Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

24 February 2005

NRC File

Subject: Source Material License SUA-1350 - License Condition 12.3 – Annual ALARA Report

The following areas of the Sweetwater Uranium Project Radiation Safety Program were reviewed to determine if occupational radiation safety exposures were managed to be **A**s **L**ow **A**s **R**easonably **A**chievable (ALARA):

1. Employee exposure records:
Individual monitoring of employee exposures at the Sweetwater Uranium Project is not required as per 10 CFR 20.1502 since employees are unlikely to receive in excess of 10% of the limits for external or internal exposure. Gamma radiation levels and concentrations of airborne radionuclides are assessed to verify that employee doses are below the levels requiring individual monitoring. Individual dosimetry was conducted during a three (3) month period in 2005 during operations related to shipping of yellowcake slurry on site to another facility for drying and sale. The dosimeters showed no external doses in excess of ten (10) millirems for the entire (3 month) period. Ten (10) millirems is the thermoluminescent dosimeters lower limit of detection (LLD). In addition, the facility's Safety and Environmental Report (SER) only requires badging during full operations, stating, "However, during full operations at the mill, each employee working at the facility will be issued badges and be required to wear them while working in the mill complex."

2. Quarterly bioassay results:
All bioassay results from site employees were below the first action level. In addition, bioassays were taken of contract employees working in restricted areas on site. All results were below the first action level.

3. Inspections and reports:
Daily Mill Foreman inspections and weekly work area inspections by the Radiation Safety Officer have been suspended during the period of mill shutdown as per a letter from the licensee dated June 10, 1983 and a response from NRC dated September 23, 1983.

4. Training:
Annual Radiation Safety Refresher Training was conducted on February 12, 2004. Annual MSHA Refresher Training was conducted on April 8, 2004. In addition, driver training was conducted on April 7, 2004.

5. Safety Meetings:
Monthly radiation safety meetings were held with site and applicable contract personnel.

6. Radiation surveys and sampling:
Gamma, radon and airborne uranium levels in the mill are low. Internal and external dose levels are below 10% of the applicable limits so individual monitoring of personnel is not required.

7. Reports of overexposure of workers:
No overexposures have occurred.

8. Standard Operating Procedures (SOPs):
Standard Operating Procedures (SOPs) were reviewed during 2004, as documented in the memorandum entitled "Annual Review of Standard Operating Procedures (SOPs)", dated 15 February 2005.

9. Radiation Work Permits:
A single radiation work permit (RWP) was issued in 2004. This permit covered the loading of the yellowcake slurry on site into a truck for shipment to another facility for drying and sale. A calculation of dose for this RWP is provided. The dose was estimated at 12.3 millirems. All other work was completed under Standard Operating Procedures.

10. Nuclear Density Gauges:
All nuclear density gauges in the mill are stored in place with the shutters closed and locked. All nuclear density gauges are inventoried semiannually. The gauges were inventoried on 6/21 and 12/16/04. All nuclear density gauges in the mill were leak tested on May 16, 1997. All gauges passed the leak test. Leak testing of the gauges is only required every ten (10) years provided they are in storage and not being used, as is the case at the Sweetwater Uranium Project.

11. Safety and Environmental Review Panel (SERP):
License Condition 9.3 of the facility's performance based operating license approved on August 18, 1999 addresses the Safety and Environmental Review Panel (SERP) and requires that an annual report of its activities be included in the facility's annual ALARA audit. The Safety and Environmental Review Panel issued one (1) Safety and Environmental Evaluation (SEE) during 2004. This action is reflected in the memorandum entitled "Safety and Environmental Review Panel (SERP) - 2004", included in this report.

12. Instrument Calibrations:
Instrument calibrations were reviewed. All instruments were within their calibration interval when used.

13. Respiratory Protection:
Members of the site's respirator program were qualified for respirator use by a physician on May 26 and June 10, 2004. Annual fit testing and respirator training was conducted on November 11 and December 9, 2004.

The following is based on the review of the Radiation Safety Program:

Trends in Exposure

Operations were suspended in April 1983. The mill has been cleaned with the exception of the precipitation and drying areas, which are isolated. Exposures remain low since operations are suspended.

Some equipment stored on site, especially some steel pressure vessels stored in the grinding area of the mill, has created the potential for very slight increases in gamma doses. The gamma dose rates from this equipment are not sufficiently high to require posting under 10 CFR 20.1003; however, site employees have been instructed about the vessels and avoid them. The storage of this equipment has caused slight increases in exposure to individuals working near where the equipment is stored. In addition, the equipment has caused slightly elevated radon daughter concentrations in the Solvent Extraction (SX) Building. This situation was corrected by the installation of a vent fan. The vent fan in that building was adjusted to operate continuously beginning on December 11, 2001, to exhaust

accumulated radon and radon daughters. Radon daughter concentrations were low in the Solvent Extraction (SX) Building, averaging 0.007 WL on 6/21/04 and 0.041 WL on 12/2/04.

All (approximately 17,000 pounds of U_3O_8 as slurry) of the site's yellowcake slurry was shipped to another licensed facility for drying and sale in the fourth quarter of 2004. This reduced gamma exposures from the stored material in the Mill Building.

Current Use of Control Equipment

Since the mill is not operating use of control equipment is not required in the Mill Building. The mill and solvent extraction (SX) buildings are kept locked to control access. Sprays and lagoons are operated in the tailings impoundment when weather conditions permit to control dusting. A fan is operated continuously in the Solvent Extraction (SX) Building to vent any accumulated radon and radon daughters in the building.

The shutters on the nuclear density gauges in the mill are closed and locked.

Possible Reduction of Exposure Under the ALARA Concept

Exposures are at minimal levels due to suspension of operations. Access to known contaminated areas and to stored equipment with slightly elevated gamma levels is limited and controlled. All nuclear density gauge shutters are closed and locked. An amendment to the sealed source license BML-49-19005-01 dated April 9, 1998 was obtained which freed the licensee from the requirement of testing the on-off mechanism on the gauges every six (6) months. This amendment has caused some reduction in exposures by reducing the time that personnel have to work around the gauges and by eliminating personnel having to work with the gauge in the yellowcake barreling area thus reducing exposure to airborne yellowcake particles.

Oscar Paulson
Facility Supervisor

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

17 February 2005

NRC File

Subject: Sweetwater Uranium Project – Source Materials License SUA-1350: In-House Review of the Radiation Safety Program Including Audits, Inspections, Employee Exposures, Effluent Releases and Environmental Data as Required by License Condition 12.3

As required by License Condition 12.3 of SML #SUA-1350, the radiation safety, health physics and environmental monitoring programs are reviewed herein. In addition, trends in exposure, possible reductions in exposure or effluents under the ALARA concept and the use, maintenance and inspection of radiation monitoring equipment is discussed. The required (License Conditions 9.3 and 12.3) report on the activities of the Safety and Environmental Review Panel (SERP) is also attached.

Attached as part of this review process are the following:

- Summary of Monthly Radiation Safety Meetings
- Summary of Annual Radiation Refresher Training
- Occupational Exposure Assessment - Suspended Operations
- Bioassay Assessment
- Summary of Radiation Instrument Calibrations
- External Gamma Radiation Survey Assessment
- Total and Removable Alpha Radiation Survey Assessment
- Radon Daughter Monitoring Assessment
- Potable Water Quality Summary
- Safety and Environmental Review Panel (SERP) - 2004
- Releases for Unrestricted Use - 2004
- Respiratory Protection - 2004
- Review of Standard Operating Procedures – 2004
- Radiation Work Permits – 2004
- Dose Assessment/Determination of No Requirement for Individual Monitoring or Dose Calculation at the Sweetwater Uranium Project for 2004.

Review of the Programs

A review of the program revealed the following item(s) which required additional attention or correction during the year:

1. Storage of Contaminated Equipment and Ion Exchange Resin on Site

Contaminated equipment now belonging to the Green Mountain Mining Venture (GMMV), but originally stored on site in 1997 by U.S. Energy Corp./Yellowstone Fuels, Inc., continues to be stored on site. The equipment is stored in the Mill Building, Solvent Extraction (SX) Building, in the tailings impoundment, in a designated restricted area within the Main Shop (the Welding Bay). Ownership of this equipment was transferred to the Green Mountain Mining Venture (GMMV) by U.S. Energy Corp./Yellowstone Fuels, Inc., on September 11, 2000.

In addition, approximately 174,740 pounds of an ion exchange resin/water mixture is stored on site in the Number 1 Counter Current Decantation (CCD) thickener tank in the Mill Building. This material now belongs to

the Green Mountain Mining Venture (GMMV), but was originally stored on site by U.S. Energy Corp./Yellowstone Fuels, Inc. This material was unloaded on site between April 22 and May 7, 1998. This material is stored submerged in the Number 1 CCD tank in the mill, which is heated to prevent freezing in the winter. Ownership of this ion exchange resin was transferred to the Green Mountain Mining Venture (GMMV) by U.S. Energy Corp./Yellowstone Fuels, Inc. on September 11, 2000.

Additional radon monitoring was performed using the modified Kusnetz method during unloading and RadTrak radon monitors are placed on top and below the CCD thickener used to store the resin and are changed quarterly. Air sample filters are collected semiannually near the Number 1 Counter Current Decantation (CCD) thickener tank and analyzed using the modified Kusnetz method. This is done to determine if handling or storing the resin creates elevated radon levels in the area. The results of the monitoring show that the radon levels in the storage area remain at background in spite of resin being stored there.

The stored equipment may be responsible for elevated radon daughter concentrations measured in the Solvent Extraction (SX) Building. This situation has been corrected by operating an exhaust fan to remove accumulated radon and radon daughters. Radon daughter monitoring using the modified Kusnetz method has been performed semiannually in this area. The monitoring shows radon daughter concentrations ranging from 0.005 WL to 0.055 WL.

Changes in the Program

1. Additional Continuous Radon Monitoring

Continuous RadTrak radon monitors are placed on top and at the base of the Number 1 CCD Thickener and changed on a quarterly basis to monitor radon levels in the area to determine if the storage of resin in the thickener increased radon levels in the Mill Building. Radon levels in the Mill Building remain at background levels.

Trends in Exposure

Operations were suspended in April 1983. Operations have remained suspended since that time. Exposures are low. Individual monitoring of personnel is not required since all exposures are below 10% of the allowable limit. In-plant air samples are collected semiannually. Work performed in the mill and tailings impoundment has been under Standard Operating Procedures (SOPs). A single Radiation Work Permit (RWP) was issued in 2004 to address the loading of the yellowcake slurry on site into a tanker truck for shipment to another licensed facility for drying and sale. The only activities conducted in 2004 were property security, preservation, maintenance, operation of the tailings impoundment pumpback and spray system, environmental monitoring, storage of equipment and used ion exchange resin, drilling of additional sampling bore holes and monitor wells around the Catchment Basin, loading and shipping of the yellowcake slurry on site and land farming of petroleum contaminated soils.

Storage of some of the equipment, notably some steel pressure vessels in the mill, has caused gamma radiation levels to increase slightly in the area within the mill in which they are stored. An exhaust fan is operated in the SX building continuously to vent any accumulated radon and radon progeny. Radon daughter concentrations in this area varied between 0.005 WL to 0.055 WL.

Possible Reduction of Personnel Exposures or of Effluents Under ALARA

With operations suspended since April 1983, there have been no releases of effluents or employee exposures. The mill, with the exception of the dryer, and yellowcake area has been decontaminated. The dryer is locked and entry is restricted. The yellowcake (precipitation) area has been externally cleaned and the tanks are covered. All thirteen (13) nuclear density gauges in the mill are shuttered and are inventoried semiannually. The gauges were inventoried on 6/21 and 12/16/04. The gauges were leak tested on May 16, 1997. No leakage was detected. An amendment dated April 9, 1998 was obtained to the nuclear density gauge license, which freed the licensee from testing the on-off mechanism on the thirteen (13) nuclear density gauges in the mill as long as operations remain suspended. This change has caused some reduction in personnel exposure in that personnel now spend less time near the gauges and personnel are not exposed to yellowcake dust associated with testing the on-off mechanism of the gauge in the yellowcake barreling area. A Corrective Action Program (CAP) is in place to address the seepage from the tailings impoundment. The pumpback system continues to

operate as designed. The fan in the Solvent Extraction (SX) Building is now operated continuously to exhaust any accumulated radon and radon daughters emanating from equipment stored there.

The approximately 17,000 pounds of U_3O_8 as slurry stored on site was loaded onto a tanker truck and shipped to another licensed facility for drying and sale. This caused some reduction in gamma exposures on site.

Current Use of Control Equipment

Concurrent with the suspension of mill operations in April 1983, all mill control systems have been shut down. The Mill and Solvent Extraction (SX) buildings are kept locked when personnel are not inside them. Security is maintained on site twenty-four (24) hours a day as required by Section 5.4 of the license application that is cited in License Condition 9.5 of SUA-1350, to prevent unauthorized access to the facility and unauthorized entry into the tailings impoundment. This prevents potential exposure to radioactive materials to unauthorized individuals, who may attempt to gain access to the facility buildings or the tailings impoundment. The tailings retention system continues as a passive control system incorporating a synthetic Hypalon liner to retain the tailings fluids. Seepage has occurred in the past due to a liner failure. A seepage collection (pumpback) system is in operation. A system using sprays and lagoons constructed on the tailings and operated during non-freezing weather serves to minimize dusting, reduce radon emanation and evaporate fluids. The Low Volume air samples taken at Air 4A, (downwind of the tailings impoundment) show levels of natural uranium, thorium-230 and radium-226, which remained below 2% of the regulatory limits during 2004, documenting the effectiveness of the lagoons and spray system in controlling dusting on the tailings impoundment. Evaporation will continue to decrease the potential of seepage from the impoundment. A fan is operated continuously in the Solvent Extraction (SX) Building to exhaust any accumulated radon and radon daughters emanating from equipment stored there.

Additional monitor wells were drilled in 2004 around the Catchment Basin. The nature and extent of the contamination of soils and ground water around the Catchment Basin has been described in submittals dated May 12, July 22 and December 15, 2004 and January 18, 2005. Fluid has been pumped out of one of the shallow monitor wells (TMW-90) beginning on September 4, 2003, under Safety and Environmental Evaluation (SEE) #6 and out of the second shallow monitor well (TMW-105) beginning on March 23, 2004 under an amendment to Safety and Environmental Evaluation (SEE) #6.

Oscar A Paulson

Oscar Paulson

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

24 February 2005

To: NRC File

Subject: Summary of Monthly Radiation Safety Meetings

The following is a summary of the monthly (plus eight (8) additional) Radiation Safety meetings held in 2004:

DATE	TOPIC	ATTENDEES
1/27/04	Particulate air sampling/Bioassay results/Radon in building/Radon decay chain.	OP, GP, LR, LM, RP, SS
2/18/04	ALARA report/Review of doses/Catchment Basin fluid recovery/TMW-105.	OP, GP, LR
2/23/04	Urinalysis and air sampling results related to drilling in Catchment Basin area.	OP, RP, LM
3/22/04	Groundwater standards for uranium/TMW-105/Release of drilling rig.	OP, GP, LR
4/27/04	Article on "Dirty Bomb" sensors/Respiratory protection/Catchment Basin area groundwater sampling.	OP, GP, LR
5/25/04	Radon in indoor air/Breathing zone samples/Stored equipment.	OP, GP, LR, SS
6/17/04	Radon in indoor air/Radon daughter sampling/Radiation detection instrumentation and radiation types/Catchment Basin fluid recovery.	OP, GP, LR
6/24/04	Radon in buildings.	OP, GP, LR, SS
6/30/04	Radon in buildings/RadTrak detectors.	OP, GP, LR
7/28/04	Yellowcake shipment/Method 115 test/Tailings impoundment.	OP, GP, LR
8/4/04	Viewed History Channel Tech Effects episode on the technology of the atom bomb/Method 115 test.	OP, GP, LR
8/17/04	Method 115 test/Personnel monitoring/Bioassaying	OP, LR, RA
8/31/04	Method 115 test results/Radon in buildings	OP, LR
9/13/04	Radon in buildings/RadTrak results/Charcoal canister testing/New radioactive material transportation regulations/Yellowcake sale.	OP, GP, LR, SS
10/11/04	Yellowcake shipment.	OP, JV
10/19/04	Dosimetry/Bioassay results/High volume air sampling results for Roller Room, Precipitation Area and Tailings Impoundment/Differences between Luxel and TLD dosimeters.	OP, GP, LR
11/1/04	RadTrak radon detectors.	OP, GP, LR
11/11/04	Respiratory protection/Respirator fit test for Lyle Reizenstein.	OP, LR
11/30/04	Lo-Volume environmental air sampling/Bioassay results/Dosimetry results.	OP, LR
12/9/04	Respiratory protection/Respirator fit test for George Palochak/High volume air sampling results/RadTrak results.	OP, LR, GP

Initial key:

Kennecott Uranium Company Employees:
OP – Oscar Paulson
LR – Lyle Reizenstein
GP – George Palochak
SS – Shelley Schutterle

Contract Employees:
RP – Rex Polen
LM – Lawrence Martin
JV – Jack Vines

Oscar A Paulson

Oscar Paulson
Facility Supervisor

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

24 February 2005

To: NRC File

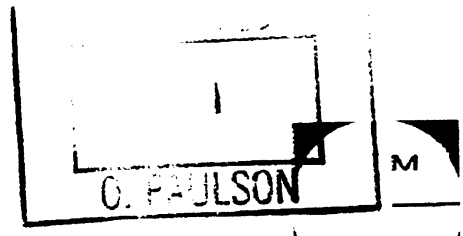
Subject: Annual Radiation Refresher Training

Annual radiation safety training for uranium mill workers was conducted by Dr. Robert Meyer of MFG/Shepherd Miller, Inc. on February 12, 2004, as discussed in the attached letter.

The attendees are listed in the letter. A description of the course content is maintained on file on site.

Oscar A Paulson

Oscar Paulson
Facility Supervisor



25 February 2004

Mr. Oscar Paulson
Sweetwater Uranium Project

MFG
consulting
scientists and
engineers

Dear Mr. Paulson:

The following individuals received four hours of General Radiation Worker Training in Rawlins, Wyoming on February 12, 2004. The training consisted of: a discussion of the characteristics of radiation; familiarization with radiation background, dose and the risks associated with radiation exposure; review of radiation measurement instrumentation and a demonstration of alpha, beta and gamma radiation detection instruments; consideration of worker radiation protection rights, responsibilities and methods including female worker rights and responsibilities; discussion of radon exposure and remediation; and other related material. Copies of the training presentation were provided to all participants, as was a test covering key points from the training session. All of the listed individuals received passing scores on the examination.

Raymond Grate
John Martine
James McMacken
Oscar Paulson
Anita Morris
George Palochak
Randy Archer
Mike Pattyn
Barry Hackleman
Lyle Reizenstein
Harry Lovato

Thanks very much for the opportunity to provide this training.

Sincerely,

H R Meyer

H. Robert Meyer, Ph.D.
MFG Inc
3801 Automation Way, Suite 100
Fort Collins, CO 80525

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

16 February 2005

NRC File

SUBJECT: Internal Occupational Exposure Assessment – Suspended Operations

The following occupational exposure assessment is based on air samples taken in the Sweetwater Mill and tailings impoundment during 2004. Annual intakes (based on airborne concentrations and exposure times) below 10% of the applicable Allowable Limits of Intake (ALI) in Table 1, Column 1 of Appendix B (5 E-2 µCi for Class Y natural uranium) do not require individual monitoring or dose assessment. This assessment is of the Mill Foreman, who is the individual on site who spends the greatest amount of time within the restricted areas and receives the largest dose.

Airborne Particulate Air Sampling Results

The results of this sampling are attached as the spreadsheet "Airborne Sampling Results". Quarterly breathing zone samples and semiannual high volume air samples in the Grinding and Precipitation Areas of the Mill Building and the tailings impoundment are collected.

Time Spent in the Mill Building and Tailings Impoundment

The Mill Foreman spent a total of 340 hours (34 days) in the Sweetwater Mill and 520 hours (52 days) in the tailings impoundment during calendar year 2004. This is a maximum estimate of time and is based upon the assumption that for each day the Mill Foreman was in the mill or tailings impoundment, he spent the entire ten (10) hour day there, even though on many occasions a visit to the mill or tailings impoundment in a given day constituted only a few hours inside the building or inside the impoundment.

Dose Calculation Method

10CFR20.1003 states, "Occupational dose does not include dose received from background radiation…". In the interest of simplicity and conservatism, however, background airborne radionuclide concentrations have not been deducted from the concentrations, derived air concentrations (DACs) or percentages of allowable limits of intake (ALIs) presented in the table on the spreadsheet or text that follows.

The following additional steps were followed to ensure that the calculated dose is conservative:

- The highest airborne concentration measured (from a single breathing zone sample) in the year (September 30, 2004 – 9.33 E-13 µCi/ml) was used for an airborne uranium concentration in the Mill Building.
- An assumption of ten (10) hours occupancy (a full working day) in either the Mill Building or tailings impoundment was assumed if the Mill Foreman entered either area on a given day in spite of the fact that actual occupancy may have been far less.
- The maximum airborne concentrations for thorium-230 and radium-226, based on high volume air samples, were used to calculate the doses to thorium-230 and radium-226 for the time spent in the Mill Building and tailings impoundment.
- The maximum airborne concentration for natural uranium based on high volume air sampling in the tailings impoundment was used to calculate the dose from uranium for time spent in that area.

Dose Calculation Results

An internal dose of 4.03 E+01 millirems (40.3 millirems) was calculated for the maximally exposed individual (the Mill Foreman) on site for normal duties. In addition, a radiation work permit was issued to load and ship the yellowcake slurry on site. The calculated airborne radionuclide exposures for this activity are presented in the attached spreadsheet entitled “Yellowcake Radiation Work Permit Airborne Sampling Results”. Based upon the high volume air sampling results for natural uranium, thorium-230 and radium-226, the time spent working under the permit and the fact that a respirator with a protection factor of 10 was used, an internal dose of 1.79 millirems was calculated. Thus, the total internal dose is calculated to be 42.1 millirems.

The calculated dose of 42.1 millirems is less than 10% of the limit of 500 millirems, above which individual monitoring is required as per 10 CFR 20.1502(b)(1). Thus, the maximally exposed individual received less than 1% of the ALI for natural uranium, radium-226 and thorium-230 when working in both the Mill Building and tailings impoundment.

Oscar A Paulson

Oscar A. Paulson

Kennecott Uranium Company

Sweetwater Uranium Project

Airborne Sampling Results

Breathing Zone Samples

Date	Location	Concentration (Natural Uranium Only) (microCuries/ml)	Percent of DAC
31-Mar-04	Mill	4.33E-13	2.16
29-Jun-04	Mill	<3.00E-13	<1.5
30-Sep-04	Mill	9.33E-13	4.66
20-Dec-04	Mill	5.26E-13	2.63

High Volume Air Sampling

Date	Location	Concentration			Percent of DAC		
		Natural Uranium (microCuries/ml)	Radium-226 (microCuries/ml)	Thorium-230 (microCuries/ml)	Natural Uranium	Radium-226	Thorium-230
2-May-04	Mill-Precipitation	9.93E-16	1.79E-16	<1.0E-16	4.97E-03	5.97E-05	<1.67E-3
3-May-04	Mill - Grinding	3.23E-16	<1.0E-16	<1.0E-16	1.62E-03	<3.33E-5	<1.67E-3
7-Sep-04	Mill-Precipitation	2.51E-15	<1.0E-16	2.15E-16	1.26E-02	<3.33E-5	3.58E-03
2-Sep-04	Mill - Grinding	1.45E-15	<1.0E-16	1.47E-16	7.25E-03	<3.33E-5	2.45E-03
8-Sep-04	Tailings Impoundment	3.37E-15	6.37E-16	1.62E-15	1.69E-02	2.12E-04	2.70E-02
25-May-04	Tailings Impoundment	1.47E-15	<1.0E-16	9.79E-16	7.35E-03	<3.33E-5	1.63E-02

Maximum Measured Concentrations

		Concentration			Percent of DAC		
		Natural Uranium (microCuries/ml)	Radium-226 (microCuries/ml)	Thorium-230 (microCuries/ml)	Natural Uranium	Radium-226	Thorium-230
	Mill	9.33E-13	1.79E-16	2.15E-16	4.67E+00	5.97E-05	3.58E-03
	Tailings	3.37E-15	6.37E-16	1.62E-15	1.69E-02	2.12E-04	2.70E-02

Exposure Calculations

Hours Worked During 2004

Mill	340
Tailings Impoundment	520

Exposure		Natural Uranium (millirems)	Radium-226 (millirems)	Thorium-230 (millirems)	Total (millirems)
	Mill	3.97E+01	5.07E-04	3.05E-02	
	Tailings	2.19E-01	2.76E-03	3.51E-01	
	Total	3.99E+01	3.27E-03	3.81E-01	4.03E+01

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Sweetwater Uranium Project								
Yellowcake Radiation Work Permit Airborne Sampling Results								
Start Date	**End Date**	**Location**	**Concentration**			**Percent of DAC**		
			Natural Uranium	**Radium-226**	**Thorium-230**	**Natural Uranium**	**Radium-226**	**Thorium-230**
			(microCuries/ml)	**(microCuries/ml)**	**(microCuries/ml)**			
23-Sep-04	30-Sep-04	Mill-Precipitation/Roller Room	8.16E-12	4.63E-15	6.54E-15	4.08E+01	1.54E-03	1.09E-01
4-Oct-04	4-Nov-04	Mill-Precipitation/Roller Room	5.06E-12	3.78E-15	6.23E-15	2.53E+01	1.26E-03	1.04E-01
Respirator Used for Duration of Work								
Protection Factor:	10							
Start Date	**End Date**	**Location**	**Concentration Accounting for Respiratory Protection**			**Percent of DAC**		
			Natural Uranium	**Radium-226**	**Thorium-230**	**Natural Uranium**	**Radium-226**	**Thorium-230**
			(microCuries/ml)	**(microCuries/ml)**	**(microCuries/ml)**			
23-Sep-04	30-Sep-04	Mill-Precipitation/Roller Room	8.16E-13	4.63E-16	6.54E-16	4.08E+00	1.54E-04	1.09E-02
4-Oct-04	4-Nov-04	Mill-Precipitation/Roller Room	5.06E-13	3.78E-16	6.23E-16	2.53E+00	1.26E-04	1.04E-02
Hours Exposed								
23-Sep-04	30-Sep-04	Mill-Precipitation/Roller Room	12.46	Hours				
4-Oct-04	4-Nov-04	Mill-Precipitation/Roller Room	8.17	Hours				
Exposure			**Natural Uranium**	**Radium-226**	**Thorium-230**	**Total**		
			(millirems)	**(millirems)**	**(millirems)**	**(millirems)**		
23-Sep-04	30-Sep-04	Mill-Precipitation/Roller Room	1.27E+00	4.81E-05	3.40E-03			
4-Oct-04	4-Nov-04	Mill-Precipitation/Roller Room	5.17E-01	2.57E-05	2.12E-03			
		Total Internal Dose:	1.79E+00	7.38E-05	5.52E-03			
						1.79E+00		

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

15 February 2005

To: NRC File

Subject: Bioassay Assessment

A review of the quarterly urinalysis sample results for the Mill Foreman, Senior Facility Technician and Facility Supervisor and pre-job, during job and post job urine analysis sample results of contract and site employees working inside the restricted area, shows that all results are well below the first action level of 15 µg/L. In fact, all urinalysis results for the year 2004 were less than the lower limit of detection (LLD) of 5.0 µg/liter.

Site employees entering the restricted areas were bioassayed quarterly. Contract employees working on site who could potentially contact contaminated materials were bioassayed prior to the commencement of work, monthly as long as operations were performed and at the end of operations. Site employees entering the restricted area during yellowcake loading operations were bioassayed monthly.

Please see attached summary of 2004 urinalysis data.

Oscar A Paulson

Oscar A. Paulson
Facility Supervisor

URINANALYSIS RESULTS :	2004															
	SAMPLE DATE:	First	27-Jan-04	23-Feb-04	27-Mar-03	Second	Third	17-Aug-04	18-Aug-04	13-Sep-04	28-Sep-04	19-Oct-04	04-Nov-04	Fourth	LLD
		Quarter			Post-Job	Quarter	Quarter	Pre-Job	Post-Job	Pre-Job			Post-Job	Quarter	(ug/L)
		27-Jan-04	Drilling	Drilling	Drilling	03-May-04	12-Aug-04	Method 115 Test	Method 115 Test	Yellowcake Shipment	Yellowcake Shipment	Yellowcake Shipment	Yellowcake Shipment	08-Dec-04	
All results in micrograms per liter.															
EMPLOYEE TITLE	EMPLOYER														
FACILITY SUPERVISOR	KENNECOTT URANIUM COMPANY	<5.0		<5.0	<5.0	<5.0	<5.0		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
MILL FOREMAN	KENNECOTT URANIUM COMPANY	<5.0				<5.0	<5.0			<5.0	<5.0	<5.0	<5.0	<5.0	5.0
SR. FACILITY TECHNICIAN	KENNECOTT URANIUM COMPANY	<5.0				<5.0	<5.0		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
CONTRACT EMPLOYEE NAME															
Rex Polen	WESTERN AMERICAN DRILLING*		<5.0	<5.0	<5.0								<5.0		
Lawrence Martin	WESTERN AMERICAN DRILLING*		<5.0	<5.0	<5.0								<5.0		
Randy Archer	ARCHER CONSTRUCTION, INC.**							<5.0	<5.0						
ALL SAMPLES TESTED BY:															
ENERGY LABORATORIES, INC.															
ALL SAMPLES BELOW															
FIRST ACTION LEVEL		*Drilling													
		**Method 115 Test													
HIGH AND LOW SPIKE															
SENT WITH EACH BATCH															
OAP															
B:\URINE007.WK1															

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

10 February 2005

To: NRC File

Subject: Summary of Radiation Instrument Calibrations – 2004

Instrument		Date(s) Calibrated
Calibration Orifices		
	Lo Vol-40A S/N M100	2/11/04
	Hi Vol-25A S/N 8080978	2/11/04
	Sierra Instruments	2/11/04
Alpha Detectors		
	43-5 S/N P-2425 [2]	2/6/04 & 8/6/04
	43-5 S/N P-2426	2/6/04 & 8/6/04
	43-5 S/N P-2427	6/2/04 & 1/12/05
	43-5 S/N P-2428	2/6/04 & 8/6/04
	43-5 S/N P-2429	6/2/04 & 1/12/05
	43-90 S/N PR-138872	6/3/04 & 1/12/05
	43-90 S/N PR-138874	2/6/04 & 8/6/04
	43-1 S/N PR-206925 (Acquired Nov. 2003)	5/28/04 & 12/1/04
	AC3-5 S/N 3793	(Acquired from L-Bar May 2004) 5/12 & sent on 1/9/05
Gamma Meters/Detectors		
	12S S/N 11816	6/1/04 & 12/14/04
	5 S/N 8170	6/1/04 & 12/14/04
	44-10 S/N 206932 (Acquired Nov. 2003)	5/28/04 & 12/1/04
	TNN2652 S/N B275 (In service 5/12/03)	Out of Service since 11/13/03 – under repair
	19 S/N 16938	(Acquired from L-Bar May 2004) 5/19 & sent on 11/15/04
Rate Meters		
	Model 177 S/N 14390	2/6/04 & 8/6/04
	Model 177 S/N 14407	6/2/04 & 1/12/05
	Model 2350-1 S/N 192613 (Acquired Nov. 2003)	5/28/04 & 12/1/04
	Model 3 S/N 157539	6/2/04 & 12/14/04
	Model 12 S/N 12280	3/4/04 & 9/9/04
	PRS-1 S/N 330/3793	(Acquired from L-Bar May 2004) 5/12 & sent on 11/9/04
SAC R4		
	S/N 383	(Acquired from L-Bar May 2004 - In calibration on arrival) 8/4/04
SAC R5		
	S/N 614	(Found on site Feb/2004) 4/2, 5/11 & sent 11/9/04
	S/N 965	(Found on site Feb/2004) 4/2 & 11/4/04
	S/N 602548	4/2/04 & 11/3/04

Scaler		
	MS-2 S/N 738	4/2/04 & 11/3/04
	MS-2 S/N 994	(Acquired from L-Bar May 2004) 5/11 & sent on 11/9/04
Beta Gamma Detector		
	Model 44-1 S/N PR-156890	3/4/04 & 9/9/04
	Model 44-9 S/N PR-093335	6/2/04 & 12/14/04
Instrument		**Date(s) Calibrated**
Air Pumps		
	Bendix BDX-44 S/N 11-79-170	1/20, 1/22, 3/15, 6/4, 8/25 & 10/5/04
	Sensidyne GilAir II S/N 902331	3/04, 3/15, 4/1, 4/22, 6/1, 6/5, 6/29, 8/25, 9/10, 11/15, 12/1, 12/8 & 12/20/04
	MSA #1	(Acquired from L-Bar May 2004) 6/1/04 - Removed from service and sent for battery replacement.
	MSA #5	(Acquired from L-Bar May 2004) 6/1 & 6/21/04 - Removed from service and sent for battery replacement.
Scintillation Detector		
	Model SPA-1 S/N 704727	4/2/04 & 11/4/04
Hi Vol Air Sampler		
	S/N 17625	2/3, 4/29, 8/31 & 12/28/04
Lo Vol Air Sampler		
	Unit #1	1/12, 1/29, 2/3, 3/1, 4/21, 4/27, 5/10, 6/1, 6/28, 7/4, 7/29, 8/2, 8/25, 9/7, 9/29, 10/24, 11/1 & 12/9/04
	Unit #2	1/12, 2/2, 3/15, 4/1, 5/4, 6/1, 7/4, 7/15, 8/2, 8/25, 9/5, 10/4, 11/3, 11/10 & 12/1/04

Unit #1 In-Service Dates:

1/1 – 1/26; 3/1 – 4/1; 4/27 – 6/5; 7/6 – 7/26; 8/21 – 9/20; 10/25 – 12/6/04

Unit #2 In-Service Dates:

1/26 – 2/29; 4/1 – 4/27; 6/5 – 7/6; 7/26 – 8/20; 9/20 – 10/25; 12/6 – 12/31/04

(One unit is required to be operating at the single required downwind monitoring station Air 4A. When a given unit fails while in operation at Air 4A, it is replaced with the other unit. Thus, the two units are rotated in and out of service.)

Note: Portable electronic survey instruments calibrated by a contract laboratory (Energy Laboratories, Inc.) in accordance with ANSI Standard N323A-1997 – American National Standard – Radiation Protection Instrumentation – Test and Calibration, Portable Survey Instruments.

Orifices are calibrated annually as stated in the Environmental Protection Agency Quality Assurance Handbook for Air Pollution Measurement Systems - Volume II – Ambient Air Specific Methods.

Oscar A Paulson

Oscar Paulson
Facility Supervisor

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

16 February 2005

Gamma Radiation Monitoring File

Subject: External Gamma Radiation Survey Assessment

In 2004, gamma surveys of the mill and ion exchange areas were conducted on 6/28/04 and 12/16/04. A gamma survey of the disposal area in the tailings impoundment was also conducted on 6/28/04 and 12/30/04.

There were twenty-six (26) locations throughout the mill and solvent extraction buildings and fourteen (14) locations associated with the IX that were monitored for gamma radiation.

Gamma readings ranged from 83 to 1040 µR/hour (233-µR/hr average for the year) for the Ion Exchange related equipment, to 14.1 to 990 µR/hour (92.1 µR/hr average for the year) in the Mill and Solvent Extraction (SX) Buildings. Gamma readings in the Mill Building dropped in the fourth quarter of 2004 due to the removal of the stored yellowcake. Gamma readings at the cone-bottomed slurry storage tank dropped from 1040 µR/hour to 48.5 µR/hour due to the removal of the yellowcake slurry.

The stored equipment was monitored as well on 6/28/04 and 12/29/04. The stored equipment ranged from 15.7 to 2670 µR/hr at thirty (30) centimeters from the equipment surface, averaging 609 µR/hr at thirty (30) centimeters from the equipment surface. The stored equipment exhibited a higher average reading than the existing mill equipment, with the overall effect of slightly increasing gamma doses in the mill in areas where the equipment is stored.

None of the stored equipment exhibited dose rates sufficient to require posting under 10 CFR 20.1003. The highest measured gamma dose rate at 30 centimeters from any piece of equipment was 2.67 millirems/hour (.0030 rems/hr.) in front of a stored drum containing valves (assuming a 1:1 relationship between milli Roentgens and millirems for gamma radiation). Employees and contract personnel have been instructed to avoid certain pieces of stored equipment (pressure vessels) in the mill that exhibit the highest levels of gamma radiation. The area in which the pressure vessels are stored in the mill has been identified.

Two gamma surveys were completed in the tailings impoundment on June 28 and December 30, 2004. This area averaged 127.9 µR/hr. (Please see attached tables.)

Gamma radiation levels from the stored resin in the thickener in the Counter Current Decantation (CCD) area of the mill are tracked. The levels remain low. The results of the monitoring \are included on the attached table entitled “Stored Resin Gamma Radiation Monitoring Results”.

Site employees were issued thermo luminescent dosimeters for the three (3) month period (October to December 2004) during which the yellowcake slurry on site was loaded and shipped for drying and sale. No exposures in excess of ten (10) millirem (the lower limit of detection) for the thermoluminescent dosimeters were received. This shows that gamma exposures on site are low and well below the threshold for which individual monitoring is required under 10 CFR 20.1502(a)(1).

An assessment of dose (external and internal) to the maximally exposed individual (the Mill Foreman) demonstrating the lack of need for individual monitoring under 10 CFR 20.1502 is maintained on file on site.

Oscar A Paulson
Oscar Paulson

Kennecott Uranium Company
Sweetwater Uranium Project

Tailings Impoundment Gamma Radiation Survey

Date:	28-Jun-04	Rate meter:	Ludlum Model 2350-1	Probe:	Ludlum 44-10
Time:	09:20 AM	Serial Number:	192613	Serial Number:	PR-206932
Check Source:	Cs-137				
Serial Number:	2304	Calibration Date:	28-May-04		
Counts:	278 microR/hour	Background:	19.5 microR/hour		

Location		Reading
Ramp Area	Ramp Top	98.9 microR/hour
Ramp Area	Ramp Top	101 microR/hour
Ramp Area	Ramp Top	107 microR/hour
Ramp Area	Ramp Top	114 microR/hour
Ramp Area	Ramp Top	110 microR/hour
Ramp Area	Ramp Top	91.3 microR/hour
Ramp Area	Ramp Bottom	78.3 microR/hour
Ramp Area	Ramp Bottom	80.4 microR/hour
Storage Area	Storage Area	77.6 microR/hour
Storage Area	Storage Area	76.1 microR/hour
Storage Area	Storage Area	72.3 microR/hour
Storage Area	Storage Area	90.1 microR/hour
Storage Area	Storage Area	80 microR/hour
Storage Area	Storage Area	99.2 microR/hour
Storage Area	Storage Area	165 microR/hour
Storage Area	Storage Area	181 microR/hour
Storage Area	Storage Area	90 microR/hour
Storage Area	Storage Area	82.8 microR/hour
Road to Dump Area	Storage Area	80.1 microR/hour
Road to Dump Area	Storage Area	78.2 microR/hour
Road to Dump Area	Storage Area	95.1 microR/hour
Road to Dump Area	Storage Area	107 microR/hour
Road to Dump Area	Storage Area	105 microR/hour
Road to Dump Area	Storage Area	82.2 microR/hour
Road to Dump Area	Storage Area	83.1 microR/hour
Road to Dump Area	Storage Area	72.6 microR/hour
Road to Dump Area	Storage Area	75.3 microR/hour
Road to Dump Area	Storage Area	67.8 microR/hour
Dump Area		67.7 microR/hour
Dump Area		68.6 microR/hour
Dump Area		86.5 microR/hour
Dump Area		73.6 microR/hour
Dump Area		63.3 microR/hour
Dump Area		57.2 microR/hour
Dump Area		56.6 microR/hour
Dump Area		59.4 microR/hour
Dump Area		55.4 microR/hour
Tailings	Road to NE Lagoon	65.5 microR/hour
Tailings	Road to NE Lagoon	101 microR/hour
Tailings	Road to NE Lagoon	116 microR/hour
Tailings	Road to NE Lagoon	121 microR/hour
Tailings	Road to NE Lagoon	124 microR/hour
Tailings	Road to NE Lagoon	164 microR/hour
Tailings	Road to NE Lagoon	215 microR/hour
Tailings	Road to NE Lagoon	278 microR/hour
Tailings	Northeast Lagoon	367 microR/hour
Tailings	Northeast Lagoon	157 microR/hour
Tailings	Northeast Lagoon	214 microR/hour
Tailings	Northeast Lagoon	190 microR/hour
Tailings	Northeast Lagoon	176 microR/hour
Tailings	Northeast Lagoon	169 microR/hour
Tailings	Northeast Lagoon	206 microR/hour
Tailings	Northeast Lagoon	112 microR/hour
Tailings	Northeast Lagoon	234 microR/hour
Tailings	Northeast Lagoon	201 microR/hour
Tailings	Northeast Lagoon	198 microR/hour
Tailings	Northeast Lagoon	194 microR/hour
Tailings	Northeast Lagoon	362 microR/hour
Tailings	Northeast Lagoon	317 microR/hour
Tailings	Northeast Lagoon	277 microR/hour
Tailings	Northeast Lagoon	255 microR/hour

Average:	131.9
Standard Deviation:	76.3
Median:	81.4
Maximum:	367
Minimum:	55.4

Kennecott Uranium Company
Sweetwater Uranium Project

Tailings Impoundment Gamma Radiation Survey

Date:	30-Dec-04	Rate meter:	Ludlum Model 2350-1	Probe:	Ludlum 44-10
Time:	11:00 AM	Serial Number:	192613	Serial Number:	PR-206932
Check Source:	Cs-137				
Serial Number:	2304	Calibration Date:	01-Dec-04		
Counts:	278 microR/hour	Background:	14.7 microR/hour		

Location		Reading	
Ramp Area	Ramp Top	86.8	microR/hour
Ramp Area	Ramp Middle	94.1	microR/hour
Ramp Area	Ramp Middle	96.9	microR/hour
Ramp Area	Ramp Middle	106.0	microR/hour
Ramp Area	Ramp Middle	102.0	microR/hour
Ramp Area	Ramp Middle	107.0	microR/hour
Ramp Area	Ramp Middle	98.4	microR/hour
Ramp Area	Ramp Middle	77.9	microR/hour
Ramp Area	Ramp Bottom	78.4	microR/hour
Storage Area	Storage Area	69.8	microR/hour
Storage Area	Storage Area	78.7	microR/hour
Storage Area	Storage Area	111.0	microR/hour
Storage Area	Storage Area	80.2	microR/hour
Storage Area	Storage Area	126.0	microR/hour
Storage Area	Storage Area	79.9	microR/hour
Storage Area	Storage Area	115.0	microR/hour
Storage Area	Storage Area	81.1	microR/hour
Road to Dump Area	Road to Dump Area	84.2	microR/hour
Road to Dump Area	Road to Dump Area	83.5	microR/hour
Road to Dump Area	Road to Dump Area	99.5	microR/hour
Road to Dump Area	Road to Dump Area	101.0	microR/hour
Road to Dump Area	Road to Dump Area	93.7	microR/hour
Road to Dump Area	Road to Dump Area	81.6	microR/hour
Road to Dump Area	Road to Dump Area	88.7	microR/hour
Road to Dump Area	Road to Dump Area	89.1	microR/hour
Road to Dump Area	Road to Dump Area	78.2	microR/hour
Road to Dump Area	Road to Dump Area	79.4	microR/hour
Road to Dump Area	Road to Dump Area	72.1	microR/hour
Dump Area	Dump Area	76.5	microR/hour
Dump Area	Dump Area	74.5	microR/hour
Dump Area	Dump Area	100.0	microR/hour
Dump Area	Dump Area	95.1	microR/hour
Dump Area	Dump Area	89.9	microR/hour
Dump Area	Dump Area	61.3	microR/hour
Dump Area	Dump Area	64.4	microR/hour
Dump Area	Dump Area	60.8	microR/hour
Dump Area	Dump Area	63.8	microR/hour
Tailings	Road to NE Lagoon	110.0	microR/hour
Tailings	Road to NE Lagoon	101.0	microR/hour
Tailings	Road to NE Lagoon	159.0	microR/hour
Tailings	Road to NE Lagoon	183.0	microR/hour
Tailings	Road to NE Lagoon	267.0	microR/hour
Tailings	Road to NE Lagoon	253.0	microR/hour
Tailings	Road to NE Lagoon	145.0	microR/hour
Tailings	Road to NE Lagoon	137.0	microR/hour
Tailings	Northeast Lagoon	130.0	microR/hour
Tailings	Northeast Lagoon	128.0	microR/hour
Tailings	Northeast Lagoon	198.0	microR/hour
Tailings	Northeast Lagoon	179.0	microR/hour
Tailings	Northeast Lagoon	255.0	microR/hour
Tailings	Northeast Lagoon	197.0	microR/hour
Tailings	Northeast Lagoon	195.0	microR/hour
Tailings	Northeast Lagoon	135.0	microR/hour
Tailings	Northeast Lagoon	136.0	microR/hour
Tailings	Northeast Lagoon	165.0	microR/hour
Tailings	Northeast Lagoon	176.0	microR/hour
Tailings	Northeast Lagoon	320.0	microR/hour
Tailings	Northeast Lagoon	274.0	microR/hour
Tailings	Northeast Lagoon	230.0	microR/hour
Tailings	Northeast Lagoon	137.0	microR/hour
Tailings	Northeast Lagoon	120.0	microR/hour
Tailings	Northeast Lagoon	64.8	microR/hour
Tailings	Dump Area	54.3	microR/hour
Tailings	Dump Area	61.1	microR/hour
Tailings	Dump Area	70.9	microR/hour
Tailings	Dump Area	61.2	microR/hour
Tailings	Dump Area	68.1	microR/hour
Tailings	Road to Dump Area	74.4	microR/hour
Tailings	Road to Dump Area	75.7	microR/hour
Tailings	Road to Dump Area	82.7	microR/hour
Tailings	Road to Dump Area	92.8	microR/hour
Tailings	Road to Dump Area	96.8	microR/hour
Tailings	Road to Dump Area	110.0	microR/hour
Tailings	Road to Dump Area	85.1	microR/hour
Tailings	Road to Dump Area	94.9	microR/hour
Storage Area	Storage Area	62.8	microR/hour
Storage Area	Storage Area	78.0	microR/hour
Ramp Area	Ramp Bottom	74.8	microR/hour
Ramp Area	Ramp Middle	70.2	microR/hour
Ramp Area	Ramp Middle	88.4	microR/hour
Ramp Area	Ramp Middle	105.0	microR/hour
Ramp Area	Ramp Middle	106.0	microR/hour
Ramp Area	Ramp Middle	103.0	microR/hour
Ramp Area	Ramp Middle	99.3	microR/hour
Ramp Area	Ramp Top	77.1	microR/hour

Average:	123.9
Standard Deviation:	59.3
Median:	81.4
Maximum:	320.0
Minimum:	60.8

Kennecott Uranium Company
Sweetwater Uranium Project
Stored Resin

Stored Resin Gamma Radiation Monitoring Results

Date	Gamma	
	Top (uR/hr)	Bottom (uR/hr)
28-Apr-98	25	60
8-Oct-98	22	160
12-May-99	19	60
17-Nov-99	45	90
21-May-00	30	70
21-Dec-00	40	70
20-Jun-01	40	65
26-Dec-01	90	80
24-Jun-02	60	80
23-Dec-02	14	60
25-Jun-03	20	60
16-Dec-03	41.8	71.7
28-Jun-04	57.8	152
16-Dec-04	28.7	110
Average	37.2	77.2
Standard Deviation:	21.3	27.8

OAP:2004
resin0001.xls

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

30 January 2005

Radon Monitoring File

Subject: Radon Daughter Monitoring Assessment

In 2004 radon monitoring was conducted on June 21 and December 2, 2004.

At least twelve (12) locations throughout the mill and three (3) locations around the IX were sampled for radon daughters. In addition, locations in the Security Trailer and Administration Building were sampled for radon daughters. Radon daughter concentrations (in working levels) were at low levels, ranging from non-detect to 0.01 WL in the Ion Exchange area (average: 0.004), to non-detect to 0.027 WL in the Mill Building (average: 0.014). The ventilation fan operated continuously in the Solvent Extraction (SX) Building. Radon levels varied in the SX building from 0.005 to 0.055 WL. The fan continues to be effective in controlling radon daughter concentrations.

Radon daughter concentrations were measured in June and December 2004 in the Security Trailer to assist in determining an equilibrium factor for the area, for use in calculating dose to the nearest resident.

Radon daughters were sampled and analyzed using the modified Kusnetz method.

Two (2) RadTrak radon monitors were placed above and beneath the Number 1 Counter-Current Decantation (CCD) tank in the Mill during all four quarters of 2004 to monitor radon levels associated with the used ion exchange resin stored in the Number 1 CCD tank. Radon concentrations below the tank varied from 2.5 to 3.5 pCi/L. Radon concentrations on top of the tank varied from 1.2 to 3.2 pCi/L. These values are at background levels since upwind radon concentrations for the facility varied from 2.4 to 3.9 pCi/L during 2004, as shown in the table below:

2004 Radon Concentrations

Quarter	Bottom of CCD#1 (pCi/L)	Top of CCD#1 (pCi/L)	Upwind (Background) (pCi/L)
1st	3.5	2.9	2.7
2nd	2.4	1.2	2.4
3rd	2.7	2.2	3.6
4th	3.4	3.2	3.9
Average	3.0	2.4	3.2

Notes: 1. Radon daughter concentrations at the top and bottom of CCD#1 were low, ranging from 0.010 to 0.027 WL.

A history of the RadTrack results and the radon daughter sampling results is included on the attached tables entitled “Stored Resin RadTrak Monitoring Results” and “Stored Resin Radon Monitoring Results”.

Oscar A Paulson

Oscar Paulson

Kennecott Uranium Company
Sweetwater Uranium Project
Stored Resin

Stored Resin RadTrak Monitoring Results

Date	RadTrak Results	
	Top (pCi/l)	Bottom (pCi/l)
2nd Quarter 1998	1.9	2.0
3rd Quarter 1998	2.3	2.1
4th Quarter 1998	1.7	1.8
1st Quarter 1999	3.3	3.3
2nd Quarter 1999	2.3	2.5
3rd Quarter 1999	2.3	2.9
4th Quarter 1999	4.8	4.5
1st Quarter 2000	2.7	2.7
2nd Quarter 2000	2.2	3.3
3rd Quarter 2000	2.8	3.2
4th Quarter 2000	3.9	4.7
1st Quarter 2001	2.9	5.2
2nd Quarter 2001	1.0	1.5
3rd Quarter 2001	2.0	2.5
4th Quarter 2001	2.5	3.4
1st Quarter 2002	2.8	2.6
2nd Quarter 2002	1.8	2.2
3rd Quarter 2002	2.9	2.3
4th Quarter 2002	2.7	4.7
1st Quarter 2003	2.5	2.8
2nd Quarter 2003	2.0	3.2
4th Quarter 2003	3.5	3.3
1st Quarter 2004	2.9	3.5
2nd Quarter 2004	1.2	2.4
3rd Quarter 2004	2.2	2.7
4th Quarter 2004	3.2	3.4
Average	2.6	3.0
Standard Deviation:	0.8	0.9

Kennecott Uranium Company
Sweetwater Uranium Project
Stored Resin

Stored Resin Radon Monitoring Results

Date	Radon	
	Top (WL)	Bottom (WL)
24-Nov-98	0.028	0.023
19-May-99	0.037	0.02
12-Oct-99	0.04	0.057
26-Apr-00	0.008	0.005
21-Nov-00	0.03	0.023
15-May-01	0.027	0.027
10-Dec-01	0.024	0.023
16-Jun-02	0.013	0.012
25-Nov-02	0.027	0.028
2-Jun-03	0.013	0.011
30-Nov-03	0.012	0.007
30-Jun-04	0.01	0.013
2-Dec-04	0.011	0.027
Average	0.024	0.021
Standard Deviation:	0.011	0.014

OAP:
resin0001.xls

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

16 February 2005

Total and Removable Alpha Monitoring File

Subject: Total and Removable Alpha Monitoring Assessment

In 2004 removable alpha monitoring was performed in the Mill and Solvent Extraction Buildings and in the Ion Exchange area on 6/29 and 12/13/04. Total alpha monitoring was performed in the Mill and Solvent Extraction Buildings and in the Ion Exchange area on 6/15/04 and 12/13/04.

Total and removable alpha monitoring was performed at least four (4) locations related to the Ion Exchange plant and at least nineteen (19) locations related to the Mill and Administration Buildings.

Total alpha contamination levels in the Mill Building ranged between 108 and 45,333 dpm/100 cm2. The single high reading was taken at a location on the centrifuge support frame in the Yellowcake Area of the Mill Building. This area is part of the restricted area. Removable alpha contamination in the Mill Building ranged from 1.1 to 274.2 dpm/100 cm2. The centrifuge support frame in the Yellowcake Area only had a maximum removable alpha contamination reading of 274.2 dpm/100 cm2 (12/13/04). Clearly most of this alpha contamination on this frame is fixed in place and non-mobile. The contamination on the centrifuge frame appears to be fixed to the zinc coating on the galvanized steel support frame.

The Precipitation Area of the Mill Building was thoroughly washed following shipment of the yellowcake slurry. The highest total alpha measured (by the sump) was 427 dpm/100 cm2.

Total alpha contamination levels in the Ion Exchange area ranged from 8.3 to 787-dpm/100 cm2. This single high reading was on the skid of the elution pump. The Ion Exchange area is a restricted area. Removable alpha contamination levels in the Ion Exchange area ranged from 2.3 to 78.3 dpm/100 cm2. The reading of 78.3-dpm/100 cm2 of removable alpha contamination was obtained on the skid of the elution pump. Clearly, little of the alpha contamination on the elution pump skid is removable. Both the high total and removable alpha readings are below the limits (5000/1000 dpm/100 cm2) for release for unrestricted use.

Total alpha readings for the exteriors of stored equipment ranged from 43.2 to 24,390 dpm/100 cm2. Removable alpha readings for the stored equipment ranged from 0 to 8167.2 dpm/100 cm2. This high removable alpha reading was from the exposed interior rubber liner of a piping component attached to a pressure vessel. This pressure vessel is stored in the tailings impoundment (a restricted area). The high total alpha reading was from the side of a fiberglass tank stored in the tailings impoundment. All of the stored equipment was kept within restricted areas unless it was released for unrestricted use.

Oscar A Paulson
Oscar Paulson

Kennecott Energy

Memorandum *Sweetwater Uranium Project*

Oscar Paulson
Facility Supervisor

30 January 2005

To: Distribution

Subject: Safety and Environmental Review Panel (SERP) – 2004

During the calendar year 2004 the licensee has not:
- Made changes in the facility as described in the license application (as updated);
- Made changes in the procedures presented in the license application (as updated),
- Conducted tests or experiments not presented in the license application (as updated).

During calendar year 2004 the licensee has:
- Amended SEE #6 to include a second fluid recovery well.
- Changed reporting titles/updated the organization chart.

Amendment to SEE #6:
Safety and Environmental Evaluation #6 was amended in March 2004 to include a second shallow monitor well (TMW-105) as a recovery well to recover contaminated fluids perched on a shallow clay layer immediately west of the Catchment Basin. Information concerning the recovery of fluids from this well (TMW-90) was submitted as part of an amendment request dated May 12, 2004.

This document was reviewed as part of the facility's Nuclear Regulatory Commission inspection and found to be technically adequate.

Change #9:
This change is covered by SEE #9, entitled "Change in Reporting Titles/Updated Organization Chart". This change was an administrative change. It changed the name and title of the individual to whom the Manager, Projects, reports. The Manager, Projects, formerly reported to Jerry Tystad, Vice President of Technical Services. The Manager, Projects, now reports to Jeane Hull, Vice President of Technical Services and Business Improvement. This was purely an administrative change. A copy of the revised organization chart is attached.

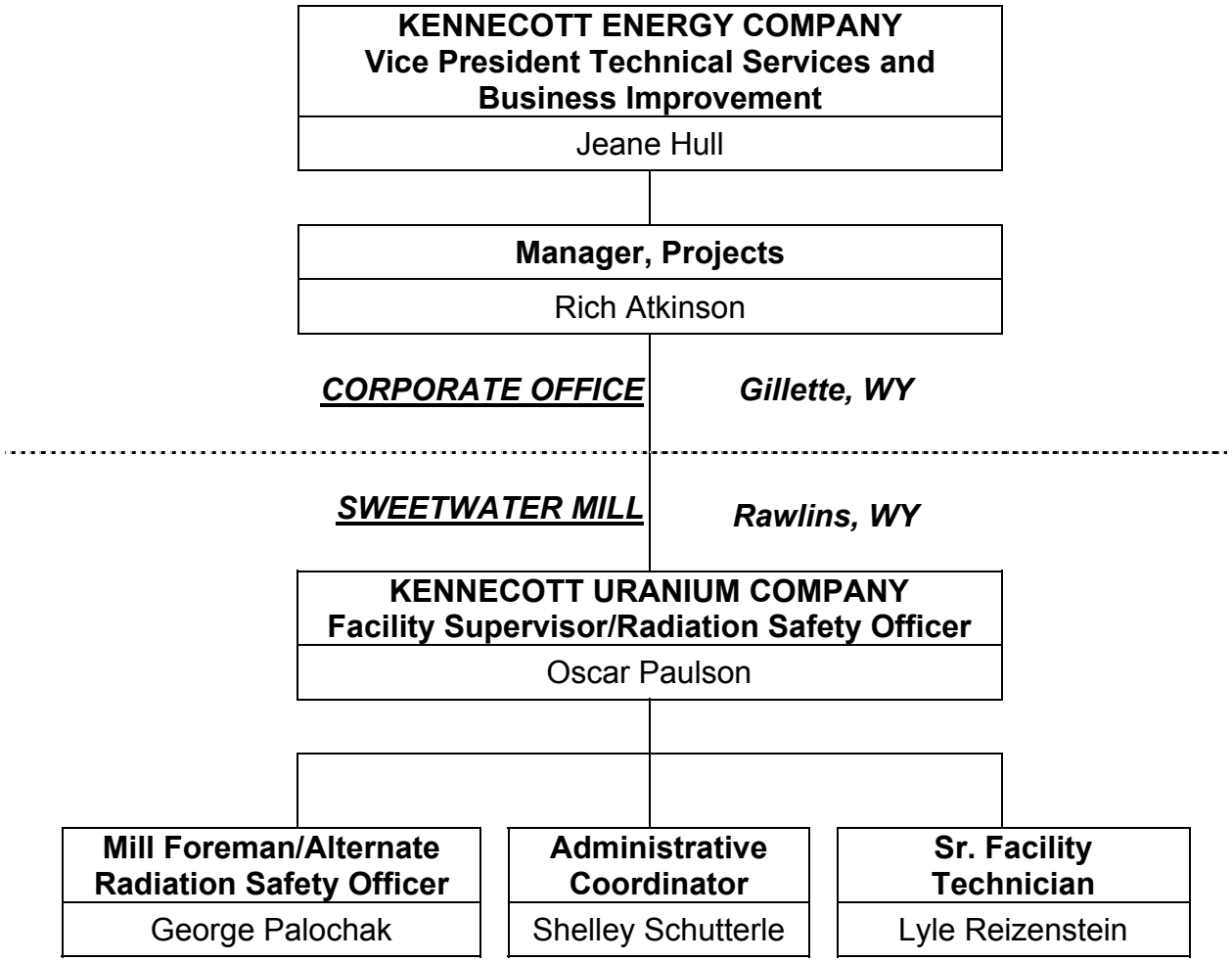
Other Issues Pertaining to the Safety and Environmental Review Panel (SERP)
The Radiation Safety Officer (RSO) is designated as the chairman of the panel, coordinates the activities of the panel and the preparation of the Safety and Environmental Evaluations (SEEs).

Oscar A Paulson
Oscar Paulson

Distribution: Safety and Environmental Review Panel File
George Palochak
Roger Strid

KENNECOTT URANIUM COMPANY
SWEETWATER URANIUM PROJECT

ORGANIZATION



Kennecott Energy

Sweetwater Uranium Project

Memorandum

Oscar Paulson
Facility Supervisor

15 February 2005

To: Standard Operating Procedures File

From: Oscar Paulson

Subject: Annual Review of Standard Operating Procedures (SOPs)

Requirement

License Condition 12.1 states: "An annual report of the review of all existing standard operating procedures, required to be performed by the RSO, shall be prepared and retained on site."

License Condition 9.6 states in part: "In addition, the RSO shall perform a documented review of all existing standard operating procedures at least annually."

Review of Standard Operating Procedures (SOPs) is ongoing throughout the year; however, a final review was performed in December 2002. This review included all Standard Operating Procedures (SOPs) related to the Nuclear Regulatory Commission (NRC) license including Mill Operating Procedures (MOPs), Tailings Operating Procedures (TOPs), Health Physics Procedures (HPs), Environmental Procedures (EPs) and other Standard Operating Procedures (SOPs). Also, SOPs not related to the Nuclear Regulatory Commission (NRC) license were reviewed, revised and updated. The review was conducted over the course of the year and completed on December 22, 2004 with the preparation of this review document. The date of addition or revision for each procedure follows the name of the procedure.

A. Non-Radiologic SOPs

The following non-radiologic procedures were modified:

- The *Extreme Snowfall Plan* was revised with a new contractor name on November 11, 2004.
- The *Instructions for All Security Personnel* was revised July 8, 2004.
- The *Hearing Protection* procedure was revised on December 22, 2004.
- The *Lifejackets/Working on the Water* procedure was revised December 2, 2004.
- The *Cleanup of Oil Spills* procedure was revised December 2, 2004.
- The *Security Round Call In* procedure was deleted July 8, 2004, since it was incorporated in the *Instructions for All Security Personnel* procedure revised on July 8, 2004.
- The *Jackpot/Big Eagle Mine Security* procedure was deleted July 8, 2004.
- The outdated *Confined Spaces* procedure in the Non-Radiological Standard Operating Procedures book was deleted. This procedure has been replaced by *Confined Space Entry Requirements*.

Some procedures in the Non-Radiological Standard Operating Procedures book were moved to either the Mill Operating Procedures (MOP) or Tailings Operating Procedures (TOP) sections of the Radiologic SOPs book.

- The following procedures were moved to the Mill Operating Procedures (MOP) section of the Radiologic SOPs book:
  - *Mill Piping Color Code* – December 2, 2004
  - *Ion Exchange Unit Standard Operating Procedures* – December 2, 2004
  - *Yellowcake Decanting and Slurry Barreling* – December 2, 2004
  - *Resin Storage Procedure* – December 2, 2004

- *Precipitation Standard Operating Procedure* – December 22, 2004
- *Fire Protection* – December 2, 2004
- *Hazardous and Process Chemicals on Site* – December 22, 2004
- *Roller Room Entry Procedures* – December 22, 2004

- The following procedures were moved to the Tailings Operating Procedures (TOP) section of the Radiologic SOP book:
  - *Speed Limit on Tails Cell Road* – December 2, 2004
  - *Tailings Cell Work Rules* – December 2, 2004
  - *Reduction of Voids in Material Placed in the Tailings Cell for Disposal* – December 2, 2004
  - *Tailings Impoundment/Special Hazard Recognition Training* – December 2, 2004
  - *Tailings Area Stabilization* – December 22, 2004

- *Spills – Non Operational Periods* was removed from the Non Radiologic Standard Operating Procedures book and placed in the Radiologic SOP book as HP-37 on December 2, 2004.

B. Radiologic (NRC License) Related SOPs (HP, EP, TOP, SERP-OP and MOP)

The following radiologic procedures were added:

- HP-36 – *Coveralls for Restricted Area Entry* – September 13, 2004
- HP-37 – *Spills – Non Operational Periods* – December 2, 2004
- TOP-2 – *Speed Limit on Tails Cell Road* – December 2, 2004
- TOP-3 – *Tailings Cell Work Rules* – December 2, 2004
- TOP-4 – *Reduction of Voids in Material Placed in the Tailings Impoundment for Disposal* – December 2, 2004
- TOP-5 – *Tailings Impoundment/Special Hazard Recognition Training* – December 2, 2004
- TOP-6 – *Tailings Area Stabilization* – December 22, 2004
- MOP-5 – *Emergency Generator Starting Procedure* – April 29, 2004
- MOP-6 – *Mill Piping Color Code* – December 2, 2004
- MOP-7 – *Ion Exchange Unit Standard Operating Procedures* – December 2, 2004
- MOP-8 – *Yellowcake Decanting and Slurry Barreling* – December 2, 2004
- MOP-9 – *Resin Storage Procedure* – December 2, 2004
- MOP-10 – *Fire Protection* – December 2, 2004
- MOP-11 – *Precipitation Standard Operating Procedure* – December 22, 2004
- MOP-12 – *Hazardous and Process Chemicals on Site* – December 22, 2004
- MOP-13 – *Roller Room Entry Procedures* – December 22, 2004

The following radiologic procedures were modified:

- HP-2 – *Gamma Survey* – December 6, 2004
- HP-3 – *Beta Survey* – July 20, 2004
- HP-4 – *Radon Daughter Survey* – December 6, 2004
- HP-6 – *Total Alpha Surveys* – December 6, 2004
- HP-7 – *Personnel Alpha Monitoring and Decontamination* – July 20, 2004
- HP-8 – *Removable Alpha Radiation Sampling* – December 6, 2004
- HP-9 – *Management Control, Bioassay Urine and In Vivo Programs* – December 6, 2004
- HP-10 – *Air Sampling in the Work Place* – December 6, 2004
- HP-14 – *Calibration of Equipment* – December 6, 2004
- HP-17 – *Yellowcake Pre Shipment Survey* – December 6, 2004
- HP-21 – *Respiratory Protection* – April 22, 2004
- HP-33 – *Shipment of Radioactive Samples* – December 2, 2004
- HP-35 – *Spill, Release, Excursion, Leak and Incident Reporting* – July 20, 2004
- MOP-2 – *Mill Pipeline Integrity Testing* – July 20, 2004
- MOP-3 – *Drilling in Potentially Radiologically Contaminated Soils and Materials During Non Operational Periods* – July 20, 2004
- SERP-OP-1 – *Safety and Environmental Review Panel* – March 29, 2004
- EP-5 – Calibration Procedure for Lo Volume Air Sampling Units with Accu-Vol Controllers – December 22, 2004

- EP-6 – Calibration Procedure for Lo-Volume Air Sampling Units Directly Connected to Line Voltage – December 22, 2004
- EP-10 – Radon-222 Sampling – December 22, 2004
- EP-11 – Thermoluminescent Dosimeter Area Monitoring – December 22, 2004
- EP-12 – General Surface Water Sampling and Sample Preparation Procedures – December 22, 2004
- EP-12b – General Surface Water, Sampling, Sample Preparation and Water Level Measurement Procedures – December 2, 2004
- EP-14 – Non-Operational and Operational Surface and Ground Water Sampling and Level Measurement Locations and Frequencies – March 29, 2004
- EP-18 – Meteorological Monitoring – July 15, 2004

C. Other Procedures

The Suspended Operations Procedure was reviewed. No revisions were required.

Oscar Paulson
EOY Review – SOPs

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

30 January 2005

To: Respiratory Protection File

Subject: Respiratory Protection – 2004

The Mill Foreman and Senior Facility Technician are the two (2) employees on site that are part of the facility's respirator program. They received their annual qualification for respirator use by a physician on June 10 and May 26, 2004, respectively. They received an annual fit test with stannic chloride irritant smoke and annual instruction on respirator use on December 9 and November 11, 2004, respectively.

Oscar A Paulson

Oscar Paulson
Facility Supervisor

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

30 January 2005

File

Subject: **Releases for Unrestricted Use – 2004**

Releases for unrestricted use issued in 2004 were related to the release of equipment used to delineate the Catchment Basin contamination (a water truck, drilling, trailer, drill pipe and the drill rig), fire extinguishers (for hydrotesting), an air conditioner, a tractor used to pull a trailer, a John Deere tractor and other miscellaneous items.

Oscar A Paulson
Oscar Paulson

Kennecott Energy

Memorandum ***Sweetwater Uranium Project***

Oscar Paulson
Facility Supervisor

16 February 2005

Radiation Work Permit File

Subject: Radiation Work Permits (RWP)

A single radiation work permit was issued in 2004 for loading the yellowcake slurry stored on site into a tanker truck for transport to another licensed facility for drying and sale.

Personal protective equipment (Tyvek coveralls, boots and a respirator with a protection factor of 10) were used. High volume air sampling was performed during the work and site personnel were also supplied with dosimeters in spite of the fact that individual monitoring of employee exposures at the Sweetwater Uranium Project is not required as per 10 CFR 20.1502 since employees are unlikely to receive in excess of 10% of the limits for external or internal exposure. In addition, the facility's Safety and Environmental Report (SER) only requires badging during full operations, stating, "However, during full operations at the mill, each employee working at the facility will be issued badges and be required to wear them while working in the mil complex."

None of the thermoluminescent dosimeters (TLDs) used (with a lower limit of detection (LLD) of 10 millirems) showed any exposure. A dose of ten (10) millirems is being used as the external dose for the permit since this is the LLD of the dosimeter.

An assessment of the internal dose from natural uranium, thorium-230 and radium-226 is attached as the spreadsheet entitled "Yellowcake Radiation Work Permit Airborne Sampling Results". An assessment of internal dose due to radon is attached as the spreadsheet entitled "Radon Exposure Assessment". A dose summation is attached as the spreadsheet "Yellowcake Radiation Work Permit Exposure Assessment". The total dose is calculated to be 12.3 millirems from the job.

Oscar A Paulson
Oscar Paulson

Kennecott Uranium Company								
Sweetwater Uranium Project								
Yellowcake Radiation Work Permit Airborne Sampling Results								
Start Date	**End Date**	**Location**	**Concentration**			**Percent of DAC**		
			Natural Uranium	**Radium-226**	**Thorium-230**	**Natural Uranium**	**Radium-226**	**Thorium-230**
			(microCuries/ml)	**(microCuries/ml)**	**(microCuries/ml)**			
23-Sep-04	30-Sep-04	Mill-Precipitation/Roller Room	8.16E-12	4.63E-15	6.54E-15	4.08E+01	1.54E-03	1.09E-01
4-Oct-04	4-Nov-04	Mill-Precipitation/Roller Room	5.06E-12	3.78E-15	6.23E-15	2.53E+01	1.26E-03	1.04E-01
Respirator Used for Duration of Work								
Protection Factor:	10							
Start Date	**End Date**	**Location**	**Concentration Accounting for Respiratory Protection**			**Percent of DAC**		
			Natural Uranium	**Radium-226**	**Thorium-230**	**Natural Uranium**	**Radium-226**	**Thorium-230**
			(microCuries/ml)	**(microCuries/ml)**	**(microCuries/ml)**			
23-Sep-04	30-Sep-04	Mill-Precipitation/Roller Room	8.16E-13	4.63E-16	6.54E-16	4.08E+00	1.54E-04	1.09E-02
4-Oct-04	4-Nov-04	Mill-Precipitation/Roller Room	5.06E-13	3.78E-16	6.23E-16	2.53E+00	1.26E-04	1.04E-02
Hours Exposed								
23-Sep-04	30-Sep-04	Mill-Precipitation/Roller Room	12.46	Hours				
4-Oct-04	4-Nov-04	Mill-Precipitation/Roller Room	8.17	Hours				
Exposure			**Natural Uranium**	**Radium-226**	**Thorium-230**	**Total**		
			(millirems)	**(millirems)**	**(millirems)**	**(millirems)**		
23-Sep-04	30-Sep-04	Mill-Precipitation/Roller Room	1.27E+00	4.81E-05	3.40E-03			
4-Oct-04	4-Nov-04	Mill-Precipitation/Roller Room	5.17E-01	2.57E-05	2.12E-03			
		Total Internal Dose:	1.79E+00	7.38E-05	5.52E-03			
						1.79E+00		

Kennecott Uranium Company
Sweetwater Uranium Project

Yellowcake Radiation Work Permit Exposure Assessment

Radon Exposure Assessment

Radon Daughter Measurements 2004 in the Roller Room

21-Jun-04		0.01	**Working Levels**
2-Dec-04	ND		**Working Levels**

Site Background: Upwind Air)

Start Date	**End Date**	
1-Jan-04	1-Apr-04	2.7
1-Apr-04	30-Jun-04	2.4
30-Jun-04	3-Oct-04	3.6
3-Oct-04	1-Jan-05	3.9

Average: 3.15

Average Background (Working Levels) 0.007

Site Equilibrium Factor: 0.219

Radon Daughters (Above Background): 0.003 **Working Levels**

Time in Roller Room: 20.63 Hours

Radon Exposure: 0.485 millirems

Kennecott Uranium Company
Sweetwater Uranium Project

Yellowcake Radiation Work Permit Exposure Assessment

Total Internal Exposure from Airborne Radionuclides Other than Radon:	1.79E+00	**millirems**
Gamma Exposure	10	**millirems**
Radon:	0.485	**millirems**
Total:	1.23E+01	

Note: Used ten (10) millirems - lower limit of detection (LLD) of the dosimeter, as the dose.

Kennecott Energy

Memorandum *Sweetwater Uranium Project*

16 February 2005

Memo to File

SUBJECT: Dose Assessment/Determination of No Requirement for Individual Monitoring or Dose Calculation at the Sweetwater Uranium Project for 2004

This determination is being prepared to demonstrate that individual monitoring and dose calculation is not required at the Sweetwater Uranium Project due to the low levels of gamma radiation, airborne particulate radionuclides and radon present at the facility. The Sweetwater Uranium Project is a non-operating uranium mill, which suspended operations in the spring of 1983. This assessment is based on background data for the facility and data from radiation surveys and air sampling surveys taken at the facility during 2004.

Background

10 CFR 20 (in 20.1003) in the definition of occupational dose states, *"Occupational dose does not include dose received from background radiation...."* In order to assess the occupational dose received at the facility the background must be deducted from the total dose received. Background data for gamma radiation and airborne particulate radionuclides were collected in 1976 for the Environmental Report and in 1979 for the pre-operational monitoring program. The average upwind radon concentration for 2004 was used to represent the background radon concentration for the facility.

Item	Average Concentration	Dose
Background Gamma		200.7 mrem/yr (22.9uR/hr)
Airborne Particulates:		
U-nat	6.2E-16 uCi/ml	0.34 mrem/yr
Ra-226	3.9E-16 uCi/ml	0.22 mrem/yr
Th-230	3.9E-16 uCi/ml	0.65 mrem/yr
Pb-210	1.7E-14 uCi/ml	1.39 mrem/yr
Radon-222	3.15 pCi/l	303.53 mrem/yr

Note: Based on calculations prepared by Lyda Hersloff dated December 29, 1993.

The background dose for radon in working levels at the upwind monitoring site assuming daughters present is computed as follows:

(3.15 pCi/l) / (1E3 ml/l) / (1E6 pCi/uCi) = 3.15 E-9 uCi/ml

0.33 WL = 3E-8 uCi/ml (with daughters present)

[(3.15E-9 uCi/ml) / (3E-8 uCi/ml)] * (0.33 WL) * (0.219) = 0.076 WL for background

The calculated equilibrium factor for the facility (1993 to 2004) average is 0.219.

Occupational Dose

1) Gamma Radiation

The average gamma dose at the facility is based on an average of survey results for twenty-eight (28) locations in the mill and twelve (12) locations in the ion exchange area. The results are as follows:

Gamma Survey Results

Area	Total Dose	Background Dose	Occupational Dose
IX Area	233.0 uR/hr	22.9 uR/hr	210.1 uR/hr
Mill	92.1 uR/hr	22.9 uR/hr	69.2 uR/hr
Tailings	127.9 uR/hr	22.9 uR/hr	105.0 uR/hr

Approximately 340 hours (thirty-four 10-hour working days) are estimated to have been spent in the mill and 520 hours (fifty-two 10 hour working days) are estimated to have been spent in the tailings impoundment by the Mill Foreman in 2004. This estimate is based on the number of entries in the restricted area alpha survey record for 2004 and assuming that each entry constitutes a full ten (10) hour day in the mill. This assumption is very conservative since many entries in the alpha survey record are the result of a brief (1 - 2 hour) period in the mill.

The table below estimates the gamma dose likely to be received by the Mill Foreman:

Area	Time	Occupational Dose Rate	Total Dose
Mill	340 hours	69.2 μR/hr	23.5 mrem
Tailings	520 hours	105.0 μR/hr	54.6 mrem
Total			**78.1 mrem**

Since the gamma levels are low in the mill and ion exchange area and only a limited amount of time is spent in these areas, it is unlikely that personnel would receive in one year from sources external to the body a dose in excess of 10% of any of the applicable limits in 20.1201(a); therefore, individual monitoring and dose calculation for external exposure is not required. Gamma doses measured in the Ion Exchange (IX) Area were not used in the estimate due to the very small amount of time spent in that area each year. This estimate assumes a one to one to one (1:1:1) equivalence of exposure (in Roentgens) to absorbed dose (in Rads) to equivalent dose (in REMs). For gamma radiation with a Quality Factor (QF) of one (1), this is acceptable.

This low dose is confirmed by personnel dosimetry that was performed during the approximately three (3) month interval from October to December 2004 on all site personnel during the loading and shipment of the yellowcake stored on site. The thermoluminescent dosimeters used, with a lower limit of detection (LLD) of 10 millirems, were exchanged monthly and showed no doses above the LLD.

2) Radon

The average radon dose at the facility is based on an average of survey results for three (3) locations in the ion exchange area, at least fourteen (14) locations in the mill and two (2) locations in the Solvent Extraction (SX) Building taken in June and December of 2004. The results are as follows:

Radon Sampling Results

Area	Concentration	Background	Occupational Dose
IX Area	0.004 WL	0.0076 WL	0.0 WL
Mill Area	0.014 WL	0.0076 WL	0.0064 WL

The average occupational radon dose for facility personnel is:

{[(0.0064 WL) / (0.33 WL/DAC)] * 340 hours} / (2000 DAC hours/ALI) = 0.0033 ALI
(0.0033 ALI) * (5000 millirems/ALI) = 16.5 millirems

3) Airborne Particulate Radionuclides (Uranium)

The average airborne particulate natural uranium dose at the facility is based on high volume air samples taken in the grinding and yellowcake areas of the mill and the tailings impoundment in May and September of 2004 and four (4) breathing zone samples taken of the Mill Foreman. The results are as follows:

High Volume Air Sampling Results

Area	Concentration	Background	Occupational Conc.
Grinding	8.87 E-16 uCi/ml	6.2 E-16	2.67 E-16 uCi/ml
Precipitation	1.75 E-15 uCi/ml	6.2 E-16	1.13 E-15 uCi/ml
Tails Impound.	2.42 E-15 uCi/ml	6.2 E-16	1.80 E-15 uCi/ml
Average			1.07 E-15 uCi/ml

Breathing Zone Samples

Date	Concentration	Percent of DAC
03/31/04	4.33 E-13 uCi/ml	2.16%
06/29/04	<3.00 E-13 uCi/ml	<1.50%
09/30/04	9.33 E-13 uCi/ml	4.66%
12/20/04	5.26 E-13 uCi/ml	2.63%

Using the value of 9.33 E-13 uCi/ml (the highest measured airborne uranium concentration) coupled with a working time spent in the mill of 340 hours and the tailings impoundment of 520 hours in 2004 would yield the following exposure:

(9.33 E-13 uCi/ml) / (2E-11 uCi/ml/DAC) * (340+520 hours) = 40.1 DAC-hrs
(40.1 DAC-hrs) / (2000 DAC-hrs/ALI) = 0.020 ALI = 2.0% ALI

A dose of 40.1 DAC-hrs represents the maximum possible internal dose at the facility and is 2.0% of the ALI, which is below the 10% threshold that triggers monitoring and dose calculation.

This is an extremely conservative dose estimate since it applies the highest uranium concentration to all work within the restricted areas (Mill Building and tailings impoundment) at the facility. This estimate equates to an internal exposure of 100 millirems, which is over twice the 40.3 millirem value calculated in the *Internal Occupational Exposure Assessment – Suspended Operations* because it applies the maximum airborne natural uranium concentration found in the Mill Building to work performed in the tailings impoundment in order to remain very conservative.

This maximum possible exposure of 0.020 ALI is also below the intake limit of 10 milligrams/week for soluble natural uranium listed described in 20.1201(e) as per the calculation below:

(0.020 ALI/yr) * (5E-2 uCi/ALI) = 1.00 E-3 uCi/yr
(1.00 E-3 uCi/yr) * (1 E-6 pCi/uCi) / (677 pCi/mg) = 1.47 mg/yr total intake

This is well below the 10 milligram per week limit.

Based on the levels of airborne uranium as demonstrated by the high volume air samples, the level of exposure exhibited by the breathing zone samples and the limited time spent in the mill (340 hours) and the tailings impoundment (520 hours) by the Mill Foreman in 2004, it is unlikely that personnel would receive in one year an intake in excess of 10 percent of the applicable ALI for uranium (natural) in Table 1, Columns 1 and 2 of Appendix B therefore monitoring and dose calculation for uranium (natural) is not required.

Conclusions:

1) Monitoring and calculation of external dose is not required at the Sweetwater Uranium Project since no personnel are likely to receive an external occupational dose in excess of 0.5 rem.
2) Monitoring and calculation of internal dose at the Sweetwater Uranium Project is not required because:
   a) Radon is at background levels.
   b) The maximum possible dose to airborne uranium from exposures in the mill is less than 0.10 ALI.
3) The maximum possible total occupational dose to the maximally exposed individual on site, the Mill Foreman, is as follows:
   a) Estimated external dose: 0.078 rem/yr.
   b) Estimated internal dose (particulates) 0.100 rem/yr.
   c) Estimated internal dose (radon-222) 0.017 rem/yr.
   d) Estimated total exposure from Radiation Work Permit: 0.012 rem
   Total: 0.207 rem/yr.

   This is below 10% of the 5-rem/year TEDE limit.

Oscar A. Paulson
Oscar A. Paulson