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March 30, 2001

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

Re: Year 2000 Annual ALARA Review, Smith Ranch Facility
License SUA-1548
Docket 40-8964

Dear Mr. Ting:

Attached, in accordance with license condition #12.9 of the above referenced license, is the annual ALARA review for the Smith Ranch Facility. The audit was conducted for calendar year 2000 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: S. Deaderick, RAMC/Smith Ranch
P. Drummond, RAMC/Smith Ranch
B. Ferdinand, RAMC/Smith Ranch
M. Freeman, RAMC/Smith Ranch
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RIO ALGOM MINING CORP.
SMITH RANCH FACILITY
ALARA SUMMARY, JANUARY - DECEMBER 2000
LICENSE SUA-1548, DOCKET 40-8964

I. INTRODUCTION

The annual ALARA summary, audit number 26, for the Smith Ranch in-situ operation, NRC license SUA-1548, for the calendar year 2000 is hereby submitted for NRC review in accordance with License Condition No. 12.9.

The annual ALARA audit was conducted by John Cash on March 15, 2001. The results of the ALARA review were presented to ALARA committee members Bill Ferdinand (General Manager), Ken Holman (Radiation Safety Technician), Jake Hagar (Radiation Safety Technician), John Cash (Manager EHS & Regulatory Affairs), Skip Deaderick (Chief Geologist), Pat Drummond (Manager Plant Operations), 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 eighty-eight (388), [385 in 1999] routine bioassay samples were collected. Analytical results were below the lower limit of detection for uranium, 5 micrograms per liter (μg/l), for all but seven (7), [18 in 1999] samples. All but one of the seven samples were above 15μg/l but less than 35μg/l. The results and corrective actions summarized from interviews with the individuals are described below.

16.7 μg/l (2/19/00), 16.7 μg/l (3/20/00), 364.0 μg/l (4/3/00), 19.5 μg/l (8/3/00), 15 μg/l (8/4/00), 17.1 μg/l (10/10/00), 25.3 μg/l (12/13/00).

Cause: Interviews were conducted with all of the individuals that had bioassay results greater than 15 μg/l. Some unique causes resulted from the interviews along with the usual lapses in personal hygiene and areas discussed below.

Potential contaminated liquids were found inside an individuals Racal visor during a general wash-down of the dryer area after unloading. After the individual sprayed the area overhead he proceeded to wash the floor under the dryer. Wash water dripped form overhead onto his Racal hood and entered into his visor at the contact point of visor-hood.

An individual working and wearing a Racal respirator felt the onset of a cold before and during the performance of the task. Each time the individual sneezed he raised his Racal visor and covered his mouth with his hands, as we are all taught to do from early childhood. It was felt that this reflex action resulted in his inadvertent elevated bioassay.

An individual working in the dryer area during the summer months would raise his visor and wipe sweat from his face after washing his gloves. Again a possible reflex action resulting in a potential intake of contaminates.

An individual entered the dryer area while the "Respirator required beyond this point" sign was turned around, indicating no respirators were required. The dryers were not being unloaded and the area had been washed. He was in the area to oil the drum rollers located under the dryer. He noticed dry yellowcake after moving the rollers. The act of moving the rollers may have dispersed contaminates into the air.

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 Racal visor in the down position when in use. Sweat-bands were recommended to help minimize the impulse of wiping the face. Individuals were informed that just rinsing of the hands or gloves could not guarantee the removal of potential contaminates and that thorough washing was necessary. Individuals should remove themselves from the contaminated area prior to lifting the Racal visors to minimize facial contact with possible air borne contaminates. Individuals working with colds or allergies should not raise their visors or remove a respirator to sneeze. Respirators which have been sneezed into can be washed after leaving the potentially contaminated area. Be conscious of and fight the reflex action to cover your nose/mouth when sneezing or coughing. Individuals were informed that all maintenance work, regardless of how minor, in the dryer area requires the use of a respirator.

Corrective actions resulting from elevated bioassay investigations are presented at weekly Safety Meetings. During the year corrective action topics at Safety Meetings included: bioassays, exit scans (2), housekeeping (5), personal protective equipment (3), respirators (3), and the health effects of natural uranium. These topics were chosen to reiterate to all employees the necessity of and how to minimize potential exposures.

Based on our sampling results, respirators are no longer required in the yellowcake storage area. Respirators in the dryer/press area are now required only during the unloading process, maintenance work and subsequent clean up.

The bioassay resulting in 364.0 µg/l was reported to the NRC on May 12, 2000 incorporating the results of the interview, follow-up bioassays and corrective actions and is here-by referenced.

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 244 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. Two individuals received greater than 10% of the annual limit (0.578rems and 0.507rems) during the year and they worked the entire year in the dryer and plant respectively. The elevated exposure is believed to have resulted from an individual realizing he was not wearing his badge while in the dryer area but leaving it attached to his hard hat on storage hooks at the dryer access door. The employee then began wearing the badge while in the dryer giving the appearance of increased exposure. If the employee had worn his badge in the dryer all year, we project his recorded gamma exposure would have been approximately 832 mRems with a TEDE of 837 mRems or 16.7% of the annual limit. Since access to these areas are restricted it would not be expected that a visitor would receive 10% (0.10rems) of the annual dose limit.

RAMC's personal dosimeter supplier switched from "Thermoluminescent Dosimeters" (TLD) to "Optically Stimulated Luminescence" (OSL) dosimeters in September of 2000. The OSL dosimeters can be read numerous times to confirm readings while the old TLDs could only be read once.

Table 1
Gamma Dose By Individuals Per Quarter (mRem)

Period	< 10	11-29	30-49	50*-69	>70
1st Qtr.2000	63 (76)	6 (8)	3 (3)	8 (0)	3 (0)
2ndQtr.2000	56 (72)	1 (11)	4 (6)	5 (2)	6 (0)
3rdQtr.2000	50 (65)	9 (5)	4 (10)	3 (1)	10 (2)
4thQtr.2000	46 (60)	11 (3)	4 (8)	5 (5)	7 (3)

The corresponding values for 1999 are in parenthesis.

All values of 30 mRem and above can be attributed to plant and wellfield operators.

* 50 mrem is 1% of the allowable dose.

Internal - Uranium (Yellowcake):

Employee exposure to airborne uranium are 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. The DAC hours were half of the previous year's values. 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	January - December 1998	January - December 1999	January - December 2000
Plant operator	31.4	14.5	7.5

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 2000, as compared to 1998, and 1999 is provided in Table 3.

Table 3
Annual Exposure to Radon Daughters

Exposure (WLM)	January - December 1998	January - December 1999	January - December 2000
< 0.10 **	92	93	82
0.10 - 0. 20	3	5	0
0.21 - 0.30	2	0	0
0.31 - 0.40	1	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 2000 was 0.583 rems or approximately 11.6 % of the annual limit. During 1999 the maximally exposed individual was 0.301 rems approximately 6.02 % of the annual limit. The slight upward trend may be attributed to the dryer operator's attention to wearing his dosimeter rather than leaving it in his change locker.

C. Safety Meetings and Training

One hundred and forty-six (146) radiation topics were discussed during weekly safety and staff meetings during 2000, [eighty-three (83) in 1999]. Discussion topics included in the meetings were: results of NRC inspections (2), plant emergency exits, contaminated waste (7), PPE (3), proper labeling, by-product shipping requirements, respirators (3), scan out procedures (2), radon (5), SOP reviews (79), bioassays (1), task training, emergency check list, emergency preparedness, loading yellowcake trailer, housekeeping (5), MSDS procedures, evacuation drill, restricted areas, escape packs, sampling methods, work order/RWP (5), work place inspections, material storage, radium in scale, sun exposure and health effects, alpha contamination, de-contamination, time cards and exposures, release of materials, weighing risks, fire alarms, radium in water, use of SOPs, and yellowcake inhalation. Topics discussed and attendance records are recorded and maintained on file. Safety or staff meetings are conducted nearly each day during the work week and a 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. Two hundred seventy-nine (279) man-hours of Health Physics were presented during the year for radiation refresher and new employee training. Twelve and one half (12.5) man-hours of Hazmat Awareness Training were presented during the year. Respiratory lung function checks were performed during May 2000 for employees who may be called upon to utilize respiratory protection.

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

During "Commercial Operations" daily walk through inspections were conducted by the RSO, RST, or trained designee. 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. 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 form 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, or 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 four thousand eight hundred thirty-six (4,836), (3,339 in 1999), surface contamination surveys performed during the review period in both the controlled and restricted areas of the facility. During "Commercial Operations" eating areas, change rooms, laboratories, and offices are surveyed weekly.

Removable contamination exceeding 1,000 dpm/100 cm^2 requires decontamination in restricted areas outside of the yellowcake area. 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-two thousand eight hundred ninety-four (22,894), (23,518 in 1999], alpha contamination surveys were logged, for an average of one thousand nine-hundred eight (1,908) per month. Individuals exceeding the release limit of 1,000 dpm/100 cm^2 are required to decontaminated and re-scan to below 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 thirty-eight (1,038), (1,217 in 1999), scans were performed. All spot scans preformed on individuals exiting the work area were below the 1,000 dpm limit.

There were a total of one thousand six hundred forty-one (1,641), (370in 1999], surveys on equipment released from within the restricted and controlled areas.

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 2000	2nd 2000	3rd 2000	4th 2000	Average
1 Pilot	0.09	0.07	0.02	0.04	0.06 (0.06)
2 Pilot	0.08	0.07	0.01	0.10	0.07 (0.08)
3 Pilot	0.20	0.20	0.04	0.24	0.17 (0.10)
4 Pilot	0.40	0.38	0.13	0.48	0.35 (0.27)
5 Pilot	0.05	0.08	0.03	0.08	0.06(0.06)
1 CPP	0.38	0.10	0.11	0.05	0.16 (0.12)
2 CPP	0.43	0.14	0.15	0.40	0.28 (0.15)
3 CPP	0.30	0.10	0.10	0.38	0.22 (0.18)
4 CPP	0.38	0.32	0.04	0.38	0.27 (0.13)
5 CPP	0.22	0.10	0.10	0.22	0.16 (0.15)
6 CPP	0.16	0.08	0.04	0.10	0.10 (0.07)
7 CPP	0.06	0.15	0.01	0.07	0.07 (0.05)
8 CPP	0.06	0.11	0.01	0.08	0.07 (0.08)
9 CPP	0.10	0.25	0.08	0.08	0.13 (0.05)
10 CPP	0.15	0.10	0.07	0.37	0.17 (0.08)
11 CPP	0.05	0.42	0.28	0.80	0.39 (0.12)
12 CPP	0.15	0.07	0.03	0.15	0.10 (0.15)
13 CPP	0.10	0.14	0.04	0.16	0.11 (0.04)
14 CPP	0.10	0.11	0.05	0.17	0.11 (0.05)
15 CPP	0.20	0.12	0.07	0.19	0.15 (0.05)
1 Sat	0.10	0.20	0.05	0.29	0.16 (0.04)
2 Sat	0.26	0.60	0.18	0.60	0.41 (0.13)

The corresponding values for 1999 are in parenthesis.

[1]Areas are: 1 - Injection Area, 2 - Lab, 3 - Elution Area, 4 - Column Areas, 5 - 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. 1Sat- control-room / change-room, 2Sat- plant area.

In addition to the required gamma survey locations, there were nine hundred twenty-two (922), (429 in 1999), spot gamma surveys conducted during 2000.

Exposure rates were similar to previous gamma values.

Airborne Uranium and Radon Daughters:

During the reporting period, there were four hundred ninety-one (491), (487 in 1999), and five hundred ten (510), (583 in 1999), samples taken for airborne uranium and radon daughters respectively. The average and highest concentrations detected for the period are listed in Table 5.

Table 5
In-Plant Airborne Radionuclide Concentrations

Pilot Plant

Parameter	Area	Average	High
Unat (% DAC)	Yellowcake Filter Press	0.08 (0.29)	0.63 (1.35)
Unat (% DAC)	General Process Plant	0.18 (0.34)	0.71 (2.10)
Radon Daughters (WL)	General Process Plant	0.02 (0.01)	0.06 (0.03)

Satellite Plant

Parameter	Area	Average	High
Unat (% Dac)	General Satellite	0.04 (0.28)	0.26 (0.96)
Radon Daughters (WL)	General Satellite	0.02 (0.02)	0.57 (0.27)

Central Processing Plant

Parameter	Area	Average	High
Unat (% DAC)	Yellowcake Filter Press / Dryer	4.55 (5.89)	21.31 (93.98)
Unat (% DAC)	General Process Plant	0.34 (0.38)	1.63 (2.09)
Radon Daughters (WL)	General Process Plant	0.01 0.02)	0.10 (0.19)

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

The corresponding values for 1999 are in parenthesis.

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	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Average
Dave's WW	0.9	0.8	0.8	1.2	0.9 (0.83)
Fence	0.6	1.9	1.6	1.1	1.3 (0.98)
Vollman	0.5	0.6	2.1	1.4	1.2 (0.90)

The corresponding values for 1999 are in parenthesis.

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 values and no significant trends were noted. The data is present in Table 7.

Table 7
Environmental Gamma Concentrations (mR/hr)

	1st	2nd	3rd	4th	Period
Area	2000	2000	2000	2000	Average
1	0.022	0.015	0.005	0.018	0.015 (0.017)
2	0.025	0.023	0.005	0.020	0.018 (0.021)
3	0.024	0.025	0.010	0.022	0.020 (0.030)
4	0.056	0.077	0.006	0.028	0.042 (0.029)
5	0.052	0.038	0.006	0.024	0.030 (0.039)

The corresponding values for 1999 are in parenthesis.

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	1st 2000 mR/Qtr.	2nd 2000 mR/Qtr.	3rd 2000 mR/Qtr.	4th 2000 mR/Qtr.	Period Average
Dave's ww	25.61	21.58	22.49	22.36	23.01 (23.20)
Fence	25.87	23.53	26.13	27.56	25.77 (27.63)
Vollman	21.32	19.76	21.97	20.93	21.00 (23.79)
Wellfield I	23.79	22.10	24.31	28.34	24.64 (24.21)
Pond	27.04	23.66	26.00	24.57	25.32 (24.51)
Wellfield 3	23.14	18.85	21.71	23.14	21.71 (22.62)
Wellfield 4	23.66	22.75	24.70	22.36	23.37 (25.06)
Wellfield 4A	n/a	n/a	n/a	22.36	22.36

The corresponding values for 1999 are in parenthesis.

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 (μCi/mL)

Vollman Station (Downwind)

Radionuclide	1st Quarter μCi/mL	2nd Quarter μCi/mL	3rd Quarter μCi/mL	4th Quarter μCi/mL	Average μCi/mL
U^{nat}	4.52E-15	4.05E-15	2.98E-15	6.55E-15	4.52E-15
Th^{230}	1.63E-16	1.67E-16	1.70E-16	4.71E-16	2.43E-16
Ra^{226}	1.63E-16	1.08E-15	7.63E-16	4.71E-16	6.19E-16
Pb^{210}	3.94E-13	2.62E-13	5.03E-13	1.43E-12	6.47E-13

Dave's WW Station (Upwind-Background Location)

Radionuclide	1st Quarter μCi/mL	2nd Quarter μCi/mL	3rd Quarter μCi/mL	4th Quarter μCi/mL	Average μCi/mL
U^{nat}	4.38E-15	2.64E-15	3.37E-15	6.13E-15	4.13E-15
Th^{230}	3.81E-16	2.11E-16	1.01E-15	1.01E-15	6.53E-16
Ra^{226}	3.81E-16	1.79E-15	2.62E-15	1.01E-15	1.45E-15
Pb^{210}	7.32E-13	2.71E-13	5.83E-13	1.02E-12	2.13E-13

Fence Line Station

Radionuclide	1st Quarter μCi/mL	2nd Quarter μCi/mL	3rd Quarter μCi/mL	4th Quarter μCi/mL	Average μCi/mL
U^{nat}	2.81E-14	2.12E-14	3.40E-14	2.62E-14	2.73E-14
Th^{230}	1.70E-16	1.78E-15	2.38E-15	1.56E-16	1.12E-15
Ra^{226}	3.05E-15	1.13E-14	3.15E-15	1.25E-15	4.69E-15
Pb^{210}	5.78E-13	3.73E-13	5.50E-13	4.84E-13	4.96E-13

The elevated Pb-210 values can be attributed to the upwind coal fired power plant and/or open pit coal mine as evidenced by the elevated levels at the sampler nearest these sources.

F. Surveys Requiring Radiation Work Permits

Eighty-seven (87) RWP's were issued during the report period. Thirty-nine (39) associated samples were collected in conjunction with the RWP's.

H. Reports of Overexposures

There were no overexposures during the reporting period.

I. Transportation

There were forty (40), (51 in 1999), yellowcake shipments made during the year with four thousand eight hundred eighteen (4,818), (5,960in 1999), associated alpha and gamma surveys. Four thousand six hundred six (4,606), (6,021 in 1999), alpha scans were preformed on yellowcake drums before their release for shipment. There were one hundred forty-two (142), (467 in 1999), barren and pregnant resin shipments made from the plant and satellite with four thousand three hundred thirty-eight (4,338), (13,034 in 1999), associated alpha and gamma surveys.

There were eleven (11) slurry shipment received from Ambrosia Lake during the year with nine hundred forty-six (946) 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 four to five different drivers.

J. Review of Operating and Monitoring Procedures

A review of the Standard Operating Procedures (SOPs) for production and monitoring activities was performed in October 2000.

III. CONCLUSIONS AND RECOMMENDATIONS FOR THE ALARA PROGRAM

A. Status of the 1999 ALARA Audit Recommendations

The following list details the status of recommendations made by the year 1999 ALARA Committee.

- Maintain the training program on personal hygiene and protective equipment practices.

  During the year 2000, the training program has continued with great success as detailed in the ALARA Report.

- Continue to verify housekeeping in the yellowcake area through monitoring.

  Daily walkthroughs were continued throughout the report period. General housekeeping continued to improve.

- Examine electrical problems with the environmental air samplers to provide better monitoring results.

  The electrical infrastructure at Dave's Water Well sample site was upgraded in order to improve reliability. The samplers are also checked more frequently to ensure proper operation.

- Examine the relocation of ventilation fans from present locations to a position closer to the floor in both the satellite and central processing plant.

  Relocation of the fans has been reviewed. The fans in the CPP will not be moved due to safety considerations. However, the fans in the satellite will be lowered as the same safety concerns do not exist.

- Examine relocation of vacuum pumps and heaters from the dryer area to the main plant.

  The vacuum pumps were relocated after review by an ORC. Relocation of the heaters will be evaluated by an ORC in future.

B. The Conclusions of the Year 2000 ALARA Audit are as follows:

Emergency, lock-out/tag-out, and confined space entry procedures were reviewed with all employees during the year to ensure knowledge of critical procedures.

A washer and dryer were obtained for the satellite building allowing individuals to wash and dry potentially contaminated items.

Emergency escape packs were obtained for placement at critical points on site in the event of an emergency. All individuals were trained in the proper use and location of the packs.

An Environment Health and Safety management system was initiated during the year. Our "Standard Operating Procedures" and "Health Physics Manual" were up-dated and expanded with additional manuals created including: "Management Procedures", Emergency Procedures", "Environmental Manual", "Health and Safety Manual", "Training Manual", and "System Manual".

An in-depth Risk screening and assessment was concluded for seventeen identified potential hazards.

Vacuum pumps were removed from the dryer area for ease of access to maintenance while minimizing exposures. The move also enhanced the overall housekeeping in the dryer area.

"P-traps" were extended to minimize potential escape of radon form tanks in the satellite.

Respirators are now required anytime maintenance is performed in the dryer room.

Resin is now transferred from the trailers through a closed bottom feed rather than an open hole in the top. This helps minimize the potential escape of radon during resin transfers.

Due to Work Order/ORC 0276, header houses in WF4A will be constructed with a leak detection system so spills can be more quickly recognized.

Questionnaires are issued to all individuals having detectable quantities of Unat in their bioassay.

C. Recommendations of the Year 2000 ALARA Committee

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

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

Continue education in radiation safety.

Continue stressing the importance of housekeeping.

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

During the year 2000 one (1) S.E.R.P. was convened to review the potential safety and environmental impacts of initiating production in Wellfield 4A (Work Order 403). Upon review of the proposed start-up, the panel agreed that production in Wellfield 4A would not significantly impact safety or the environment and therefore approved the start-up. Because the Performance Based License was not officially in place at the time of the review, an amendment to the existing license was sought and obtained in the form of license amendment 18. Changes to the PBLA (Performance Based License Application) as a result of the S.E.R.P. include the insertion of figures 2.1.4 and 2.10.4 from the June 1, 2000 Submittal and the insertion of pages D5-18A, D6-K.1, and D6-L.1 into the PBLA. A summary report of the S.E.R.P. findings is attached as well as the pages which need to be inserted into the PBLA. The two figures listed above were submitted to NRC in the June 1, 2000 Submittal.

FIGURE 1

Figure 1 Filter Press & Dryer Airborne Concentrations
Average U-Nat. Conc. (Fraction MPC or DAC)

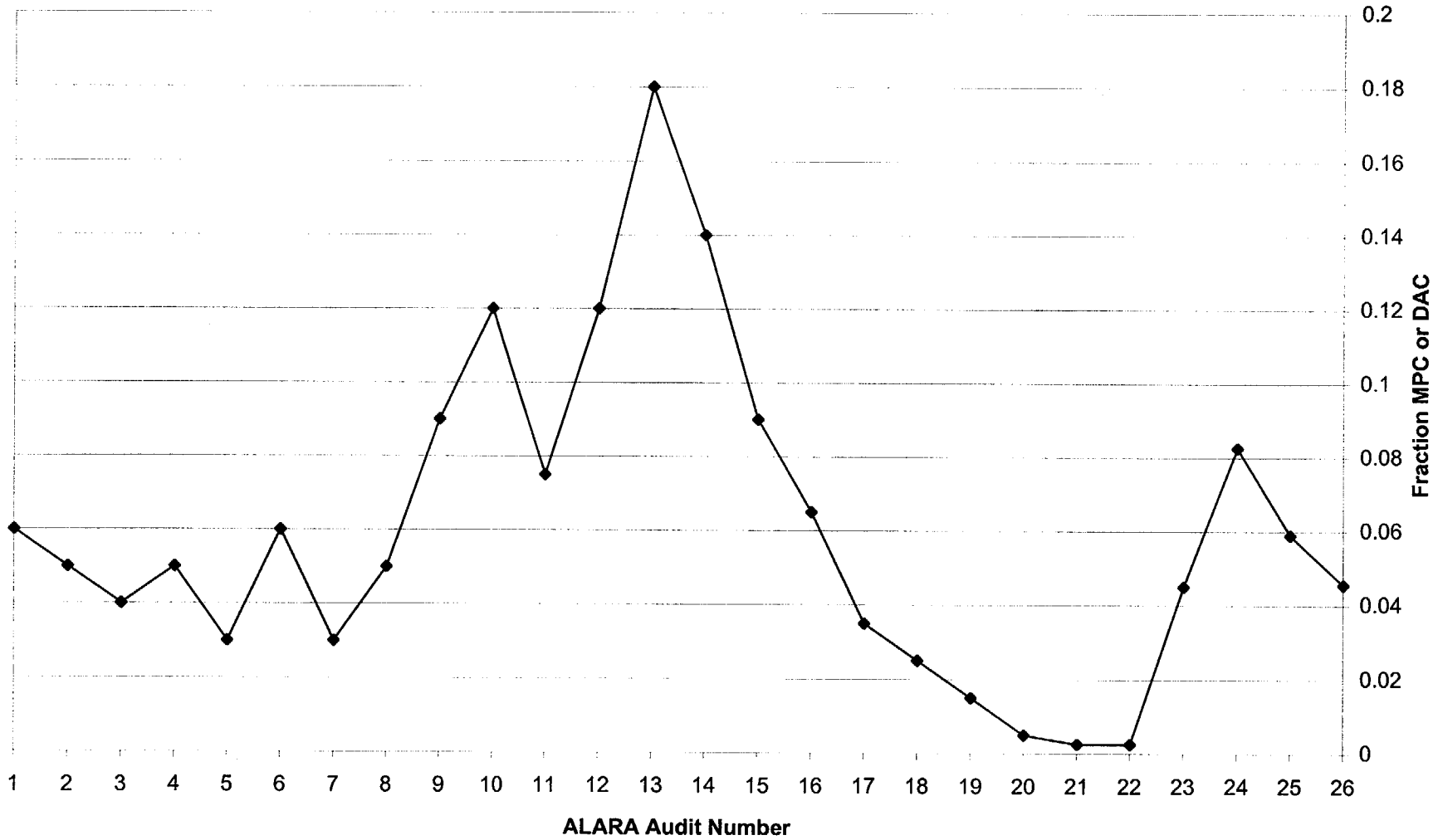
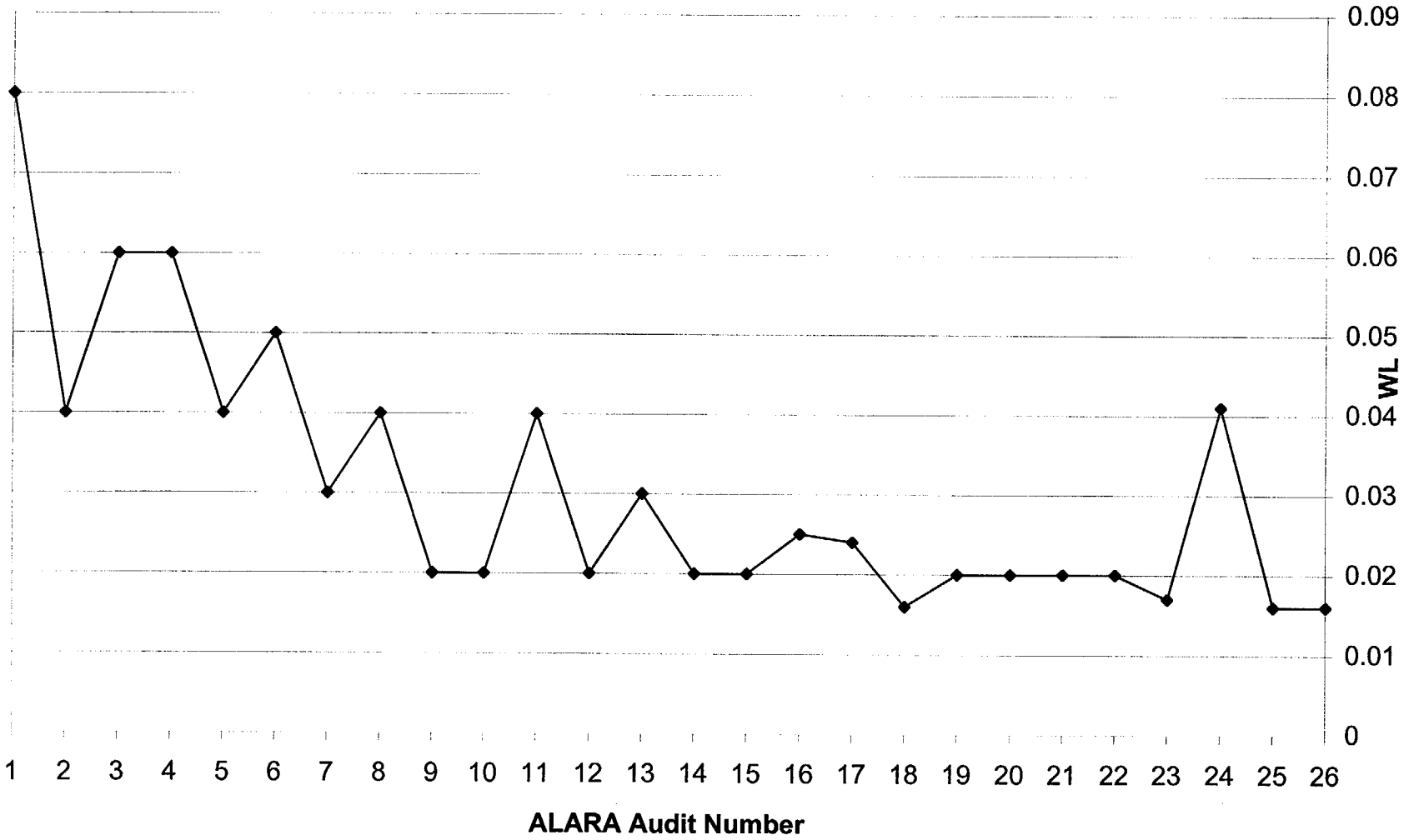


FIGURE 2

Figure 2 General PlantAirborne Concentrations
Average Radon Daughter Conc. (WL)



S.E.R.P. SUMMARY FOR WORK ORDER 403 AND PBLA ATTACHMENTS

Rio Algom Mining Corp.
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Oklahoma City, OK 73118
USA
tel 405.858.4807
fax 405.810.2860

Rio Algom Memo

To Bill Ferdinand
John McCarthy
John Cash
Pat Drummond
Steve Hatten
Greg Kruse

CC Marvin Freeman

From Paul Goranson

Date February 5, 2001

Subject Close out of WO 403

The SERP action on W/O 403 has been completed based on the review of the resolution outstanding items listed in my memo dated January 3, 2001. That review has been summarized in a memo from John Cash to Paul Goranson, dated January 15, 2001 (attached). That review found no issues that would require a change in the original comparison of the addition of Wellfield 4A as a change to be reviewed under the SERP procedure (SOP 1130) and Chapter 9 of the License Application. As a result, the following changes should be made to the License Application:

Insert Figures 2.1.4 and 2.10.4 from the June 1, 2000 Submittal into the current License Application. Insert the attached reference sheets into the appropriate locations in Appendices D5 and D6 to incorporate those portions of the June 1, 2000 submittal by reference into the License Application.

Further, Amendment 18 to the Source Material License authorizes RAMC to begin injection operations in Wellfield #4A as an amendment to the Wellfield #4 wellfield area.

As a result of these actions, I recommend that the W/O 403 be closed as complete.

APPENDIX D-5

Geological Data

Appendix D-5 also consists of wellfield geological data submitted the U.S. Nuclear Regulatory Commission and Wyoming Department of Environmental Quality – Land Quality Division in the wellfield applications. Those are hereby incorporated by reference.

Wellfield 1	Submittal: May 27, 1997 (pages: D5-19 through D5-21B)
Wellfield 3	Submittal: June 1, 1998 (pages: D5-22 through D5-29)
Wellfield 4	Submittal: April 26, 1999 (pages: D5-29 through D5-36)
Wellfield 4A	Submittal: June 1, 2000 (pages: D5-37 through D5-45)

Appendix D-6
Attachment K

Wellfield 4A Hydrological Test Report
Submitted June 1, 2000

Incorporated by Reference

Appendix D-6
Attachment L

Wellfield 4A Baseline Water Quality
and Upper Control Limit Determination
Submitted June 1, 2000

Incorporated by Reference

Rio Algom Mining Corp.
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Glenrock, WY 82637

tel 307.358.3744
fax 307.358.9201

Rio Algom Memo

To Paul Goranson

From John Cash

Date 1/15/00

Subject WF 4A Start-up S.E.R.P. Review

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1. Environmental/HP/Safety Review

a. Review the proposed change to determine if any changes in monitoring and record keeping are required to ensure compliance with existing programs.

The proposed change will not require any change in the record keeping methodology, however, monitoring requirements will change. As a result of the annex coming on-line the wellfield sampling program will be expanded to include all M, MS, and MD wells in the annex. The sampling schedule will be rearranged so that WFs 1 and 3 are sampled during the same week and WFs 4 and 4A are sampled during the same week.

The surface water sampling program will be expanded to include 2 ponds within I kilometer of the wellfield.

A TLD monitor is already in place in WF 4A.

b. Review the proposed change and determine the need for additional training.

Certain employees working in WF 4A will require some additional training due to minor changes in header house and wellfield design. The Wellfield Operators need to learn how the new sump system, emergency shut-off, and relief valves at the wellheads work. Wellfield Services and Wellfield Samplers will need to be made aware of the placement of junction boxes at each wellhead although these individuals are already familiar with the proper use of junction boxes. The revised SOPs along with associated additional training will be performed when installation of the houses are completed and prior to initiating operation in the newly designed houses.

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

Minor changes will be made to SOPs 2220 and 2230 to account for changes noted in Pat Drummond's 1/11/01 memo to John Cash. In addition, once the wellfield is in operation, a new SOP will be generated to discuss the emergency shut down switches and leak detection sumps. All Wellfield Operators will be trained to use the newly designed header houses and the training records will reflect the training.

3. Compliance Review

a. Review the proposed change and determine whether it will conflict with Corporate and Facility Policies regarding training, safety, and responsibilities concerns.

A review of the following appropriate documents were made to determine if there were any conflicts with corporate and facility Policies regarding training, safety, and responsibilities. Documents reviewed included the "Rio Algom Mining/Quivira Mining Company, Employee Handbook", "Rio Algom Mining Corp. Employee Handbook, Safety and Work Rules", "Rio Algom Mining Corp. Contractor Safety Handbook", and the Smith Ranch EHS Program manuals. Based on this review, there were no identified conflicts with any of the corporate or facility policies.

The startup of WF 4A does not conflict with any Corporate or facility policies regarding training, safety, or responsibility concerns.

b. Review the proposed change and determine compliance with the facility source material license.

- *9.1 Notification Requirements - the proposed action will not change nor affect compliance with the facility's source material license.*
- *9.2 Authorized Place of Use - the proposed actions will be in compliance as all activities located within Smith Ranch facilities.*
- *9.3 Authorized Use - the material and action will be in accordance with this license condition.*
- *9.4 Change of Permit Area - there will be no change in the permit area thus this proposed actions will continue to comply with this condition.*
- *9.5 Byproduct Material - this action will have no affect on byproduct disposal actions and authority to dispose of such material at the Ambrosia Lake facility. Thus, this action will not affect any compliance matters relative to this condition.*
- *9.6 NRC Assessment - this action has already been reviewed and approved in issuance of the NRC license as identified in the license application, Environmental Assessment, and Safety Evaluation Report. Thus compliance with this provision continues to be maintained.*
- *9.7 Condition Deleted*

- *9.8 Archeological Buffer Zones - this area has had an archeological clearance by the U.S. BLM and the Wyoming State Historical Preservation Officer (SHPO) with such clearance approved by NRC. No cultural resources have been unearthed during the disturbance of lands associated with wellfield 4A. Thus, this proposed action will continue to comply with this condition.*
- *9.9 Release of Equipment/Packages - this action does not affect the release of equipment or packages from the facility's restricted area. However, the release of any material having potential contamination will be conducted per NRC release guidance levels. Thus, this proposed actions will continue to comply with this condition.*
- *9.10 Standard Operating Procedures (SOP) -SOPs are in place for this proposed action, however SOPs 2200 and 2270 will require minor changes before the wellfield comes on line. John Cash will ensure the appropriate changes are made. Once the wellfield is on-line a new SOP will be written to account for new safety and environmental protection devices.*
- *9.11 Financial Assurance - Rio Algom submitted to NRC by letter dated June 18, 2000, proposed financial surety to cover the estimated reclamation and closure costs for this wellfield. This proposed surety was approved by NRC letter dated August 23, 2000 (License Amendment 17). Thus, the proposed action continues to comply with this condition.*
- *9.12 Condition Deleted*
- *9.13 Corporate Organization - the proposed actions does not change or modify the organization within Rio Algom at the corporate or the facility level. Thus, the proposed action complies with this condition.*
- *9.14 Health Physics Responsibilities - the proposed action does not change or modify the responsibilities or the qualifications of the health physics organization within Rio Algom at the corporate or the facility level. Thus, the proposed action complies with this condition.*
- *9.15 Training Program - the proposed action does not change or modify the training program. Thus, the proposed action continues to comply with this condition.*
- *9.16 Sign Exemption - the wellfield entrances are posted as required by this condition*
- *9.17 Emergency Plan - the facility continues to maintain an emergency action plan for accidents as detailed in the license application. Therefore, the proposed action continues to comply with this condition.*
- *10.1 Flow Rates - the facility maintains daily reviews of monthly flow rates and production from all its wellfields. This new wellfield will be added to the daily flow rate and production report to continue to assure compliance. Thus, this proposed action would continue to comply with this condition.*
- *10.2 Process Changes - this proposed action does not change the respective process circuit or the applicable fluid flow balance. Accordingly, the proposed action continues comply with the facility's license.*

- *10.3 Yellowcake Controls - this proposed action does not affect this license condition associated with effluent controls in the yellowcake area nor does it affect the facility's ability to maintain compliance with this condition.*
- *10.4 Mechanical Integrity Tests - prior to utilizing any production, injection or monitor well, the well will be tested*
- *10.5 Lixiviant Mixture - the facility continues to use only the lixiviants previously approved by NRC as stated in this license condition. Accordingly, this proposed action does not compromise continued compliance with the license.*
- *10.6 Waste Water Pond - this proposed action does not affect the licensing of any future waste water pond. Prior to the installation of any such pond, approval of such construction would be sought from NRC.*
- *10.7 Byproduct Material Storage Area - the facility maintains a storage area for such material and the proposed action will not affect this condition.*
- *10.8 Liquid Effluents - this proposed action would not change the disposition of liquid effluents as they would continue to be returned to the process, evaporation ponds, or injected into a deep disposal well.*
- *10.9 Baseline Water Quality - baseline water quality was developed in accordance with this license condition. Water quality data has been established for each applicable geologic horizon with the appropriate placement and number of monitor wells established.*
- *10.10 Wellfield Installation - this action does not affect this condition as this wellfield is not in the southwest mining area of the permit but rather an integral part of the mining wellfield (#4) already approved by NRC.*
- *10.11 Restoration Activities - the facility has not initiated restoration activities and this implementation of this item has no affect on this condition. Thus, this proposed action will maintain compliance with this condition.*
- *10.12 RWP - the facility maintains SOP for working in wellfield areas. These would be applicable to the initiation and operation of this proposed action. Accordingly, compliance would be maintained.*
- *10.13 Facility Security - the facility maintains the registration of visitors and contractors and provides the appropriate instructions relative to security, safety, and radiation protection prior to entering the controlled or restricted areas of the facility. This action does not change this on-going action by the facility.*
- *10.14 TLD - this action would not affect the issuance of TLDs to all site employees. This action will continue during the operation of wellfield 4A. Thus, compliance will continue with this license condition.*
- *10.15 Protective Clothing - the proposed action will not affect the facility's continuation of providing the appropriate protective clothing for individuals working in yellowcake areas or contaminated with yellowcake. This action will continue thus, the proposed action will not affect the facility's continuance of compliance.*

- *10:16 Eating Areas - the proposed action does not affect this condition. All employees eat in enclosed lunch rooms separated from the process.*
- *10.17 Monitoring - the proposed action does not affect this requirement of employees scanning or showering prior to leaving the restricted areas. Accordingly, compliance will continue through the application of prescribed health physics programs.*
- *10.18 Radiation Monitor/Sampling Equipment Calibration - the proposed action does not affect the health physics department programs for the continued calibration of survey equipment.*
- *10.19 Pre-Operational Period Requirements - not applicable*
- *11.1 Flow Rates - flow rates on each injection and recovery well along with manifold pressures are measured and recorded daily with injection wells taken off line that approach the MIT test pressure. These programs will continue allowing compliance to be maintained at the facility.*
- *11.2 Daily Inspections - the proposed action will not affect the daily inspection of the evaporation ponds. The inspections will continue thus maintaining the facilities compliance with this license condition.*
- *11.3 Monitor Well - this proposed action will be incorporated into the requirement that its monitor wells be sampled on a bi-weekly basis once commercial operations are commenced. Accordingly, the proposed action would continue to maintain compliance with the facility's license.*
- *11.4 Effluent and Monitoring Report - the proposed action and its resultant monitoring results will be incorporated into the sampling and reporting schedule as required by this provision. Thus, compliance will be maintained with this license condition.*
- *11.5 Pre-Commercial Operation - not applicable*
- *11.6 Daily Walkthrough - the proposed action does not affect the health physic's group or their designee's practice of walking through operating areas to ensure that radiation protection and monitoring requirements are followed. This practice will continue with WF 4A. Accordingly, compliance will be maintained.*
- *11.7 Radon Daughter Surveys - the proposed action does not affect the monitoring for radon daughters and natural uranium as required by this license condition. This sampling will continue and compliance will be maintained.*
- *11.8 Gamma Surveys - the proposed action does not affect monitoring for gamma as required by this license condition. Sampling will continue and compliance will be maintained.*
- *11.9 Alpha Monitoring - the proposed action does not affect the monitoring for alpha contamination as required by this license condition. Sampling will continue and compliance will be maintained.*
- *11.10 Occupational Exposures - the proposed action will not affect determining occupational exposures as personnel working in this wellfield*

are already included in these determinations. Thus, compliance with the license continues and will be maintained.

- *11.11 Documentation - all documentation that is required by the implementation of this action or future actions that require documentation will be kept pursuant to this license condition including all air sampling, gamma monitoring, groundwater sampling, training, investigations, corrective actions or other applicable items. This material will be maintained at least 5 years pursuant to the condition thereby maintaining compliance.*
- *12.1 Wellfield Pre-Operational Data Submittal - this license conditions was met with the submittal of the WF 4A "Pre-Operational Data" information on July 18, 2000. This wellfield is anticipated to commence operation in February 2001.*
- *12.2 Semi-Annual Effluent Report - the results of the effluent monitoring for this wellfield will be included in the semi-annual reports and submitted to NRC to maintain compliance with the license.*
- *12.3 Groundwater Excursion - any groundwater excursion associated with the proposed action will be reported pursuant to the terms of this license condition. Accordingly, the facility will maintain compliance with its requirements.*
- *12.4 Excursion Report - any groundwater excursion associated with this action will comply with the terms of this condition by submitting a written report to NRC within 2 months of its confirmation. The report will contain the information needed to describe the excursion and if there are wells still on excursion lixiviant injection for that wellfield will be terminated until off excursion status.*
- *12.5 Evaporation Pond - the proposed action will not affect this license condition, as all identified leaks will be reported to NRC as required by this condition to assure continued compliance with the license.*
- *12.6 Spill Reports - any significant spill associated with WF 4A will be reported pursuant to this condition with the appropriate reports to follow. Accordingly, compliance will be maintained.*
- *12.7 Restoration Application - once the proposed item has exhausted its ore reserves and mining is complete, a ground water restoration plan will be submitted to NRC for review and approval to assure compliance with this license condition.*
- *12.8 Decommissioning Plan - prior to final decommissioning of the Smith Ranch facility, a detailed plan will be prepared and forwarded to NRC for approval. Accordingly, compliance will be maintained with the facility's license.*
- *12. 9 ALARA Report - the facility will maintain its commitment to conduct and prepare an ALARA report to maintain compliance. The proposed action will not hamper or affect this continued action.*
- *12.10 Bioassay Program - the proposed action will not affect the continuation of the facility's bioassay program. Thus, the proposed will maintain compliance with the facility license.*

c. Review the proposed change and determine compliance with U.S. Nuclear Regulatory Commission regulations and other Federal and State regulations

The following regulations were reviewed and no conflicts with the proposed action were found.

- *10 CFR 19, 20 and 40;*
- *40 CFR 190 and 192;*
- *Wyoming State Engineer's Rules and Regulations;*
- *WDEQ/LQD Rules and Regulations; and*
- *WDEQ/WQD Rules and Regulations*
- *30 CFR 48 and 56*