



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV  
URANIUM RECOVERY FIELD OFFICE  
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FEB 20 1992

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Docket No. 40-8964  
SUA-1548  
04008964012S  
04008964013E

MEMORANDUM FOR: Docket File No. 40-8964  
FROM: Joel P. Grimm, Project Manager  
SUBJECT: SAFETY EVALUATION REPORT (SER): RIO ALGOM MINING CORP.,  
SMITH RANCH COMMERCIAL ISL LICENSE

Attached is the SER prepared by the NRC staff, Uranium Recovery Field Office, in partial consideration of source material license issuance to Rio Algom Mining Corp. The SER addresses radiation safety aspects associated with expansion of the Smith Ranch pilot ISL facility to a commercial-scale ISL uranium mine. The SER is provided in concert with an Environmental Assessment (EA) to document the staff's review of a license application submitted March 31, 1988.

The staff's review indicates Rio Algom's application, as amended, complies with 10 CFR Part 40. The application is acceptable, and a license should be issued subject to the conditions specified in the SER and EA.

*Joel P. Grimm*  
Joel P. Grimm  
Project Manager

Attachment:  
As stated

Cases Closed: 04008964012S  
04008964013E

cc:  
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SAFETY EVALUATION REPORT  
ACCOMPANYING ISSUANCE OF A  
SOURCE MATERIAL LICENSE  
TO  
RIO ALGOM MINING CORPORATION  
SMITH RANCH ISL PROJECT  
CONVERSE COUNTY, WYOMING  
DOCKET NO. 40-8964  
SOURCE MATERIAL LICENSE NO. SUA-1548

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## 1.0 INTRODUCTION

On March 31, 1988, Sequoyah Fuels Corporation, a subsidiary of Kerr-McGee Corporation, submitted an application to the NRC for a source material license to commercially produce uranium at its Smith Ranch Project, Converse County, Wyoming (Figure 1.1). The application specifically addressed expanding an existing licensed pilot project.

On December 20, 1988, Kerr-McGee notified NRC it had concluded negotiations to sell the Smith Ranch project to Rio Algom Ltd., Toronto, Canada, and requested a transfer of licensed activities to Rio Algom. Corporate management was retained at Rio Algom Mining Corporation, Oklahoma City, Oklahoma. During and after the interim period, NRC's review of the application was deferred pending Rio Algom's commitment to pursue the license application. NRC's review process was resumed during 1990.

During the review period, the applicant amended it's submittal with page changes submitted on May 10, June 30, and August 30, 1988; February 15, February 28, March 13, March 20, March 28, April 5, September 30, December 5, and December 10, 1991. In addition, the applicant made commitments or provided additional information regarding licensed activities in the following:

<u>Submittal Date</u>	<u>Description</u>
July 13, 1990	Responses to NRC comments and questions, including aquifer pump-test analyses, and monitor-well-spacing calculations.
October 4, 1990	Cover letter submitting MILDOS-Area Predictions of Radiation Dose.
April 5, 1991	Letter providing proposal for waste byproduct material disposal.
May 7, 1991	Cover letter transmitting consulting historian's report and recommendations, proposing changes to the mine facilities layout.
July 12, 1991	O-Sand deferral and interim environmental monitoring plan.
September 3, 1991	Cover letter assigning new Radiation Safety Officer for the Smith Ranch project.

This safety evaluation report (SER) addresses the proposed commercial operation and summarizes the foreseen associated safety aspects. Information concerning environmental effects of the proposed action is found in an accompanying Environmental Assessment (EA).

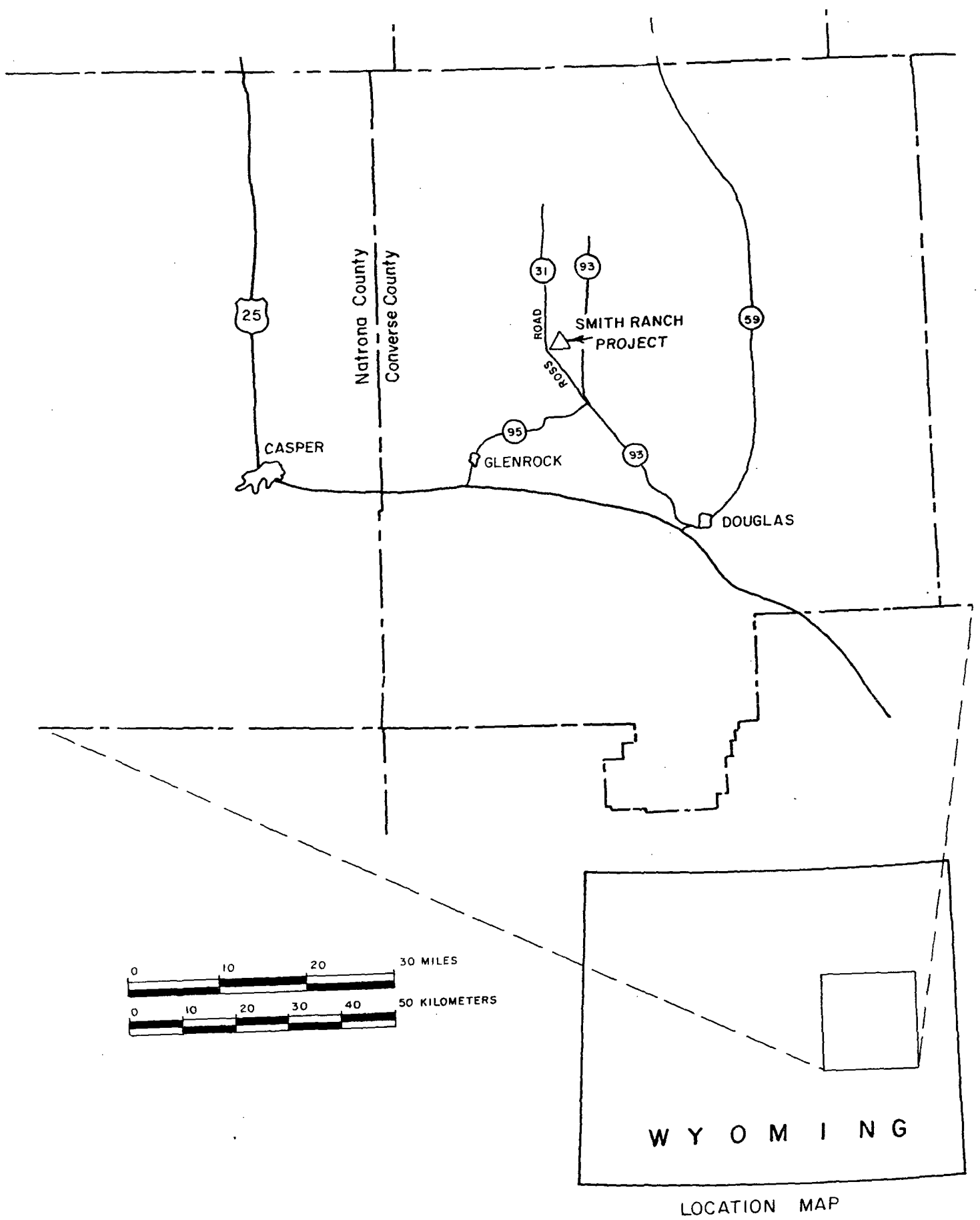


Figure 1.1 - Index map for the Smith Ranch site, Converse County, Wyoming

## 1.1 Description of the Proposed Action

The proposed Federal action is to grant a new source and byproduct material license to Rio Algom. The license will replace Source Material License SUA-1387 authorizing a research and development (R&D) project which operated 1981 through 1991. The new license is for commercial-scale uranium production.

## 1.2 Background Information

Rio Algom operated the R&D plant for 10 years, producing uranium from two five-spot well fields. The R&D project was known as the O-sand/Q-sand project, named for the uranium-bearing sandstone horizons being tested. Rio Algom ended mining and completed an aquifer restoration demonstration in the Q-sand well field in 1987. The O-sand pilot well field continued production until late 1991, when it was placed on standby status anticipating commercial project construction. Operating the commercial project will expand upon the well fields, roads and surface facilities of the pilot project. Therefore this SER does not take into special consideration the reclamation and decommissioning of the pilot project. All reclamation and decommissioning requirements will be transferred to commercial license conditions.

## 1.3 Review Scope

This document details the staff's review of the applicant's radiological safety program for the expanded project. In addition to increased disturbed areas and production rates, adding a yellowcake dryer to the facility provides a new area requiring review. The staff's review takes into account the license application and previous operational monitoring data, as well as previous experience with commercial ISL facilities.

## 2.0 AUTHORIZED ACTIVITIES

The new license will authorize expanding the existing Smith Ranch facility (Figure 2.1). Specifically, expansion will involve constructing a new processing plant, installing numerous five- and seven-spot well fields and header houses, and adding a satellite ion exchange (IX) plant in the remote well fields. Processing flow rates are slated to increase from 250 gallons per minute (gpm) to a 6000 gpm maximum, and the applicant will be authorized to produce 2 million pounds of yellowcake per year.

### 2.1 Facility Location

The plant site is found 17 air miles northeast of Glenrock, Wyoming (Figure 1.1). The proposed commercial project is located in an area permitted by the Wyoming Department of Environmental Quality (DEQ) exceeding 16,000 acres. Proposed mining will actually affect approximately 500 acres in Sections 25, 26, 27, 33, 34, 35, and 36 T36N R74W; and Sections 2, 8, 16, 17, 18, and 21 T35N R74W, in Converse County, Wyoming.



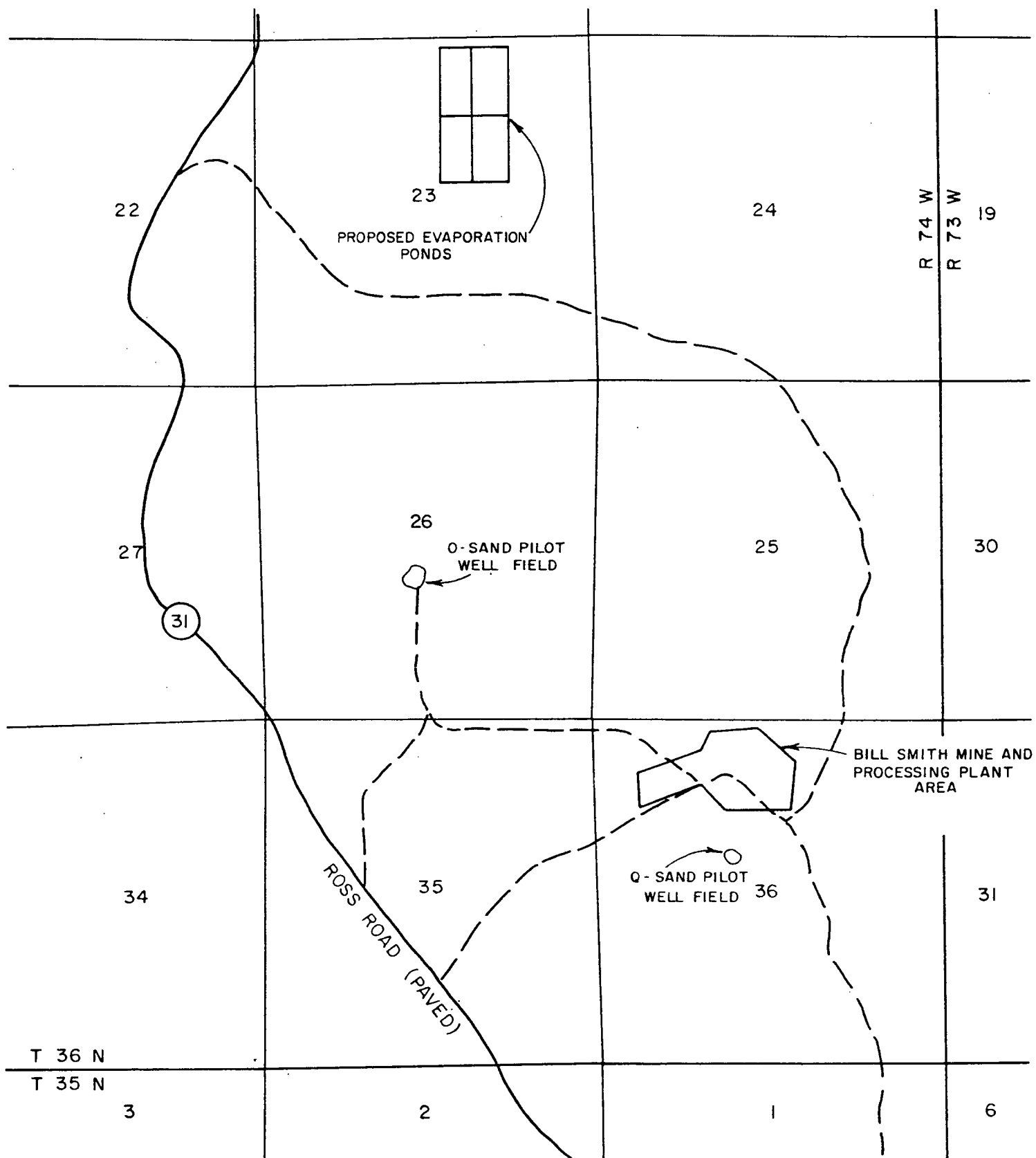


Figure 2.1 - General map of the Smith Ranch ISL facility including processing plant, pilot well fields, and proposed evaporation ponds.

## 2.2 Facilities and Operations

Rio Algom proposes to mine uranium occurring in sandstone strata of the Wasatch and Fort Union Formations, at depths of 450 to 1000 feet. Ore deposits typically are sinuous, up to several thousand feet in length, and 100- to 300-foot in width. The O-sand and Q-sand pilot projects were conducted approximately 500 and 750 feet deep, respectively.

The proposed mining project involves approximately 25 individual mining units. When the project is fully operational, about 2 years after licensing, approximately five mining units will be in production at a time (Figure 2.2). Well field installation and testing for each unit is slated to require a year and a half. Mining will proceed approximately 3 years in each unit, followed by an equivalent period for aquifer restoration and surveillance monitoring. Rio Algom's proposed schedule covers about 20 years. Precise locations and boundaries for each mining unit are likely to be adjusted as detailed stratigraphic and ore-occurrence data are collected during well field construction.

Rio Algom's proposed mining schedule (Figure 2.2) is based on known ore zones and projected capacity of the uranium recovery plant. The applicant originally proposed to run the plant at a rate of 5000 gallons per minute (gpm). In addition, the applicant intends to install a satellite ion-exchange unit in the well fields having a capacity for 3000 gpm. The applicant's radiological effluents calculations, however, have been based on two ion-exchange units, each operating at 3000 gpm, producing two million pounds of yellowcake per year. Therefore, the licensee's annual production will be limited to two million pounds of yellowcake, and a total well-field production rate of 6000 gpm.

During the uranium extraction process, Rio Algom will prepare aqueous solutions of sodium carbonate, sodium bicarbonate, carbon dioxide, oxygen, and hydrogen peroxide, adding them to ground water. The mining solution, known as lixiviant, will be pumped down injection wells into the mineralized sandstone where it will dissolve uranium from the formation. The uranium-bearing solution will migrate through the formation, will be recovered from production wells, and the uranium extracted in the processing plant. The leaching solution is then recharged and reused. Well fields will be located inside a ring of monitor wells.

Each well will be connected to an injection or production manifold in a well-field header building. The manifolds will conduct solution through pipelines to and from the recovery plant. The applicant proposes to expand the former Bill Smith mine equipment building for its ISL processing plant, which will circulate solutions in three circuits (Figure 2.3). The IX circuit will consist of a series of columns containing IX resin, tanks to store solutions, and pumps. Lixiviant will be pumped through the columns where uranium will be removed. Barren lixiviant is then returned to the well field injection system. When a resin column becomes fully charged with uranium, it will be taken off line to begin the elution/precipitation circuit. Lean eluant will be pumped from barren eluant tanks to the IX column and the resulting pregnant eluant

**PROJECTED DEVELOPMENT SCHEDULE BY MINING UNIT  
SMITH RANCH PROJECT**

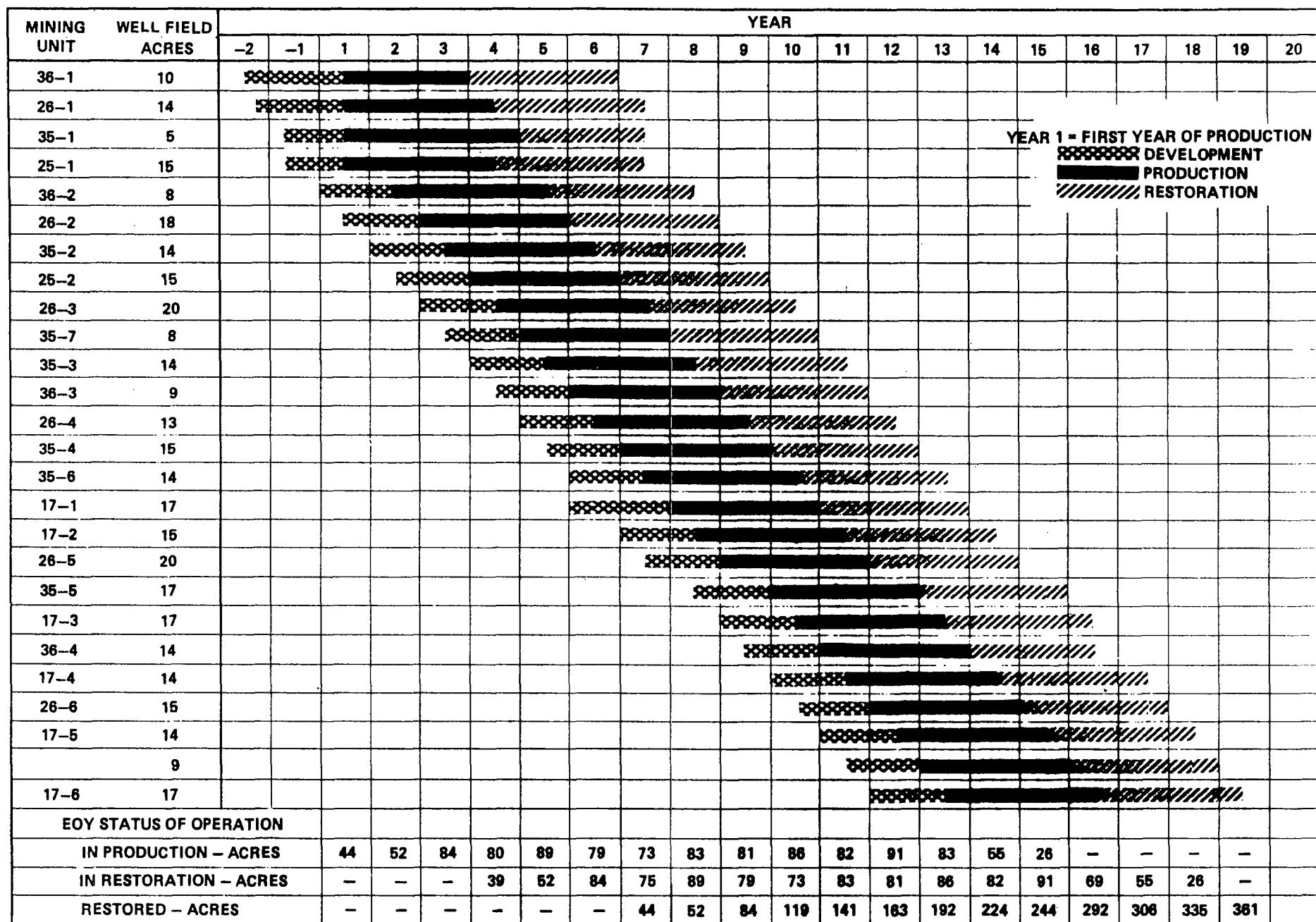


Figure 2.2 - Schematic diagram of Rio Algom's mining and reclamation schedule.

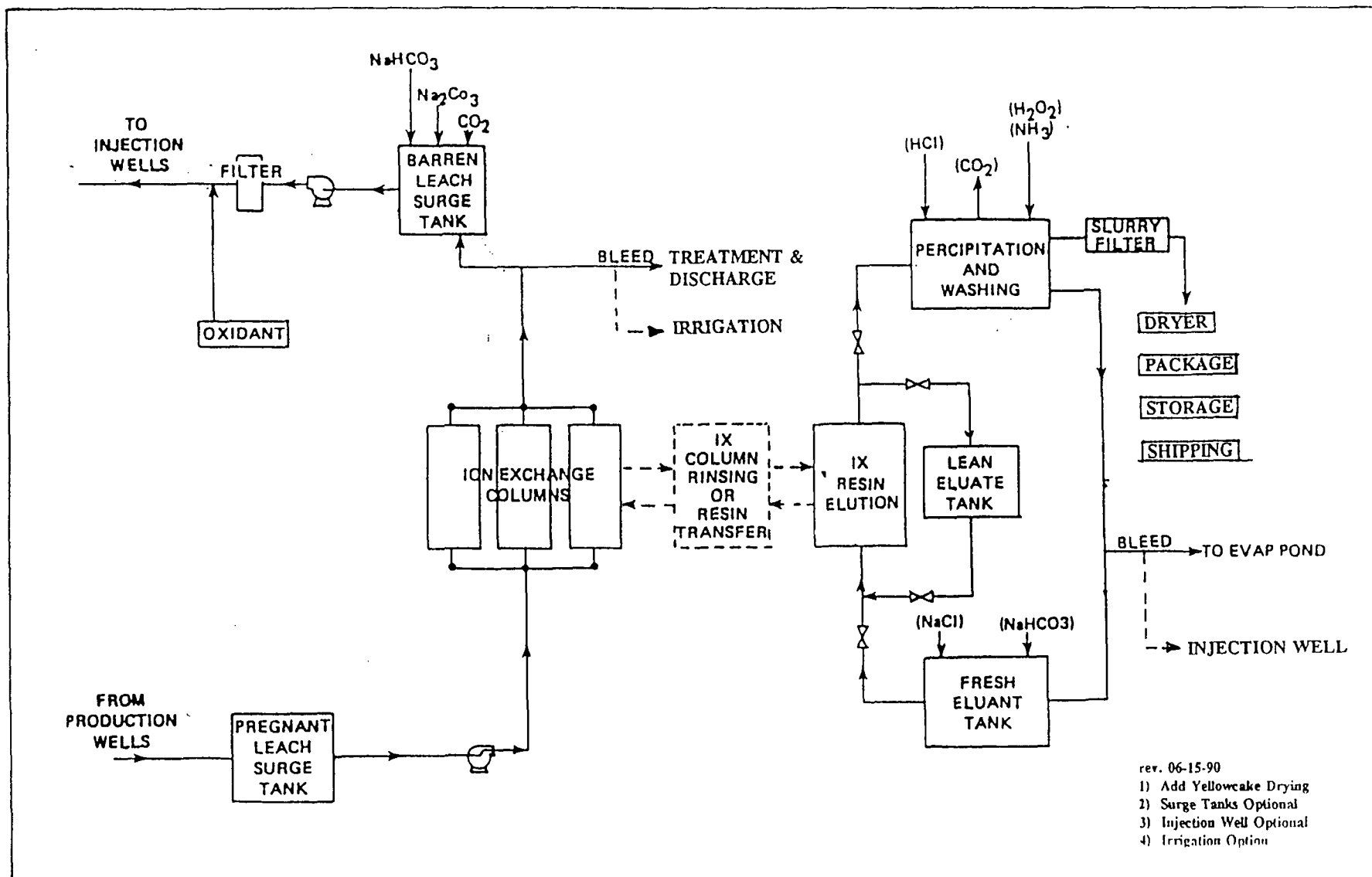


Figure 2.3 - Schematic diagram of Rio Algom's well field, ion exchange, and yellowcake precipitation circuits.

will be transferred to the acidizer/precipitor where uranium is precipitated. The precipitated uranium then begins the final drying circuit, where it first is dewatered and washed. Finally, the uranium will be vacuum dried on site and packaged for storage and shipment.

### 3.0 FACILITY ORGANIZATION AND ADMINISTRATIVE PROCEDURES

#### 3.1 Organization

Figure 3.1 shows Rio Algom's organizational structure for the Smith Ranch project. The Rio Algom Corporate Vice President is located in Oklahoma City, as is the Radiation Safety Officer (RSO) during the preoperational period. Rio Algom committed in its September 3, 1991, submittal to provide an onsite RSO prior to beginning mining. The RSO will be assisted by a Radiation Safety Technician (RST) also assigned to the mine site.

The RST will perform duties in conjunction with a Plant Superintendent and Mine Superintendent, all of whom report ultimately to the General Manager and to the Corporate Vice President for Operations. The RSO will work onsite, but will also report to the corporate office via a Manager of Radiation Safety and Vice President for Regulatory Affairs. Ultimately, the Vice President of Operations also is responsible for this chain of authority.

#### 3.2 Radiation Safety Staff and Responsibilities

The site RST has direct responsibility for implementing radiation protection procedures which include measuring, calculating, documenting, and reporting on surveys and exposures. The RST will perform facility inspections and review facility work orders. In addition, the RST will be responsible for an annual review of operating and monitoring procedures.

The RSO is responsible for planning and administering the radiation safety training program and as low as reasonably achievable (ALARA) audits. The RSO has the authority to review and concur on plans for procedural or equipment changes that could influence radiation safety. The RSO has the authority to enforce regulations and company policy that affect the radiation safety program.

#### 3.3 Administrative and Operating Procedures

Rio Algom currently uses written standard operating procedures (SOPs) for all activities involving employees handling, processing, storing, or transporting radioactive materials. These procedures specify pertinent radiation safety procedures. SOPs also exist for in-plant and environmental monitoring, bioassay analysis, and instrument calibration involving radiation safety. SOPs remaining from standby pilot operations will be implemented during the preoperational period. Revisions and updates will be necessary for commercial operations. Copies of the written procedures are kept in the work areas where they are used. All new procedures involving radiation safety are reviewed and approved in writing by the RSO. On an annual basis, the RSO reviews, approves, and updates the SOPs.

# HEALTH PHYSICS ORGANIZATION

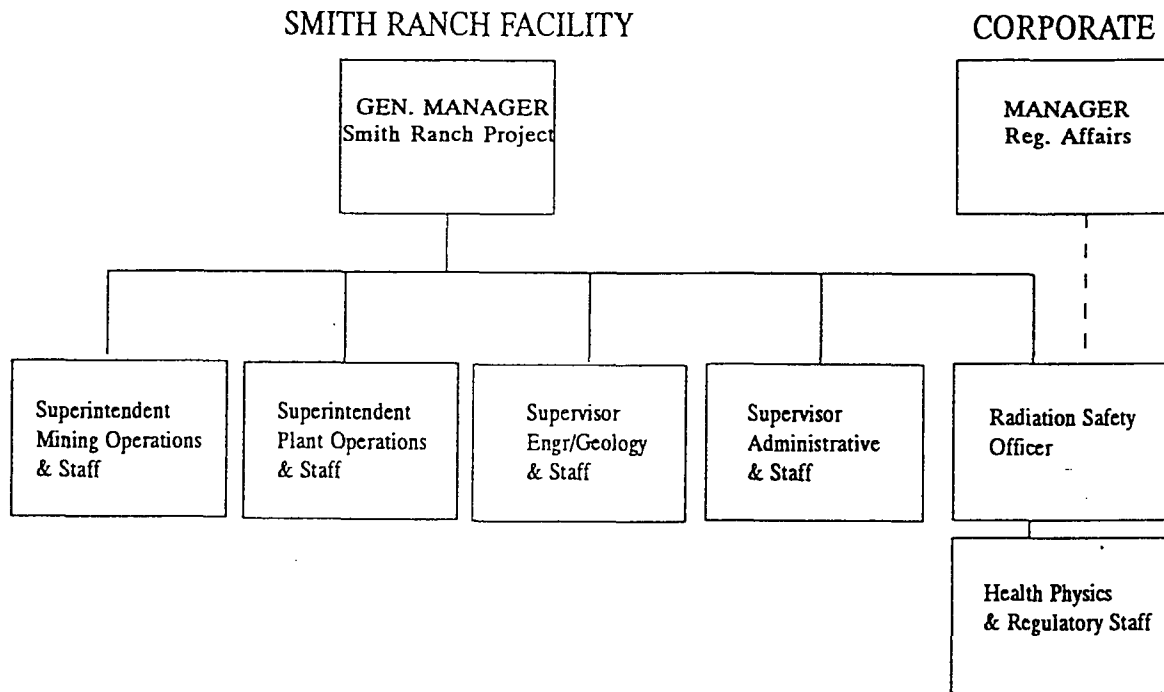


Figure 3.1 - Diagram of Rio Algom's chain of authority for radiation safety onsite for the Smith Ranch facility and at the corporate office in Oklahoma City.

Where no SOP applies to a task potentially resulting in a significant exposure to radioactive material, a Radiation Work Permit (RWP) will be required by license condition. The RWP will describe the scope of the work, precautions necessary to maintain radiation exposures ALARA, and supplemental radiological monitoring and sampling to be conducted during the work. An RWP is reviewed and approved in writing by the RSO, RST, or a designated supervisor prior to initiating the work.

### 3.4 ALARA Audits and Inspections

Rio Algom's September 3, 1991, submittal commits them to an ALARA program including: (1) an RST and RSO assigned to the site full time during commercial operations; (2) disseminating and posting information and policy statements regarding radiation safety; (3) annual ALARA audits; (4) a site Health Physics Manual; and (5) annual radiation safety training for all employees.

The licensee will be required by license condition to submit the annual ALARA audit to the NRC for review. The audit shall include detailed summaries of the analytical results of radiological surveys. The audit shall include a review of the areas itemized in Section 2.3.3 of NRC Regulatory Guide 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills Will be As Low As Reasonably Achievable." The ALARA audit will also emphasize noticeable trends in personnel exposures for identifiable categories of workers and types of activities, trends in radiological effluent data, and the performance of exposure and effluent control equipment. Additionally, the ALARA audit will provide recommendations to further reduce personnel exposures or environmental releases of uranium, radon, and radon daughters.

### 3.5 Radiation Safety Training

The licensee will require all permanent site employees to participate in training on basic radiation safety principles, health hazards of exposure to uranium, personal hygiene practices for uranium facilities, radiation safety procedures, and emergency response for accidents involving radioactive materials. Training will include written exams and reviews of incorrect responses. Each worker must achieve a predetermined passing score before being allowed to work in a restricted area. Written examinations for each employee will be maintained on file. The training program will be required by license condition as described in Section 2.5 of Regulatory Guide 8.31.

## 4.0 RADIATION SAFETY CONTROLS AND MONITORING

### 4.1 Ventilation and Air Effluent Control

The processing buildings will be ventilated to to control potential radon concentrations. Operational data from several areas of the pilot plant indicate that concentrations of radon daughters and average airborne uranium were low. However, ALARA audits indicate that airborne uranium concentrations can become elevated in yellowcake processing areas. These topics are discussed further in the following sections.

#### 4.2 In-Plant Monitoring Data

During pilot operations, in-plant monitoring indicated that the ventilation systems efficiently removed radon daughters from the processing building. However, airborne uranium in the yellowcake press area increased through 1988, but again decreased through July 1991. See Figure 4.1 and Table 4.1. During the period 1985 through 1987, individual readings for airborne uranium were also elevated and decreased through July 1991.

Average radon daughter concentrations have remained steady at 0.02 working levels for the last three annual ALARA audits. Historically, radon concentrations have decreased since 1985, from a high of 0.08 working levels to about 0.02 working levels in 1991 (Figure 4.1).

Rio Algom proposes to monitor airborne uranium in four locations and radon daughters in nine locations inside the new processing plant. Radon-daughter monitoring will take place throughout the plant, while uranium surveys will be concentrated in the yellowcake precipitation and drying area. Other locations will be monitored as necessary. Each constituent will be monitored monthly.

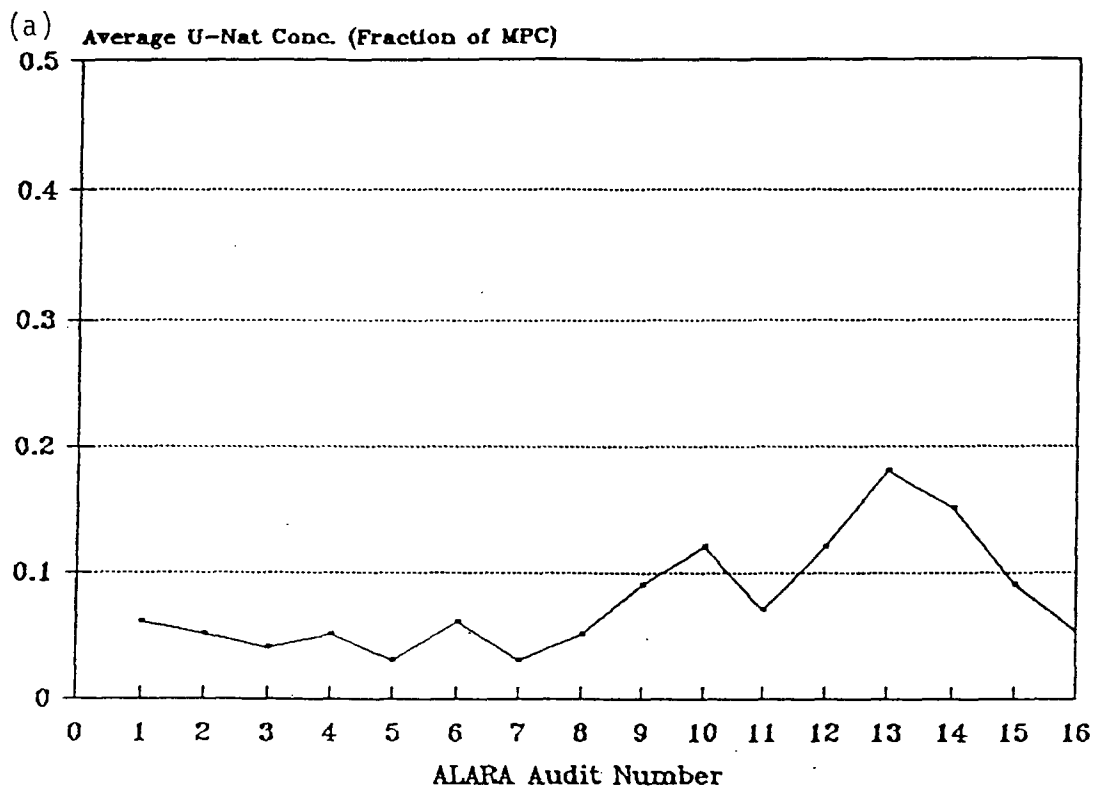
#### 4.3 Personnel Monitoring Data

Rio Algom's application explains how worker exposures will be calculated for inhaled and ingested airborne radon, its daughters, and uranium particulates. 10 CFR 20.103(a)(1) and (2) require controlling and assessing exposure to radon and its daughters on a calendar year basis, whereas soluble uranium must be evaluated and controlled on the basis of a 40-hour work week. To assure that these regulatory objectives are met, Rio Algom has proposed to survey monthly for radon daughters and natural uranium in the areas specified in Figure 4.2.

Internal exposure to uranium and radon or its daughters will be calculated based upon time-weighted exposure (TWE) considering both occupancy time and average airborne concentrations. Occupancy factors will be determined from a time study approach. Occupancy times will additively consider exposures from nonroutine or cleanup operations that are covered by radiation work permits. The licensee will also be required by license condition to perform and document, within 1 week after each weekly regulatory period, occupational exposure calculations as required by 10 CFR 20.103(a)(2) and 10 CFR 20.103(b)(2).

Should exposures exceed 25 percent of the Maximum Permissible Exposure (MPE), based upon a calculated TWE for the week or calendar quarter, Rio Algom will be required by license condition to conduct an investigation into the possible causes. Corrective actions will be required by Rio Algom to assure that future exposures are as low as reasonably achievable. Furthermore, the licensee will be required by license condition to maintain all survey and monitoring data as well as reports on audits and operations for a minimum period of 5 years.





## General Plant Airborne Conc.

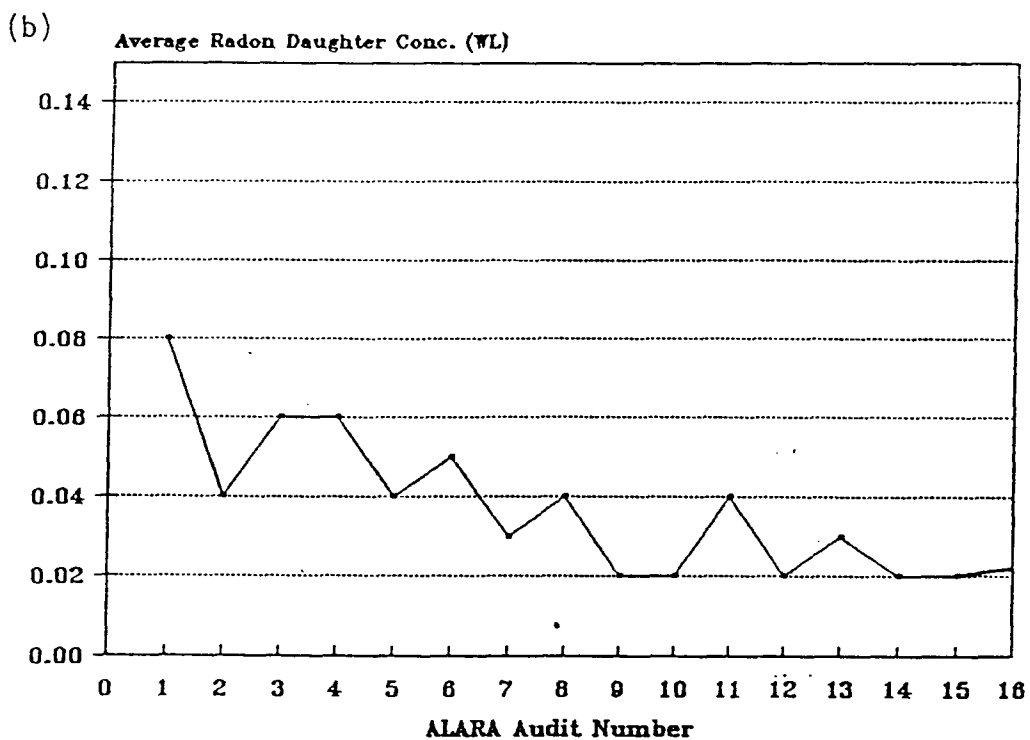


Figure 4.1 - Concentration of airborne radionuclides versus time, as measured by semiannual ALARA audits, 1984-1991

(a) average natural uranium

(b) average radon daughters

Table 4.1

Annual and Semiannual ALARA Audit Results  
for Rio Algom's Pilot Plant Operations

ALARA Audit Number	Audit Submittal Date	Airborne Uranium in Yellowcake		Radon Progeny		Time-Weighted Exposures (MPC - hours)			
		Press Area (Avg % MPC)	Highest % MPC	Avg % W.L.	Highest W.L.	Operator Month Avg	Highest Month	Maintenance Monthly Avg	Highest Month
16	07/22/91	5	32	0.02	0.06	0.3	ND	0.1	ND
15	07/13/90	7	133	0.02	0.32	0.4	ND	1.13	5.87
14	07/24/89	15	382	0.02	0.06	2.3	ND	0.16	ND
13	06/10/88	20	400	0.03	0.18	1.6	4.7	0.16	0.22
12	11/13/87	12	120	0.02	0.23	1.3	6.6	<0.1	<0.1
11	05/29/87	7	250	0.04	0.44	5.5	12	1.7	7.2
10	12/05/86	12	200	0.02	0.08	1.2	5.6	ND	ND
9	05/29/86	9	110	0.02	0.08	1.2	8.9	0.1	2.4
8	12/31/85	5	65	0.04	0.44	1.1	5.37	0	0
7	05/31/85	3	19	0.03	0.08	0.7	2.5	0.1	0.1
6	11/29/84	6	73	0.05	0.59	0.5	3.1	0	0.1
5	05/21/84	3	48	0.04	0.34	0.8	1.8	0	0
4	11/28/83	5	39	0.06	0.91	0.9	3.8	0	0
3	06/03/83	4	30	0.06	0.42	2.7	4.1	0.3	1.3
2	10/01/82	5	50	0.04	0.53	1.8	2.9	0.2	0.5
1	04/07/82	6	22	0.08	0.35	16	24	2	6

ND = No Data

W.L. = Working Levels

MPC = Maximum Permissible

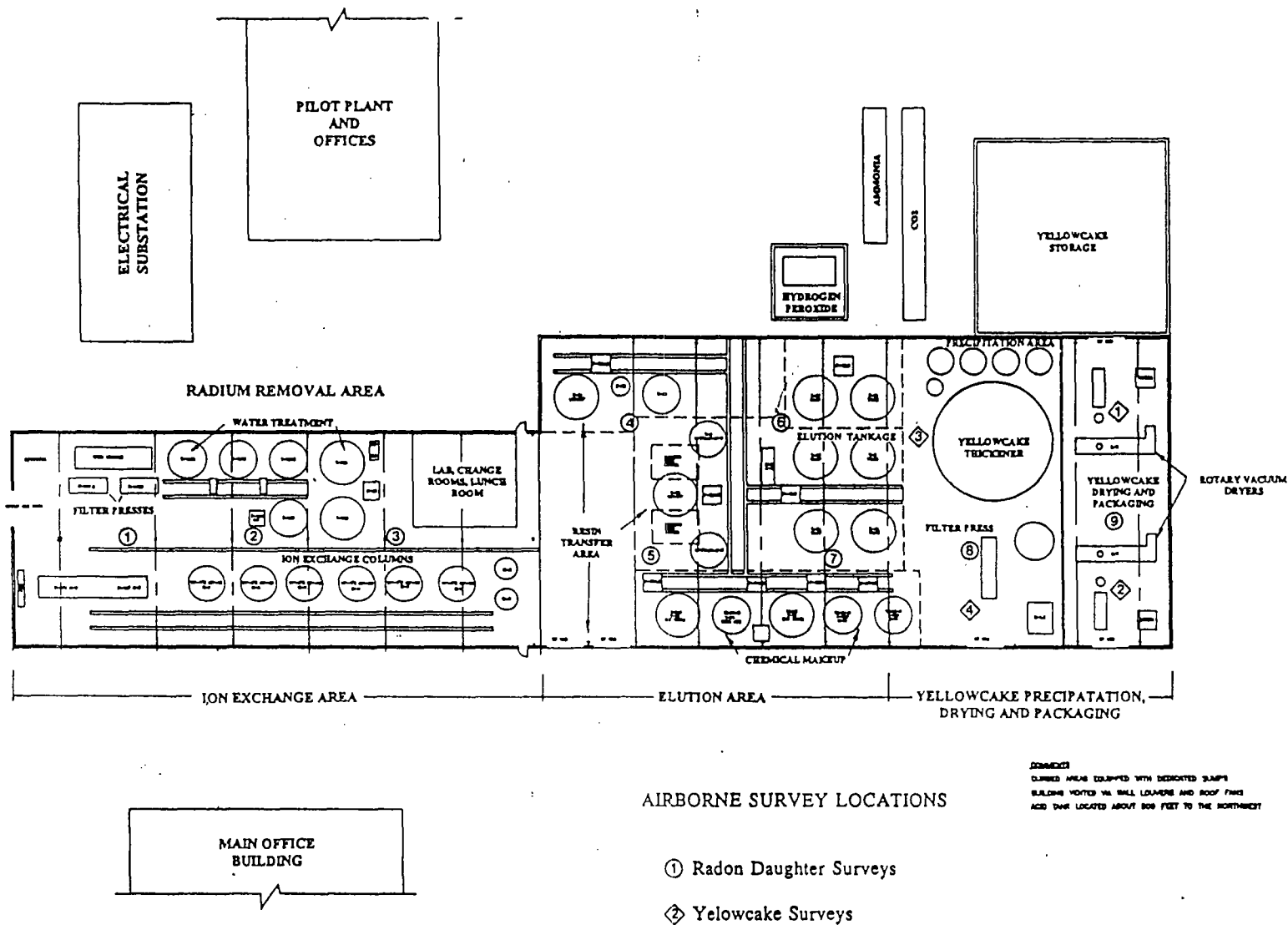


FIGURE 9-2

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				APPROVED BY				CENTRAL PROCESSING FACILITY			
				SCALE				1/32" = 1'-0"			
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Figure 4.2 - Proposed floor plan and monitoring locations for airborne radon daughters and uranium in the commercial processing plant.

#### 4.4 External Radiation Control Program

##### 4.4.1 External Radiation Surveys

During pilot operations, monthly personal dosimeter monitoring showed that average quarterly exposures were less than 10 mRem. However, employees occasionally received an external dose of 30 to 50 mRem. These exposures reportedly resulted from maintenance work near ion exchange columns. Exposure values from the operational record lie considerably below the regulatory limit of 1250 mRem/quarter and Rio Algom's action level of 312 mRem/quarter. To assure that external radiation monitoring continues, all Rio Algom employees will be required by license condition to continue wearing dosimeters in restricted areas for quarterly analysis.

##### 4.4.2 Exposure to External Radiation

In addition to personal TLD monitoring, Rio Algom will be required by license condition to evaluate the results of a quarterly gamma survey in the locations specified in Figure 4.3. The evaluation will identify any areas which require posting as radiation areas. Operational records indicate that the areas surrounding the IX columns and yellowcake storage may require posting.

Rio Algom will be required by license condition to assure that all process and maintenance workers who work in the yellowcake area or work on equipment contaminated with yellowcake wear protective clothing. Specific requirements are contained in Rio Algom's standard operating procedures.

#### 4.5 Internal Radiation Control Program

##### 4.5.1 Airborne Radioactivity Surveys

Rio Algom proposes to use several airborne radionuclide sampling techniques to determine personnel exposure to uranium-bearing dust. Area monitoring at four plant locations (Figure 4.2) will provide the main approach to determining personnel exposures. Areas associated with yellowcake activities are sampled monthly. Any nonroutine work or maintenance where exposures to airborne particulates may be elevated will require personal air samplers. Radon daughter sampling will be conducted at an additional nine locations as shown on Figure 4.2.

##### 4.5.2 Exposure to Internal Radiation

Radiation exposure at a work station is primarily a function of the time spent there and the air concentration of uranium and radon daughters. As previously discussed, the plant will be ventilated to limit the amount of radionuclides contained in the various enclosed areas. Rio Algom proposes to conduct monthly sampling for airborne uranium in the yellowcake areas specified in Figure 4.2. Additionally, radon daughters will be sampled on a monthly frequency in the nine locations shown in Figure 4.2. Previous air monitoring indicates that monthly sampling is adequate to determine employee exposures. The NRC will require that any time a radiation work permit is issued, a breathing zone or applicable general area air sample will be used to determine employee exposure for the specific task.

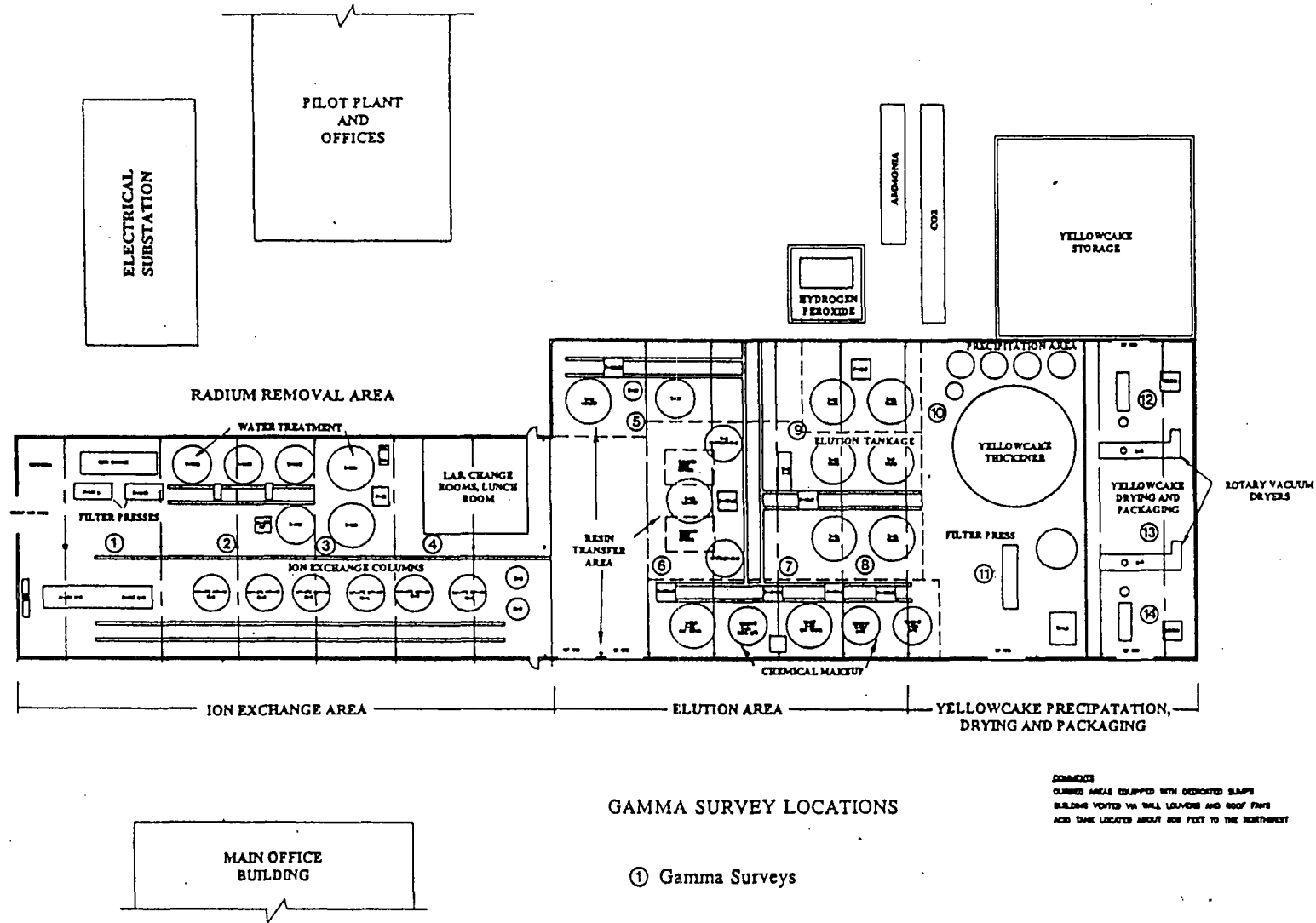


FIGURE 9-3

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				CHECKED BY:		OKLAHOMA CITY	
				APPROVED BY:		CENTRAL PROCESSING FACILITY	
				SCALE: 1/32" = 1'-0"		DATE: 3-14-91	
REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED	DRAWN NO.	REV. NO.

Figure 4.3 - Proposed floor plan and monitoring locations for gamma radiation in the commercial processing plant.

Additionally, the license will require that eating be allowed only in administrative offices and lunch areas that are separated from the process area.

#### 4.5.3 Respiratory Protection Program

Rio Algom's Health Physics Manual (Section 8.6) describes respiratory protection from airborne radioactive materials. The program uses guidelines contained in Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," and NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials." Rio Algom requires that employees be trained, fit tested, and medically cleared for respirator use. Because Rio Algom will not take credit for respirator use in determining exposures, the NRC has no specific license condition requiring provisions for respirator use, nor has Rio Algom's health physics manual been specifically approved by the NRC.

#### 4.6 Bioassay

The purpose of a bioassay program is to confirm the effectiveness of radiation protection programs and to verify exposure calculations. Rio Algom proposes to continue their urinalysis program consistent with the program outlined in Regulatory Guide 8.22, "Bioassay at Uranium Mills." The program includes baseline urinalysis for all permanent employees prior to assignment at the facility and monthly urinalysis for those employees who routinely work in the processing plant controlled area. A license condition will specify an action level of 15 micrograms per liter ( $\mu\text{g/l}$ ) uranium. If the action level is reached or exceeded for any worker, the RSO will investigate the cause, correct the situation, and report the results in the semiannual ALARA audit. Any time two consecutive urine specimens exceed  $35 \mu\text{g/l}$ , or one specimen exceeds  $130 \mu\text{g/l}$ , a report shall be submitted to the NRC within 30 days, indicating what corrective actions have been performed. Because Rio Algom's urinalysis program will be consistent with Regulatory Guide 8.22, the NRC has determined that Rio Algom's urinalysis program will adequately verify calculated exposures.

Urine samples are analyzed by vendors providing a lower limit of detection of  $5 \mu\text{g/l}$  uranium. Blank and spiked samples will be submitted regularly as a quality control measure. Previous analyses have been within the 30 percent error limit recommended by Regulatory Guide 8.22, "Bioassay at Uranium Mills."

#### 4.7 Contamination Control

##### 4.7.1 Personnel Contamination

A license condition will require that all process workers leaving the restricted area monitor themselves for alpha contamination. The monitoring will be done at the exit from the change area. Alpha values meeting or exceeding  $1000 \text{ dpm}/100 \text{ cm}^2$  mean that personnel must decontaminate and resurvey themselves. Additionally, the license condition will require the licensee to perform and document quarterly spot surveys for alpha contamination on all

employees leaving the change area. The NRC has determined that the personnel contamination program is adequate to detect and control alpha contamination.

#### 4.7.2 Surface Contamination

Rio Algom proposes to conduct weekly alpha contamination surveys in the eating and change areas, and monthly in the facility laboratory and offices. A license condition shall require decontaminating removable alpha contamination exceeding the levels indicated in Table 9-2 of the licensee's application submitted March 31, 1988.

#### 4.7.3 Release and Disposal of Contaminated Equipment

Rio Algom proposes that all equipment, materials, and packages be surveyed for radiological contamination prior to release from the restricted area, in accordance with NRC's "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials." These guidelines will be incorporated as an attachment to the license. Equipment that does not meet unrestricted use limits may be transferred to another licensed facility or to a licensed disposal facility.

#### 4.8 Quality Assurance and Calibration

Rio Algom commits to a quality assurance (QA) program for sampling and analyses performed for radiation safety. The QA program includes the recommended elements specified in Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Stream and the Environment." Therefore, it is acceptable to the NRC.

Rio Algom has committed to recalibrate all radiation monitoring, sampling, and detection equipment on a regular basis (Section 11.3 of their Health Physics Manual, submitted June 15, 1987). The NRC has determined that these devices should be recalibrated after each repair and as recommended by the manufacturer, or at least annually, whichever is more frequent. In addition, all radiation survey instruments shall be operationally checked with a radiation source each day when in use. These procedures will be required by license condition.

#### 4.9 Radiological Environmental Monitoring Program

Environmental monitoring at the site is described in full detail in the Environmental Assessment. Rio Algom currently conducts an interim environmental monitoring program remaining from its R&D mining project. The program will be continued by license condition, providing continued preoperational baseline data. The preoperational program is outlined in Table 4.2, and requires monitoring at the pilot plant as shown on Figure 4.4. Historical results are found in Table 4.3. Rio Algom's commercial monitoring program will be expanded to include sampling air particulates and radon, surface water, ground water, soil, vegetation, and stack emissions, and direct gamma radiation monitoring.

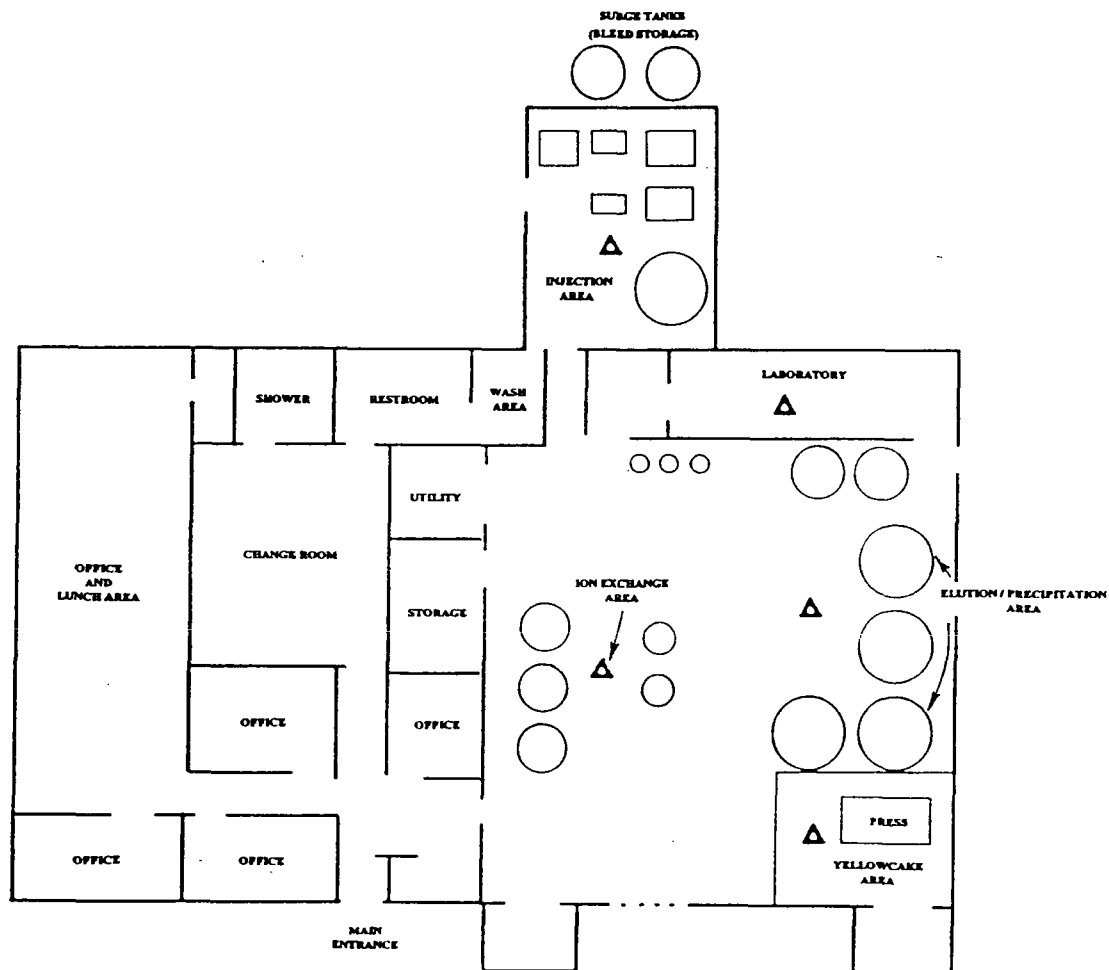
Table 4.2

Preoperational Environmental and  
Radiological Monitoring Program

<u>Environmental</u>	<u>Frequency</u>	<u>Analysis or Location</u>
Well field monitoring	monthly monthly	water level HCO <sub>3</sub> , Cl <sup>-</sup> , conductivity
Bleedstream	quarterly	NPDES analyses
Evaporation ponds	weekly annual	leak inspection Ca, Cl, Na, Se, U, As, pH, Ra-226, Th-230
<u>Radiological</u>		
Environmental:		
Radon	continuously	quarterly analysis
Gamma	quarterly	background and downwind from plant
Sediment	once upon termination of NPDES permit	Pond 3 outfall; Ross Road; 1.5 miles down- stream; for Ra-226
In-plant:		
Gamma	semiannual or following filter press use; which- ever is more frequent	Figure 4.4 locations
Radon Daughters	monthly	Figure 4.4 locations
Airborne Uranium	during filter press use	Figure 4.4 locations
Alpha Surveys	monthly	laboratory, office, eating and change areas
Plant Inspections	weekly	by RST or designee



## "O"-Sand Pilot In-Plant Radiological Monitoring Locations



Δ — Radon Daughters, Airborne Uranium and  
Gamma Radiation Survey Locations

Figure 4.4 - Floor plan and monitoring locations for the preoperational period in the existing pilot processing plant.

Table 4.3

Summary of Radiological Environmental Monitoring  
(4th Quarter 1985 through 2nd Quarter 1991)

	<u>Avg.</u>	<u>Min.</u>	<u>Max.</u>
<u>Radon</u> (pCi/l)			
-downwind	1.06	0.3	9.1
-percent MPC	35	10	300
<u>Direct Gamma</u> (μR/hr)			
upwind	12	5	21
downwind	15	10	22
leach tanks	33	21	38
evaporation ponds	20	17	25
<u>Sed. Radium</u> (pCi/g)			
outfall	3.25	0	8.9
Ross Road	2.72	0	8.4
downstream	2.12	0	5.3
<u>Water Outfall</u> (pCi/l)			
Radium (average)	1.25	0.6	2.5
-percent MPC	4.17	2.0	8.3
Thorium	0.62	0	1.5
-percent MPC	0.03	0	0.08

During commercial mining, Rio Algom will no longer be authorized to release production or restoration bleed streams. During R&D mining, the mining bleed stream was treated for radium removal, then intermingled with water from the abandoned shaft mine, treated again, and released under an NPDES discharge permit. Because ISL mining discharge will cease, stream water and sediment will no longer require sampling. Environmental monitoring locations and techniques are described in more detail in NRC's Environmental Assessment.

## 5.0 RESTRICTED AREA MARKINGS AND ACCESS CONTROL

Rio Algom proposes to establish a restricted area including the processing plant, yellowcake storage areas, evaporation ponds, and radium settling ponds. NRC will require by license condition that an acceptable pond reclamation plan be approved prior to commercial uranium production. The pond areas shall remain a restricted area until appropriate reclamation is completed.

Rio Algom's new evaporation ponds are slated for construction some miles north of the processing plant. When pond designs are reviewed and approved, a license condition shall require restricted access to those ponds as well, as they will receive certain amounts of byproduct waste material from the uranium recovery process. In addition, NRC is considering taking action which will require all ISL operators to post well fields as areas containing radioactive materials. Additional restrictions, including personal monitoring and fencing may also be employed. Restricted area posting shall meet the requirements of 10 CFR Part 20.023(c). Rio Algom will be exempted by license condition from the requirements of Section 20.203(e)(2) of 10 CFR 20 for areas within the facility, provided that all entrances to the facility are conspicuously posted in accordance with Section 20.203(e)(2) and with the words, "ANY AREA OR ROOM WITHIN THIS FACILITY MAY CONTAIN RADIOACTIVE MATERIAL."

## 6.0 EMERGENCY PROCEDURES AND PREVENTATIVE MEASURES

Rio Algom has an Emergency Action Plan for accidents at the site, including accidents releasing hazardous materials, transporting yellowcake and radioactive waste, and industrial accidents including fires and explosions. The procedures specify appropriate individuals to contact and shall be referenced by license condition.

Potential pipeline ruptures are not expected to result in an emergency situation, and will be detected by decreased flow rates and pressure. These spills will result in minimal radionuclide releases because production solutions are low in activity. A spill or pipeline rupture inside the processing plant will be detected immediately and contained by built-in foundation berms and sumps.

Transportation accidents might release radioactive materials outside the facility's control. Rio Algom's SOP for such incidents has been reviewed during inspections and indicates thorough response instructions, chain of command, and notification procedures.

The potential for radioactive material releases resulting from adverse weather phenomena or earthquakes is low because tornadoes and similar violent weather are infrequent, and the mill is located in a low seismic activity area.

Accidents involving the failure of the evaporation ponds will be unlikely. All embankments shall be designed and built in accordance with NRC Regulatory Guide 3.11, "Design, Construction and Inspection of Embankment Retention Systems for Uranium Mills." Evaporation ponds will be inspected daily noting signs of embankment stress and compliance with freeboard requirements. All failures releasing radioactive material require notifying the NRC, Uranium Recovery Field Office, within 48 hours by telephone.

#### 7.0 EVAPORATION POND EVALUATION

The licensee's two existing evaporation ponds are lined with hypalon, have leak detection sumps, and are designed and constructed in accordance with acceptable engineering standards. The evaporation ponds have a designated freeboard of 3 feet to ensure that they will not overflow. The freeboard also allows for transfer of contents from one pond to another in the event of a leak. Rio Algom's license will include a condition requiring review and approval of designs for new evaporation ponds slated for this project.

#### 8.0 DECOMMISSIONING AND RECLAMATION

Rio Algom will be required by license condition to decommission and reclaim the site to appropriate radiation protection standards, including radium-226 standards for well fields and other earthen areas. This condition will assure that all materials left at the site meet the requirements for unrestricted release. Additionally, all production and injection wells shall be abandoned in accordance with the State of Wyoming standards. Rio Algom will be required by license condition to submit a restoration plan 3 months prior to commencing aquifer restoration in each well field. In addition, the license will require submitting a site decommissioning plan 1 year prior to mine shutdown.

#### 9.0 SURETY REQUIREMENTS

A license condition will require that the licensee maintain an NRC-approved financial surety, consistent with 10 CFR 40, Appendix A, Criterion 9. The surety will be adequate to cover the estimated costs for restoration, decommissioning, decontamination, and reclamation. All associated costs will be calculated based upon hiring a third-party contractor to perform the work. The surety shall be updated annually, adjusting for the effects of inflation, changes in plans, or other conditions affecting costs. The licensee's proposed surety amount of \$7,500,000 is sufficient to meet the requirements of Criterion 9 of Appendix A to 10 CFR 40. The licensee will be allowed 90 days from the license issuance date to submit, for NRC approval, the forms and information required to evidence surety in the amount of \$7,500,000.

## 10.0 COMPLIANCE INSPECTION HISTORY

The facility's compliance history chronology since 1982:

### October 6, 1982, Inspection

One violation was identified:

Violation 1 - Contrary to License Condition No. 11, calibration data for equipment used to calibrate air samplers was not documented and maintained.

Corrective Action: The licensee is maintaining calibration data for equipment used to calibrate air samplers.

### June 27 and 28, 1984, Inspection

One item of apparent noncompliance was identified. However, the licensee's response resolved the issue.

### June 3, 1985, Inspection

No violations or deviations were identified.

### October 28, 29, and 30, 1986, Inspection

Three items of apparent noncompliance were identified. Two of these items were resolved based upon the licensee's response. Therefore, one violation was identified.

Violation - License Condition No. 60 requires, in part, that individuals performing evaporation pond inspections have training in proper inspection techniques.

Contrary to the above, the licensee could not produce such training documentation.

Corrective Action: The licensee now conducts and maintains training documentation for evaporation pond inspections.

### June 13 and 14, 1988, Inspection

Three violations and two open items were identified.

Violation 1 - License Condition No. 50 (formerly License Condition No. 30) of Source Material License SUA-1387 provides that the licensee be exempted from the requirements of Section 20.203(e)(2) of 10 CFR Part 20 for posting areas within the facility provided that all entrances to the facility are conspicuously posted in accordance with Section 20.203(e)(2) and with the words "Caution - Any Area or Room Within this Facility May Contain Radioactive Material."

Contrary to this requirement, the three entrances to the facility in the vicinity of the westernmost water treatment settling ponds were not posted.

Corrective Action: The licensee eliminated gates or posted the entrances as required.

Violation 2 - License Condition No. 34(C) (formerly License Condition No. 18) of Source Material License SUA-1387 requires, in part, that radiation work permits describe any supplemental radiological monitoring and sampling required during and following work if the potential for exposure to radioactive materials exists.

Contrary to this requirement, the radiation work permit dated June 3, 1988, notes "possible removable alpha" but no self-monitoring was required or performed.

Corrective Action: The licensee revised the radiation work permit adding a new block entitled "Radiation monitoring requirement" and further instruction to staff.

Violation 3 - License Condition No. 16(A) of Source Material License SUA-1387 requires that the licensee maintain at least a 3 foot freeboard in each evaporation pond.

Contrary to this requirement, freeboard in the east evaporation pond was exceeded during the time period March 20 through April 18, and May 19, 1988.

Corrective Action: The licensee revised the operations manual and marked the freeboard limit on the fluid level gauge of each cell.

Open Item 1 - There is no procedure or corrective action specified when freeboard requirements of License Condition No. 16 are exceeded.

Corrective Action: A procedure was developed to provide for corrective action to be taken when freeboard requirement is exceeded.

Open Item 2 - License Condition No. 39 cites Section 2.4.1 of Regulatory Guide 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills will be As Low As Is Reasonably Achievable." Therefore, the RSO is required to attend refresher training on uranium mill health physics every 2 years. License Condition No. 38 requires, in part, that training documentation be maintained onsite. The RST's records are onsite, but the corporate RSO's (located in Oklahoma City, Oklahoma) records are not maintained onsite. The licensee should have the RSO's records maintained onsite.

Corrective Action: Refresher training documentation for the RSO is on file at the site. This open item was not closed until the August 22, 1989, inspection.

August 22, 1989, Inspection

No violations or deviations were identified; two open items were found.

Open Item 1 - The Radiation Safety Officer's (RSO) refresher training documentation was not maintained onsite. This is an open item not closed from the previous inspection.

Refresher training documentation for the RSO is maintained on file at the site.

Open Item 2 - Section 17 of the site procedures requires wipe tests and surveys and that the results be recorded. Although required tests were done, only that they were acceptable was recorded. The actual results of these tests should be recorded.

The licensee is recording test and survey results appropriately.

October 3, 1990, Inspection

No violations or deviations were identified; one open item was found.

Open Item - Health Physics Manual was not included and revised with Standard Operating Procedures (SOPs).

The Health Physics Manual is included with the SOPs and is annually reviewed.

August 15, 1991, Inspection

No violations or deviations were identified.

Summary

The licensee has been cited for five violations over the period of record. However, the licensee has provided satisfactory and timely corrections for the violations. No violations were recorded for the inspections conducted in 1990 and 1991. Additionally, the audit and inspection programs described in Section 3.5 of this SER will help to ensure that proper management attention is given to conducting operations in accordance with the license. All open items were typically corrected prior to the next inspection.

11.0 CONCLUSION INCLUDING SAFETY LICENSE CONDITIONS

Based upon Rio Algom's application and the discussion contained in this SER, the NRC has concluded that operating the Smith Ranch project, in accordance with the commitments in Rio Algom's submittals and the following license conditions, will be protective of health and safety and fulfill the requirements of 10 CFR Part 20.

Therefore, the staff recommends that Rio Algom Mining Corp. be issued a source material license subject to the following conditions:

- Release of equipment or packages from the restricted area shall be in accordance with the attachment to this license entitled, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September 1984.
- Standard operating procedures (SOPs) shall be established for all operational activities involving radioactive materials that are handled, processed, stored or transported by employees. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. In addition, written procedures shall be established for nonoperational activities to include in-plant and environmental monitoring, bioassay analysis, and instrument calibration. An up-to-date copy of each written procedure shall be kept in each area where it is used.

All written procedures shall be reviewed and approved in writing by the RSO before being implemented and whenever a change in a procedure is proposed. The RST shall document that all existing facility procedures are reviewed and approved on an annual basis.

- The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criterion 9, adequate to cover the estimated costs, if accomplished by a third party, for completion of the NRC-approved site closure plan including; above-ground decommissioning and decontamination, the cost of offsite disposal of radioactive solid process or evaporation pond residues, and ground-water restoration, as warranted. Within 3 months of NRC approval of a revised closure plan and cost estimate, the licensee shall submit, for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs in the newly approved site closure plan exceed the amount covered in the existing financial surety. The revised surety shall then be in effect within 3 months of written NRC approval.

Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criterion 9, shall be provided to the NRC by June 30 of each year. If the NRC has not approved a proposed revision 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing arrangement, prior to expiration, for 1 year. Along with each proposed revision or annual update, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation, maintenance of a minimum 15 percent contingency, changes in engineering plans, activities performed, and any other conditions affecting estimated costs for site closure. The licensee shall also provide the NRC with copies of surety-related correspondence submitted to the State, a copy of the



State's surety review, and the final approved surety arrangement. The licensee must also ensure that the surety, where authorized to be held by the State, expressly identifies the NRC-related portion of the surety and covers the above-ground decommissioning and decontamination, the cost of offsite disposal, soil and water sample analyses, and ground-water restoration associated with the site. The basis for the cost estimate is the NRC-approved site closure plan or the NRC-approved revisions to the plan. The site closure plan, cost estimates, and annual updates should follow the outline in the attachment to this license entitled "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates."

Within 90 days of the issuance of this license, the licensee shall submit a surety instrument acceptable to the State of Wyoming and the NRC, in an amount no less than \$7,500,000. This surety shall be written in favor of the State of Wyoming or the NRC for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9, and shall be continuously maintained until a replacement is authorized by both the State of Wyoming and the NRC.

- At least 30 days prior to initial well-field and processing plant testing, the licensee shall assign a radiation safety officer (RSO) to the site on a permanent full-time basis.
- Any changes to the licensee's corporate organization scheme illustrated in Figure 9-4 of the March 31, 1988, application, as amended by the submittal dated December 10, 1991, shall require approval by the NRC, Uranium Recovery Field Office, in the form of a license amendment.
- In addition to the responsibilities and qualifications specified in Chapter 9 of the licensee's March 31, 1988, application, as amended, the Radiation Safety Officer (RSO) shall be qualified as specified in Sections 1.2 and 2.4.1 of Regulatory Guide 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills will be As Low As Reasonably Achievable," dated May 1983. The RSO shall also receive a minimum of 40 hours of related health and safety refresher training every two years.

The licensee shall have a Radiation Safety Technician (RST) assigned full time to the site who shall report directly to the Plant Supervisor on matters dealing with radiological safety. In addition, the RST shall have access to the RSO at all times. The RST shall have the qualifications as specified in Section 2.4.2 of Regulatory Guide 8.31, and the responsibilities as specified in chapter 9 of the licensee's March 31, 1988, application as amended.

- The licensee shall have a training program for all site employees as described in Section 2.5 of Regulatory Guide 8.31, and as detailed in Section 9.3 of the licensee's March 31, 1988, application, as amended.
- The licensee is hereby exempted from the requirements of Section 20.203(e)(2) of 10 CFR 20 for posting areas within the facility,

provided that all entrances to the facility are conspicuously posted in accordance with Section 20.203(e)(2) and with the words, "CAUTION - ANY AREA OR ROOM WITHIN THIS FACILITY MAY CONTAIN RADIOACTIVE MATERIAL."

- ° The licensee shall implement the Emergency Action Plan for Accidents as detailed in Appendix G of the licensee's March 31, 1988, application, as amended.
- ° The licensee is prohibited from commencing aquifer restoration prior to review and approval of an occupational safety plan addressing the deployment of chemical reducing agents in the processing plant or well fields.
- ° The licensee shall maintain effluent control systems as specified in Section 4.1 of the license application dated March 31, 1988, as amended, with the following exceptions:
  - A. Yellowcake drying operations shall be suspended immediately if any of the emission control equipment for the yellowcake drying or packaging areas is not operating within specifications for design performance.
  - B. The licensee shall, during all periods of yellowcake drying operations, assure that the manufacturer's recommended pressure is maintained in the heating chamber. This shall be accomplished by either (1) performing and documenting checks of air pressure differential approximately every 4 hours during operation, or (2) installing instruments which will signal an audible alarm if air pressure differential falls below the manufacturer's recommended levels. If an audible alarm is used, its function shall be checked and documented daily.
  - C. Air pressure differential gauges for other emission control equipment shall be read and the readings documented once per shift during operations.
- ° For work where the potential for exposure to radioactive materials exists and for which no SOP exists, a radiation work permit (RWP) shall be required. Such permits shall describe the following:
  - A. The scope of work to be performed.
  - B. Any precautions necessary to reduce exposure to uranium and its daughters to levels as low as is reasonably achievable (ALARA).
  - C. Any supplemental radiological monitoring and sampling required during and following completion of the work. Nonroutine maintenance involving exposure of workers to airborne particulates of uranium and its daughters shall require the use of continuous breathing zone monitoring.

The RSO, RST, or their designees shall indicate by signature the review of each RWP prior to the initiation of the work.

- ° Any visitor, including contractors, shall be required to register at the office and shall be given appropriate instruction in the areas of security, safety, and radiation protection, prior to entering controlled or restricted areas.
- ° 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.
- ° The licensee shall require that all process and maintenance workers who work in yellowcake areas or work on equipment contaminated with yellowcake wear protective clothing including coveralls and boots or shoe covers. Workers who package yellowcake slurry for transport shall wear gloves.
- ° Eating shall be allowed only in administrative offices and enclosed lunch areas that are separated from the process areas.
- ° Before leaving the restricted area, all process workers shall shower or monitor themselves using a calibrated alpha survey instrument. Surveys meeting or exceeding the radiation level of 1000 dpm/100 cm<sup>2</sup> shall require personnel to decontaminate and resurvey themselves. The licensee shall perform spot surveys for alpha contamination at least quarterly on all workers leaving the facility.
- ° All radiation monitoring, sampling, and detection equipment shall be recalibrated after each repair and as recommended by the manufacturer, or at least annually, whichever is more frequent. In addition, all radiation survey instruments shall be operationally checked with a radiation source each day when in use.
- ° During commercial production, the RSO, RST, or a trained designee shall perform and document a daily walk-through inspection of all operating areas. The inspection's purpose is to ensure that all radiation protection and monitoring requirements are being followed.
- ° The licensee shall perform monthly surveys for natural uranium and radon progeny as shown in Figure 9-2 of the licensee's application dated March 31, 1988, as amended. In addition, the licensee shall conduct spot surveys to confirm the adequacy of the yellowcake and radon progeny monitoring plan. If radon or radon progeny concentrations exceed 8 picocuries per liter (pCi/l) or 0.08 working level (WL), respectively, sampling shall be weekly until 4 consecutive weekly samples exhibit less than 8 pCi/l or 0.08 WL.

The calculation of internal exposure to radon, radon progeny, or natural uranium shall be based on a Time Weighted Exposure (TWE) calculation

incorporating a consideration of both occupancy times and average airborne working levels or activity concentrations. If occupancy times are established as an average for each category of worker, the licensee shall also, by means of a semiannual time study, determine the basis upon which average occupancy periods are established.

If any worker reaches or exceeds 25 percent of the maximum permissible exposure limits as specified in 10 CFR Part 20, based upon a calculated TWE for the week or the calendar quarter, dependent on the solubility of the material, the RST shall initiate an investigation of the employee's work record and exposure history to identify the source of the exposure. Necessary corrective measures shall be taken to ensure reduction of future exposures to as low as is reasonably achievable. Records shall be maintained of these investigations.

- The licensee shall perform quarterly gamma radiation surveys in enclosed areas at the locations specified in Figure 9-3 of the licensee's application dated March 31, 1988, as amended. In addition, the licensee shall conduct spot checks to confirm the adequacy of the gamma radiation monitoring plan.
- The licensee shall perform monthly alpha contamination surveys of the facility laboratory and offices and weekly surveys of eating and change areas, as specified in licensee's application dated March 31, 1988, as amended. If samples are analyzed in the facility laboratory, the licensee shall survey all surfaces used for urine sample preparation preceding the analyses as specified in Section 3.5 of Regulatory Guide 8.31.

If the alpha contamination levels exceed those listed in the attachment to this license entitled, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September 1984, the area shall be decontaminated.

- Occupational exposure calculations shall be performed and documented within 1 week of the end of each regulatory compliance period as specified in 10 CFR 20.103(a)(2) and 10 CFR 20.103(b)(2). Routine radon daughter and particulates shall be analyzed in a timely manner to allow exposure calculations to be performed in accordance with this condition. Nonroutine samples shall be analyzed and the results reviewed by the RST within 2 working days after sample collection.
- The results of the sampling, analyses, surveys, and monitoring, the calibration of equipment, reports on audits and inspections, all meetings and training courses required by this license, and any subsequent reviews, investigations, and corrective actions, shall be documented. Unless otherwise specified in the NRC regulations, all such documentation shall be maintained for a period of at least 5 years.

- o The licensee shall perform an annual ALARA audit of the radiation safety program which shall be conducted by the RSO or other authorized individual with equivalent qualifications, in accordance with Section 2.3.3 of Regulatory Guide 8.31. A report of this audit shall be submitted to the NRC, Uranium Recovery Field Office, within 60 days after conducting the audit. The report shall include detailed summaries of the analytical results of the radiological surveys. In order to evaluate the ALARA objective, the licensee shall, at a minimum, review the following records: (A) Bioassay results including any actions taken when the results exceeded action levels in Table 1 of Regulatory Guide 8.22, "Bioassay at Uranium Mills," dated January 1987; (B) Exposure records of external and internal time-weighted calculations (TWE); (C) Safety meeting minutes, attendance records, and training program records; (D) Daily inspection log entries and summary reports of the monthly reviews; (E) In-plant radiological survey and monitoring data, as well as environmental radiological effluent and monitoring data; (F) Surveys required by radiation work permits; (G) Reports on overexposure submitted to NRC, MSHA, or the State of Wyoming; and (H) Reviews of operating and monitoring procedures completed during the period.

The audit shall also address any noticeable trends in personnel exposures for identifiable categories of workers and types of activities, any trends in radiological effluent data, and the performance of exposure and effluent control equipment as well as its utilization, maintenance, and inspection history. Any recommendations to further reduce personnel exposures or environmental releases of uranium or radon and radon progeny shall be included in the report.

- o The licensee shall implement a urinalysis program as outlined in Revision 1 to Regulatory Guide 8.22, with the following additions:

  - A. Baseline urinalysis shall be performed for all permanent employees prior to their initial assignment at the facility.
  - B. Any time uranium in urine reaches or exceeds an action level of 15 micrograms per liter ( $\mu\text{g/l}$ ) for any worker, the licensee shall provide documentation, in the annual ALARA audit, to the NRC, Uranium Recovery Field Office, indicating what corrective actions have been performed to satisfy the recommendations of Revision 1 to Regulatory Guide 8.22.

Any time an uranium action level of 35  $\mu\text{g/l}$  for two consecutive urine specimens or 130  $\mu\text{g/l}$  for any one specimen is reached or exceeded, the licensee shall provide documentation within 30 days to the NRC, Uranium Recovery Field Office, indicating what corrective actions have been performed to satisfy the recommendations of Revision 1 to Regulatory Guide 8.22.