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April 1, 2002

Mr. Melvyn Leach, Branch Chief
Uranium Recovery Branch
Division of Low Level Waste Management & Decommissioning
Mail Stop T7J9
11555 Rockville Pike
Rockville, MD 20850

Re: Year 2001 Annual ALARA Review, Smith Ranch Facility
License SUA-1548
Docket 40-8964

Dear Mr. Leach:

Attached, in accordance with license condition #9.4(d) and 12.2 of the above referenced license, is the annual ALARA review for the Smith Ranch Facility. The audit was conducted for calendar year 2001 on March 15, 2001.

All facility process operations and health physics programs are being performed in accordance with license conditions and in keeping with the ALARA philosophy. If you have any questions concerning this ALARA report please call me at (307) 358-3744 ext. 62.

Sincerely,

John W. Cash
Manager EHS and Regulatory Affairs

Attachment: As stated

xc: P. Drummond, RAM/Smith Ranch
B. Ferdinand, RAM/Smith Ranch
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**RIO ALGOM MINING LLC.
SMITH RANCH FACILITY
ALARA SUMMARY, JANUARY - DECEMBER 2001
LICENSE SUA-1548, DOCKET 40-8964**

I. INTRODUCTION

The annual ALARA summary for the Smith Ranch in-situ operation, NRC license SUA-1548, for the calendar year 2001 is hereby submitted for NRC review in accordance with Performance Based License Condition No. #9.4(e) and 12.2.

The annual ALARA audit was conducted by John Cash on March 11, 2002. The results of the ALARA review were presented to ALARA committee members Bill Ferdinand (General Manager), Jake Hagar (Radiation Safety Technician), John Cash (Manager EHS & Regulatory Affairs), Pat Drummond (Manager Plant Operations), Terry Warner (Manager of Administration and Personnel), and Steve Hatten (Manager Wellfield Operations) by John McCarthy (RSO). Copies of the ALARA summary have also been distributed to corporate management for their review. The following is a summary of the ALARA audit.

The Smith Ranch Project initiated commercial operations June 20, 1997.

II. HEALTH PHYSICS SAMPLING SUMMARY

A. Bioassay Results

During the calendar year a total of three hundred four (304) routine bioassay samples were collected. Analytical results were below the lower limit of detection for uranium, or less than 15 micrograms per liter ($\mu\text{g/l}$), for all but two (2) samples. Both samples, (30.5 $\mu\text{g/l}$ (9/9/01), and 59.4 $\mu\text{g/l}$ (10/7/01)), were above 15 $\mu\text{g/l}$ but less than 135 $\mu\text{g/l}$. Confirmation samples were given to both individuals and the results were $<5 \mu\text{g/l}$. The results and corrective actions summarized from interviews with the individuals are described below.

Cause: Interviews were conducted with both individuals that had bioassay results greater than 15 $\mu\text{g/l}$. Both cases were thought to be reflex reactions and are discussed below.

The September 9, 2001 incident involved a maintenance worker who was working in the general plant area during the course of his duties. The individual was surprised by the results and stated that he washed and scanned many times during the day while working in the plant areas. The individual mentioned

that early in September he had a cold or flu and may have involuntarily wiped his nose or face with his gloved hand during the progress of work.

The October 7, 2001 incident involved a dryer operator who has since been reassigned to other duties. This individual had worked in the dryer for approximately two years. He mentioned that his hands were dry and sometimes caught himself biting the loose skin from a nervous reaction while away from the work area. He stated that he always washed his hands twice after leaving the dryer area to minimize potential contamination and scanned each day.

Corrective action: All individuals interviewed were instructed on the importance of personal hygiene and good housekeeping to minimize potential contamination, the health effects of natural uranium when taken internally, how to avoid or minimize a potential intake, and the necessity of maintaining the Respirator in the down position when in use. It appears reflex reactions were contributing factors in both cases and the employees were asked to identify these actions that are unique to each individual.

Corrective actions resulting from elevated bioassay investigations and reflex reactions were presented at weekly Safety Meetings.

B. Exposure Data

External (Gamma)

Gamma doses for employees are determined by the analysis of individual dosimeters worn by the employees. Personnel dosimeters are analyzed by an accredited outside contract laboratory in accordance with NVLAP procedures and specifications. Summarized in Table 1 below are the employee quarterly gamma doses by incurred dose ranges. The highest individual dose during the year was 878 mrem. Based on the annual dosages within the facility and in accordance with 10 CFR §20.1501 and §20.1502, which requires personnel monitoring only if it is expected that an individual will receive 10 % of the annual limit, it is not necessary to badge visitors. The individuals receiving greater than 10% of the annual limit during the year worked in the dryer, satellite and plant. Exposures outside of these restricted areas are less than 10% of the annual limit. Since access to restricted areas is limited it would not be expected that a visitor would receive 10% (0.10rems) of the annual dose limit.

Table 1
Gamma Dose By Individuals Per Quarter (mRem)

Period	< 10	11-29	30-49	50*-69	>70
1st Qtr.2001	41	14	4	2	7
2ndQtr.2001	41	6	9	4	6
3rdQtr.2001	37	7	7	3	6
4thQtr.2001	39	8	5	4	9

All values above 30 mRem can be attributed to individuals working in the Central Processing Plant or Satellite.

* 50 mrem is 1% of the allowable dose.

Internal - Uranium (Yellowcake)

Employee exposure to airborne uranium is determined by a time weighted average method, which uses air particulate sampling data and employees' time in designated areas of the facility. Final exposure results are recorded in DAC-hours.

As indicated on Table 2, exposures to airborne natural uranium were negligible. This can be attributed to better housekeeping and personal hygiene, and experienced, well-trained operators.

Table 2
Exposure to Airborne Uranium (DAC-Hours)

Employee Category	Year 1999	Year 2000	Year 2001
Plant operator	14.5	7.5	14.5

As indicated, employee exposure to airborne uranium continues to be limited.

Internal Radon Daughters

Exposure to radon daughters are calculated using the time weighted average format as outlined by the Mine Safety and Health Administration (MSHA) in 30 CFR §57.5040. The total radon exposure summary received by employees during 2001, as compared to 2000 and 1999 is provided in Table 3.

Table 3
Annual Exposure to Radon Daughters

Exposure (WLM)	Year 1999	Year 2000	Year 2001
< 0.10 **	93	82	82
0.10 - 0.20	5	0	8
0.21 - 0.30	0	0	3
0.31 - 0.40	0	0	0
> 0.40 *	0	0	0

* 10 % of the annual DAC (4 WLM), ** 2.5 % of the annual limit (4 WLM)

As indicated, employee exposure to radon daughters continues to be limited.

The overall total effective dose equivalent (TEDE) for the maximally exposed individual during the year 2001 was 1.08 rems or approximately 21.6% of the annual limit. During 2000 the maximally exposed individual was 0.583 rems approximately 11.6 % of the annual limit.

C. Safety Meetings and Training

One hundred and six (106) radiation topics were discussed during weekly safety and staff meetings during 2001. Discussion topics included in the meetings were:

Subject	Number of discussions
Results of NRC inspections	2
Emergency evacuation procedures	1
Results of daily inspections	1
Lockout/tagout procedures	3
SOP reviews	35
Exposure time cards	2
Risk assessment, contamination	4
Radiological safety	5
Hazardous materials security	1
Yellowcake security	1
Land fill	1
Materials release	2
Respirator sign for the dryer	2
Labeling of uranium samples	1
Intake of uranium and health effects	1
Reflex reactions and potential of intake	1
Radium	3
Radon	4
Header house radiation areas	3
By-product materials	3

RWPs	1
PPP	6
Emergency response	1
MSDS	2
UV radiation	1
Performance based license	4
Housekeeping	2
10 CFR part 20	1
Waste management	1
PFTs and fit tests	1
ALARA	2
Annual exposures	1
Maintenance and potential exposures	1
SOP in general	1
Task training	1
Over filling of tanks and the ramifications	1
Monitor well sampling	1
Racals	1
P-traps and the need to keep them full	1

Topics discussed and attendance are recorded and maintained on file. Safety or staff meetings are conducted nearly each day during the work week and a safety session is attended by all employees present on their scheduled workdays.

The annual radiation safety and MSHA refresher training courses were conducted at various times during the year. The MSHA training includes a radiation safety review in addition to first aid and industrial safety procedures and rules. Three hundred forty five (345) man-hours of Health Physics were presented during the year for annual radiation refresher and new employee training. Fifty four (54) man-hours of Hazard Awareness Training were presented during the year. D.O.T. Hazardous Awareness Training is required every three years and 2001 was the third year for most employees. Pulmonary function checks were performed during May 2001 for employees who may be called upon to utilize respiratory protection.

D. Weekly and Daily Inspection Log Entries and Monthly Summary Reports

Daily walk through inspections are conducted by the RSO, RST, or trained designee. There were two hundred fifty six (256) items noted during 2001. General housekeeping, proper use and disposal of protective clothing, and ventilation fans are checked during the inspections. A review of the inspections indicated there were minimal problems and housekeeping was the only action required.

Respirators/Racals are inspected for potential contamination and damage each month. During 2001 there were four hundred fifty (450) swipes performed on respirators/Racals. Respirators/Racals with more than 100 dpm removable are washed by the assigned individual and returned to service. Damaged respirators/Racals that can not be repaired are removed from service.

The RSO's monthly report summarizes the results of health physics activities and environmental monitoring. The facility General Manager reviews the RSO's monthly report and takes any actions deemed appropriate regarding radiation, industrial safety, or environmental concerns. No major items of concern were noted during the reporting period.

E. Radiological Surveys and Monitoring Data

Contamination Surveys

There were five thousand six hundred twenty two (5622) surface contamination surveys performed during the review period in both the controlled and restricted areas of the facility. Eating areas, change rooms, laboratories, and offices are surveyed weekly.

Removable contamination exceeding 1,000 dpm/100 cm² requires decontamination in restricted areas outside of the yellowcake/precip areas. During this reporting period no surveys exceeded the action level.

Personnel exiting the restricted area of the plants scan or "frisk" themselves for alpha contamination prior to entering the controlled/uncontrolled areas. During this report period a total of twenty-one thousand five hundred fifteen (21515) alpha contamination surveys were logged, for an average of one thousand seven hundred ninety three (1793) per month. Individuals exceeding the release limit of 1000 dpm are required to decontaminate and re-scan until below the posted limit prior to exiting. Additionally, during each quarter, the RSO or designee randomly performs an alpha contamination "spot check" on the personnel present in the controlled area that day. A total of one thousand one hundred seventy one (1171) scans were performed. All spot scans performed on individuals exiting the work area were below the 1000 dpm limit.

Scans are performed within waste receptacles in the plant and dumpsters located on site to verify contaminated materials are not inadvertently leaving the facility. There were two thousand three hundred forty six (2346) alpha or gamma surveys on waste/refuse during the year. No problems were noted during the reporting period.

There were a total of four hundred ninety four (494) alpha and gamma surveys conducted on equipment released from within the restricted or controlled areas of the facility. All equipment released was below the limits stated in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for

Unrestricted Use or Termination of Licenses for Byproduct or Source Materials”.

Gamma Monitoring

Gamma surveys are performed quarterly at various locations within the facility. The results of the in-plant surveys (inclusive of background) are shown in Table 4.

**Table 4
In-Plant Gamma Exposure Rates (average mR/hr)**

Area ¹	1st 2001	2nd 2001	3rd 2001	4th 2001	Average
1 Pilot	0.05	0.04	0.06	0.02	0.04
2 Pilot	0.12	0.04	0.05	0.04	0.06
3 Pilot	0.22	0.12	0.19	0.04	0.14
4 Pilot	0.19	0.34	0.30	1.00	0.46
5 Pilot	0.06	0.08	0.09	0.14	0.09
1 CPP	0.06	0.07	0.09	0.13	0.09
2 CPP	0.38	0.34	0.44	0.70	0.47
3 CPP	0.42	0.90	0.80	0.70	0.70
4 CPP	0.22	0.36	0.38	0.34	0.33
5 CPP	0.20	0.28	1.10	0.30	0.47
6 CPP	0.13	0.22	0.42	0.26	0.26
7 CPP	0.10	0.10	0.42	0.10	0.18
8 CPP	0.09	0.05	0.09	0.09	0.08
9 CPP	0.07	0.10	0.12	0.10	0.10
10 CPP	0.10	0.16	0.60	0.30	0.29
11 CPP	0.32	0.28	0.44	0.30	0.34
12 CPP	0.08	0.15	0.18	0.10	0.13
13 CPP	0.06	0.07	0.09	0.10	0.08
14 CPP	0.06	0.08	0.10	0.06	0.08
15 CPP	0.39	0.48	0.32	1.10	0.57
1 Sat	0.31	0.28	0.24	0.60	0.36
2 Sat	0.24	0.16	0.11	0.60	0.28

¹Areas are: 1 Pilot - Injection Area, 2 Pilot - Lab, 3 Pilot - Elution Area, 4 Pilot - Column Areas, 5 Pilot - Yellowcake Press, 1 CPP through 4 CPP - Injection/column Area, 5 CPP through 9 CPP - Elution Area, 10 CPP and 11 CPP - Thickener Area, 12 CPP through 14 CPP - Dryer Area, and 15 CPP - Yellowcake Storage. 1 Sat- control-room / change-room, 2 Sat- plant area

In addition to the required gamma survey locations, there were nine hundred eighteen (918) spot gamma surveys conducted during 2001.

Airborne Uranium and Radon Daughters

During the reporting period there were four hundred nine (409) and five hundred seventy seven (577) samples taken for airborne uranium and radon daughters respectively. The average and highest concentrations detected for the period are listed in Table 5. The satellite was not sampled for airborne natural uranium because sampling is not required by the performance based license and because airborne natural uranium is not expected to be present due to the nature of the process.

**Table 5
In-Plant Airborne Radionuclide Concentrations**

Pilot Plant

Parameter	Area	Average	High
Unat (% DAC)	Yellowcake Filter Press	0.27	5.38
Unat (% DAC)	General Process Plant	0.27	4.33
Radon Daughters (WL)	General Process Plant	0.01	0.04

Satellite Plant

Parameter	Area	Average	High
Radon Daughters (WL)	General Satellite	0.01	0.58

Central Processing Plant

Parameter	Area	Average	High
Unat (% DAC)	Yellowcake Filter Press / Dryer	1.26	16.66
Unat (% DAC)	General Process Plant	0.36	2.30
Radon Daughters (WL)	General Process Plant	0.02	0.58

- Racial respirators are required when unloading the dryer or filter press areas and during cleanup.

Attached, as Figures 1 and 2, are the graphical representations for the yellowcake filter press and general process plant areas for natural uranium and radon daughter's concentrations.

Environmental Radon

Radon monitoring is conducted on a continuous basis using a Track-etch cup. The cup is exchanged on a quarterly frequency for analysis.

Table 6
Environmental Radon Concentrations 2000 (pCi/liter)

Location	1 st Qtr.	2 nd Qtr.	3 rd Qtr.	4 th Qtr.	Average
Dave's WW	0.8	1.4	0.8	0.9	1.0
Fence	1.2	1.5	0.8	0.8	1.1
Vollman	0.9	1.0	0.6	1.2	0.9

Environmental Gamma

Direct radiation (gamma) is measured on a quarterly basis at the following locations: 1 - Upwind from the plant, 2 - Down-wind from the plant, 3 - Leach tank, 4 - East evaporation pond, and 5 - West evaporation pond. The results of the quarterly surveys for this reporting period indicate that the gamma values are essentially at background and no significant trends were noted. The data is presented in Table 7.

Table 7
Environmental Gamma Concentrations (mR/hr)

	1st	2nd	3rd	4th	Period
Area	2001	2001	2001	2001	Average
1 Upwind	0.018	0.018	0.018	0.022	0.019
2 Downwind	0.027	0.024	0.028	0.028	0.027
3 Leach Tank	0.029	0.032	0.026	0.038	0.031
4 E. Evaporation Pond	0.026	0.036	0.039	0.043	0.036
5 W. Evaporation Pond	0.029	0.069	0.069	0.041	0.052

Continuous environmental gamma dosimeters are used for monitoring. The dosimeters are analyzed by an accredited outside contract laboratory in accordance with NVLAP procedures and specifications. A summary of the environmental monitoring results is presented in Table 8.

Table 8
Environmental Gamma Dosimeter Concentrations (mR/quarter)

AREA	1 st 2001 mR/Qtr.	2 nd 2001 mR/Qtr.	3 rd 2001 mR/Qtr.	4 th 2001 mR/Qtr.	Period Average
Dave's WW	38	33	36	34	35
Fence	51	41	42	38	43
Vollman	41	35	34	31	35
Wellfield I	45	40	36	36	39
Evap. Pond	47	42	38	37	41
Wellfield 3	41	38	33	32	36
Wellfield 4	46	38	34	37	39
Wellfield 4A	43	32	33	33	35

During "Commercial Operations" continuous air-monitoring samples were collected at three locations, Dave's WW, Vollman Ranch, and at the controlled area boundary fence. The air sample filters are collected a minimum of once a month. The air sample filters are analyzed by an accredited outside contract laboratory in accordance with NVLAP procedures and specifications. A summary of the environmental air sampling monitoring results is presented in Table 9.

Table 9
Environmental Air Sample Concentrations ($\mu\text{Ci}/\text{mL}$)

Vollman Station (Downwind)

Radionuclide	1 st Quarter $\mu\text{Ci}/\text{mL}$	2 nd Quarter $\mu\text{Ci}/\text{mL}$	3 rd Quarter $\mu\text{Ci}/\text{mL}$	4 th Quarter $\mu\text{Ci}/\text{mL}$	Average $\mu\text{Ci}/\text{mL}$
U^{nat}	1.53E-15	1.76E-15	1.92E-15	9.69E-16	1.54E-15
Th^{230}	1.81E-16	1.05E-15	1.02E-15	3.18E-16	6.42E-16
Ra^{226}	7.23E-16	6.49E-15	1.58E-15	6.76E-16	2.37E-15
Pb^{210}	1.02E-12	3.71E-13	3.82E-13	3.95E-13	5.42E-13

Dave's WW Station (Upwind-Background Location)

Radionuclide	1 st Quarter $\mu\text{Ci}/\text{mL}$	2 nd Quarter $\mu\text{Ci}/\text{mL}$	3 rd Quarter $\mu\text{Ci}/\text{mL}$	4 th Quarter $\mu\text{Ci}/\text{mL}$	Average $\mu\text{Ci}/\text{mL}$
U^{nat}	1.54E-15	1.19E-15	1.49E-15	7.08E-16	1.23E-15
Th^{230}	3.02E-16	1.85E-16	3.67E-16	3.05E-16	2.90E-16
Ra^{226}	1.06E-15	3.61E-15	1.74E-15	7.41E-16	1.79E-15
Pb^{210}	7.67E-13	3.32E-13	2.79E-13	3.86E-13	4.41E-13

Fence Line Station

Radionuclide	1 st Quarter $\mu\text{Ci}/\text{mL}$	2 nd Quarter $\mu\text{Ci}/\text{mL}$	3 rd Quarter $\mu\text{Ci}/\text{mL}$	4 th Quarter $\mu\text{Ci}/\text{mL}$	Average $\mu\text{Ci}/\text{mL}$
U^{nat}	9.02E-15	2.09E-14	1.85E-14	1.07E-14	1.48E-14
Th^{230}	1.67E-16	1.50E-15	1.52E-16	4.40E-16	5.65E-16
Ra^{226}	1.42E-15	6.49E-15	2.20E-15	2.86E-15	3.24E-15
Pb^{210}	5.89E-13	3.51E-13	3.71E-13	4.37E-13	4.37E-13

F. Surveys Requiring Radiation Work Permit

Twenty (20) RWP's were issued during the report period. One hundred twenty six (126) associated samples were collected in conjunction with the RWP's.

G. Reports of Overexposures

There were no overexposures during the reporting period.

H. Transportation

There were seventeen (17) yellowcake shipments made during the year with one thousand eight hundred seventy nine (1879) associated alpha and gamma surveys. One thousand six hundred eighty four (1684) scans were performed on yellowcake drums before their release for shipment. There were fifty-three (53) barren and pregnant resin shipments made from the plant and satellite with one thousand five hundred thirty-seven (1537) associated alpha and gamma surveys.

The transport index for yellowcake is 0.25 for bulk shipments or 0.25 mR/hr at 1 meter from the side of the trailer.

Averaging the dose rate in the living quarters, sleeper, of the truck from previous shipments indicates the driver could receive 0.135 mRems/hr. Assuming fifty-six (56) shipments per year, a thirty (30) hour driving time to destination and the same driver for all shipments, the annual potential exposure could be 226.8 mRems/year. This would be an extreme case as we have numerous different drivers.

I. Review of Operating and Monitoring Procedures

A review of the Standard Operating Procedures (SOPs) for production and monitoring activities were performed by October 2001.

III. CONCLUSIONS AND RECOMMENDATIONS FOR THE ALARA PROGRAM

A. Status of the 2000 ALARA Audit Recommendations

The following list details the status of recommendations made by the year 2000 ALARA Committee.

- Re-locate fans in the satellite to assist in radon removal.

During the year 2001, the ventilation fans located at ceiling level in the satellite were removed to a more efficient floor level. To date radon levels are generally lower than the previous year, but a years sampling results should confirm the effectiveness of the move.

- Encourage proper storage of personnel dosimeters; especially for individuals working in the CPP and/or dryer.

Discussions with individuals and presentations at safety meetings have assisted in demonstrating to the operators the importance of

proper storage. We continue to stress the importance and will perform audits on the dosimeter storage racks in the future.

- Continue education in radiation safety.

The number of safety meetings attended with radiation topics presented demonstrates the ongoing training of the workforce. Annual radiation refresher training gives the Environmental, Health and Safety (EHS) Department an opportunity to discuss specific radiation topics with individuals.

- Continue stressing the importance of housekeeping

Improvements in housekeeping throughout the facility can be attributed to the professionalism and maturity of the work force. Daily radiation safety inspections, daily occupational safety, monthly Safety Committee inspections, and monthly environmental inspections are conducted throughout the facility. The inspections have assisted individuals in identifying areas of concern that otherwise may not be recognized as potential problems.

B. The Conclusions of the Year 2001 ALARA Audit are as follows

Pre-operational alpha and gamma surveys were completed on equipment and the environment prior to start of the wellfield re-completions. Pre-operational bioassays were collected from contract drillers and helpers during their radiation training to help us maintain ALARA. The drillers were given dosimeters to wear while working in wellfield three to monitor their potential exposures. To date no contamination has been identified on equipment or individuals working in the re-completion wellfield. Dosimeter results have not recorded exposures above background.

P-traps located on tanks in both the plant and satellite have been extended with a clear plastic tube allowing operators to easily recognize when traps require additional water to minimize the potential escape of radon.

Sight tubes on tanks in the satellite and plant has been capped in an effort to minimize potential sources of radon.

The sump located under the shaker deck has been vented through the ceiling of the plant to assist in the removal of potential radon.

All header houses have been posted "CAUTION Radiation Area" and "Authorized Personnel Only" as a result of our investigation of gamma radiation areas. The postings should discourage the public from entering the houses and alert employees to minimize their time in the area.

In light of the events of September 11th, security at the facility has been tightened. Historically, there were three vehicle access points to the facility. Two of the three access points have been blocked by locked gates. Currently, the only vehicle access to the facility is through a locked autogate. SOP 1190 "Facility Access Control" was also updated in order to strictly limit who can access the controlled area without an escort. The man door to the yellowcake storage area is now kept locked to prevent access by unauthorized individuals. Finally, all bulk chemical providers have been asked to provide Rio Algom with a list of driver's names and driver's license numbers or to notify Rio Algom who the driver will be for the next delivery. This allows Rio Algom to verify that an unknown driver is legitimate. Most chemical suppliers have provided such lists to Rio Algom.

The overflow tanks for the IX columns in both the CPP and Satellite were vented to atmosphere to potentially reduce the escape of radon gas into the building.

C. Recommendations of the Year 2001 ALARA Committee

The 2001 ALARA Committee made the following recommendations:

1. Continue maintaining high standards in housekeeping;
2. Continue to encourage site personnel to properly store dosimeters when they are not in use;
3. Continue radiation safety in departmental safety meetings and during annual refresher

IV. SAFETY AND ENVIRONMENTAL REVIEW PANEL (S.E.R.P.)

During the year 2001, one (1) S.E.R.P. was convened and completed. Work Order 439 was originated by the facilities RSO, John McCarthy, in order to review the EHS and technical aspects of switching from a thermoluminescent dosimeter (TLD) to an optically stimulated luminescent dosimeter (OSL). The ORC determined that the OSLs would protect EHS and that the dosimeters were technically sound. Upon completion of the ORC review, a SERP consisting of John McCarthy, John Cash, Pat Drummond, and Bill Ferdinand was convened to determine if a license amendment would be required. At the beginning of the SERP review the facility's NRC license specifically used the words TLD. However, before completing the review the Performance Based License Application (PBLA) was approved and a new license was issued. The new license makes no mention of the type of dosimeters to be used by the facility. The SERP concluded that no changes needed to be made to the license but that the license application would need to be amended to allow for other types of dosimeters other than TLDs. The revisions to the PBLA and a summary of the SERP evaluation are attached in Appendix A.

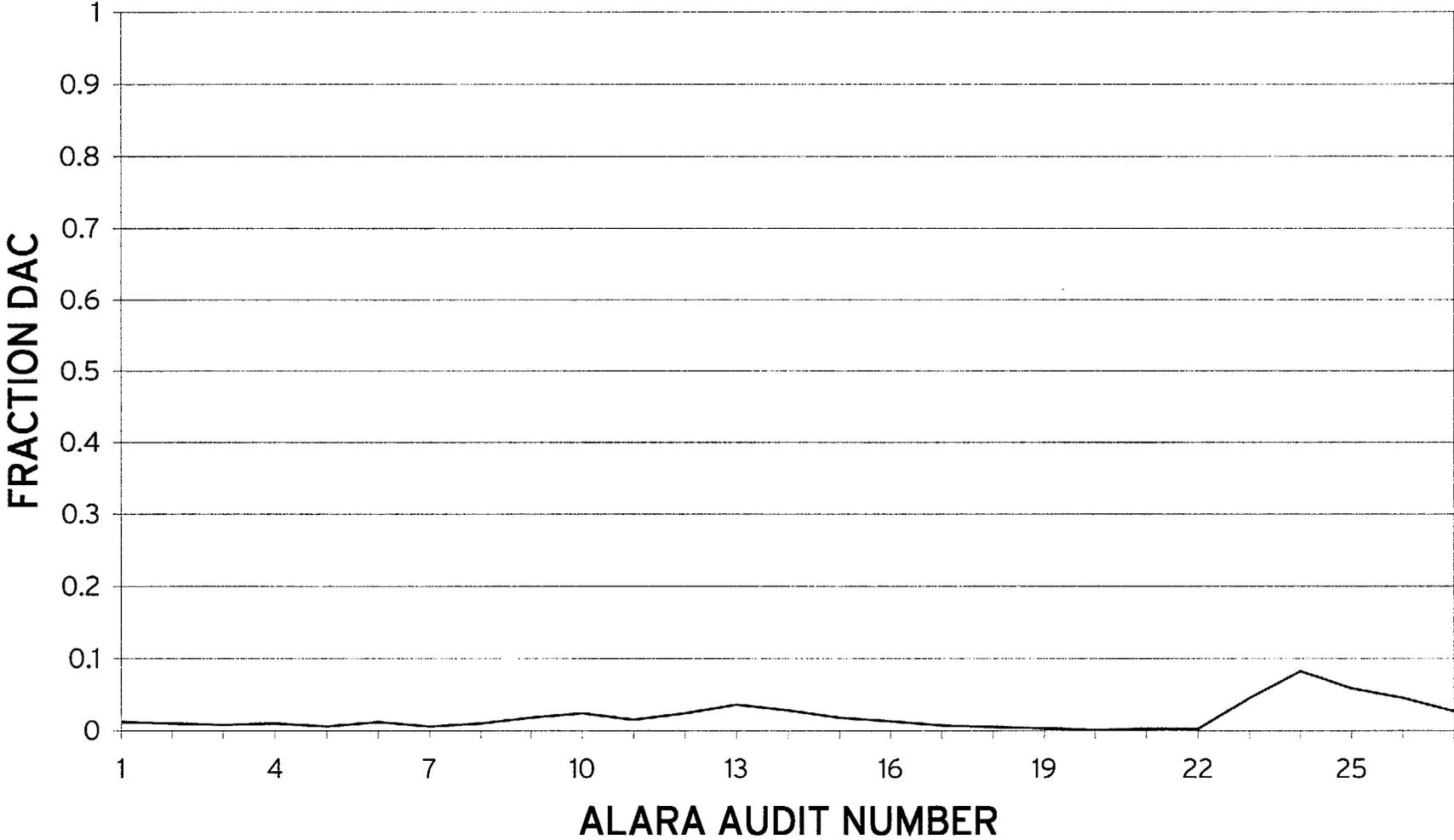
A second SERP to review second completions in Wellfield 3 was convened in 2001, however, changes to the application were not made until the year 2002. Therefore, a summary of the findings will be reported in the 2002 ALARA report.

V. LAND USE SURVEY

Pursuant to License condition 12.2 please find attached in Appendix B the land use survey map for the calendar year 2001. The map covers a two mile radius measured from the center of the central processing plant and shows grazing area, wellfields, roads, sources of water used for livestock and domestic use, and buildings. All land within the area of review was used for grazing except areas occupied by the controlled area, satellite and wellfields.

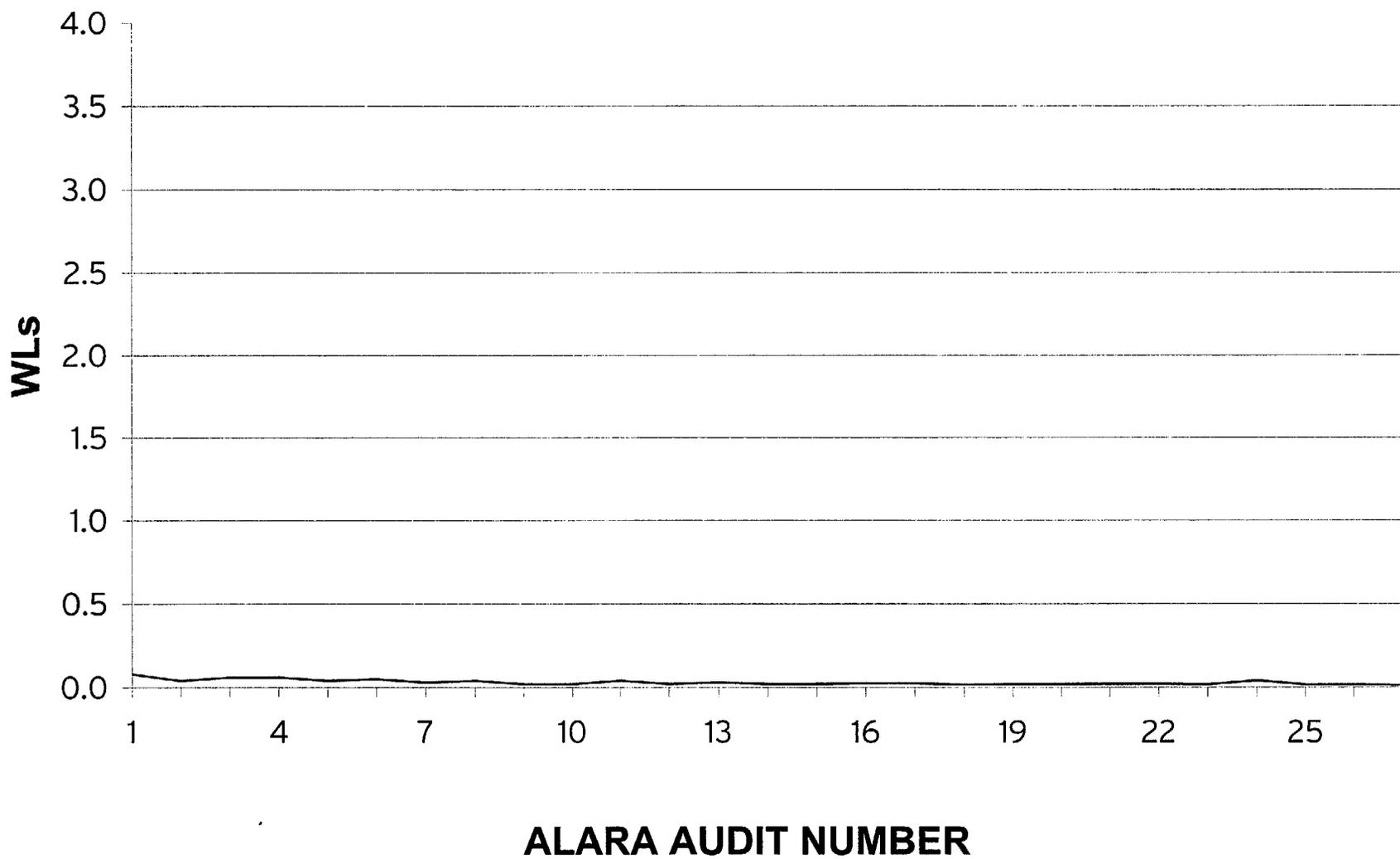
AVERAGE U-NAT CONCENTRATIONS (fraction of DAC)

Figure 1



AVAEAGE RADON DAUGHTER CONCENTRATIONS (WLS)

Figure 2



APPENDIX A

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and environmental monitoring, bioassay analysis, and instrument calibration for activities involving radiation safety. A copy of the written procedure shall be kept in the area where it is used. All procedures involving radiation safety shall be reviewed and approved in writing by the RSO or another individual with similar qualifications prior to being implemented. The RSO and/or his designee(s) shall review and approve the operating procedures annually.

For work where the potential for significant exposure to radioactive material exists, and which has no standard operating procedure, is designated as nonroutine and a Radiation Work Permits (RWP) will be prepared. The RWP will describe the scope of the work, precautions necessary to maintain radiation exposures to ALARA, and any supplemental radiological monitoring and sampling to be conducted during the work. The RWP shall be reviewed and approved in writing by the RSO, RST, or a designated supervisor in the absence of the RST, prior to initiation of the work.

Any changes to the Health Physics manual developed for this uranium recovery facility will be reviewed and approved by the RSO prior to being implemented. Written standard operating procedures for both operational and non-operational activities involving radioactive materials will be prepared and be reviewed and approved by the RSO and the RST prior to their implementation.

Standard written operating procedures shall be established for all routine operational and non-operational activities that do not involve radioactive materials. These procedures will enumerate pertinent safety procedures to be followed. A copy of the written procedure shall be kept in the area where it is used. These procedures that do not involve radiation safety shall be reviewed and approved by the Safety Engineer, RSO, or another individual with similar qualifications prior to being implemented. The Safety Engineer shall review and approve all of the non-rad standard operating procedures annually.

9.7 Personnel Radiation Monitors

Appropriate, approved, external personnel radiation dosimeters will be worn by all employees who work in or routinely enter the recovery plant controlled area (Figure 9-1).

9.8 Bioassay Program



Rio Algom

Memo

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To John Cash
From J. McCarthy
Date 7/3/01
Subject SERP of ORC-W00439

.....

A Safety and Environmental Review Panel (SERP) was convened on June 12, 2001 to review the findings of ORC 439. Those members present were Bill Ferdinand (General Manager), John Cash (Manager, EHS), John McCarthy (Radiation Safety Officer), and Jim Clay (Chief Chemist and supervisor plant operations). The attached ORC review was conducted on April 4, 2001 and reviewed the change from Thermal Luminescent Dosimeters (TLD) to Optically Stimulated Luminescent (OSL). The ORC determined that the change to OSL would not have an adverse effect on the quality of data, the NRC accepts and uses OSLs, and that they have been rugged enough for field work. The ORC was forwarded to the SERP process because of question 1. "The corrective actions is contrary to regulations, license, or permit conditions;" was answered "Yes". The existing Source Materials License Condition 10.14, "The licensee shall issue to all site employees, either thermoluminescent dosimeters (TLDs) or film-type dosimeters which shall be exchanged and read on a quarterly frequency", would require an amendment to replace the reference to TLDs with an "approved dosimeter". As we were informed that the approval of our Performance Based License (PBL) was weeks away, it was determined that rather than amend the existing license we would await the PBL and change the application as per SERP. The PBL was issued on May 8, 2001 and the SERP has concluded that the only reference to TLDs would be found in the application and procedures. As per protocol found in the EHS Management Procedures, number 1130 the following questions were answered.

1. *OPERATIONS / TECHNICAL REVIEW*

1.1 *Review operation criteria and critical equipment and determine the following:*

1.1.1 *Does the proposed change impact the operations as described in the license application?*

There is would be no impact on the operations as described in the license application, only word smithing as described in Paul Goranson's attached memo dated June 6, 2001.

1.1.2 *Does the proposed change significantly change the processes used at the facility as described in the license application?*

This change would not change the processes used at the facility.

1.2 *Review the Standard Operating Procedure(s) (SOP) for the proposed change and determine the impact on the current SOPs. Make sure necessary updates are made to the current SOPs or develop new procedures.*

Standard Operating Procedures (SOP) would change as per Paul Goranson's memo dated June 6, 2001.

1.2 *Has a Risk Assessment screening been performed on the proposed change with respect to potential risks to the operations? If so, are there additional risks caused by the action under review that will affect other systems in the operation that will need to be considered in this review? (Procedure 1140 - Risk Assessment)*

1.3 *If applicable, review the current emergency response procedures (ERP) and determine if the change is compatible with the current ERP.*

Again, only word smithing as per Paul Goranson's memo of June 6, 2001.

2. *ENVIRONMENTAL / HEALTH PHYSICS / SAFETY REVIEW*

2.1 *Review the proposed changes to determine if any modifications in the current monitoring and record keeping procedures are required to ensure compliance with existing programs.*

The record keeping will remain the same, only the supplier changes.

2.2 Review the proposed changes and determine the need for additional training.

All site employees have been and are trained in the use of personal dosimeters.

2.3 Review key personnel training records and determine training needs as required by the proposed change.

No additional training is necessary as stated in 2.3.

2.4 Has a Risk Assessment screening been performed on the proposed change with respect to potential risks to the worker and public safety and to the environment? If so, are there additional risks caused by the action under review that will affect other aspects of impact by the operation that will need to be considered in this review? (Procedure 1140 - Risk Assessment)

2.5 Review the potential environmental impact as a result of the proposed changes and investigate worst case scenarios.

The environmental TLD have not changed and remain the same type as previously used.

2.6 Review the potential health physics impact as a result of the proposed changes and investigate worst case scenarios.

The Health Physics aspects have been review in ORC 439 and found no impact, see attached ORC-439.

2.7 Review the potential safety impact as a result of the proposed changes and investigate worst case scenarios.

The safety of employees will not be compromised by the use of OSL dosimeters.

3. *COMPLIANCE REVIEW*

- 3.1 *Review the proposed changes and determine whether it will conflict with corporate and facility policies regarding training, safety, environmental, and responsibility concerns.*

The change will not impact any company policies regarding training, safety, environmental, and responsibility concerns.

- 3.2 *Review the proposed changes and determine compliance with the facility source material license, permit, and/or other pertinent permits and regulatory approvals.*

Changes as per Paul Goranson's memo dated June 6, 2001 will be made to the permit and Health Physics Manual.

- 3.3 *Review the proposed changes and determine compliance with Federal and State regulations. (Example: NRC, EPA, DEQ-LQD, DEQ-WQD, and etc.)*

Compliance with all agencies and regulations will be maintained with the changes.

The SERP determined that the appropriate changes to the license application and Health Physics Manual, as per Paul Goranson's memo dated June 6, 2001, would be necessary to eliminate the references to TLDs and replace with an "approved dosimeter".

A license amendment would not be required for this change, but the change(s) made to the license application would be forwarded to the NRC in the annual ALARA report.



Rio Algom

Memo

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To Pat Drummond, Bill Ferdinand, John McCarthy

From John Cash *John Cash*

Date 4/4/01

Subject WO 0439; Review of OSL Dosimeters; Final Summary

INTRODUCTION

During September of the year 2000, Smith Ranch Facilities' supplier of personal radiation dosimeters, Eberline, was bought out by a company called Landauer. While Eberline had provided the facility with "Thermal Luminescent Dosimeters," (TLD), Landauer began issuing "Optically Stimulated Luminescent" (OSL) dosimeters without informing the Smith Ranch Facility of the change. Upon learning of the change, an ORC was convened to review the potential health, safety, environmental, and regulatory impacts of using the Luxel® Optically Stimulated Luminescent dosimeters provided by Landauer.

OBJECTIVES

1. Determine if the OSL dosimeters will provide the quality of data we desire.
2. Determine if the OSL dosimeters are acceptable to NRC.
3. Evaluate the construction of the OSL badges to ensure they are sufficiently rugged to handle field work..
4. Determine if a SERP is necessary.

ORC MEMBERS

John Cash - Manager EHS & Regulatory Affairs

Pat Drummond - ORC Chairman, Plant Manager, Member of Operations

Bill Ferdinand - General Manager, Member of Management

DATES

The ORC held one meeting on March 19, 2001.

ANALYSIS

According to Landauer, the Luxel® OSL dosimeters can read from 1 mrem to 1,000 rem at energies of 5 keV to over 40 MeV. Therefore, the badges will record the vast majority of decay energies from the uranium daughters expected at the facility. The badges are reported to be unaffected by heat, moisture, and pressure as long as the clear blister packaging is uncompromised. The OSL badges can be allowed to record data for up to a full year whereas at the Smith Ranch Facility the badges are replaced at least once per quarter.

The OSLs are more precise than the TLD dosimeters and can be reanalyzed if necessary. Once a TLD dosimeter is read the information on the badge is destroyed making it impossible to confirm readings.

While no tests on the OSLs, other than controls, have been performed at the Smith Ranch Facility, the range of values recorded by OSL dosimeters have been in line with historic values recorded by TLD dosimeters. Landauer is accredited by the National Institute of Standards and Technology through the National Voluntary Laboratory Accreditation Program (NVLAP) and accordingly meets the processing standards set forth in ANSI HPS N13.11-1993.

Finally, NRC is also using the new OSL dosimeters for their employees.

RISK ASSEMENT

The OSL dosimeters will not increase the potential risk at the facility. In fact, the improved precision and ability to reanalyze the results may improve the quality of monitoring data.

CONCLUSIONS

1. Based on the above analysis, it is the consensus of the ORC that the OSL dosimeters do in fact provide the quality of data desired at the Smith Ranch Facility.
2. NRC finds the OSL dosimeters acceptable.
3. The OSL badges have held up reasonably well to rugged field conditions.

4. Based on the response to the questions noted below, it was determined that a S.E.R.P. is necessary.

S.E.R.P.

The ORC determined that a SERP is required because:

1. The corrective actions is contrary to regulations, license, or permit conditions;
2. The corrective action will not degrade essential safety and environmental commitments in the license;
3. The corrective action is consistent with present activities;
4. The corrective action will not require an archeological/cultural release as the area has already been released;
5. The corrective action will have no impact on the surety bond for the facility as the area impacted has already been bonded for with the installation of WF 4; and
6. The corrective action will have no impact on the size of the present permitted mining area.

The official SERP screening questionnaire from SOP 1100 is attached.

RECOMMENDATIONS

It is the consensus of the ORC that the use of OSL dosimeters continue. However, it is necessary to convene a S.E.R.P. in order to address the current use of TLD verbiage in the license and potentially in other binding documents.

Xc: Paul Goranson

APPENDIX B

**THIS PAGE IS AN
OVERSIZED DRAWING
OR FIGURE,
THAT CAN BE VIEWED AT
THE RECORD TITLED:
FIGURE 3
SMITH RANCH PROJECT
NRC 2001 ALARA REPORT
LAND USE MAP
WITHIN THIS PACKAGE...OR,
BY SEARCHING USING THE
DOCUMENT/REPORT NUMBER
FIGURE 3**

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

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