

ENCLOSURE 3

**SAFETY EVALUATION REPORT
FOR RENEWAL OF
SOURCE MATERIAL LICENSE NO. SUA-1341**

**COGEMA MINING, INC.
IRIGARAY AND CHRISTENSEN RANCH PROJECTS
CAMPBELL AND JOHNSON COUNTIES, WYOMING**

JUNE 1998

DOCKET NO. 40-8502

**U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Division of Waste Management**

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1.0 INTRODUCTION

On January 5, 1996, COGEMA Mining, Inc. (COGEMA) submitted a License Renewal Application (LRA) for Source Material License SUA-1341 for the combined operation of the Irigaray and Christensen Ranch mine sites, located in Campbell and Johnson Counties, Wyoming. In response to comments and requests for additional information from the U.S. Nuclear Regulatory Commission (NRC) staff, COGEMA provided page changes to the LRA by letter dated September 3, 1997.

This Safety Evaluation Report (SER) discusses the public health and safety aspects of the operations that COGEMA has proposed in the application for the renewed license. Information and discussions in this safety evaluation report (SER) are based on information contained in the LRA and supplements; NRC licensing actions approved since January, 1996; semiannual environmental monitoring reports submitted by COGEMA since the previous renewal of SUA-1341 in 1988; and NRC inspection reports generated during the nearly 10 yr of commercial operation since the Irigaray and Christensen Ranch operations were consolidated under license SUA-1341. The inspection history, conclusions, and license conditions presented here are based on NRC staff evaluations and reviews in support of the proposed renewal. Additional information concerning the environmental impacts of the proposed renewal is contained in the Environmental Assessment (EA) for the license renewal of SUA-1341.

With the renewal of SUA-1341, NRC would be authorizing COGEMA to continue commercial uranium extraction operations at the Irigaray and Christensen Ranch sites but under a new format, a full performance-based license (PBL) format. Under a PBL, the licensee is authorized to take certain actions and to make certain predetermined changes to its procedures or operations without submitting a request for NRC approval to do so each time such a change is contemplated.

Under the PBL, COGEMA may:

- Make changes in the facilities or process, as presented in the LRA;
- Make changes in the procedures presented in the LRA; or
- Conduct tests or experiments not presented in the LRA, without specific NRC approval, if the licensee ensures that the following conditions are met:
 - (1) The change, test, or experiment does not conflict with any requirements specifically stated in this license (excluding material referenced in the PBL) or impair the licensee's ability to meet all applicable NRC regulations.
 - (2) There is no degradation in the essential safety or environmental commitments in the license application or provided by the approved reclamation plan.
 - (3) The change, test, or experiment is consistent with NRC conclusions regarding actions analyzed and selected in the EA.

Under a PBL, the licensee has the burden of ensuring the proper implementation of the PBL. So instead of submitting the proposed change to NRC for review, COGEMA is required to have a

panel of its staff, called a Safety and Environmental Review Panel (SERP) conduct a thorough review of the action or change to consider its impacts on the licensee's operations and the environment before the change is implemented by the licensee. Under a PBL, the SERP is to act in lieu of NRC to assure that all regulatory requirements and conditions have been met both before mining operations commence and during all phases of operations. Thus, COGEMA's SERP will determine if the licensee can proceed with contemplated changes or if NRC approval of the change or action is needed in the form of an amendment to the renewed license.

COGEMA's SERP must consist of a minimum of three individuals. One member of the SERP is to have expertise in management and should be responsible for managerial and financial approval of changes, one member will have expertise in operations and/or construction and should be responsible for implementation of any changes, and one member is to be the corporate radiation safety officer (CRSO) or equivalent. Additional members may be included in the SERP, as appropriate, to address technical aspects in several areas such as health physics, groundwater hydrology, surface water hydrology, geology, geochemistry, and others. Temporary members, or permanent members other than the three identified above, may be consultants. In addition, one member of the SERP shall be designated as the Chairman.

Under the PBL, COGEMA is required to keep records of the decisions made by the SERP so they can be examined during NRC inspections of the Irigaray and Christensen Ranch facilities. The records of any changes made pursuant to the Performance-Based License Condition (PBL) must be kept until license termination. These records will include written safety and environmental evaluations, made by the SERP, that provide the basis for determining that each change complies with the requirements stated previously. COGEMA will furnish an annual report to the NRC that describes such changes, tests, or experiments, including a summary of the safety and environmental evaluation of each. In addition, COGEMA will submit annual updates to any pages of its license application that have been revised to reflect changes made under this condition.

The SERP is to operate under standard operating procedures (SOPs) approved by the NRC. The inspection role of NRC remains unchanged with the administration of performance-based licensing. Operational changes, regulatory commitments, and record keeping requirements implemented by COGEMA through the PBL are subject to NRC inspection and possible enforcement actions.

In order to facilitate operations at Irigaray and Christensen Ranch during NRC's review of the LRA, COGEMA requested that NRC consider making early decisions on several proposals that were made in the renewal application. One of the most significant was that COGEMA requested early NRC approval of a limited PBL for the initiation of wellfield operations, which NRC approved by Amendment 45 in December of 1996. Thus, since that time, COGEMA has been operating under a limited PBL. That PBL authorized COGEMA to develop and open new well fields within the permitted area without seeking NRC approval for each new field. Amendment 45 established license conditions and provided NRC approval of SOP's that COGEMA was required to follow for setting up its SERP and having the SERP make the well startup decisions. Subsequent to the issuance of Amendment 45, COGEMA implemented the new PBL for the review and startup of Mine Unit 6 at Christensen Ranch. When NRC inspected COGEMA's activities relative to the MU 6 startup decision, NRC staff concluded that COGEMA had met the requirements of the PBL.

Thus, COGEMA already has had experience with making decisions pursuant to a PBL, has the organizational elements in place that are required for a full PBL, and has already successfully demonstrated that they can function as they will be required to under a full PBL. After the PBL renewal is issued, the SERP will have the authority to act in lieu of NRC on the rest of the issues covered by the full PBL for both Irigaray and Christensen Ranch operations.

COGEMA also requested early NRC approval of several other operational changes that had been proposed in the LRA. These included an intermediate increase in the production flowrate at Christensen to 3,600 gallons per minute (gpm), and then later an additional increase in the flowrate to 4,000 gpm, a request to increase the annual yellowcake production of these facilities to 2,500,000 pounds per year, and early approval to proceed with the initial phase of the proposed restoration program for certain mine units. NRC considered each request, reviewed the relevant information in the LRA submittal, in the revisions to the LRA and other supplemental submittals, determined that any related environmental impacts were acceptable, and approved COGEMA's requests. NRC has issued amendments to the existing license to authorize these changes to operations, and they will be carried into the renewed license as well.

NRC assessed the environmental and safety impacts of these changes to COGEMA's operations at the Irigaray and Christensen Ranch facilities as part of approving the amendments to the existing license. The assessments are documented in the technical evaluation reports (TERs) that the staff prepared to support the issuance of the amendments. Thus, those assessments are described in this SER since the requested changes were originally proposed by COGEMA in the LRA, and the LRA as revised, but since the decisions regarding their approval are already documented, they are not discussed in depth.

This license will be issued for a ten year period rather than a five year period.

1.1 Description of the Proposed Action

The proposed action is to renew Source Material License SUA-1341 to authorize the continued commercial operation of the Irigaray and Christensen Ranch facilities. In the LRA, and subsequent revisions to the LRA, COGEMA proposed numerous changes to the operations and procedures at those licensed facilities. As discussed in the Introduction, several of the changes have been reviewed and approved by NRC and will be carried into the new license. NRC will review the impacts of the others in this SER and the accompanying EA. As a result, in renewing SUA-1341, NRC will be approving operations that in many ways are different from the those that were approved in the current license.

One of the major changes proposed by COGEMA is to combine the mine and development plans for Irigaray and Christensen Ranch, which have previously been separate and different, into one plan, and to standardize the requirements and license conditions for both sites. In most cases, what this means is that the requirements for Irigaray wellfield operations which were established when ISL technology was in its infancy, will be converted to the more modern requirements that have been applied at Christensen Ranch and are more typical of what is being applied at other ISLs. In some cases, COGEMA is proposing changes to the existing operations at Christensen Ranch as well. For the most part, since COGEMA proposed changes and standardizations to their operations in the LRA, as revised, that reflect improvements in technology, or factor in experience or actual data collected by COGEMA at Irigaray and or Christensen Ranch, NRC staff have found them, and related impacts, to be generally acceptable.

Standardizations proposed for the renewed license include, among other things, the upper control limit calculation, the baseline water quality program, and the frequency and spacing of baseline water quality wells through a wellfield. Other major changes to the operations include a revised section on radiological effects based on 10 CFR Part 20, new MILDOS modeling and EPA guidance; revision to the upper control limit calculation method for Chloride; proposed radiological and non-radiological monitoring programs based on new Part 20; and new proposed Annual Limit on Intake (ALI) and Derived Air Concentration (DAC) for natural uranium based on actual solubility test results of Irigaray produced yellowcake.

The renewed license would authorize the facilities to continue to be operated such that the annual throughput at Christensen Ranch does not exceed an average flow rate of 4000 gallons per minute (gpm) exclusive of restoration flow, and such that the annual average yellowcake production does not exceed 1,133,980 kg (2,500,000 pounds) of U_3O_8 annually. (These numbers were originally proposed in the LRA, as revised, and have already been amended into the current license at COGEMA's request.) This SER discusses the health and safety aspects of the COGEMA proposal. Additional information concerning the environmental aspects of the proposed renewal is contained in the accompanying EA.

1.2 Background Information

The Irigaray Project was licensed for commercial operation in August 1978 during ownership by Westinghouse Electric Corporation. In 1982, operations ceased at the Irigaray plant and well fields, and the facility was placed on standby status pending improvements in the uranium market. In June 1987, Malapai Resources Company purchased the Irigaray site from Westinghouse and resumed operations. In 1988, Malapai was granted an amendment to SUA-1341 to include the Christensen Ranch satellite ion exchange (IX) plant and associated mine units (MUs). The Irigaray site was then upgraded to include facilities for processing IX resin from Christensen Ranch. In February 1990, operations ceased again, and in September 1990, Malapai was sold to Electricite de France (EdF), a French nuclear utility. EdF chose to manage the Irigaray and Christensen Ranch sites through Total Minerals Corporation (TOMIN), another French company, and TOMIN resumed operations in 1991. Finally, in April 1993, a large stock exchange occurred in France between COGEMA and TOTAL (parent of TOMIN), in which TOTAL acquired 10 percent of COGEMA stock and, in return, COGEMA acquired all of the TOMIN uranium properties and stock in TOTAL. As a result, COGEMA acquired ownership of the Irigaray and Christensen Ranch uranium projects. In November 1993, the name TOMIN was changed to COGEMA Mining, Inc. COGEMA maintains its operational offices in Mills, Wyoming.

Current operations continue under COGEMA management. Well fields 1, 2 and 3 at the Irigaray site are considered to be restored by COGEMA, and Well fields 4 - 9 are undergoing restoration. While COGEMA is not currently mining at Irigaray, future mining is planned if there is an improved market outlook.

Uranium slurry product from the Christensen Ranch site is processed to yellowcake form at the Irigaray central plant. Previous operations at Christensen Ranch have included production from MUs 2, 3, 4, and 5, all of which are currently undergoing restoration. MU 6 is currently in production, and MU 7 is undergoing wellfield development and baselining.

Remaining reserves on the entire Irigaray property controlled by COGEMA is approximately seven million pounds. Reserves remaining on the Christensen Ranch property are approximately thirteen million pounds in the current low value uranium market.

The combined Irigaray and Christensen Ranch permit areas cover approximately 14,000 ha (35,000 acres), while the surface area expected to be disturbed over the projected life of the projects is less than 400 ha (1,000 acres). Figure 1-1 is a regional location map that includes both project areas.

1.3 Review Scope

The safety review of COGEMA's request for license renewal included evaluations of (1) the renewal application dated January 5, 1996; (2) supplementary information submitted by letter dated September 3, 1997; (3) the compliance history for the Irigaray and Christensen Ranch facilities since the two sites were combined under license amendment on May 4, 1988; and (4) the monitoring data required under license SUA-1341.

COGEMA's proposed programs were also evaluated against NRC regulations, as specified in 10 CFR Parts 20 and 40, and appropriate NRC staff guidance.

2.0 AUTHORIZED ACTIVITIES

Currently, COGEMA is authorized to recover uranium-bearing solutions from the ore bodies at a maximum average flow rate of 15,140 lpm (4,000 gpm), exclusive of restoration flow, using lixiviant composed of native groundwater, either sodium bicarbonate/carbonate or CO₂ gas added as a complexing agent, and either oxygen or hydrogen peroxide as an oxidant. COGEMA's annual yellowcake production is limited to 1,133,980 kg (2,500,000 pounds) of U₃O₈. COGEMA is also authorized to accept yellowcake for drying from other uranium mine licensees.

2.1 Facility Description

Although under one license, the Irigaray and Christensen Ranch ISL uranium projects are two distinct sites with somewhat different facilities and functions. The Irigaray facility and associated well fields are located in southeastern Johnson County, Wyoming, approximately 10 mi northeast of Sussex and 43 mi southeast of Buffalo (figure 1-1). The land has historically been used for livestock grazing. The Irigaray property includes approximately 8,440 hectares (21,100 acres) of leases and claims. However, only a small fraction of this land has been disturbed by uranium ISL activities. The various R&D phases at the Irigaray facility occupied approximately 4 hectares (10 surface acres). Concurrent with the early stages of the site research, well fields were developed and divided into 13 MUs. Of these, nine have been depleted during previous operations and are undergoing groundwater restoration. Additional mining is also planned at Irigaray sometime in the future, both within the existing permit area and to the north and the south. To date, well field operations at Irigaray have been limited to approximately 20 hectares (50 acres).

The Christensen Ranch project area, also shown in figure 1-1, is located along the Campbell-Johnson County boundary about 30 mi north-northeast of the town of Midwest, Wyoming, and 50 mi southwest of Gillette, Wyoming. The land in the vicinity of the Christensen Ranch Satellite Operation is comprised mainly of tablelands of moderate topographic relief. The primary use of land within the project area is livestock and wildlife grazing. The total surface area expected to be disturbed by existing and future operations is 372 hectares (930 acres); 7 percent of the 5,600 hectares (14,000 acres) is within the permit area.

The main processing plant for uranium extraction and recovery is at Irigaray. Since there is no longer active ore extraction from the Irigaray well fields, the extraction part of the facility is not

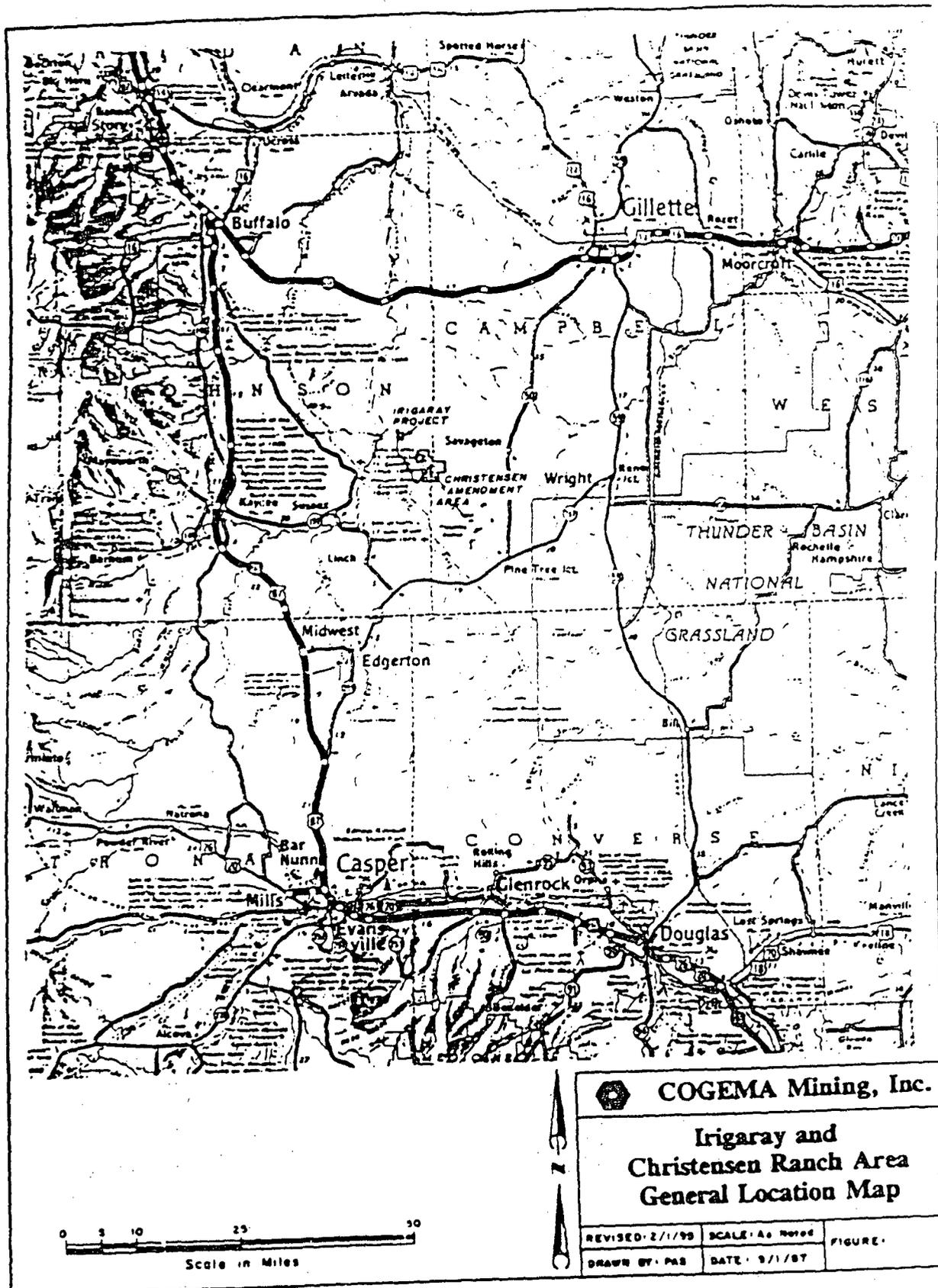


Figure 1-1 - General Facility Locations

currently in use, but the elution and precipitation circuit and the dry/pack areas of the plant are used primarily to remove the uranium from resin that is trucked in from the Christensen Ranch satellite facility. In addition to processing the slurries from Christensen, the Ingaray processing plant is equipped and licensed to receive, store and dry yellowcake slurry from other ISL operations.

Liquid wastes produced by operations may be disposed of by any of three methods: (1) in solar evaporation ponds, (2) by surface discharge, or (3) down a deep injection well. Solid wastes (e.g., piping, valves, filters) are decontaminated, if possible, and released for unrestricted use, or if unable to be decontaminated, sent to a facility licensed to accept 11e.(2) byproduct material for disposal.

2.2 Operations

During commercial operation, injection, recovery, and monitoring wells are installed in the ore zone. Within a MU, the geometric arrangement of the injection and recovery wells depends on the orebody configuration, aquifer permeability, and operator preference. The ore is typically extracted through the use of a series of five-spot well patterns installed over the mineralized section of the orebody formation. A single five-spot pattern is roughly rectangular in shape and consists of four injection wells surrounding a single central recovery well. The distance between the corner injection wells in a five-spot pattern at Christensen Ranch is typically about 85 feet, but may vary depending on topography and orebody characteristics. Each MU contains a number of wellfield houses where trunklines from the processing plant distribute injection and recovery solutions to the wells.

The mining solution (lixiviant) to be used during operations at Ingaray and Christensen Ranch will consist of either sodium bicarbonate/carbonate or carbon dioxide as a complexing agent, and either oxygen or hydrogen peroxide as an oxidant. Carbon dioxide gas will also be added for pH control and as an additional source of carbonate during the use of sodium bicarbonate. Uranium in the orebodies is oxidized and dissolved by complexation with the carbonate, and the resultant uranium-rich solution is drawn to recovery wells, where it is pumped to the surface and transferred to the processing plant. In the plant, the uranium is removed from the solution by adsorption onto ion-exchange (IX) resin which is contained in IX columns. The barren solution leaving the IX columns is refortified with lixiviant and reinjected into the ore zone for additional uranium recovery.

When the majority of ion exchange sites on the IX resin have been filled with uranium, the column is taken offline. The loaded column is stripped (eluted) of uranium through a process in which the uranium-carbonate complex is stripped from the resin beads using a concentrated chloride solution. The resultant concentrated uranium solution is transferred to tanks where the uranium is precipitated by the addition of hydrochloric acid, sodium hydroxide, and hydrogen peroxide. The resulting product is a uranium slurry that is approximately one-half water. This product may either be shipped as a slurry, processed slightly more to a wet cake, or dried. This cycle is continued until the ore zone is depleted past economic recovery.

Newer MU's, such as Units 5 and 6 at Christensen Ranch, and proposed future MUs, are each designed to recover approximately 454,000 kg (1,000,000 pounds) of yellowcake. COGEMA intends to sequentially recover uranium from the individual MUs. Upon completing the ISL process in one MU, COGEMA will recirculate lixiviant-rich solution into the next MU and begin the groundwater restoration process in the depleted unit. This process is expected to continue until

all MUs have been depleted of uranium, at which time the licensee will either conduct further ISL operations or will decommission and abandon the site.

The general process circuit for the Irigaray plant is shown in figure 2-1. The Christensen Ranch processing facilities do not include an elution circuit; therefore, loaded resin from the Christensen Ranch facility is transported via truck to the Irigaray facility approximately twice daily. The general layouts of the Irigaray and Christensen Ranch processing facilities are shown in figures 2-2 and 2-3, respectively. The configurations of these process circuits have been reviewed by NRC staff, and they represent typical circuits for this type of operation.

COGEMA may make changes to the process circuit in accordance with the PBLC, as long as the changes do not degrade the essential safety commitments made in the LRA and do not impair COGEMA's ability to meet all applicable NRC regulations.

3.0 ORGANIZATION AND ADMINISTRATIVE PROCEDURES

COGEMA Mining, Inc., (COGEMA) is a subsidiary of COGEMA Resources, Inc., a wholly owned subsidiary of COGEMA, Inc. COGEMA, Inc. is a United States subsidiary of COGEMA, S.A.E., located in France. COGEMA maintains a United States headquarters in Mills, Wyoming, where site licensing actions originate.

3.1 Organization

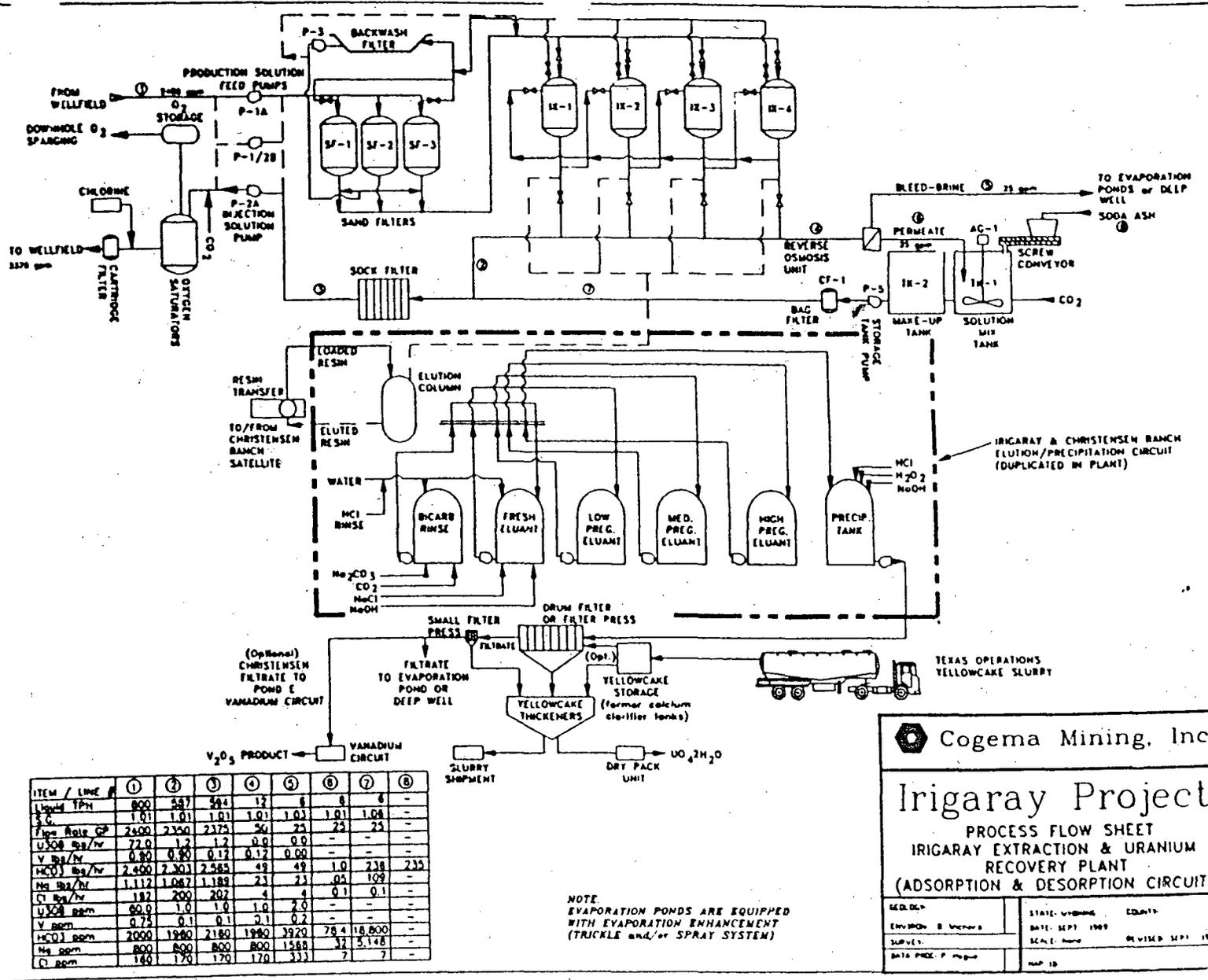
An organization chart of COGEMA Mining, Inc., depicting the relationships of the organizational components responsible for operations, environmental protection, and radiation safety at the Irigaray and Christensen Ranch facilities, is shown in figure 3-1.

The General Manager (GM) for ISL operations is responsible for each level of management and the radiation safety and environmental programs for all COGEMA ISL operations. The GM has responsibility for well field development, engineering, and operational procedures. These responsibilities include the development, review, and implementation of all production related operating procedures and the implementation of safety programs, associated quality assurance (QA) programs, and routine and nonroutine maintenance activities. The GM reports directly to the Senior Vice President for Operations in COGEMA's Saskatoon Office and is authorized to implement any action to correct or prevent radiation safety hazards to health and property, including the immediate termination of any or all portions of the project.

The Manager for ISL Environmental and Regulatory Services (MIER) reports directly to the GM and is responsible for the maintenance of all operational licenses and permits for continued well field operations including modifications, amendments, and renewals. The MIER has oversight for the development, review, approval, implementation, and adherence to radiation safety programs, environmental and groundwater monitoring programs, and associated QA programs. The MIER guides the Radiation Safety Officer (RSO) in his routine and special responsibilities when necessary and has the authority to suspend, postpone, or modify any work activity that is unsafe or potentially in violation of NRC regulations, including the ALARA program.

The NRC staff previously reviewed this organizational structure and found it to be in accordance with 10 CFR Part 20 and within the staff's recommendation in Regulatory Guide 8.31.

Figure 2-1 - Process Flow Diagram for the Irigaray Main Plant



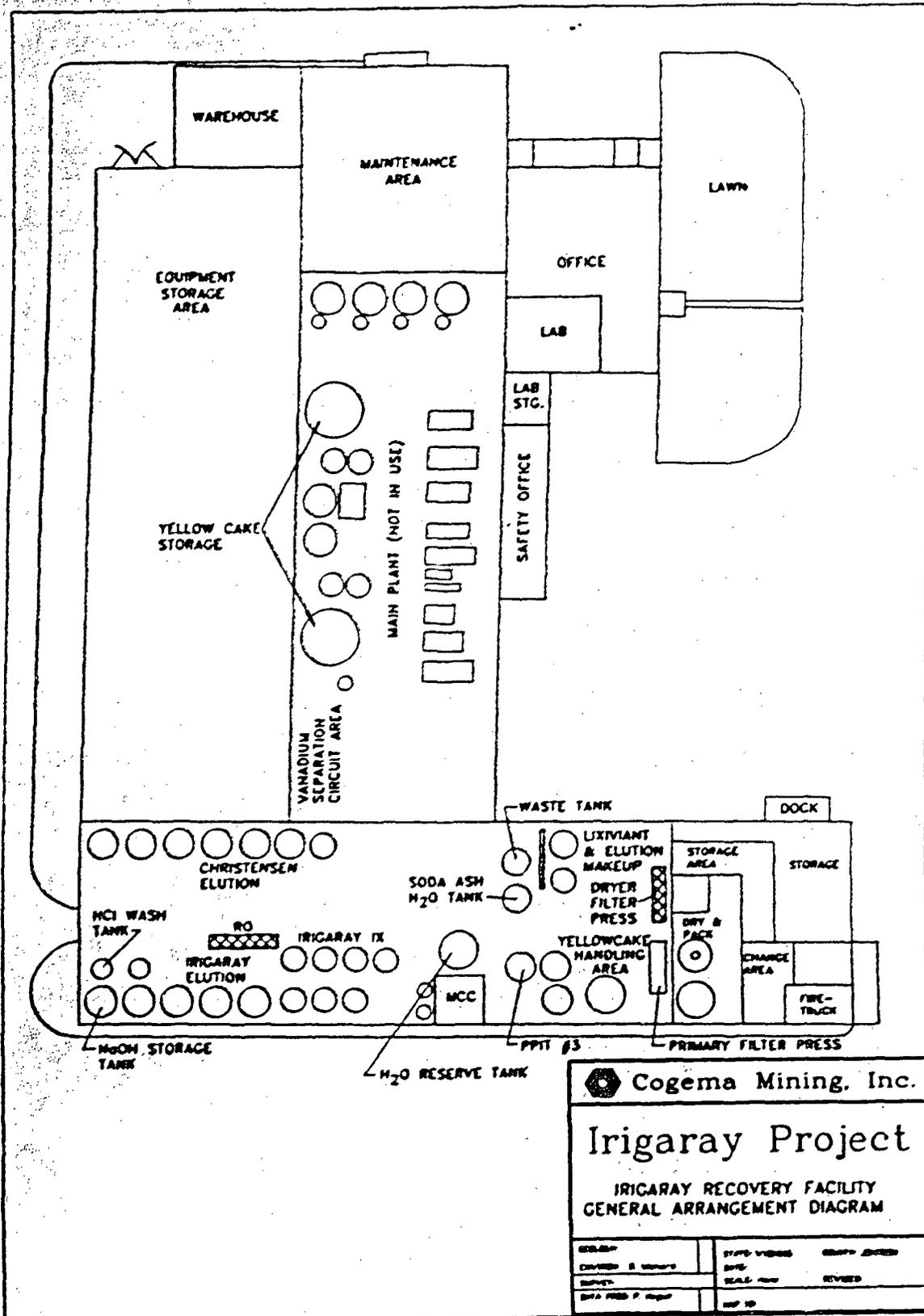
ITEM / LINE #	①	②	③	④	⑤	⑥	⑦	⑧
Liquid TPH	800	537	594	12	8	8	8	-
SG	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.08
Flow Rate GPM	2400	2350	2375	36	25	25	25	-
U ₃ O ₈ lbs/hr	77.0	1.2	1.2	0.0	0.0	-	-	-
V lbs/hr	0.30	0.30	0.12	0.12	0.00	-	-	-
HCO ₃ lbs/hr	2,400	2,301	2,585	49	49	1.0	238	235
H ₂ lbs/hr	1,112	1,087	1,188	23	23	0.5	109	-
Cl lbs/hr	132	200	202	4	4	0.1	0.1	-
U ₃ O ₈ ppm	80.0	1.0	1.0	1.0	2.0	-	-	-
V ppm	0.75	0.1	0.1	0.1	0.2	-	-	-
HCO ₃ ppm	2000	1990	2180	1980	3920	78.4	18,800	-
H ₂ ppm	800	800	800	800	1588	33	5,148	-
Cl ppm	180	170	170	170	332	7	7	-

NOTE:
EVAPORATION PONDS ARE EQUIPPED
WITH EVAPORATION ENHANCEMENT
(TRICKLE and/or SPRAY SYSTEM)

Cogema Mining, Inc.

Irigaray Project
PROCESS FLOW SHEET
IRIGARAY EXTRACTION & URANIUM
RECOVERY PLANT
(ADSORPTION & DESORPTION CIRCUIT)

SECTOR:	STATE: UTAH	COUNTY:
ENVIRONMENTAL:	DATE: SEPT 1989	SCALE: AS SHOWN
SURVEY:	REVISED: SEPT 1989	
DATE PLOTTED: 7/19/90	MAP 10	



Cogema Mining, Inc.

Irigaray Project

**IRIGARAY RECOVERY FACILITY
GENERAL ARRANGEMENT DIAGRAM**

DESIGNED BY	DATE	SCALE	REVISION
DRAWN BY	DATE	SCALE	REVISION
CHECKED BY	DATE	SCALE	REVISION
DATE	SCALE	REVISION	NO. 10

Figure 2-2 - General Arrangement: Irigaray Main Processing Facility

Figure 2-3 - General Arrangement: Christensen Ranch Satellite Plant

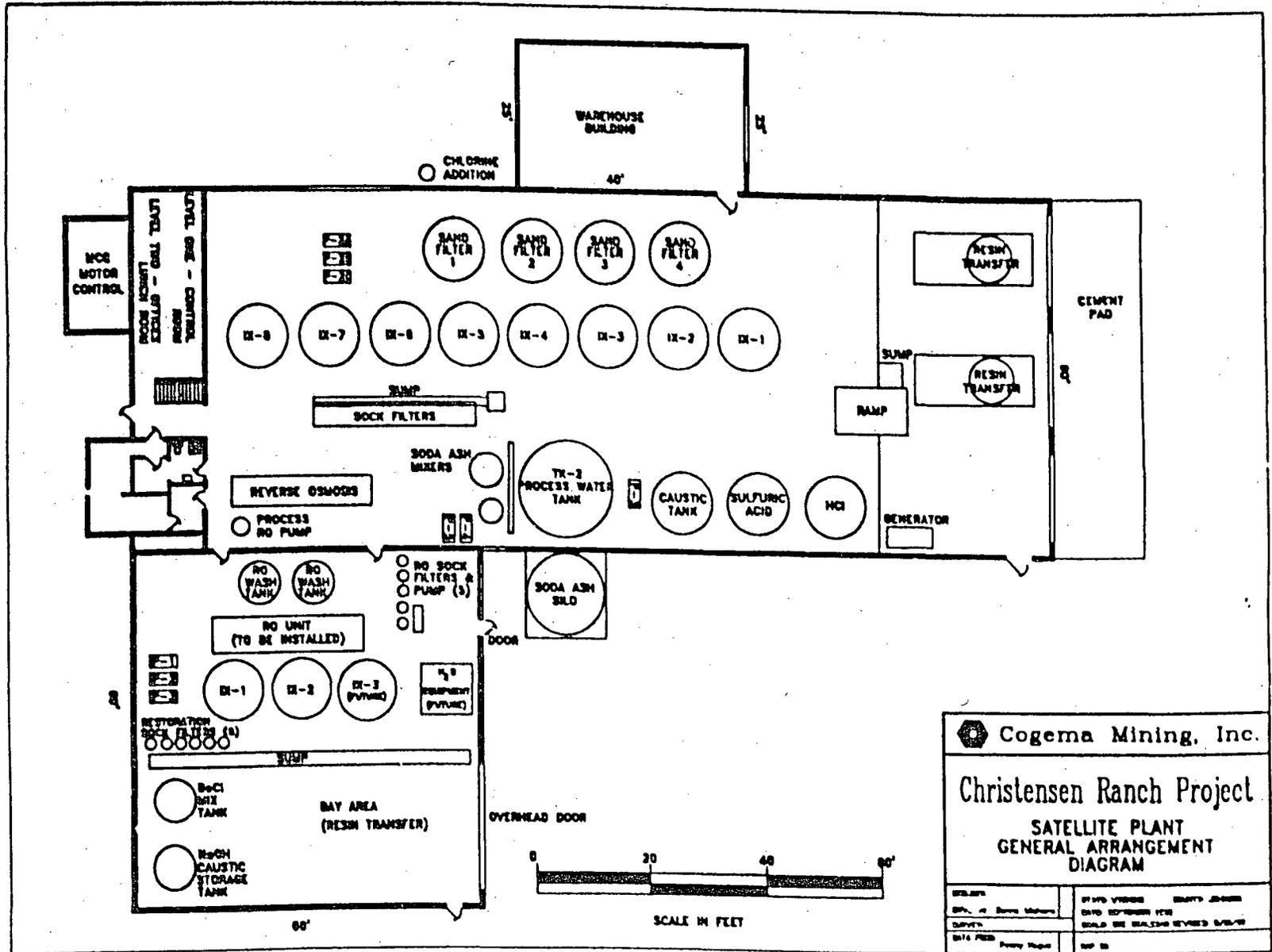
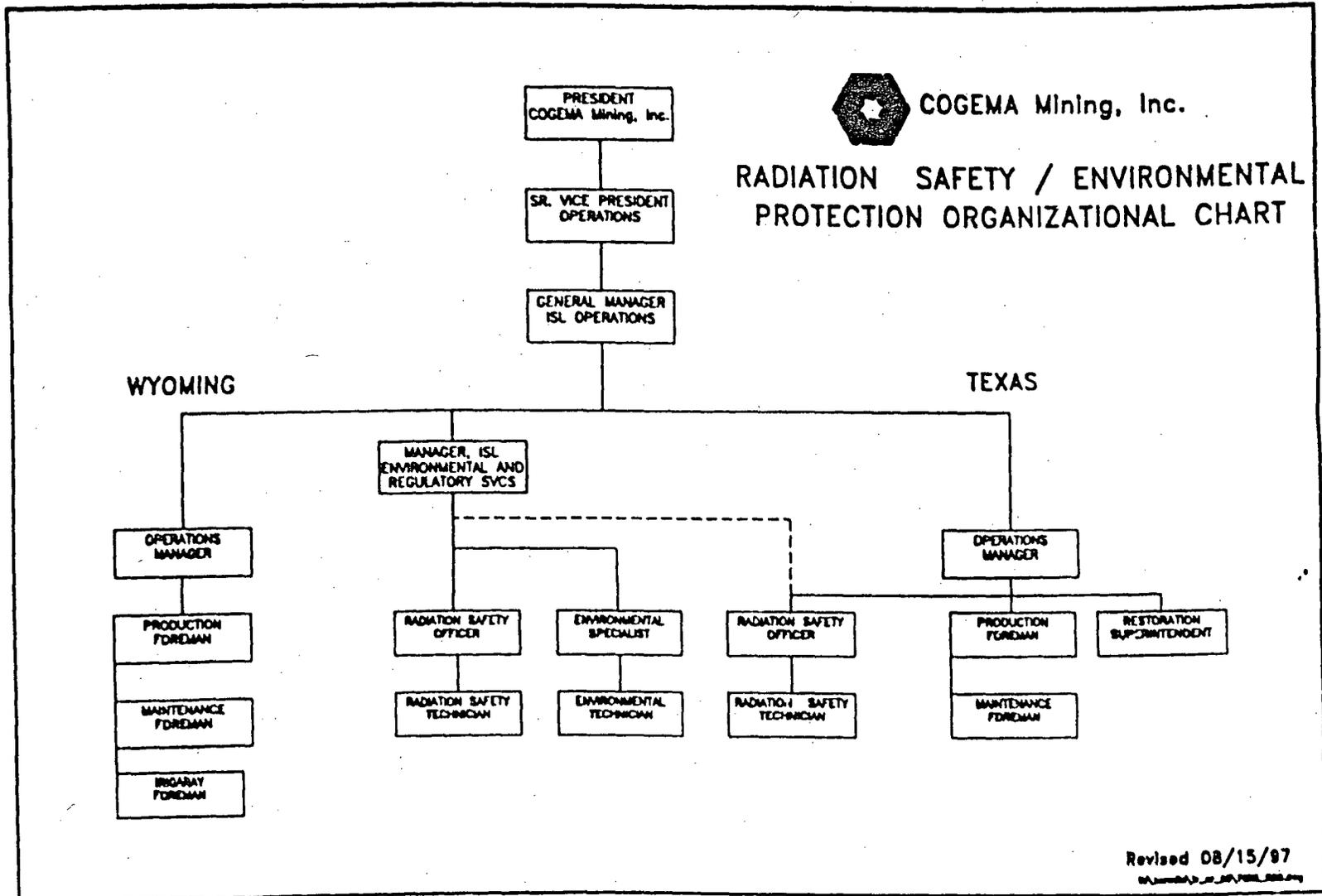


Figure 3-1 - COGEMA Mining, Inc. Organizational Chart



Revised 08/15/97

3.2 Radiation Safety Staff and Responsibilities

The RSO has direct responsibility for the implementation and adherence to radiation safety programs, industrial safety programs, environmental monitoring programs, and associated QA programs. The RSO reports directly to the MIER and relies on the assistance of the Radiation Safety Technician (RST) in the conduct of work. The RSO, with assistance from the RST or Environmental Specialist (ES) inspects all facilities to verify compliance with applicable health physics and radiation safety requirements. Like the MEIR, the RSO has the responsibility and authority to immediately order any change necessary to preclude or eliminate radiation safety hazards and/or maintain regulatory compliance. The RSO has the overall responsibility for the collection and interpretation of employee exposure-related monitoring data, which includes data from both radiological and industrial safety monitoring programs, and is also responsible for the proper recording and reporting of that information. The RSO conducts routine training programs for the supervisors and employees regarding proper radiation protection and industrial safety procedures. By license condition, the RSO reviews all SOPs annually.

The RST assists the RSO with routine radiation safety surveys, employee exposure records keeping, facility inspections, training, and industrial safety responsibilities. The RST reports directly to the RSO.

The environmental specialist (ES) is responsible for implementing all environmental monitoring programs at both the Irigaray and Christensen Ranch sites. The ES reports directly to the MIER. The ES conducts ground and surface water sampling, air monitoring, and evaporation pond inspections and is responsible for the interpretation of all monitoring data. The ES is also trained as an RST and can assist the RSO in conducting radiological and industrial safety programs.

COGEMA utilizes either the MEIR or an outside radiation protection auditing service as the Radiation Safety Auditor (RSA) to provide assurance that radiation health protection procedures and license condition requirements are being properly conducted at the Irigaray and Christensen Ranch sites. Outside services used for this purpose are qualified in radiation safety procedures, as well as environmental aspects of uranium solution mining operations.

The NRC staff finds that the radiation safety staff positions and responsibilities at the Irigaray and Christensen Ranch facilities are in accordance with guidance in Regulatory Guide 8.31 and are, therefore, acceptable.

3.3 Minimum Technical Qualifications for Radiation Safety Staff

COGEMA proposes the following minimal qualifications and experience for personnel engaged in developing, conducting, and administering the radiation safety program at the Irigaray and Christensen Ranch facilities.

3.3.1 Radiation Safety Officer

COGEMA states that the RSO will meet certain minimum qualifications. The qualifications identified by the licensee are consistent with those recommended by the NRC in Regulatory Guide 8.31 (NRC, 1983a). RSO qualifications in Regulatory Guide 8.31 (NRC, 1983a) include (1) a bachelor's degree in the physical sciences, industrial hygiene, or engineering, or an equivalent combination of training and relevant experience in uranium mill radiation protection; (2) appropriate health physics experience relevant to uranium mill/solution mining operations;

(3) specialized classroom relevant to uranium mill/solution mining operations lasting at least four weeks, and biannual refresher training ; and (4) appropriate specialized knowledge.

3.3.2 Radiation Safety Technician

COGEMA proposes that RSTs have specific combinations of education, specialized training, and appropriate work experience. As with the required qualifications for the RSO, the combinations identified by COGEMA are consistent with the staff's recommended combinations of education, training, and experience for RSTs in Regulatory Guide 8.31(NRC, 1983a).

NRC staff finds the above qualifications for the RSO and the RST to meet the recommendations in Regulatory Guide 8.31 and, therefore, to be acceptable.

3.4 Administrative and Operation Procedures

Written Standard Operating Procedures (SOPs) are developed for all process activities, including those activities involving radioactive materials for both the Irigaray and Christensen Ranch facilities, and all principal work assignments are conducted in accordance with those SOPs. COGEMA has also developed written SOPs for non-process related activities including environmental monitoring, health physics procedures, emergency procedures, and general safety. SOPs are developed and approved by the appropriate supervisors. All written SOPs are reviewed by the RSO for radiological protection aspects and must be approved by the RSO prior to operations. Appropriate supervisors and managers also review SOPs and must approve them before implementation. The licensee is required by license condition to ensure that all written procedures for operational and nonoperational activities are also reviewed by the RSO at least annually. SOPs are revised as necessary to reflect changes in operations or regulatory requirements and approved by the RSO. Additionally, up-to-date copies of the SOPs are required to be kept in the areas of the production facility where they are used for easy access by company employees.

Due to the potential health and safety hazards associated with nonroutine operations, the licensee is required by license condition to ensure that nonroutine work or maintenance activities (not covered by existing SOPs) that may result in personnel exposure to radioactive materials are carried out in accordance with a radiation work permit (RWP). As recommended by Regulatory Guide 8.31(NRC, 1983a), the RWP specifies the necessary radiological safety precautions, equipment, or specialized clothing, and radiological surveys for performing the work. The licensee is also required by license condition to supply a breathing zone air sample or an applicable area air sample with all RWPs. The RWP is issued by the RSO or a designate qualified by way of specialized radiation protection training equivalent to the RSO.

With the issuance of the renewed license as a full performance based license, COGEMA will also have to prepare and implement administrative SOPs to direct the SERP in its review and decision making procedures regarding changes to operations at Irigaray and Christensen Ranch. As a result of the request for the limited performance based license condition for new wellfield approval, granted by NRC in December of 1996, COGEMA already has an SOP in place for the general functions of the SERP and for decisions made by the SERP regarding review of the startup of new well fields. Based on its review of those SOPs and the subsequent inspections conducted by NRC of the Irigaray and Christensen Ranch, NRC staff considers that the procedures specified in these SOPs to date provide reasonable assurance that the SERP and the PBL process have functioned, and should continue to function at COGEMA as NRC intends.

The staff finds that COGEMA's administrative and operating procedures are in accordance with guidance in Regulatory Guide 8.31 (NRC, 1983a), and are therefore acceptable.

3.5 Audits and Inspections

3.5.1 Inspections

On a daily basis, the RSO or a qualified designee will conduct a visual walk-through inspection of all the facilities to check for compliance issues or any other problems. On a weekly basis, the RSO, or a qualified designee, will conduct an inspection of the process area to observe general radiation safety control practices and make or review required changes in procedures and equipment. Any items of non-compliance or other problems are reviewed with the PM or GM. Monthly, the RSO will document in a report a review of all daily and weekly inspections, monitoring and exposure data, pertinent radiation survey records, trends in the as-low-as-reasonably-achievable (ALARA) program, and the adequacy of the implementation of the NRC license conditions. In addition, the RSO will make recommendations for any corrective actions or improvements in the process or safety programs.

In addition, NRC will continue to require by license condition that the results of sampling, analyses, surveys and monitoring, results of calibration of equipment, reports on audits and inspections, committee meetings and training courses required by the license, and any subsequent reviews, investigations and corrective actions, shall be documented and maintained for a period of at least 5 years.

The staff finds that COGEMA has committed to implement an inspection program in accordance with Regulatory Guide 8.31(NRC, 1983a). Therefore, the program is acceptable to the NRC staff.

3.5.2 ALARA Audit

COGEMA commits to conducting an annual audit of the radiation protection and ALARA programs of the plant operations in accordance with the recommendations of Regulatory Guide 8.31 (NRC, 1983a). The audit team may consist of either the MIER, and/or an outside radiation safety auditor, the RSO and the Operations Manager or the General Manager (GM). This audit result will be submitted annually to COGEMA corporate management, who will implement the recommendations in the audit report, as necessary, after consultation with the audit team and the RSO. The RSO may accompany the audit team, but may not participate in the conclusions.

The licensee is required by an existing license condition to submit a copy of the annual ALARA audit to the NRC for staff review. In the renewal license, NRC will require instead that a copy of the audit be retained onsite for NRC inspection. However, the NRC will continue to require by license condition that the audit report contain a summary of the daily walk-through inspections.

The staff finds that the COGEMA annual ALARA audit program is in accordance with Regulatory Guide 8.31 (NRC, 1983a), and is therefore acceptable.

3.6 Radiation Safety Training

All site employees and contracted personnel at the Ingaray and Christensen Ranch facilities are administered a training program based upon the COGEMA Radiation Safety Training Plan covering radioactive material handling and radiological emergency procedures. This training

program is in accordance with standard radiological protection guidelines as detailed in Regulatory Guide 8.31 (NRC, 1983a).

Visitors to the facilities receive hazard training on radiation safety requirements while in the restricted area and survey requirements upon leaving the restricted area. Contractors receive the same hazard training as visitors. In addition, contractors receive additional radiation safety training as applicable to their specific tasks.

Permanent employees all receive the same minimal training. The training will consist of (1) fundamentals of health protection, (2) facility-provided protection, (3) health protection measurements, (4) personal hygiene at uranium mines, and (5) mine emergency procedures.

The technical content of the training program is the responsibility of the MEIR. Training is conducted by the RSO or by a qualified designee. All new workers, including supervisors, are given specialized instruction on the health and safety aspects of the specific jobs they will perform. Retraining is done annually and is documented. Some instruction is done in the form of individualized on-the-job training (for RSTs). Additionally, the licensee is required by license condition to document all training and maintain the records on file for a period of at least 5 years.

The staff finds that the COGEMA radiation safety training program is in accordance with Regulatory Guide 8.31 (NRC, 1983a), and is therefore acceptable.

4.0 RADIATION SAFETY CONTROLS AND MONITORING

4.1 Ventilation and Effluent Control

There are two radioactive effluents produced during routine operations at the Irigaray facility: releases of Radon-222 gas from the production solutions and during restoration operations, and releases of yellowcake through the multi-hearth dryer exhaust system. Radon release from the production stream is limited by the use of pressurized fixed bed downflow IX units. Because the system is pressurized at all times, virtually none of the contained radon is released to the environment. The only radon released is from the bleed stream that is used for process bleed and for chemical make-up. At Christensen Ranch, the system is also pressurized. A limited amount of radon gas is released from the bleed stream into the lixiviant makeup circuit. Another potential release may occur during the resin transfer from a loaded IX column to the resin tank trailer. Venting of non-pressurized tanks and the IX column to the atmosphere outside the plant buildings also minimizes the potential for worker radon exposures. In addition to the venting, the plant buildings are equipped with general area exhaust fans to avoid buildup of radon gas in working areas. Radon exposures in working areas are monitored as discussed in section 4.2 of this SER to ensure exposures are in compliance with 10 CFR Part 20 limits.

To control uranium particulate emissions from the multi-hearth dryer, COGEMA uses a high intensity Venturi scrubber system to remove contaminants prior to atmospheric discharge. This scrubber system is designed to remove 90 to 95 percent of particulates. COGEMA is also using processes and techniques that reduce the potential particulates before they get to the dryer. COGEMA adds hydrogen peroxide to the elution solution to help precipitate contaminants before the material ever goes to the dryer. With less contaminants, the product is purer and can be dried at a lower temperature. Lower temperature drying also reduces associated particulate emissions. Environmental monitoring results from 1994 show the measured airborne effluent concentrations of uranium, thorium-230, radium-226, and lead-210 outside the restricted area

are a small fraction of the limits in 10 CFR Part 20, which indicates the engineered controls COGEMA has been applying have been effective in reducing radioactive releases from the facilities.

The staff finds the in-plant ventilation and effluent control systems acceptable for maintaining employee exposures ALARA.

4.2 In-Plant Monitoring Data

Monitoring for airborne uranium is performed routinely at the Irigaray and Christensen Ranch facilities through the use of area sampling and breathing zone sampling. In the LRA as revised, COGEMA proposed to change the locations of some of its air sampling equipment based on actual data and historical program results. The proposed locations of radon gas sampling equipment and the uranium particulate sampling equipment for the Irigaray and Christensen Ranch facilities are shown in Figures 4-1 and 4-2. In addition to the locations shown in these figures, samples are to be taken at new locations in the dryer room during dryer operations (Figure 4-3). NRC staff has reviewed the locations proposed by COGEMA for the renewal and agrees they may provide more accurate monitoring of in-plant radiological conditions than the currently specified locations. The NRC staff finds the new locations to be acceptable. Samples will also be taken whenever RWPs are issued.

Area samples for uranium particulates are collected monthly, and measurements are made using alpha counting of a glass fiber filter. At the Irigaray facility, continuous airborne uranium sampling is performed in the yellowcake dryer and drum packaging areas. Breathing zone samples are taken to assess individual exposures during certain RWP operations.

COGEMA has established SOPs for conducting this sampling that are based upon NRC Regulatory Guide 8.25, Air Sampling in the Workplace (NRC, 1992). If any area exceeds 25 percent of the derived air concentration (DAC), specified in 10 CFR Part 20, the COGEMA RSO will increase sampling to weekly and investigate, correct, and document the cause of the high particulate levels. Results of the investigations are reported in the annual ALARA report. Annual average and maximum monthly gross alpha activity from 1987 to 1994 for both the Irigaray and Christensen Ranch facilities showed all activity levels due to uranium particulates to be below 25 percent of the maximum permissible concentration (MPC) (or DAC after January 1, 1994) specified in 10 CFR Part 20.

COGEMA has conducted monthly in-plant radon daughter surveys at specific locations in the operating areas of the Irigaray and Christensen Ranch facilities. Using historical program results which show the average radon daughter activity at Irigaray and Christensen Ranch has been generally less than 5% of the regulatory limit, in the LRA as revised, COGEMA proposed to change the locations of the radon daughter sampling stations to improve the accuracy of the information collected. NRC staff finds these new locations to be acceptable.

The action level for radon or radon daughters is specified in the LRA as 8 pCi/L (0.08 WL). If this action level is exceeded, the RSO will investigate the cause and increase sampling to weekly until the radon daughter levels are below the action level. Annual average radon daughter activities from 1987 to 1994 have been less than 6 percent of the MPC (or DAC after January 1, 1994) specified in 10 CFR Part 20. Maximum radon daughter monitoring results were below 25 percent of the regulatory limits except for four measurements; one each in 1987, 1988, 1989,

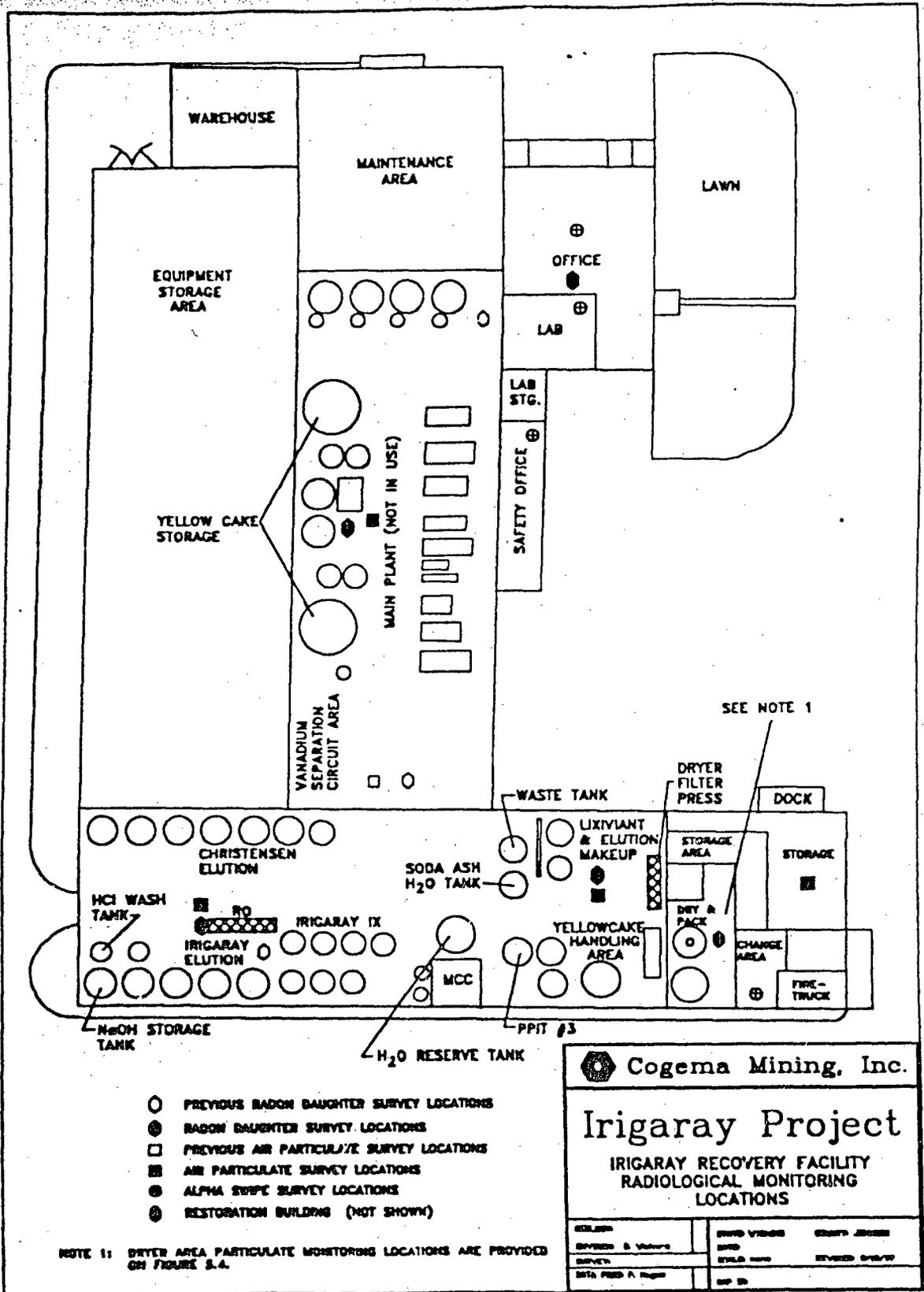
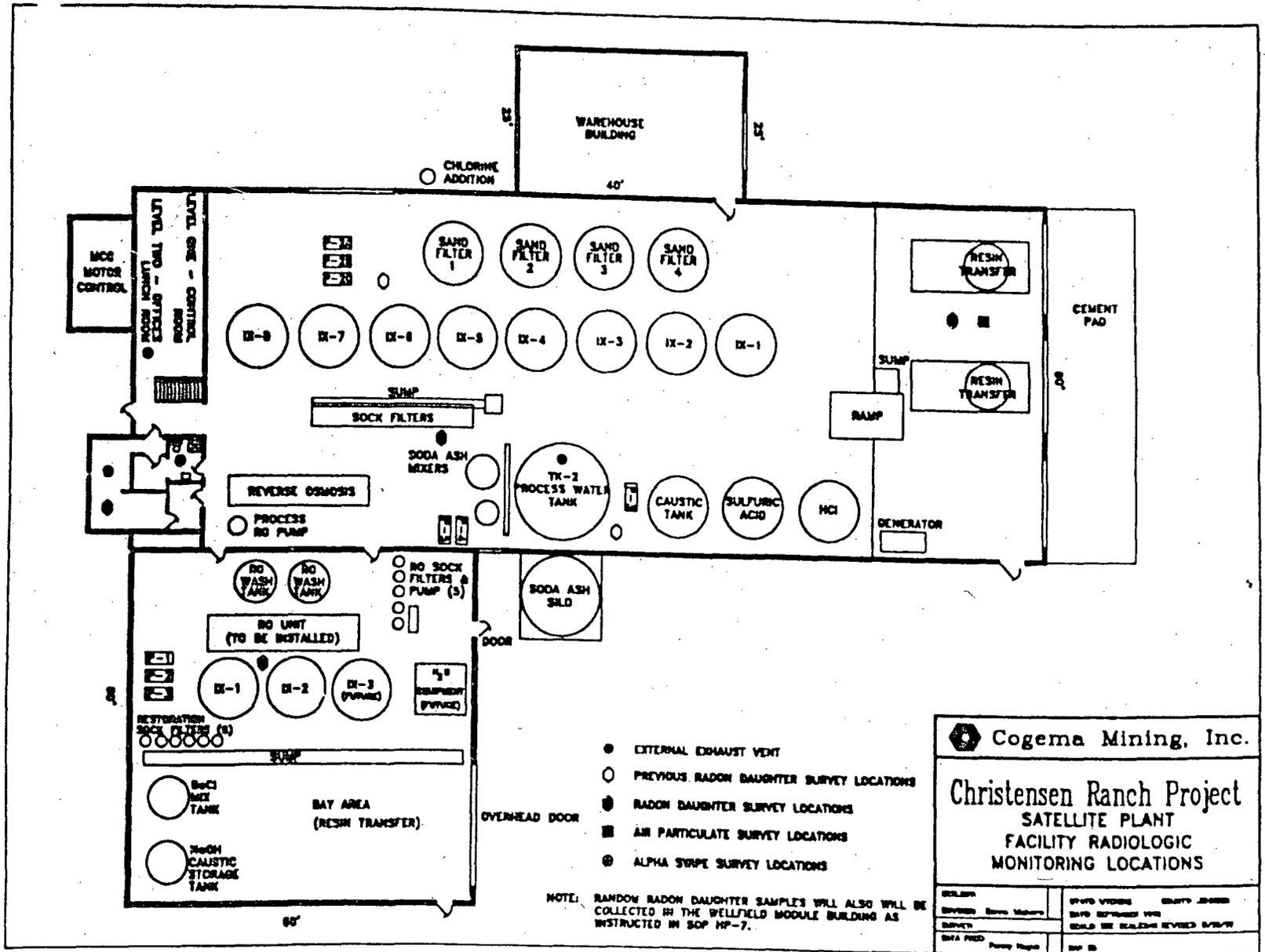


Figure 4-1 - Irigaray Site: Survey and Sampling Locations

Figure 4-2 - Christensen Ranch Site: Survey and Sampling Locations



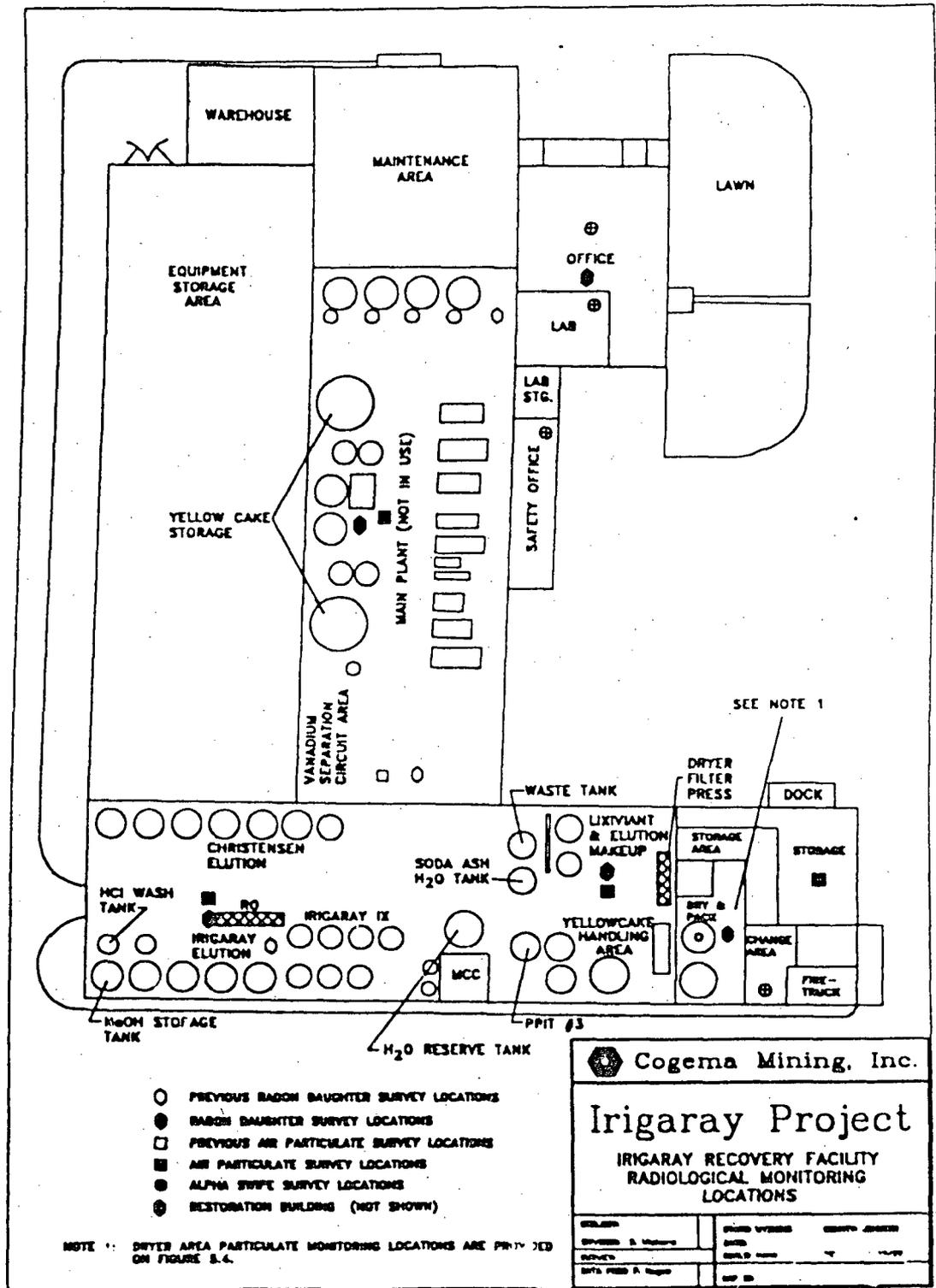


Figure 4.3 - Irigaray Facility Radiological Monitoring Locations

and 1993; that exceeded the limits by a small amount but did not represent a trend. COGEMA conducted appropriate investigations and corrective actions to address these situations.

The staff finds that the COGEMA in-plant monitoring program, including the new sampling locations proposed in the revised LRA, is in accordance with the ALARA concept.

4.3 Personnel Monitoring Data

COGEMA's calculation of employees' internal exposure to radon or its daughters and uranium in DAC-hours is based on a time-weighted exposure calculation incorporating a consideration of both occupancy time and average airborne concentration. Occupancy factors are determined from actual time card data or may be based upon a time study approach. The licensee has been required by license condition, to perform and document internal occupational exposure calculations within one week of the end of each monitoring period, in accordance with 10 CFR 20.2106(a). Furthermore, timely analysis of routine radon daughter and particulate samples has been required to allow exposure calculations to be performed. Finally, nonroutine samples have been required to be analyzed and reviewed by the RSO within two working days after sample collection. With this license renewal, NRC will drop these conditions because the requirements concerning internal occupational dose calculations are already specified in 10 CFR Part 20.

COGEMA has been required by license condition to have the RST investigate an employee's work record and exposure history anytime a worker reaches or exceeds 25 percent of the maximum permissible exposure limits as specified in 10 CFR Part 20. COGEMA has also been required to conduct necessary corrective actions to ensure reduction of future exposures to ALARA. Records of these investigations have been required to be maintained and furnished to the NRC in the annual ALARA audit report. With this renewal, NRC will drop these conditions from the license, because licensees are already required under 10 CFR 20.1101 to implement a program that maintains occupational doses ALARA.

The staff finds that the COGEMA program to assess personnel internal exposures is acceptable for maintaining exposures ALARA and demonstrating compliance with the exposure limits in 10 CFR Part 20, subpart B. Proposed COGEMA exposure calculations are in accordance with Regulatory Guide 8.30 (NRC, 1983b), and are therefore acceptable.

4.4 External Radiation Control Program

4.4.1 External Radiation Surveys

Monthly gamma surveys have been performed routinely at the Ingaray and Christensen Ranch facilities. Surveys were conducted at potential gamma sources including areas where large amounts of uranium and daughters are likely to exist, such as tanks and filters. Since the establishment of the new 10 CFR Part 20, COGEMA has used the administrative action level of 2.0 mR/hr gamma. If that level is exceeded, the survey frequency is increased to weekly and corrective actions are documented. A "radiation area" is declared if readings are recorded in excess of 5.0 mR/hr at worker occupied stations. Access to the radiation area is limited, and the area is posted as required in 10 CFR 20.1902.

The historical gamma survey data that COGEMA has collected indicates the average exposure rates have been relatively constant since 1987, with the exception of slightly elevated readings

during the Christensen Ranch startup. Upward trends over time are not demonstrated by existing data. In the revised LRA, COGEMA proposed to perform the same gamma monitoring program at Irigaray and Christensen Ranch that has been performed to date with the following changes:

Rather than performing the gamma exposure rate surveys at the current specified fixed locations, COGEMA proposed to perform the gamma exposure rate surveys in areas which are accessible to personnel and would potentially exceed the criteria for designation and posting as a radiation area. Based on operating experience, the areas would be limited to those near the filtration equipment, reverse osmosis units, and columns as shown in Figures 4.1 and 4.2. Because the areas may vary depending upon operational activities, COGEMA has proposed that no permanent gamma monitoring locations be identified in the LRA or in the license.

Also, based on the consistency and extent of survey data available since 1987, COGEMA proposed to change the frequency of the surveys to quarterly for routine surveys and monthly for areas over the 2.0 m Rem /hr administrative limit. COGEMA proposed to have the SERP review changes which would affect gamma exposure conditions and to recommend new monitoring requirements.

NRC considered these proposed changes to the locations of the gamma survey stations and to the frequency of sampling. The proposed program appears to be adequate to detect changes to conditions.

The staff finds that the COGEMA proposed gamma survey program is in accordance with Regulatory Guide 8.30 (NRC, 1983b), and is therefore acceptable.

4.4.2 Exposure to External Radiation

Based on operational data at the Irigaray and Christensen Ranch facilities from 1987 to 1994, the average annual exposures have been at or below 1 percent of the 5 rem (0.05 Sv) limit in 10 CFR 20.1201(a). This level is below the level at which personal monitoring is required by 10 CFR 20.1502. All employees working full time in the process facilities at the Irigaray and Christensen Ranch sites will continue to be issued thermoluminescent dosimeters (TLDs) for determination of personal gamma exposure; however, COGEMA will discontinue TLD issuance to employees who do not regularly enter the process facility. TLDs are exchanged and read on a quarterly basis.

The staff finds that the COGEMA program to monitor external radiation exposures to personnel is in accordance with 10 CFR 20.1502(a)(1) and Regulatory Guide 8.30 (NRC, 1983b), and is therefore acceptable.

4.5 Internal Radiation Control Program

4.5.1 Airborne Radiation Surveys

Airborne radiation surveys conducted for the internal Radiation control program are identical to those described in Section 4.2. Therefore, the staff finds that the COGEMA program for airborne radiation monitoring is acceptable.

4.5.2 Exposure to Internal Radiation

Employee internal exposures to airborne radioactive materials has been determined at Irigaray since 1987, and at Christensen since 1989. Prior to January 1, 1994, COGEMA calculated internal exposures using the MPC-hour method based upon 10 CFR 20.103. Since that time, COGEMA has determined internal exposures based upon the requirements of 10 CFR 20.1204, using DAC (Derived Air Concentrations) -Hours formula.

Radiation exposures at the various work stations are primarily functions of the time spent at the station and the concentration of radioactive material present. As previously discussed, the licensee vents the process tanks and facility buildings and uses a Venturi scrubber to significantly reduce the concentration of airborne uranium particulates in effluents. As discussed in section 4.2, COGEMA will conduct monthly sampling for uranium particulates in the processing plant. Additionally, general air sampling and breathing zone samples are taken during operations in the dryer room and packaging area to estimate possible internal radiation exposure.

In the LRA, COGEMA proposed to institute the internal airborne uranium exposure calculation methods at Irigaray and Christensen Ranch. This means that employee exposures to internal radiation will be calculated on the basis of the DAC corresponding to the natural solubility classifications of D (soluble), W (somewhat soluble), and Y (insoluble) of the yellowcake produced at Irigaray. This method uses actual data collected at the site to assess exposures and to determine action levels for the licensee. As discussed in Section 5.7.4.1 of the LRA, COGEMA had extensive solubility tests run on their yellowcake at various stages of production and in different places in the plant in order to classify it. On the basis of these actual tests, COGEMA has been able to classify its material as Class D, highly soluble, and use the corresponding DAC and ALI to plan its internal radiation control program. In their case, calculating internal exposure using Class D DACs and ALI, provides a more accurate and more flexible bottom line than using the specified values in 10 CFR Part 20, Appendix B, Table 1.

Among other things, the staff has considered the test information and finds that the COGEMA internal radiation control program is in accordance with Regulatory Guide 8.30 (NRC, 1983b), and is therefore acceptable.

4.5.3 Respiratory Protection Program

COGEMA is required by license condition to maintain respiratory protection in areas where engineering controls may not be sufficient. COGEMA has implemented a respiratory program in accordance with guidance given in Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection" (NRC, 1976) and has developed a series of implementing SOPs. The program is administered by the COGEMA RSO. RWPs for special jobs or emergencies may also require respirator use.

The staff finds that the COGEMA respiratory protection program is in accordance with Regulatory Guide 8.15 (NRC, 1976), and is therefore acceptable.

4.6 Bioassay

COGEMA has implemented a urinalysis bioassay program in accordance with guidance provided in NRC Regulatory Guide 8.22 Rev. 1, "Bioassay at Uranium Mills" (NRC, 1988). The primary purpose of the bioassay program is to detect uranium intake by employees who are

regularly exposed to uranium. COGEMA's bioassay program involves collection of baseline urinalysis samples for all new employees, and monthly collection of urine samples from process area workers. Samples are analyzed by an outside laboratory, accompanied by blank and spiked samples as part of COGEMA's quality assurance program. COGEMA has committed to using action levels for urinalyses specified in table 1 of Regulatory Guide 8.22, Revision 1 (NRC, 1988c).

Because COGEMA did not address *in vivo* measurements in the LRA, NRC will continue to require by license condition that all *in vivo* measurements be performed in accordance with Revision 1 of Regulatory Guide 8.22 (NRC, 1988c).

Currently, under SUA 1341, COGEMA is required to document the corrective actions taken when action levels are exceeded for urinalyses or *in vivo* measurements, and to submit this documentation to NRC within 30 days of reaching or exceeding the action level. With this renewal, NRC will require this license condition. Instead, licensee documentation of corrective actions will be reviewed during site inspections.

Historical data from operations (1987 to 1994) shows that most bioassay samples were below the action level of 15 µg/L. For those that were above the action level, subsequent samples were found to be below the action level, indicating subsequent alleviation of the elevated exposure conditions.

The staff finds that the COGEMA bioassay program, as modified by the staff, is based upon Regulatory Guide 8.22, Revision 1 (NRC, 1988c), and is therefore acceptable.

4.7 Contamination Control

4.7.1 Personnel Contamination

By license condition, all employees at the Irigaray and Christensen Ranch sites are required to monitor themselves with an alpha survey instrument prior to leaving a restricted area, unless first showering. COGEMA requires all employees leaving the restricted areas to monitor themselves for alpha contamination and document the results, in accordance with NRC Regulatory Guide 8.30 (NRC, 1983b). Employees are trained in the methods for performing surveys of skin and clothing. In addition, personnel in the well fields who come in contact with potentially contaminated solutions are required to monitor themselves prior to leaving that work site.

As currently required by license condition, alpha levels above 1,000 disintegrations per minute per 100 square centimeters (dpm/100 cm²) require the employees to decontaminate themselves and resurvey. If an employee cannot be decontaminated to less than 1,000 dpm/100 cm², the employee is required to report the incident to the RSO for investigation. In addition, the RSO is to perform and document quarterly spot checks of employees leaving the process facility. This procedure does not include the recommendation of Regulatory Guide 8.30 (NRC, 1983b) that, if workers leave the site with contamination levels above this action level, the cause of the contamination should be investigated and corrective action taken, if appropriate. Therefore the staff will continue to require these conditions in the renewal license, but will modify the condition to require that COGEMA conduct its personnel alpha monitoring and survey program in accordance with Regulatory Guide 8.30 (NRC, 1983b). COGEMA agreed to this license condition, by telephone, on March xx, 1998.

In accordance with Regulatory Guide 8.30 (NRC, 1983b), COGEMA also conducts and documents quarterly spot checks of personnel to verify the effectiveness of the personnel contamination program.

The staff finds that the COGEMA personnel contamination control program, as modified, is in accordance with Regulatory Guide 8.30 (NRC, 1983b), and is therefore acceptable.

4.7.2 Surface Contamination

COGEMA will implement contamination control in operating and clean areas in accordance with NRC Regulatory Guide 8.30 (NRC, 1983b). Weekly surveys and routine monthly smear wipes are conducted in designated eating areas, change rooms, and office areas. Workers leaving restricted areas are required to perform and document alpha contamination monitoring. Quarterly unannounced spot checks of personal contamination are conducted to verify compliance with survey and decontamination procedures.

The staff finds that the COGEMA surface contamination control program is based upon Regulatory Guide 8.30 (NRC, 1983b) and is therefore acceptable.

4.7.3 Disposal of Contaminated Equipment

COGEMA will conduct surveys of all items leaving the restricted area, with the exception of small hand-carried items, which are surveyed during personnel surveys. These surveys are performed by the RSO, radiation safety staff, or properly trained employees. As specified in the LRA, release limits for all items from the restricted area are set in accordance with "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct Source Material" (NRC, 1987c).

The staff finds that the COGEMA program for release of contaminated equipment is in accordance with NRC guidelines, and is therefore acceptable.

4.8 Quality Assurance and Calibration

The COGEMA QA and instrument calibration program includes procedures and policies for the effluent and radiological monitoring programs. The QA program is based on guidance provided in Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operations)—Effluent Streams and the Environment, Revision 1 (NRC, 1979).

COGEMA has been required by license conditions to calibrate all radiation monitoring, sampling and detection equipment after each repair, and as recommended by the manufacturer or at least annually, whichever is more frequent. With this renewal, the second part of this requirement will be changed to allow recalibration on an annual basis, rather than semiannually. COGEMA is also required to have all radiation survey instruments operationally checked with a radiation source prior to each use, and to maintain records of radiation detection and environmental monitoring equipment calibration for at least 5 years. COGEMA also will continue to be required by license condition to establish and follow written SOPs for instrument calibration.

The staff finds that the COGEMA QA and calibration programs are in accordance with Regulatory Guides 4.15 (NRC, 1979) and 8.30 (NRC, 1983b), and are therefore acceptable.

5.0 RESTRICTED AREA MARKINGS AND ACCESS CONTROL

COGEMA controls access to restricted areas at Irigaray by way of fences, gates, and posted warning signs. Entrances to the Irigaray and Christensen Ranch project areas are posted to alert visitors that any building or area within the facility may contain radioactive materials and that permission is required prior to entry. The Irigaray plant site is within the fenced permit area which is gated and can be locked, and complies with the prominent posting and marking requirements in 10 CFR 20.1902(e). Access to restricted areas is limited to authorized personnel only.

Security for the Christensen Ranch satellite is provided by the personnel working there. The site is remote and security has not really been a problem. The entrance is posted to alert visitors to the presence of radioactive materials. Signs are properly and conspicuously posted at plant sites and at the perimeter. Entrance to the site has a lockable gate. Pump houses near roads have locking doors with access codes to keep unauthorized people out. Pond areas are fenced and posted.

All visitors entering the restricted areas are required to register at the main office and are not permitted inside the plant area without authorization from designated supervisory personnel. Visitors who have not received formal training are escorted while on site by properly trained personnel.

The licensee will continue to be exempted by license condition from the requirements of 10 CFR 20.1902(e) for areas within the facility, provided that all entrances to the facility are conspicuously posted in accordance with 10 CFR 20.1902(e) with the words, "ANY AREA WITHIN THIS FACILITY MAY CONTAIN RADIOACTIVE MATERIAL."

The staff finds that the COGEMA programs for restricted area marking and access control will limit exposures to ALARA in accordance with 10 CFR 20.1101 and comply with marking and posting requirements in 20 CFR 1902(a) and (d), and are therefore acceptable.

6.0 EMERGENCY PROCEDURES AND PREVENTIVE MEASURES

COGEMA has developed contingency plans for dealing with spills as a result of operations. Spill scenarios considered by COGEMA include pipeline failures, leaks from chemical storage tanks, waste pond leakage, well casing failure, transportation accidents, and failure of concrete foundations and subsequent tank spills. All in-plant spills are contained by floor sump systems. Effective monitoring and response procedures enable mine operators to quickly control and mitigate the effects of any spill that might occur outside of the processing plants. COGEMA has also developed an emergency action plan and cleanup procedures for dealing with transportation accidents involving shipments of yellowcake, and drivers are trained in emergency and accident response procedures.

Preventive measures include daily inspections of the facility by the RSO, required by license condition, to determine if radiation control practices are being implemented. These inspections will continue to be required by license condition.

The staff finds that the COGEMA emergency procedures and preventative measures are acceptable for maintaining employee and public exposures ALARA as required 10 CFR 20.1101, and are therefore acceptable.

7.0 EVAPORATION POND EVALUATION

COGEMA uses solar evaporation ponds as one disposal option for liquid wastes generated by its process operations. NRC has also approved the use of deep injection wells, and surface discharge of solutions that meet National Pollutant Discharge Elimination System standards. A complete discussion of these methods is contained in the accompanying EA.

8.0 DECOMMISSIONING AND RECLAMATION

COGEMA will continue to be required by license condition to decommission and reclaim the site to meet applicable radiation protection standards. Applicable standards include limits for reclamation of soil contamination consistent with those in Appendix A of 10 CFR Part 40, and decommissioning requirements of 10 CFR 40.42. Additionally, the well fields are required to meet the State of Wyoming standards for abandoning ISL sites. Additional site decommissioning, reclamation, and aquifer restoration information is contained in the accompanying EA.

COGEMA will continue to be required by license condition to submit a final site decommissioning plan for NRC review and approval at least 12 mo prior to a planned final shutdown of mining operations.

9.0 SURETY REQUIREMENTS

Under 10 CFR Part 40, appendix A, criterion 9, licensees are required to establish a financial surety arrangement adequate to cover the estimated costs, if accomplished by a third party, for completion of the NRC-approved site closure plan, including decommissioning and decontamination of above-ground facilities, offsite disposal of radioactive solid waste, soil and water analyses, and groundwater restoration as warranted. The surety is based on an estimate that must account for the total costs that would be incurred if an independent contractor were contracted to perform the work. The surety estimate must be approved by the NRC and based on an NRC-approved decommissioning and reclamation plan. The licensee's surety mechanism will be reviewed by the NRC annually to ensure that sufficient funds are available to complete reclamation. Additionally, the amount of the surety should be adjusted to account for any increases or decreases in the liability resulting from inflation, changes in engineering plans, or other conditions affecting costs.

The current NRC-approved surety is an irrevocable standby letter of credit, issued by the Credit Commercial de France of New York, in favor of the State of Wyoming. It is currently maintained at an amount no less than \$16,868,937 for the purpose of complying with 10 CFR Part 40, appendix A, criterion 9.

10.0 INSPECTION HISTORY

The NRC has conducted routine announced and routine unannounced inspections at the Ingaray and Christensen Ranch Facilities. Results of inspections during the 10 yr prior to submittal of the LRA are summarized in table 10-1. NRC has cited COGEMA for a total of 23 violations during these inspections, with none being greater than Severity Level IV. A discussion of inspection and enforcement actions, including severity of violations is provided in NUREG-1600 (NRC, 1995). Under the current system, minor violations are cited at Severity Level IV, and major violations are cited at Severity Level I. Typically, Severity Level IV violations are such violations as not performing required surveys or incomplete documentation. It can be seen from the inspection.

Table 10-1. Summary of site inspection results

Inspection Date	Total Violations (Severity Level)	Comments/Results
09/09/97	none	
04/28/97	none	
09/24/96	none	
05/07/96	none	
09/26/95	1 (IV)	Failure of lab workers to shower or monitor themselves for alpha.
06/06/95	none	
08/03/94	none	
06/07/94	none	
02/28/94	none	
06/04/93	none	
11/02/92	none	
06/13/91	none	
02/11/91	2 (IV)	New employee did not have baseline bioassay; contaminated equipment outside of restricted area.
07/09/90	none	
11/06/89	2 (IV), 1 (V)	Failure to inspect respirator use (IV); employees failed to monitor themselves for alpha (V); failure to observe alpha release limits (IV).
10/11/88	2 (IV), 1 (V)	Failure to annually update SOPs (IV); failure to use protective clothing during well maintenance (IV); failure to document daily evaporation pond inspections (V).
11/10/87	2 (IV)	Failure to issue radiation work permit for nonroutine maintenance; failure to perform daily evaporation pond inspections.
07/21/87	1 (IV)	Failure to determine air concentration of particulates during nonroutine work.

Table 10-1. Summary of site inspection results		
Inspection Date	Total Violations (Severity Level)	Comments/Results
07/29/86	11 (IV)	License information not maintained on site; entrances to restricted area not posted; 30 wells not capped; employee exposures not determined; drum filter cloth not removed; lab equipment released without written report to NRC; fluid in evaporation pond standpipe not sampled; evaporation pond inspections not complete; freeboard requirements not met on pond 3; confirmation samples not taken when groundwater limits exceeded; insufficient bonding.

record that, in recent years, cited violations have become very infrequent at COGEMA. This is likely due to the experience COGEMA has gained in managing ISL facilities.

On July 12, 1996, the Commission approved increasing the license term for qualified uranium recovery licensees from a 5-yr period to a 10-yr period. As discussed in SECY-96-112 (issued on May 21, 1996), the criteria to be used in determining whether a licensee is "qualified" for a 10-yr license are as follows:

- (1) the licensee must have performed well;
- (2) the licensee must have a successful inspection record, with no violations more serious than a Severity Level IV;
- (3) the licensee must have had no serious operational problems or reports during the previous 2 yr; and
- (4) the license in question must currently have a specific term of renewal (uranium mills currently undergoing reclamation would not meet this criteria).

Based on this review, the staff finds that COGEMA is a qualified licensee, and therefore, a 10-yr license term is appropriate.

11.0 CONCLUSION, INCLUDING SAFETY LICENSE CONDITIONS

Upon completion of the safety review for COGEMA's license renewal application, the NRC staff concludes that the continuation of commercial operations at the Irigaray and Christensen Ranch facilities, in accordance with the following license conditions, is protective of health and safety and fulfills the requirements of 10 CFR Parts 20 and 40. The NRC staff, therefore, recommends renewal of Source Material License SUA-1341, subject to the following conditions:

1.
 - A. The licensee may, without prior NRC approval, and subject to conditions specified in part B of this condition:
 - (i) Make changes in the facility or process, as presented in the application.
 - (ii) Make changes in the procedures presented in the application.
 - (iii) Conduct tests or experiments not presented in the application.
 - B. The licensee shall file an application for an amendment to the license, unless the following conditions are satisfied:
 - (i) The change, test, or experiment does not conflict with any requirement specifically stated in the license (excluding information referenced in the approved license application), or impair the licensee's ability to meet all applicable NRC regulations.
 - (ii) There is no degradation in the essential safety or environmental commitments in the license application, or provided by the approved reclamation plan.
 - (iii) The change, test, or experiment is consistent with the conclusions of actions analyzed and selected in this EA.
 - C. The licensee's determinations concerning Part B of this condition shall be made by a "SERP." The SERP shall consist of a minimum of three individuals employed by the licensee. One member of the SERP shall have expertise in management and shall be responsible for approval of managerial and financial changes; one member shall have expertise in operations and/or construction and shall have the responsibility for implementing any operational changes; and one member shall be the RSO or equivalent, with the responsibility for assuring changes conform to radiation safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, groundwater hydrology, surface-water hydrology, and specific earth sciences and other technical disciplines. Temporary members or permanent members, other than the three above-specified individuals, may be consultants. One member of the SERP shall be designated as Chairman.
 - D. The licensee shall maintain records of any changes made pursuant to this condition until license termination. These records shall include written safety and environmental evaluations, made by the SERP, that provide the basis for determining that changes are in compliance with the requirements referred to in Part B of this condition. The licensee shall furnish, in an annual report to the NRC, a description of such changes, tests, or experiments, including a summary of the safety and environmental evaluations of each. In addition, the licensee shall annually submit to the NRC changed pages to the Operations Plan and Reclamation Plan of the approved license application to reflect changes under this condition.

2. SOPs shall be established for all operational process activities involving radioactive materials that are handled, processed, or stored. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. Additionally, written procedures shall be established for non-operational activities to include in-plant and environmental monitoring, bioassay analyses, and instrument calibrations. An up-to-date copy of each written procedure shall be kept in the process area to which it applies.
3. All written procedures for both operational and nonoperational activities shall be reviewed and approved in writing by the RSO before implementation and whenever a change in a procedure is proposed to ensure that proper radiation protection principles are being applied. Additionally, the RSO shall perform an annual documented review of all operating procedures.
4. The licensee is hereby exempted from the requirements of Section 20.1902(e) of 10 CFR Part 20 for areas within the facility, provided that all entrances to the facility are conspicuously posted in accordance with Section 20.1902(e) with the words "Any area within this facility may contain radioactive material."
5. Release of equipment or packages from the restricted area shall be in accordance with "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Materials," dated May 1987, or suitable alternative procedures approved by NRC prior to any such release.
6. The licensee shall use a RWP for all work or nonroutine maintenance jobs where the potential for significant exposure to radioactive material exists and for which no standard written procedure exists. All RWPs shall be accompanied by a breathing zone air sample or applicable area air sample. The RWP shall be issued by the RSO or his designee, qualified by way of specialized radiation protection training, and shall at a minimum describe the following:
 - A. The scope of the work to be performed.
 - B. Any precautions necessary to reduce exposure to uranium and its daughters.
 - C. The supplemental radiological monitoring and sampling necessary prior to, during, and following completion of the work.
7. The results of sampling, analyses, surveys and monitoring, the results of calibration of equipment, reports on audits and inspections, all meetings and training courses required by the 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.
8. The licensee shall maintain restricted area boundaries at the Irigaray and Christensen Ranch Satellite facilities as described in section 5.8.1 of the January 5, 1996, license renewal application. Additionally, the Irigaray and Christensen Ranch wellfield buildings shall be restricted if required based on results of radiological surveys.

9. The RSO shall have the health physicist's authorities, responsibilities, and technical qualifications identified in Regulatory Guide 8.31 (NRC, 1983a).
10. The RSO or his designee shall document a daily walk-through of the Irigaray and Christensen Ranch satellite facilities to determine if radiation control practices are being implemented. This is in addition to the inspection and audit programs described in section 5.3 of the January 5, 1996, license renewal application.
11. The licensee shall maintain on-site for NRC inspection a copy of the annual ALARA report, as specified in section 5.3 of the January 5, 1996, license renewal application. The report shall discuss the Irigaray and Christensen Ranch satellite facilities and include a summary of the daily walk-through inspections.
12. The licensee shall sample particulates and radon daughters on a monthly frequency at the Irigaray and Christensen Ranch satellite locations shown in figures 5.2 and 5.3 of the January 5, 1996, license renewal application.
13. The licensee shall issue TLDs to each process employee. All TLDs shall be exchanged and read on a quarterly frequency.
14. The licensee shall implement the respiratory protection program as described in section 5.7.4.4 of the January 5, 1996, license renewal application. Additionally, the licensee shall perform and document random irritant smoke fit tests on at least 10 percent of the respirator issuances.
15. The licensee shall implement the bioassay program discussed in section 5.7.5 of the January 5, 1996, license renewal application. Additionally, the licensee shall comply with the following requirements:
 - A. Perform in-vivo counting of any worker whose internal exposure to radioactive material in any calendar quarter, based on time-weighted exposure, exceeds 25 percent of the exposure which would result from inhalation of concentrations listed in table 1 of Appendix B to 10 CFR Part 20 over a period of 1 calendar quarter. Counting shall be performed within 1 year of the calendar quarter.
 - B. Prior to assignment at the facility, all new employees shall submit a baseline urine sample. On a monthly frequency, all employees routinely assigned to work in the process areas shall submit urine samples.
16. Personnel alpha surveys prior to leaving restricted areas shall be performed in accordance with section 1.6 of NRC Regulatory Guide 8.30 (NRC, 1983b).
17. All radiation monitoring, sampling, and detection equipment shall be recalibrated after each repair and as recommended by the manufacturer or at least annually. In addition, all radiation survey instruments shall be operationally checked with a radiation source before each use.
18. The licensee shall submit a detailed decommissioning plan for the Irigaray, Christensen Satellite, and any remaining Willow Creek facilities to the NRC at least 12 mo prior to planned shutdown of mining operations.

19. The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR Part 40, appendix A, criterion 9, adequate to cover the estimated costs, if accomplished by a third party, for decommissioning and decontamination, off-site disposal of radioactive solid process or evaporation pond residues, and groundwater restoration as warranted. The surety shall also include the costs associated with all soil and water sampling analyses necessary to confirm the accomplishment of decontamination. Within 3 mo of the NRC approval of a revised decommissioning plan, the licensee shall submit for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs in the newly approved decommissioning plan exceed the amount covered in the existing financial surety. Annual updates to the surety amount, required by 10 CFR Part 40, appendix A, criterion 9, shall be provided to the NRC by August 18 in each successive year. Financial surety converge for the full amount of the NRC-approved decommissioning cost estimate shall not lapse for any time period prior to license termination.

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 cost of decommissioning and decontamination, off-site disposal, soil and water sample analyses, and groundwater 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. Reclamation/decommissioning plan, cost estimates, and annual updates should follow the outline in the attachment to SUA-1341 entitled "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates."

The licensee's currently approved surety, irrevocable standby letter of credit number 93/832 issued by the Credit Commercial de France of New York in favor of the State of Wyoming, shall be continuously maintained in an amount no less than \$16,868,937 for the purpose of complying with 10 CFR Part 40, appendix A, criterion 9, until a replacement is authorized by both the State and the NRC.

12.0 REFERENCES

COGEMA. 1996. "Supplemental Data for Renewal of Source Material License SUA-1341: Irigaray and Christensen Ranch Projects." Submitted under letter dated January 5, 1996.

Nuclear Regulatory Commission (NRC). 1976. "Acceptable Programs for Respiratory Protection." Regulatory Guide 8.15. October.

NRC. 1977. "Quality Assurance for Radiological Monitoring Programs (Normal Operations)-Effluent Streams and the Environment, Revision 1." Regulatory Guide 4.15. February.

NRC. 1983a. "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills Will Be As Low As Is Reasonably Achievable." Regulatory Guide 8.31. May.

NRC. 1983b. "Health Physics Surveys in Uranium Mills." Regulatory Guide 8.30. June.

NRC. 1987c. "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material." Division of Fuel Cycle, Medical, Academic, and Commercial Use Safety.

NRC. 1988. "Bioassay at Uranium Mills, Revision 1." Regulatory Guide 8.22. August, 1988.

NRC. 1992. "Air Sampling in the Workplace, Revision 1." Regulatory Guide 8.25. June, 1992.

NRC. 1995. "General Statement of Policy and Procedures for NRC Enforcement Actions (Enforcement Policy)," Office of Enforcement, NUREG-1600, July, 1995.