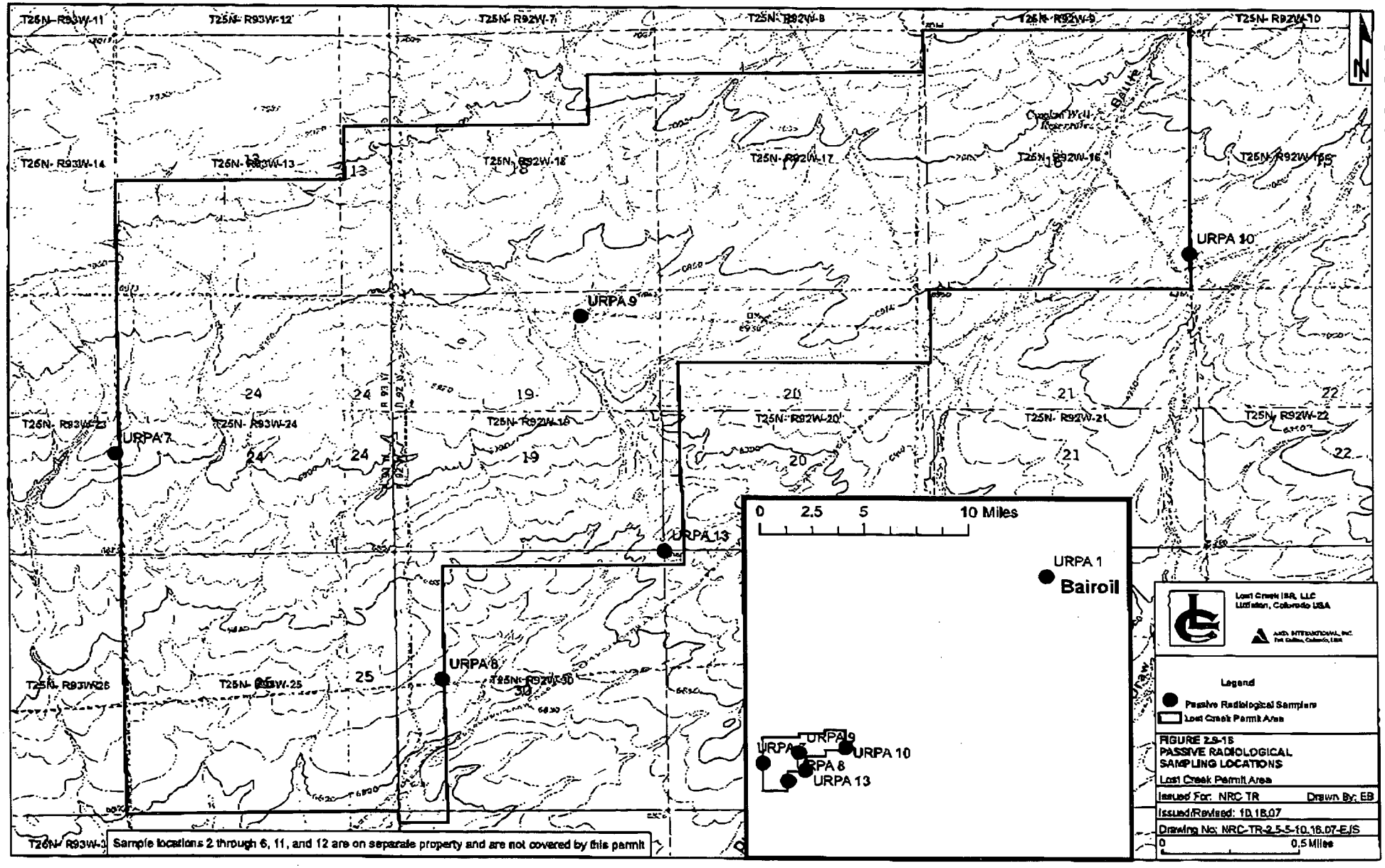
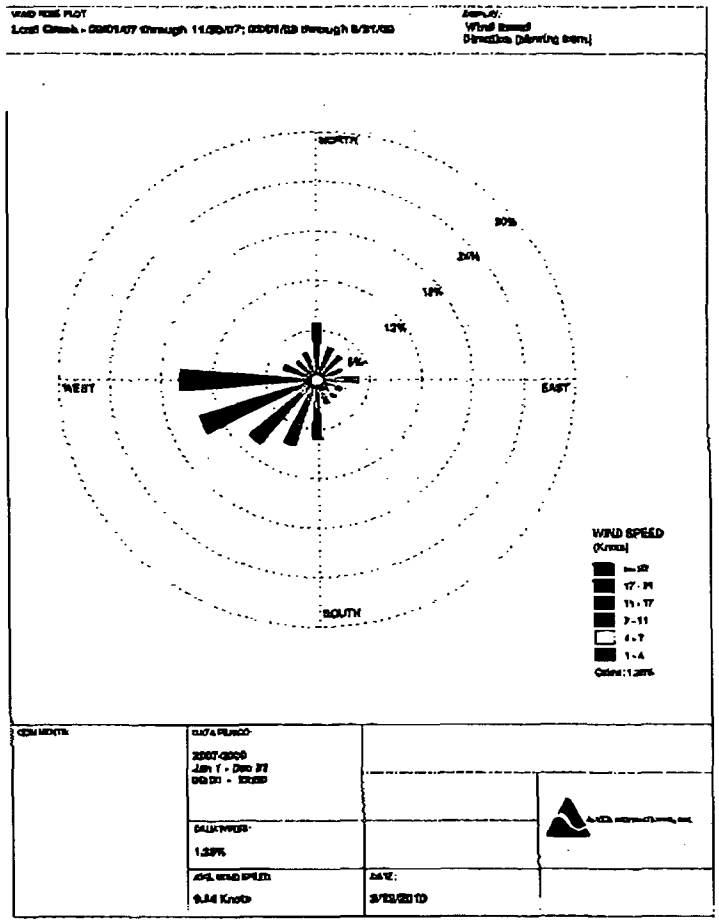
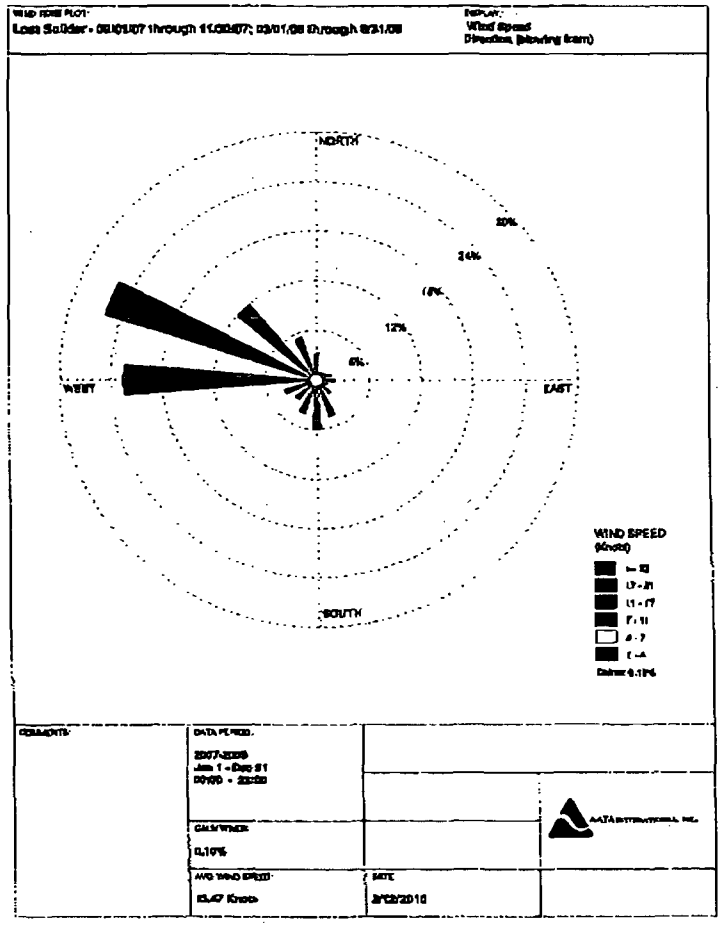


Figure 2.5-3b Wind Speed and Direction at the LS and LC Meteorological Stations





Appendix 5

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	2.76	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
Average			0.166

[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.

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