



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION IV
811 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TEXAS 76011

MAR -5 1991

Leif Robert G. Olson
HC-69, Box 473
Park Hill, OK 74451

Dear Mr. Olson:

Reference: Allegation No.: RIV-90-A-0084

This is in reference to our February 28, 1991, telephone conversation. During this conversation, you indicated that after further consideration, you no longer believe that Sequoyah Fuels is responsible for any perceived environmental problems in the Lake Tenkiller area, and requested that your previously expressed concerns be closed.

Let me assure you that our inspection activities relative to this facility will continue. As discussed, the enclosed NRC Inspection Reports 40-8027/90-06 and 40-8027/90-07 are forwarded for your information. Absent any information not previously reviewed or considered, Region IV considers this matter closed.

We believe that our actions in this matter have been responsive to your concerns. We take our safety responsibilities to the public very seriously and will continue to do so within the bounds of our lawful authority.

Sincerely,

ORIGINAL SIGNED BY
RUSSELL WISE

Russell Wise
Allegations Coordinator

Enclosures:
As stated

cc:
Allegation file

FEB 21 1991

In Reply Refer To:
License: SUB-1010
Docket: 40-8027/90-06

Sequoyan Fuels Corporation
ATTN: Beau Graves, Jr.
President
P.O. Box 610
Gore, Oklahoma 74435

Dear Mr. Graves:

This refers to the daily onsite inspector coverage of the Sequoyan facility during the period October 9 through December 21, 1990, as well as other inspection activities conducted on January 5, 1991. These extensive inspection efforts were conducted of the activities authorized by NRC Source License SUB-1010, the results of which were discussed with you and members of your staff on a number of occasions during the inspection period and at the conclusion of the daily onsite inspector coverage on December 21, 1990.

This inspection report identifies a number of weaknesses that are of concern to the NRC and indicate a lack of understanding of regulatory requirements and adherence to radiation protection and operating procedures. However, this report also discusses examples of improved communications with NRC, the activities of the Sequoyan Oversight Team (SOT), and other initiatives implemented by Sequoyan Fuels Corporation (SFC) which reflect a commitment by your managers to properly address and correct the weaknesses which were identified during the Augmented Team Inspection (AIT) (reference Inspection Report 40-8027/90-04, dated October 11, 1990), the AIT followup inspection (reference Inspection Report 40-8027/90-05, dated November 20, 1990), and this inspection period.

The inspection was an examination of the activities conducted under the license as they relate to compliance with the Commission's rules and regulations and the conditions of the license. The inspection consisted of selective examination of procedures and representative records, interviews of personnel, and observations by the inspectors.

The inspection activities discussed in this inspection report identified five apparent violations of NRC requirements. Most of these apparent violations were identified as a result of our continued inspection and on-going inquiries into the August 1990 SX excavation activities. As you are aware, our reviews of all of these matters is continuing, and a decision regarding enforcement considerations will be deferred until the completion of our inspections and on-going inquiries.

Additional information, previously unknown to NRC, was obtained from off-site interviews with former contractor workers. As a result of this information, as described in Section 4.a of this inspection report, three apparent violations

RIV:NMLS <i>HW</i> GMVasquez 2/21/91	<i>Per Wilson</i> JRFO <i>HW</i> JGarcia 2/21/91	<i>Per Wilson</i> JRFO <i>HW</i> Dward 2/21/91	NMLS <i>HW</i> WLMohrby 2/21/91	NMSIS <i>HW</i> LLasher 2/21/91	<i>Per Wilson</i> NMSS <i>HW</i> CHRobinson 2/21/91
C:NMLS / WLFisher 2/21/91	DD:DRSS/ AYandell 2/21/91	DD:DRSS/ ABBoech 2/21/91	CRA <i>HW</i> JMMontgomery 2/21/91	RA <i>HW</i> RDMartin 2/21/91	NA

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of NRC requirements were identified: (1) failure to perform an adequate evaluation, as required by 10 CFR 20.201(b), of potential uptakes for contract workers that worked in the excavation, to demonstrate compliance with 10 CFR 20.103(a); (2) failure to provide adequate instructions to contract workers, as required by 10 CFR 19.12 (previously identified as an unresolved item during the AIT follow-up inspection), and (3) the failure to inform contract workers of exposures to radioactive materials in accordance with 10 CFR 20.409. (One additional example of a failure to survey or evaluate, as required by 10 CFR 20.201(b), the effects of routine operations on changing radiological conditions is also discussed in Section 4.e. This survey or evaluation was needed to determine whether posting in accordance with 10 CFR 20.203(b) was required.)

An NRC inspector also identified contaminated materials inside the cab of a truck at the residence of a former contract worker as described in Section 4.b of this report. Several of these items had beta/gamma contamination above the SFC license release limits. The fact that required beta/gamma release surveys were not performed as required was identified as an apparent failure to satisfy the SFC license release limits. Before the discovery of the contaminated materials, the survey program for releasing materials off-site consisted of alpha surveys only. This was erroneously based on the assumption that the beta/gamma limits would not be exceeded if the alpha limits were not exceeded. After an NRC inspector discussed the license requirement to survey for beta/gamma contamination, your staff immediately responded by implementing a survey program that satisfied the license requirements.

The NRC concludes that many of these apparent violations should have been identified by your own staff. An adequate internal investigation into the working conditions in the SX excavation was not performed even some 3 months after the AIT, and is of particular concern. Off-site surveys of contractor equipment did not even begin until November 19, 1990. As a result, your managers had inadequate bases for the responses given to the NRC and the conclusions made regarding worker training for workers in the SX excavation pit, the evaluations regarding worker uptakes in the excavation pit, and in particular, that there was no material or equipment released off site above the SFC license release limit. These examples further highlight NRC concerns about management involvement at SFC, and are fully described in Section 4 of this report.

NRC inspectors observed control room operations and day-to-day operations activities. During these observations, as discussed in Section 5 of this inspection report, the NRC inspectors observed three examples of an apparent failure to follow procedures in accordance with SFC license requirements: (1) When a shift supervisor and an NRC inspector were looking for process leaks around a valve in the SX building, the shift supervisor wiped the valve with his ungloved hand to see if any liquids were present, potentially contaminating his hand; (2) During a plant tour, an NRC inspector observed an operator

working on the yellowcake screw conveyor feeding the digestion tanks with no respiratory protection; and, (3) After an NRC inspector noticed that the frisker in the women's change room was turned off and unplugged, the SFC staff discovered that three women had indeed failed to frisk with a properly functioning meter prior to exiting the plant. Although, in general, observed licensee actions were conducted in accordance with procedures, NRC is concerned that these apparent violations were observed during routine inspection activities, and those observations were further confirmed by statements by operations personnel. However, NRC also notes that SFC staff has devoted significant efforts in this area, and improvements have been observed.

During previous inspections, the operations staff appeared to be insensitive to communicating plant events to other departments. When the information was communicated some managers did not verify the accuracy of the information presented to them prior to providing the information to the NRC. Section 6.a of this inspection report documents continued examples of communication problems. Several examples of good internal communications and improvements made to worker adherence to safety practices are documented in Section 6.b.

NRC noted that between January and August 1990, NRC was formally notified by SFC twice about plant occurrences, and that between October and December five such formal notifications were made. The many issues communicated to NRC indicate that the operations staff currently is reporting occurrences or events to appropriate SFC managers, so that they are now being made aware of plant events. Section 7 describes these various reports and notifications made to NRC.

Section 8 describes the SOT and NRC observations about its initial activities. This team appears to function more aggressively than the Interim Compliance Oversight Team and its satisfactory performance provided the basis for discontinuance of NRC's daily onsite inspector coverage. NRC noted that SOT activities have identified some technical issues and these have been communicated to both SFC and NRC on a weekly basis in accordance with the commitments made to the NRC. Our inspection activities will continue to place emphasis on the SOT activities.

In general, NRC has noted improvements in SFC performance. After our meeting with the Region IV Regional Administrator on November 27, 1990, you held discussions with SFC managers regarding strict enforcement of safety rules, observation of standard protection policies, and the direction that the Health, Safety, and Environmental department would provide greater oversight of routine activities. The SFC managers subsequently held similar meetings with their staffs to communicate these expectations. We note that these meetings appeared to have had a positive effect on performance and emphasized the importance of satisfying regulatory requirements. The NRC would also note that although examples of safety procedure violations continue to occur, the violations are usually being identified by your staff, and SFC managers are attempting to

implement effective corrective actions. Although the new QA engineer has identified a number of issues in the plant, he is demonstrating the SFC's ability to identify plant issues and trend plant events. SFC's compliance with NRC's requirements and with safety procedures will continue to be carefully reviewed to monitor the overall effectiveness of these efforts.

As you are aware, our reviews of all of these matters is continuing, and a decision regarding enforcement considerations will be deferred until the completion of our inspections and on-going inquiries.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC Public Document Room.

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

Original Signed By:

A. B. BEACH

A. Bill Beach, Director
Division of Radiation Safety
and Safeguards

Enclosure:
Inspection Report
AD-2027/90-06

cc:
Oklahoma Radiation Control Program Director

Native Americans for Clean Environment
P.O. Box 1671
Tahlequah, Oklahoma 74465

cc:
DMB - Original
ABBeach
*WLFisher
*WLHooley
*LLKasner
*MIS System
*REHall, CRFO
LDChapman

RDMartin
LAYandell
*CLCain
*PJGarcia
CHRobinson, NMSS
*RIV Files (2)
*Combs, OCA

JMMontgomery
*MRodriguez, OC/LFDCB (4503)
*GMVasquez
*DWard
*WMLS
*RSTS Operator
JGilliland

*W/756

APPENDIX

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 40-8027/90-06

License: SUB-1010

Docket: 40-8027

Licensee: Sequoyan Fuels Corporation (SFC)
P.O. Box 610
Gore, Oklahoma 74435

Facility Name: Sequoyan Facility

Inspection At: Gore, Oklahoma

Inspection Conducted: October 9, 1990, through January 5, 1991

Team Members:

Michael Vasquez
S. Michael Vasquez, Health Physicist, Nuclear
Materials Licensing Section, Region IV
(Report Coordinator and contributed to all Sections)

FEB 21 1991

Date

Pete J. Garcia, Jr.
Pete J. Garcia, Jr., Project Manager
Uranium Recovery Field Office, Region IV
(Sections 4.b, 4.d, 5, and 6)

FEB 21 1991

Date

Dana C. Ward
Dana Ward, Project Manager
Uranium Recovery Field Office, Region IV
(Sections 4.b and 4.e)

FEB 21 1991

Date

Wesley L. Holley
Wesley L. Holley, Radiation Spectralist, Nuclear
Materials Licensing Section, Region IV
(Sections 4.e, 5, and 6)

FEB 21 1991

Date

4103050244

Linda Kasner

Linda Kasner, Senior Radiation Specialist
Nuclear Materials and Safeguards Inspection
Section
Region IV (Sections 4.a, 4.c, 5, 6.a, 6.b, 7,
and 9)

FEB 21 1991

Date

Charles H. Robinson

Charles H. Robinson, Project Manager, Fuel
Cycle Safety Branch, Office of Nuclear
Materials Safety and Safeguards
(Sections 4.e, 5, and 8)

FEB 21 1991

Date

W. L. Fisher

Approved:

W. L. Fisher, Chief, Nuclear Materials
Licensing Section, Region IV

FEB 21 1991

Date

Inspection Summary

Inspection Conducted October 9, 1990 through January 5, 1991
(Report 40-8027/90-06)

Areas Inspected: Special, announced 7 day-a-week inspector coverage between October 9 and December 21, 1990, an unannounced onsite inspection on January 5, 1991, and in-office reviews of licensed activities. The inspection included a review of management organization and controls, radiation and industrial safety, operational safety, internal and external communication issues, reports and notifications, the Sequoyan Oversight Team, and significant meetings between the licensee and NRC.

Results: Within the areas inspected five apparent violations were identified:

1. Two examples of the failure to provide adequate instructions to contract workers, as required by 10 CFR 19.12 (paragraph 4.a). (This had been previously identified as an unresolved item in NRC Inspection Report 40-8027/90-05.)
2. Two examples of failures to survey, as required by 10 CFR 20.201(b):
 - a. Inadequate evaluation of potential mistakes for contract workers that worked in the excavation to demonstrate compliance with 10 CFR 20.103(a) (paragraph 4.a).

- ° Inadequate evaluation of the effects of routine operations on changing radiological conditions that would have required posting in accordance with 10 CFR 20.203(b) (paragraph 4.a).
3. Failure to notify contract workers of the exposure to radioactive materials, as required by 10 CFR 20.409 (paragraph 4.a).
4. Failure to perform beta/gamma surveys on items and articles released for unrestricted use, as required by License Condition 9, Chapter 1, Section 1.8 of SFC's license renewal application, as supplemented. NRC noted that as a result, items were found to be contaminated above license release limits at the residence of a member of the general public (paragraph 4.b).
5. Three examples of failure to follow procedures as required by License Condition 9, Chapter 2, Section 2.7.1 of the license renewal application dated August 23, 1985, as supplemented:
 - ° Failure of a worker to wear gloves when manually handling contaminated equipment (Procedure G-160) (paragraph 5),
 - ° Failure of two workers to adequately frisk when exiting the women's change room (Procedure G-114) (paragraph 5),
 - ° Failure of a worker to wear a respirator when opening a uranium-bearing system (Procedure G-113) (paragraph 5),

One open item was identified:

- ° The failure to conservatively utilize personnel until urinalysis results have been obtained, may have resulted in cumulative worker uptakes and in violations of SFC's bioassay program (paragraph 4.c).

These findings, in addition to findings discussed in NRC Inspection Reports 40-8027/90-04 and 90-05, dated October 11 and November 20, 1990, respectively, indicated that workers and managers did not appear to be sensitive to communicating plant occurrences between departments and that workers appeared to reflect poor attitudes in regards to safety. However, NRC acknowledges the efforts and improvements SFC personnel have made in addressing these issues. Although, continued communication problems indicate that the licensee has not completely implemented corrective actions to previously identified deficiencies, the licensee has significantly improved in these areas. The licensee is identifying problems that might not have previously been identified, and is communicating them to NRC with increasing candor.

DETAILS

1. Persons Contacted

- *Reau Graves, President
- *Jim Mestepey, Senior Vice President
- Ron Adkisson, Vice President, Business Development
- *Lee Lacey, Manager, Regulatory Compliance and Quality Assurance
(Vice President, Regulatory Affairs)
- *Mike Nichols, Manager, Health, Safety, and Environment
- Mike Chilton, Manager, Operations (Former)
- *Carol Couch, Manager, Environment
- Ken Simeroth, Health Physics Supervisor/Assistant Radiation
Safety Officer (RSO)
- Rick Callahan, Health Physics Supervisor
- Don Knorr, Manager, Facility Laboratory
- Sam Fryer, Manager, Engineering
- Gary Jackson, Staff Technical Specialist
- Reggie Cook, Vice President, Administration
- Bob Kienn, Engineering Department
- Sue Smith, Supervisor, Waste Treatment and Solid Waste
- Richard Parker, Manager, Maintenance (currently Manager, Operations)
- Keith Asmussen, General Atomics
- Kenny Schlag, Hydrologist
- *Joe Bonanon, Quality Assurance (QA) Engineer
- *Don Latham, Sequoyan Oversight Team (Former Member of the Oversight Team,
Currently on Contract to Oversee Maintenance Activities at SFC)

*Denotes attendance at exit interview on December 20, 1990.

The inspectors also interviewed other Sequoyan Fuel Corporation site personnel and consultants during the course of the inspection.

2. Summary

On August 22, 1990, towards the end of an extended outage, SFC informed NRC about uranium contaminated liquids in the ground that had seeped into an excavation adjacent to the solvent extraction (SX) building. Initially, NRC dispatched an inspector to review the information, and the following week (August 27 through 29), NRC sent an Augmented Inspection Team (AIT) to the facility to review the facts associated with the uranium contamination. The detailed description of the uranium contamination identified adjacent to the SX building is described in NRC Inspection Report Number 40-8027/90-04, dated October 11, 1990.

Two weeks later (September 10 through 13), the AIT performed a followup inspection to review regulatory requirements that may have been violated during the SX excavation activities and to review the licensee's commitments made to the NRC in response to the identification of uranium contamination. The detailed description of the AIT followup inspection

and the 7 day-a-week inspection efforts through October 8 were documented in NRC Inspection Report 40-8027/90-05, dated November 20, 1990.

On September 20, 1990, the NRC issued an Order Modifying License (Order) to the licensee because of the apparent lack of sensitivity and urgency in characterizing the extent of environmental contamination around and under the main process building (MPB). The Order required prompt actions to characterize the extent of environmental contamination.

This current inspection report covers the time period from October 9 through December 21, 1990, the last day of the 7 day-a-week NRC inspector coverage, and an unannounced inspection conducted on January 5, 1991. During this time period, the licensee implemented an aggressive environmental discovery program in compliance with the Order, as well as other programmatic changes to the SFC management organization designed to address NRC concerns.

However, during this time, NRC inquiries discovered additional information about worker safety issues during the SX excavation activities which was not available and/or not provided to the NRC at the time of the AIT inspection. This included information that apparently had not been provided to and/or shared by SFC managers responsible for the SX excavation activities.

On November 5, NRC issued a Demand for Information (Demand) requiring a response by SFC to the detailed NRC concerns described in the Demand. The Demand requested that an independent oversight program be established to review day-to-day operations while the management weaknesses described in the Demand were being remedied. In addition, the Demand requested that an independent appraisal of the SFC management organization be developed and implemented to provide NRC with additional assurance that SFC management and staff personnel will comply with regulatory requirements.

On November 30, SFC contracted with an independent consulting company to set up a team of individuals to oversee day-to-day operation of the facility. On January 14, 1991, SFC contracted with another independent consulting company to begin the management appraisal.

During this inspection period, NRC recognized the many actions taken in response to NRC concerns and the licensee's ongoing efforts to ensure that the SFC staff was sensitive to NRC regulations and expectations. The licensee has been identifying problems that might not have been previously known and appeared to communicate these internal problems to NRC with openness and candor. However, at the conclusion of this inspection period, some management and internal communication weaknesses continued to exist, despite the attention and the increasing licensee awareness of this problem.

licensee's bioassay program, management oversight of the SFC radiation safety program, and various radiation safety activities.

a. Issues Related to the SX Excavation Activities

As stated in Section 2 of this inspection report, early in this inspection period, NRC's continued inquiries into the SX excavation activities provided additional information that was not provided by the licensee to the AIT during the AIT inspection.

Most of this information was obtained from contract employees who actually worked in the excavation pit. Several contract workers informed NRC that the contaminated liquids in the excavation caused a burning sensation when in contact with the skin (presumably from the chemicals present). This burning sensation was normally short-lived, lasting only 10-20 minutes. Some workers informed NRC that these contaminated liquids caused burning and blistering "like a good sunburn." This burning was somewhat relieved by cold showers that were routinely taken at the end of the day. Initially, when the workers took hot or warm showers, the burning was aggravated. However, after complaining to SFC employees about the temperature, the workers were told to shower with cold water to relieve the burning. Some workers indicated that they normally did not leave the pit to shower or wash except when the burning sensation was extreme. Otherwise, the burning was tolerated. NRC was also informed by an SFC employee that one contractor was "burned raw," and that the SFC employee told the contractor to go to the SFC nurse. A review of the SFC nurse's log indicated that the worker never reported to the nurse.

Contract workers further indicated that they complained to SFC employees about the burning liquids. NRC was informed that one SFC supervisor even chastised the workers, calling their complaints "childish." Later, the SFC engineer in charge of the excavation informed an NRC inspector that he was aware of these complaints and that he had liquids sting him as well. These liquids were a mixture of uranium and process chemicals which caused burning when in contact with the skin. The licensee failed to recognize that the burning sensation caused by the process chemicals was also an indication of the presence of uranium on the skin of the workers. Furthermore, it appeared that SFC had not conducted an adequate internal investigation into the excavation activities.

Contractors also informed NRC that they were unaware that uranium had been present in the pit and that they did not always wash their hands prior to eating during their lunch breaks. One contract worker confessed that many of the workers chewed snuff while working in the pit and that they kept the snuff container in their coverall pockets, which sometimes became wet from liquids from the pit. (The workers had been told by SFC not to chew snuff, but apparently continued the practice.) The workers also stated that the activities in the pit

required them, at times, to kneel, sit, and/or lay down in the contaminated liquids.

The workers reported that they routinely worked 9-10 hours per day in the pit, and that work days were usually 12 hours long. Contractors informed NRC that originally, rubber boots were not issued to the individuals. After being stung by the liquids, the contractors indicated that they "helped themselves" to rubber boots because the liquids often ran into their shoes, stinging their feet.

NRC provided the information to SFC personnel when the interviews were completed. When this information was provided to the Manager, HS&E, he stated that he was unaware of any of these conditions. When this information was provided to the Manager, RC&QA, he too claimed to be unaware of these conditions. Thus, it appears that 10 weeks after the AIT, SFC still had not thoroughly or independently investigated worker concerns despite the visibility and significance of the SX excavation activities. The two responsible managers assumed, without an adequate investigation, that no adverse conditions existed. Based on information provided by the contractors, the NRC concluded that contract workers involved in the excavation were not informed about the precautions or procedures to minimize exposure to these liquids. This was identified as an apparent violation of 10 CFR 19.12 (40-8027/9006-01).

Other information provided to the AIT involved training and information provided by SFC to the contract workers. During the AIT, licensee representatives indicated that all workers in the excavation pit received 8 hours of safety training. However, some contractors informed NRC that their training consisted only of viewing a 20-minute visitor orientation video. In addition, some individuals reported that they did not know that uranium was present in the liquids that had seeped into the excavation.

While the interviews on this subject were progressing, on November 2, the licensee notified NRC that five or six contract workers who had worked in the SX excavation may not have received adequate training. This was identified as an unresolved item in NRC Inspection Report 40-8027/90-05. Subsequent to the notification, the licensee informed NRC that the workers who had not received the 8-hour training did view the 20-minute visitor orientation video and were escorted by workers that had received the 8 hours of training. Licensee representatives, including the Manager, HS&E and the Manager, RC&QA stated that the information contained in the 20-minute video was commensurate with the hazards that existed in the pit, and therefore met the requirements of 10 CFR 19.12. However, as discussed above, the Manager, HS&E and the Manager, RC&QA also stated that they were unaware of any adverse conditions in the excavation pit.

The inspectors reviewed the visitor orientation video. The video appeared to be designed for visitors that were to tour the facility or possibly work in areas that did not involve any exposures to hazardous materials. It did not appear to provide adequate instructions about potential hazards and potential health effects from exposure to licensed materials that existed in the excavation pit. The inspectors noted that individuals were required to sign a visitor orientation checklist stating that they understood basic safety rules at the plant. The checklist also included a statement that various chemicals are used at the plant and to notify the escort should the individuals come into physical contact with any substance within the plant.

The inspectors concluded that the visitor orientation video did not appear adequate to inform a member of the general public of the health problems associated with working in the excavation pit or of the high concentrations of uranium in the liquids. Although the licensee believes the training provided was commensurate with the hazards in the excavation pit, neither the Manager, HS&E; the Manager, RC&QA; nor the Vice President, Business Development (who conducted an SFC internal investigation into this matter) were aware of the actual hazards that did, in fact, exist. NRC could find no valid basis for the licensee's conclusion. The fact that the workers were not informed that the uranium was present in the liquids in the excavation and the health problems associated with the high uranium concentrations in the liquids was identified as an apparent violation of 10 CFR 19.12 (40-8027/9006-01).

One worker, whose training consisted of viewing the 20-minute video, informed NRC that he was inadvertently sprayed in the face while pumping the contaminated liquids out of the excavation pit, on August 4. A coupling on a hose came apart while he was adjusting it and sprayed him in the face. He stated that his eyes and face started burning so he informed his (contractor) supervisor as he ran unescorted to the showers. Even though it has been stated that the H&S technicians were providing continuous coverage over the excavation activities, neither the Manager, HS&E nor the Manager, RC&QA knew about this incident until mid-November when they were informed by an inspector.

On November 19, as a result of becoming aware of this incident, NRC inspectors conducted further discussions with the SFC Engineer in charge of the excavation in the presence of the Manager, HS&E. When asked, the engineer stated that he was aware of the contract worker complaints and further stated that the liquids had also burned his own skin at times. Given this information, and the fact that contract workers had not submitted urine samples, the inspector asked the Manager, HS&E whether an evaluation had been performed on all contractors. The Manager, HS&E stated that SFC personnel were working extensively in the pit, digging in the ground and in the water, and pumping the water to barrels. Therefore, the Manager,

HS&E believed that SFC rather than contract personnel were more likely to receive an uptake. Since no SFC personnel to date had experienced elevated intakes from handling the liquids, the Manager, HS&E believed that a urinalysis for all contractors was unnecessary.

NRC inspectors then interviewed several SFC workers associated with the excavation activities and in the handling of the liquids. None of the workers indicated that they had experienced the types of working conditions that the contractors experienced. The SFC workers indicated that they did not have liquids on their skin. NRC inspectors were unable to locate an SFC employee who may have been exposed for the same time frames (8-10 hours per day, in contaminated clothing, for a period of weeks) to the same uranium concentrations and chemicals that the contract workers had been exposed to, in the same type of environmental conditions. Thus, the fact that SFC personnel had no elevated intakes from handling the liquids appeared to be irrelevant to the hazards in the excavation pit that the contract workers experienced.

NRC noted that the licensee had not yet performed an evaluation of the potential uptakes for the contract workers that had left the site without submitting a urine sample, or for those individuals working in the pit prior to August 23, when the first urine samples were obtained. (It must be noted that the biological half-life of soluble uranium is such that an uptake on August 4 might not be evident on August 23.) Although the Manager, HS&E believed SFC employees were more likely to receive uptakes than the contractors, based on interviews of SFC employees and the difference in working conditions that SFC employees experienced, it appeared that this assumption was not valid. In addition, even though the SFC Engineer in charge of the excavation activities was aware of the contractor complaints, this information was not conveyed to the Manager, HS&E, nor the Manager, RC&QA. The fact that the licensee had not performed an adequate evaluation to demonstrate compliance with 10 CFR 20.103(a) was identified as an apparent violation of 10 CFR 20.201(b) (40-8027/9006-02).

Interviews with the Manager, HS&E and the Manager, RC&QA in November 1990 also indicated that the licensee had not informed the contractors of their exposures and bioassay data, if applicable, even though SFC had reported their exposures to NRC pursuant to 10 CFR 20.405. The fact that the licensee made a report to NRC pursuant to 10 CFR 20.405, and did not notify the contractor workers at the same time, was identified as an apparent violation of 10 CFR 20.409. (40-8027/9006-03)

The inspectors also noted that SFC submitted a total of three reports to NRC pursuant to 10 CFR 20.405 relative to the SX excavation activities. On October 9, 1990, SFC submitted their first report; however, in the process of reviewing the training of contractor personnel, the Manager, HS&E discovered that one contractor was

3. Management Organization and Controls

The licensee implemented a number of changes to the operations department in response to identified weaknesses. Previously, the Senior Vice President (SVP) filled the position of Manager, Operations. However, on September 27, 1990, the UF6 Area Manager was promoted to Manager, Operations and the Manager, Process Engineering was moved to fill the UF6 Area Manager position. The Manager, Operations also acted in the capacity of Manager, Process Engineering. The DUF4 Area Manager was moved to the position of Quality Assurance Engineer, making the Manager, Operations also responsible for DUF4 operations.

However, the Manager, Operations resigned, effective January 18, 1991. As a result, on January 14, the Manager, Maintenance was named as Manager, Operations. While SFC tries to fill the Manager, Maintenance position, a consultant who participated on the Sequoyah Oversight Team (SOT) with maintenance expertise has been retained to aid the Manager, Operations in fulfilling the responsibilities of the Manager, Maintenance.

The Health, Safety, and Environment Department (HS&E) hired a person with a hydrology/geology background and experience into the environmental group. This position was created to aid SFC in the environmental discovery program and in their long-term solutions to the recently identified problems. The department also hired three additional health and safety (H&S) technicians to enhance and strengthen the H&S presence onsite, and is in the process of training them. Furthermore, a senior technician was promoted to Health Physics Supervisor to assist the Manager, HS&E.

The Manager, Regulatory Compliance and Quality Assurance (RC&QA) was promoted to the position of Vice President, Regulatory Affairs in the beginning of September 1990. Licensee representatives have indicated that a license amendment request is being prepared to have the Manager, HS&E and the Manager, Environmental report to the Vice President, Regulatory Affairs. (Currently, the Manager, Environmental reports to the Manager, HS&E and the Manager, HS&E reports to the President, SFC.)

To assist the Vice President, Regulatory Affairs, SFC created additional positions including a QA Engineer and a Licensing Assistant. The QA Engineer position was filled by the former DUF4 area manager, as noted above. The QA Engineer is responsible for identifying and tracking procedure problems, reviewing events, and day-to-day QA audits. Early SOT and NRC inspection reviews indicate that this individual functions well and has a good knowledge of plant operations. SFC was still attempting to hire a Licensing Assistant as of January 18.

4. Radiation and Industrial Safety

In the area of radiation and industrial safety, the inspectors reviewed additional information related to the SX excavation activities, two instances where contaminated materials were released offsite, the

inadvertantly omitted. Therefore, on November 9, SFC amended their October 9 report. Later, after NRC inquiries, the Manager, HS&E discovered that a second contractor had been omitted from the two previous reports. Therefore, on November 30, SFC provided NRC a second amendment to the report. NRC considered these events an example of an apparent failure to provide complete and accurate information to NRC as required by 10 CFR 40.9. The inspectors noted that SFC apparently failed to provide NRC with complete and accurate information on another unrelated matter on September 28, 1990, as documented in NRC Inspection Report 40-8027/90-05. However, unlike the September 28 apparent failure, SFC did correct their reports immediately after the information was available.

During interviews with the worker who was sprayed in the face, NRC noted that he complained of further physical symptoms, some that continued for 2 months after working in the excavation. Also, the workers' symptoms were consistent with the information contained in the Material Safety Data Sheets for the assumed chemicals in the excavation. NRC provided this information to SFC, and, in December, the licensee eventually convinced the worker who had been sprayed in the face to visit the licensee's physician due to these physical symptoms. The licensee was also attempting to locate and interview other contractors that worked in the excavation. If, during these interviews, the contractors complain of any continuing symptoms, SFC plans to make the physician available to examine the individuals in the future.

3. Release of Contaminated Materials to the General Public

The NRC reviewed two occurrences where contaminated materials and/or equipment, some above SFC's license release limits, have been released to the general public. The details of these occurrences are as follows:

1. In late October 1990, an NRC inspector discovered contaminated equipment and materials in the possession of a contractor who had worked in the SX excavation pit. Contamination was measured with a calibrated, open window GM survey meter. The inspector measured values of 3200 counts per minute (cpm) on a localized spot on a truck bed, 1400 cpm on a broom which the contractor stated was used to sweep some of the liquids that seeped into the pit and 600-800 cpm distributed along a conveyor belt that was used in the SX excavation activities. The inspector then made some reasonably conservative assumptions regarding the instrument's response (that it was due solely to beta/gamma activity), detector efficiency, and beta-to-alpha ratios to correlate the readings to SFC's license release limits. At the time, the licensee's program for surveying the equipment and materials for release at the restricted area boundary was based solely on alpha activity. Converting from the assumed beta/gamma activity to an estimated alpha activity, the

Inspector concluded that the contamination levels were considered below the SFC license release limits.

2. On November 15, 1990, an NRC inspector discovered some contaminated materials inside the cab of a flatbed truck at an individual's residence. This individual had worked as a contractor in the SX excavation pit in August. The inspector used an NRC instrument to survey some of the vehicles that had been onsite at SFC during the August excavation. No contamination levels above background were measured in any vehicles except a flatbed truck.

The individual informed the inspector that the truck had been driven inside the restricted area at the start of the excavation work on approximately July 31 and stayed onsite until early September. The NRC inspector made cursory measurements of contamination levels, with a calibrated open window GM survey meter, and measured contamination levels well in excess of background levels on the top of a pair of workman's rubber boots (while background was less than 100 cpm, the front portion of a boot measured values of 7500 cpm average and 10,000 cpm maximum). The inspector then made a cursory survey inside the cab and noted that dirt below the brake pedal (1600 cpm), a cotton glove (average of 4000 cpm, with 8000 cpm maximum), and two soiled SFC shoe covers on the floor (average of 2000 cpm) had similar readings.

On the next day, SFC personnel accompanied the NRC inspector to the offsite residence to conduct another survey. A thorough survey for fixed and removable contamination of the exterior and undercarriage of the truck indicated no contamination above SFC's license release limits. The licensee also conducted a survey of the truck cab and its contents, and identified some of the same contaminated items as the inspector. Due to the lack of sensitivity of the licensee's instrument, the SFC survey failed to identify all contaminated items in the truck cab. The licensee took custody of these items and returned them to the site for further analysis.

On Tuesday, November 20, a second NRC inspector arrived onsite to make more definitive measurements of the items found offsite. The Manager, HS&E and the inspector measured the "hottest" item, the rubber boot. The alpha survey results were 1200 dpm average and 2800 dpm maximum. The beta/gamma survey results were conservatively estimated to be 27,000 dpm average and 42,000 dpm maximum. After further reviews, the Manager, HS&E stated that he had increased the high voltage on the open window GM probe, used to measure the beta/gamma contamination levels to achieve a 100 percent efficiency as indicated by a uranium standard. The accuracy of these values was suspect because voltage adjustments affect the instrument's calibration.

At NRC's request, officials from the Department of Energy's (DOE) Idaho Operations Office traveled to SFC to make an independent measurement of the "hottest" item found at the individual's residence, the rubber boot. The officials made measurements on December 4-5, with an extrapolation chamber and directly measured the absorbed dose rate from the rubber boot. At the conclusion of the measurements, the preliminary value was 14 ± 4 mrad/hour at the hottest part of the boot. After further discussions and a QA check of these numbers, DOE refined these values in their January 11, 1991, letter as 11 ± 3 mrad/hour.

In addition, a spectrographic analysis was conducted by an SFC consultant. The analysis indicated that the contamination was natural uranium.

Due to the concerns about the beta/gamma contamination levels discovered at the individual's residence, NRC reviewed SFC's license for beta/gamma release limits. License Condition 9 of Source Material License SUB-1010 references Chapters 1-8 of SFC's license renewal application, as supplemented. Chapters 1 and 3 of the renewal application each contain beta/gamma contamination limits. In Chapter 3, Section 3.3.4.7, the licensee committed to NRC that items and equipment released from the facility for unrestricted use would meet the release criteria and conditions specified in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material." Footnote (a) in Table 1 of the above guidelines states that where alpha and beta-gamma nuclides exist, the limits established should apply independently. The limits listed for beta/gamma emitters are 5000 dpm/100 square centimeters average (fixed), 15,000 dpm/100 square centimeters maximum (fixed), and 1000 dpm/100 square centimeters removable.

In Chapter 1, Section 1.8, the licensee again committed to NRC to the aforementioned guidelines, and further indicated that the surveys of accessible surfaces by SFC personnel would verify that the beta/gamma radiation is not in excess of one millirad/hour (mrad/hour) with an average not in excess of 0.2 mrad/hour as measured by an open-window beta-gamma survey meter with a window thickness of not more than 7 milligrams per square centimeter. These limits were obtained from Footnote f of Table 1, of the aforementioned guidelines.

The fact that the licensee had not routinely surveyed items and articles for beta/gamma contamination prior to unrestricted release was identified as an apparent violation of License Condition 9, which references Chapter 1 of the license renewal application, as supplemented (40-8027/9006-04).

Shortly after becoming aware of this condition, SFC implemented an acceptable program for surveying items and articles for unrestricted release. The inspector noted that training for H&S technicians was conducted and observed that the new program was being implemented properly. The licensee has also contracted the services of a consultant to study SFC release limits and survey techniques.

In addition, SFC also informed the inspectors that they planned to use a GM survey meter in the change room for personnel leaving the restricted area, and in all unrestricted areas. The licensee planned to use an action limit based on a reading that contained the sum of alpha, beta, and gamma contributions (since SFC verified that the window on the GM meter was sufficiently thin to measure all three types of radiation). The inspectors noted that the licensee did not provide training to SFC workers and only issued a memorandum from the Manager, HS&E to all employees informing them of the change in the instrumentation used for personnel frisking when exiting the restricted area. This memo stated that the change was in response to a change in NRC's requirements, when in fact SFC appropriately made the decision to use more sensitive detectors to ensure that workers do not inadvertently leave the restricted area with contaminated clothing. This action by the licensee was not in response to any change in NRC requirements.

An inspector, watching people exit the change room during a shift change, noted that although the individuals frisked their shoes, as required, they did not perform this survey very thoroughly. The inspector noted that workers frisked themselves with the GM meter as they would have the alpha meter. This appeared to be a poor practice because the alpha probe had an active detection face of approximately 60 square centimeters, and the GM meter had an active detection face of approximately 15 square centimeters. Therefore, to survey the shoes with a smaller probe, more of an effort is required. Inspectors also noted that no training was given to SFC employees regarding use of the new friskers, only a memo to all employees stating that a new probe would be used.

The inspector brought this to the attention of the Manager, HS&E. The manager informed the inspector that he would ensure his technicians audit personnel surveys more frequently and attempt to ensure that SFC personnel frisk more thoroughly.

NRC was also informed on about November 26 that during the week of November 19, the Manager, HS&E and other H&S personnel had surveyed items at the residence of other former contractor's. The Manager, HS&E indicated that the surveys included an open window GM survey meter and that the surveys were complete. There was no indication of beta/gamma contamination above SFC

license release limits, and a review of the survey results by the inspectors appeared to confirm this.

c. Concerns Involving the Bioassay Program

During a review of the licensee's bioassay program, the inspectors noted that when a worker's urinalysis exceeds the action level of 20 micrograms per liter ($\mu\text{g/l}$), the worker is required to submit a second sample. If the second sample also exceeds the action level, the worker is to be put on a work restriction until further urinalysis declines to less than 20 $\mu\text{g/l}$. A worker whose urinalysis exceeds 100 $\mu\text{g/l}$ is to be immediately placed on a work restriction until the level declines to less than 20 $\mu\text{g/l}$, and an investigation is to be held to determine the cause of the intake.

However, an NRC inspector noted a situation where three incidents occurred within several days of each other in which one worker received an uptake from at least two incidents that may have resulted in a violation of the licensee's bioassay procedure. A worker involved with the denitrator packing leak on Tuesday night, November 27, submitted a urine sample that day prior to leaving the plant. The sample was counted the following day and indicated 44 $\mu\text{g/l}$. By procedure he was required to submit a second sample. The next time the worker reported for work, on Friday, November 30, he did not bring a second urine sample. He was not placed on a work restriction, but he was informed that he would be restricted if he did not provide a sample the next day. When the worker reported for work on Saturday, December 1, he submitted a urine sample.

Since the environmental laboratory is closed on weekends, his sample was not analyzed until Monday morning. However, that weekend (before his sample was analyzed) the worker was involved in the cleanup of a second incident at SFC, when a leak was discovered in the Resource Conservation Corporation (RCC) evaporator.

Although these subsequent urine samples were below the 20 $\mu\text{g/l}$ action level, the inspector noted that SFC implements work restrictions only after the second urine sample indicates greater than 20 $\mu\text{g/l}$. SFC managers apparently do not consider the fact that several days may elapse before the second urine sample is analyzed, and in the meantime the worker could receive an additional uptake. In fact, on Tuesday, December 4, this same worker was involved in the cleanup of a third incident and his urine sample after this third incident indicated 175 $\mu\text{g/l}$.

The failure to conservatively utilize personnel resources until test results are available may result in cumulative worker uptakes, and SFC's Procedure HS-101, "Bioassay Program," did not consider this. Because similar previous situations may have resulted in violations of SFC's bioassay program, this item was identified as an unresolved item (40-8027/9006-06).

d. Management Oversight of the Radiation Safety Program

During this period, SFC managers and the QA engineer identified several potential procedures and regulatory violations involving radiation safety in the plant.

- ° On October 26, during a routine plant tour, the SFC QA engineer noted an operator about to break into a uranium-bearing system, without a respirator. The QA engineer determined that an HWP had not been issued and stopped all work until the situation was rectified.
- ° The soil from the SX excavation was deposited on a plastic liner on the yellowcake pad and covered with a liner. Holes in the liner allowed rainwater to leak through and water would run through the contaminated soils. During a heavy rain in early December, the licensee constructed a sand bag dam to contain the water that was leaking out of the soil. This water was pumped into 55-gallon barrels and sampled. At times SFC had collected 2-8 barrels per day, and one analysis indicated 0.18 gU/l which was in excess of the licensee's environmental action level, and a pH of 5.2. Apparently the Manager, Environmental was unaware of this until it was brought to her attention through an NRC inspector's inquiries.
- ° On November 3, 1990, a H&S technician observed an operator working in the ash grinding enclosure while wearing a full face respirator. The procedure specifies that supplied air respirators should be used while working inside the enclosure. The operator was subsequently counseled by supervisory staff.
- ° On December 21, 1990, during a routine plant tour, the Manager, H&E discovered that the No. 5 Ash Receiver (posted as a High Radiation Area) was unlocked. Apparently the knob had broken and had just been rewelded, but the door was unlocked and unattended. The issue was discussed with the Senior Vice President, the Manager, RC&QA, and the Health Physics Supervisors. The Senior Vice President issued a memorandum to all operations managers and staff supervisors instructing them that this High Radiation Area must not be unattended when it is unlocked.
- ° The QA engineer had also identified a number of problems or procedure violations during his audits of procedures. Two of these instances identified operational practices that were inconsistent with plant procedures. The inspector verified that the procedures were appropriately revised.

In summary, NRC noted that these examples indicated that some SFC personnel appeared to conduct periodic walk-throughs of the plant to review conditions and identify problems. Notably, SFC's QA program

appeared to be aggressive in identifying procedural problems as well as potential operational-related issues that occurred in the plant. Many improvements have been noted since the reassignment of the DUF4 Area Manager to the QA engineer position.

e. Radiation Safety Activities

On October 22, 1990, an NRC inspector performed a radiation survey in the SX building. The inspector identified a radiation level of 8.0 mR/hour at a distance of 18 inches from the No. 3 decanter piping. The SX building was not posted as a radiation area in accordance with 10 CFR 20.203(b). The Manager, HS&E and other H&S technicians confirmed that surveys had been performed, but these surveys did not appear to consider plant operations. Therefore, it appeared to the inspector that adequate surveys of equipment in the SX building had not been performed to evaluate routine operation's effects on changing radiological conditions. The failure to adequately perform these surveys to determine the need to post in accordance with 10 CFR 20.203(b) was identified as an apparent violation of 10 CFR 20.201(b) (40-8027/9006-02). The licensee immediately responded by posting the SX building with a "Caution Radiation Area" sign and surveyed other areas in the facility. Inspectors later noted that the RCC evaporator was also posted as a radiation area.

During this inspection period, the inspectors observed uranium-bearing process solutions on the floor from overflowing sumps, spills, the use of sumps for transfer of process solutions between vessels, and other poor operational practices (reference NRC Inspection Report 40-8027/90-05).

Inspectors also noted that control points (step-off pads) into controlled areas in the plant were cluttered or in disarray. Operations or maintenance personnel appeared to move large objects through these points or would clean an area, but failed to replace the step-off pad or shoe cover racks to the proper position. Another inspector noted that step-off pads had blown away or were otherwise moved from the intended position. The inspectors informed H&S personnel in each case, and the control points were immediately corrected.

It appeared to some inspectors that, in general, SFC personnel would not react to process solutions on the floor, step-off pad problems, clutter, or other radiological issues, unless the situation was pointed out by SFC management, H&S personnel, or an NRC inspector. One inspector discussed this perception with SFC management, and the inspector recommended that retraining stress the importance of worker radiation protection issues. SFC management committed to including this enhancement into the retraining program.

However, even though these problems were observed during the inspection period, SFC management appeared to be making an effort to impress upon its personnel the importance of minimizing process solutions on the floors by (1) pumping sumps to prevent them from overflowing, (2) not intentionally placing process solutions on the floors, (3) cleaning these solutions up promptly, and (4) preparing the engineering requests to make equipment modifications and plant upgrades to direct process solutions to the sumps. SFC Management efforts were also evident by the fact that the Manager, Operations was routinely touring the facility to ensure that sumps were not overflowing and floors were clean. Though these actions had an obvious impression on personnel, as late as January 5, inspectors noted that the buildown sump had overflowed and liquids were on the floor in the digestion area. The overflow did not occur as a result of any equipment failures, rather it occurred as a result of a lack of attention to the increasing sump level. It appears that more time will be required to sensitize facility personnel to this issue, and it will continue to be reviewed during future NRC inspections.

In November, the licensee also issued a Temporary Operating Procedure (TOP) for routine shift inspections of floors and sumps for freestanding fluids. This instruction led to better documentation of fluid control since all activities involving pumping or liquid transfer were now logged and reported weekly. Additionally, the TOP requires that all fluids be analyzed for uranium, pH, and nitrate content. In addition, the uranium trioxide (UO₃) area (the wet portion of the process) implemented a process whereby leaking valves and components were tagged and maintenance work orders were submitted to repair the leaks. Periodically, the area will be shut down for repair of the leaks.

During late December and January, SFC personnel improved their efforts in the area of general housekeeping with noticeable positive effects. Areas have been cleared and cleaned. Equipment had been painted. H&S personnel appeared more sensitive to notifying the Operations Department about areas that required more attention. These actions appeared to begin having an impact in the appearance of the facility.

5. Operations Safety

The inspectors observed control room operations to determine the maintenance of proper staffing, determine adherence to procedures, observe instrumentation and recorder traces, examine the status of selected annunciators, and ensure operator knowledge of alarm conditions. An inspector also noted the lack of process instrumentation provided for the uranium purification area of the plant. SFC managers indicated that they plan to install additional actuators, alarms, and strip chart recorders to aid in process control since they were aware of the process instrumentation shortage.

The inspectors also observed the shift changes that occur in the control room. The operators and shift supervisors overlap shifts and appeared to communicate effectively.

An inspector attended the "Contingency Plan Training Program" and found the subject matter appropriate and well organized. Written documentation included the Sequoyan Facility Employee Safety Handbook, "Contingency Plan Overview for Employees," "Diagram of Restricted Areas," and the following operating procedures: "Use of 5-Minute Emergency Escape Breathing Apparatus," "Change Room Procedure," and "Access to Restricted Areas and Controlled Access Areas." Oral presentations or physical demonstrations were provided for the written documentation.

An inspector also briefly reviewed the subject of operator training. The inspector reviewed test results and discussed the training program with supervisors to verify operator participation. In addition, the inspector interviewed operators concerning their responsibilities, level of training, and familiarity with operating procedures. The exam questions pertain to the responsibilities and duties of the workers. However, the written exams for a particular plant area are identical. This caused some concern that exam questions could be discussed between more experienced operators and newer ones, before taking the exam.

During the week of October 9, the inspector observed an operator sampling the contents of one of the digestion tanks. In accordance with SFC procedures, the operator was equipped with a face shield and chemical resistant gloves. The digestion tanks are sampled by opening a sample port at the top of the tank, and manually inserting a metal rod with a container at the bottom (similar to a ladle). The rod was then pulled out of the tanks and the liquids poured into a sample container that the operator held with a gloved hand. Later, the inspector noted that samples were also manually obtained from the boildown tanks. The metal rods have gradients every foot so that the air space is actually measured, thereby providing a manual level indication.

Determining tank levels by manual means is done because of problems with control room remote indicators that may or may not accurately indicate the tank levels. SFC operations managers are aware of the problems with the remote instrumentation, but have not yet corrected the problem. Operations managers informed the inspector that they have experienced problems in finding "off-the-shelf" reliable remote level indicators for the digestion tanks because of the highly acidic environment and because of the different densities of materials that are sometimes present in the tank. In addition, problems have also occurred when the materials inside the tank have foamed and overflowed. Overflows fall directly to the floor, but plans are being made to install piping to route overflows to the sump.

On October 11, a spill of approximately 3-5 gallons occurred from the slurry break tank. The slurry feed from digestion is processed through the slurry break tank located in the SX building. The inspector noted

that overflows from this tank fell directly to the floor and that operators transport the material to the sump by washing the floor. Conversations with the operators indicated that overflows are typical with this tank. The probable cause was the failure of the feed valve due to settling of slurry solids. SFC operations personnel indicated that a level alarm is to be installed.

During the week of October 8-15, an inspector noted that the safety shower and eyewash on the second level west of the No. 3 boildown tank were inaccessible due to poor housekeeping. The area was accessible during the week of November 21-26, although housekeeping remained poor.

On the night of October 21, an inspector accompanied an SFC guard on a perimeter surveillance tour of the SFC site. The inspector noted that at least 14 perimeter lights were not illuminated. The inspector discussed this with licensee management and expressed concern about these lights, especially since some of the burned out lights were along the highway. Shortly thereafter, the licensee repaired the lights. Again on December 12, the inspector accompanied another guard on a perimeter tour and noted 6 perimeter lights out. This information was again conveyed to SFC management.

In addition to burned out lights, the inspector observed that the some of the perimeter lights were pointed towards the video surveillance camera, not away from it. This resulted in the camera being blinded by the light and ineffective in certain areas. This information was also conveyed to SFC management.

On October 23, 1990, while an inspector and a shift supervisor were looking for process leaks in the SX building, the shift supervisor felt for process leaks with his bare hand, potentially contaminating his hand. This was discussed with the Manager, HS&E. After reviewing the safety procedures and discussing the procedure with SFC managers, the inspector noted that the procedure does not specifically prohibit this action, but that Section 4.2.6 of Procedure G-160, "Health and Safety Precautions and Requirements," did require polyvinyl chloride gloves to be worn when handling wet or dry corrosive chemicals or radioactive materials. The inspector noted that License Condition 9 authorizes use of licensed materials in accordance with the license renewal application dated August 23, 1985, as supplemented; and that SFC Chapter 2, Section 2.7.1 states that the Senior Vice President will ensure that safety-related procedures are established and adhered to. Therefore, the shift supervisor's action was identified as an apparent violation of License Condition 9, Chapter 2, Section 2.7.1, of SFC's license renewal application dated August 23, 1985, as supplemented, Procedure G-160. (40-8027/9006-05)

On November 23, 1990, an NRC inspector observed a worker manually unclogging the buildup of yellowcake within the feed conveyor and the inspector noted that the operator was not wearing respiratory protection. SFC's Procedure G-113, "Non-Routine handling of Radioactive Materials,"

specifically requires respiratory protection when opening a uranium-bearing system. This was discussed with SFC management and identified as an apparent violation of License Condition 9, Section 2.7.1, Procedure G-113 (40-8027/9006-05).

During the month of November, inspectors noted hammer marks on various piping and equipment throughout the plant. Most of these items were chutes, storage bins, piping, and conveyor housings. An inspector discussed his concerns for the potential of a breach in the equipment's integrity or a weakening of the component with an SFC consultant, a member of the SOT, and the Senior Vice President. This also corresponded with an SOT finding, and the licensee is evaluating a proper course of action.

On December 1, an inspector noticed that the frisker in the women's change room was unplugged and immediately informed SFC management. The licensee's review of the situation indicated that a female worker unplugged the frisker because it was obviously malfunctioning, but did not inform the H&S technician. Later, two female employees did frisk with the deenergized frisker. Subsequent to the discovery, the workers were instructed to return to the change room and re-frisk with a properly functioning instrument. The licensee responded by counseling the workers and placing caution statements in the appropriate procedure. However, the fact that workers did not properly frisk themselves before leaving the change room was identified as an apparent violation of License Condition 9, Section 2.7.1, Procedure G-114, "Change Room Procedures" (40-8027/9006-05).

During the week of December 10, an inspector observed the repair of a fire main at the southeast corner of the MPB. Recalling that several repairs had been made for leaks on the fire main system between October and December, the licensee informed the inspector that the system was probably deteriorating. Based on the fact that standing water had been observed on the ground even during periods of no rainfall, the inspector noted that it is possible that these standing waters have come from an artificial head caused by the leaking underground fire main. This is a concern given the amounts of uranium in the ground. This possibility was discussed with licensee personnel who indicated that they would try to determine the extent of the leakage. When repairing this fire main system, the affected portion can be valved closed without affecting the entire system. Additionally, licensee personnel informed the inspector that the underground Cooling Water System was also deteriorating.

On December 15, 1990, an inspector observed that the boildown sump had overflowed. The inspector, who informed SFC management, was told that the floating sump drain had been misaligned and the liquid drained onto the floor instead of into the sump. The area was immediately cleaned.

In summary, NRC inspectors observed many operations-related activities including control room operations and day-to-day operations activities. NRC was concerned that operations activities are not always conducted in accordance with approved operating procedures and this perception was, in

part, confirmed by statements made by operations personnel and by inspector observations of operator actions. However, NRC also noted that SFC has made significant efforts in this area and that improvements have been observed.

6. Internal and External Communication Issues

During this inspection period, examples of both good and poor internal communications were noted by NRC. In general, SFC staff appeared more sensitive to plant incidents, some of which were reported in accordance with 10 CFR 20.403. Issues of communications have been a significant concern because of the communication problems noted during the SX excavation activities (documented in NRC Inspection Reports 40-8027/90-04 and 90-05 dated October 11 and November 20, 1990, respectively, and NRC's Demand for Information dated November 5, 1990), and the communications problems described in Section 4 of this report regarding the new information that NRC discovered relating to the SX excavation activities. Examples of additional communications problems had been exhibited as late as January 1991. Some of these internal communication problems resulted in factual errors when communicating required information to NRC.

a. Examples of Poor Internal Communications

One example that resulted in providing NRC erroneous information occurred on November 28. A packing leak the night before resulted in a UO3 spill inside the MPB. In a telephone conversation informing NRC Region IV of the event, an inspector asked the Manager, RC&QA if anyone was in the immediate area. The Manager, RC&QA stated that no one was. However, a worker had in fact been in the immediate area and was the person that reported the leak to the control room. This information was well known at the time of the report by the operations and H&S departments, and by the inspector onsite. A bioassay of this worker later showed that he had an intake well above the SFC license action level. Although the correct information was available at the time of the report, it was not obtained by the responsible manager, the Manager, RC&QA, and resulted in inappropriate information being communicated to NRC Region IV. (The onsite inspector later provided the correct information to the NRC Regional office.)

Another example with regulatory consequences involved some contaminated materials that were found offsite as detailed in Section 4 of this inspection report. Despite NRC's continued scrutiny of these items, continued communications on the issue, and the information available, it was not until December 19 before the Manager, RC&QA and the President, were aware that some of the items were above the SFC beta/gamma license release limits, some 3 weeks after NRC became aware of this.

Another example occurred December 17-19 when inspectors interviewed several shift supervisors regarding their understanding of the

Sequoyah Oversight Team's (SOT's) mission and degree of authority. Although several individuals discussed what they believed was the purpose of the oversight program, none of the individuals contacted had received instruction from SFC management. One shift supervisor, thought that the SOT had no authority to shut down the plant. This was contrary to the SOT authorities described in the letter from the President, SFC to the Regional Administrator, NRC Region IV dated December 18, 1990. This was of concern to the inspector since the response of supervisors to SOT directives may have been in doubt. Some supervisors even questioned the inspectors about the SOT, indicating their curiosity about the presence of the SOT.

An inspector reviewed this issue with the President and Senior Vice President on December 20. The President acknowledged the inspector's concern, noting that perhaps senior management had not fully appreciated this aspect of the oversight program. The Senior Vice President stated that the previous evening, he had conducted informal discussions regarding the SOT with backshift supervisors, and had repeated these discussions with other supervisory staff earlier that morning. Immediately after this meeting, the inspector interviewed a shift supervisor and an area manager and found that the Senior Vice President had not completed the discussions with the individuals.

This apparent discrepancy was brought to the President's attention the following day. The President confirmed his doubt that discussions with all responsible operations personnel had not occurred at the time the inspector was so informed. The President noted this to the Senior Vice President and discussed with him the issue of accurate communications to NRC inspectors. The Senior Vice President did complete his tasks with responsible personnel, and the President issued a memorandum to all employees about the SOT.

Examples of Good Internal Communications and Improvements

The licensee has responded to problems identified by consultants and NRC from the SX excavation activities. The licensee implemented a procedure "Chain of Custody/Special Analysis Request" to ensure that, when operations personnel obtain environmental samples, a copy of the results is sent to the Manager, Environmental. Previously, when operators obtained environmental samples, such as from the SX excavation, copies of the results were not always sent to the Environmental Department, and often times, the H&S organization was not informed. This problem appeared to be alleviated by the proper implementation of this procedure. However, on January 16, the licensee informed Region IV about a 2-week delay in informing the environmental department about samples taken on the roadway (in the restricted area) that indicated significantly elevated uranium concentrations. Neither the H&S nor the environmental organizations were informed about the contamination and this possibly contributed to further ground contamination. Although the issue is being

reviewed, SFC identified this problem and candidly provided this information to NRC.

During this period, NRC inspectors attended weekly staff meetings, departmental meetings, Process Operations Review Committee meetings, and other licensee meetings. In general, the inspectors found the meetings to be well organized and informative.

On November 27, the President, SFC and the Regional Administrator, Region IV held a meeting in NRC's regional office. Several items were discussed, including the licensee's responsibilities and NRC's expectations of performance. The following day, the President, SFC held meetings with all SFC managers and, the following week, each manager held a departmental meeting to communicate the President's expectations regarding performance, as well as proposed changes to the radiation safety program and its influence on daily operations. This communication about the President's expectations to the staff was an important step in changing the staff's attitude and operational practices.

These meetings included discussion of strict enforcement of safety rules, observation of standard protection policies and direction that HSE would be granted greater oversight of routine activities. While these meetings made an obvious impression on the workforce, it was notable to the inspectors that SFC management failed to provide the staff with a basis for changing a number of procedures and details which would directly affect daily activities. Many workers noted that they did not understand why "the rules had changed," other than the fact that management had told them that NRC had dictated these changes.

7. Reports and Notifications

During this inspection period, the licensee demonstrated significant improvements in notifying NRC about events or problems that have occurred at the plant. SFC has made formal and informal reports to NRC, and a brief summary of these reports follows:

- 2 On October 12, licensee personnel discovered a "lime pile" outside the security fence in the unrestricted area, but on the licensee's property. A sludge sample was obtained and indicated 0.09 grams Uranium/liter (gU/l) (twice the maximum permissible concentration (MPC) value for unrestricted release). This was discovered while the licensee was investigating past practices that may have an environmental impact. Appropriate radiological controls were implemented and the licensee is continuing its evaluations. This matter was formally reported under 10 CFR 20.403(b).
- 2 On October 16, SFC informed NRC of an unusual event that resulted in some localized high airborne concentrations of licensed materials. A barrel tipped the wrong way while a mechanical conveyerized system

was emptying its contents into a bin and approximately 200 pounds of uranium hexafluoride (UF₆) fell four floors inside the ash grinding containment. No one was in the ash grinding containment at the time. For the most part, the spill was contained, but some of the cloud came through the cracks in the door jar and caused a localized airborne problem outside the ash grinding containment. SFC personnel quickly identified and cleaned affected areas.

- ° Also on October 16, the wind blew an SFC crane into a high voltage line, while it was left unattended for a short period. No one was injured and the power company was called to shut off power.
- ° On October 25, SFC informed Region IV about a borehole (No. 33) that was drilled to sample the backfill around the outside of the combination stream piping in the unrestricted area. The first water sample indicated a uranium concentration of 11 milligrams per liter (mg/l); however, the second sample indicated 90 mg/l (twice MPC for unrestricted release). SFC believes this one sample to be an anomaly since no other samples have since exceeded the MPC, and its evaluation is continuing.
- ° On November 2, SFC informed Region IV that five or six of the contract workers that worked in the SX excavation may not have been properly trained. After further review, SFC managers stated that since all workers received the visitor orientation, adequate training was provided to those contractors. However, as discussed in Section 4 of this report, that training was not adequate.
- ° On November 7, SFC informed NRC about a combination of a sight glass that failed and a valve that did not fully seat which resulted in a fluorine and electrolyte leak into the cell area. An unusual event was declared when a small amount of fluorine was vented to the atmosphere before the release was stopped. SFC acted promptly, and actions taken were appropriate.
- ° On November 9, SFC formally notified NRC under 10 CFR 20.403(b)(3) that the lip on a stainless steel sump had separated from the adjacent concrete floor, thereby providing a pathway for solutions on the floor to seep into the ground. This was identified in the equipment decontamination room, and activities were immediately halted until the floor was repaired.
- ° On November 14, SFC formally notified NRC under 10 CFR 20.403(b)(3) that contaminated liquids were discovered on the ground near the yellowcake pad where drums had probably leaked. Initial sample results indicated a uranium concentration of 1.18 g/l. The area was cleaned and other barrels were inspected.
- ° Also on November 14, SFC informed NRC of a spill of approximately 30 gallons of nitric acid in the ammonium diurate building. The

cause of the spill was improper equipment tag-out. No damage was sustained and no one was injured. The spill was promptly cleaned.

- ° On November 18, SFC formally notified NRC under 10 CFR 20.403(b)(3) that a motor bearing on the main plant dust collector failed and certain areas in the main plant required full-face respirators. The report was made on the basis that the repair costs may exceed \$2000. The motor was fixed within 3-4 hours, and no significant airborne levels resulted from the failure.
- ° On November 27, SFC informed NRC that a packing leak occurred in one of the denitrators, resulting in elevated airborne concentrations. The leak was quickly reported to the control room and appropriate action was taken to stop the leak. The leak was believed to have resulted from improper packing installation (approximately 2 weeks prior). The original report was that no workers were in the area. However, as discussed in Section 5 of this report, the Region IV office was later informed that a worker was indeed in the area and obtained an elevated uptake.
- ° On December 1, SFC formally notified NRC under 10 CFR 20.403(b)(3) that uranyl nitrate had leaked from the top of the RCC evaporator. The event threatened to cause greater than \$2000 damage and greater than a 24-hour shutdown of several portions of the process. The event was caused by equipment malfunction.
- ° On December 4, SFC informed NRC of a leak of about 700-800 gallons of uranyl nitrate from the RCC evaporator. Even though the evaporator is located outdoors, the spill was contained on the curbed pad. Uranium concentrations were approximately 68 gU/l. The cause of the incident was a failure on the part of the mechanics to close a drain valve after repairing the evaporator from the aforementioned December 1 incident.
- ° On December 23, SFC formally notified NRC under 10 CFR 20.403(b) that a coupling on a T-head on the fire protection system failed and sprayed water in the main process building. Water from this leak entered into the sampling plant and dislodged uranium contaminations from inaccessible areas around equipment. The leak was believed to result from the extremely cold weather that caused the pipe to freeze. Licensee actions appeared prompt and complete.
- ° On January 8, SFC informed NRC about an Unusual Event that was declared earlier that day from a small release of hydrogen fluoride (HF). Mechanics, dressed in acid-resistant suits and supplied air, were working on a cold trap drain valve when liquid leaked from the valve. At the time, the Manager, RC&QA informed a Region IV inspector that there was no indication of any worker being injured. However, the next day, NRC was informed that one of the mechanics had slight HF burns (from a loss of integrity in his gloves) and was referred to a doctor.

acceptance of equipment and parts received by warehouse staff; (2) an apparent lack-of emphasis on preparing new or revised standard operating procedures for operational issues addressed in TOPs; (3) failure to involve the HS&E group during the design change authorization (DCA) process prior to initiating the construction or maintenance; (4) failure of the DCA procedures to address the revision of operational procedures and training which may be impacted by a design change; and (5) the licensee's quality assurance program for acceptance of equipment following maintenance and prior to operation or installation.

On January 5, 1991, NRC inspectors again met with the program manager to review the SOT's objectives and NRC's expectations. The SOT program manager discussed several items, identified during discussions held with SFC management the previous week. The NRC staff acknowledged the SOT findings which were discussed with individual team members on several occasions and noted their concern that these issues had not been documented in weekly reports. The program manager indicated that the reason for this was that they had not yet been fully reported and acknowledged that the detail of the weekly SOT reports would be improved. He also acknowledged that certain communication issues of concern to NRC would be reported pending further review.

9. Exits

On Thursday, December 20, 1990, the last day of the daily, 7 day-a-week inspector coverage, the Region IV principal inspector for SFC conducted a formal exit interview with licensee management to review NRC findings during this period.



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION IV
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TEXAS 76011

MAR 1 1991

In Reply Refer To:
License: SUB-1010
Docket: 40-8027/90-07

Sequoyah Fuels Corporation
ATTN: Beau Graves, Jr.
President
P.O. Box 610
Gore, Oklahoma 74435

Dear Mr. Graves:

This refers to the onsite inspection conducted November 15-16, 1990, and January 16-18, 1991, and the in-office reviews of activities authorized by NRC Source License SUB-1010 and the Order Modifying License (Order) issued on September 20, 1990. These inspections were related to the identification of environmental contamination under the main process building, and the results of these inspection activities were discussed with you and members of your staff on November 16, 1990, and January 18, 1991.

NRC acknowledges that Sequoyah Fuels Corporation (SFC) devoted significant resources to comply with the conditions of the Order, and all of the actions taken in response to the Order adequately complied with the conditions of the Order. NRC also acknowledges that these actions went beyond the requirements of the Order as SFC implemented a site-wide discovery program in October 1990. NRC understands that this effort is expected to be completed in the summer of 1991, and the actions related to this program have been aggressive.

The preliminary results of the site-wide discovery program have indicated significant environmental contamination on the SFC site. Although some quantities of licensed material have migrated outside the restricted area in the ground water and in the surface soils, current data does not indicate that licensed materials have migrated beyond SFC's property boundary. SFC appropriately responded to this matter by immediately implementing a ground-water corrective action program and a soil sampling program. Based upon the results of these programs, some form of further remediation efforts may be required in the future.

NRC reviews of the monitor well program, as described in the SFC license, indicate that several wells lack adequate completion data and therefore may be yielding information that is misleading. NRC reviews also indicate that the monitor well program described in the license is inadequate to detect the recently discovered environmental contamination. SFC has committed to submit to NRC a ground-water monitoring program for incorporation into the license once data has been evaluated from the current discovery effort.

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NRC reviews of the surface water monitoring program indicated that poor quality waters are released off-site from surface water impoundments by slowly bleeding them with good quality waters in the combination stream. This practice does not indicate a program that has incorporated the as low as reasonably achievable (ALARA) concept. Although it is recognized that SFC has reduced the total quantity of licensed materials released through the combination stream in the last year, SFC has not yet reviewed other alternatives to merely diluting these waters.

During these NRC reviews, it was obvious that many managers and members of the SFC staff that were interviewed were aware that, because of previous operational practices, the ground under the buildings and around the site was contaminated. Several managers and members of the staff were also aware that licensed material in the ground could migrate through the ground, both vertically and horizontally. However, despite the information that was known, SFC appears to have failed to evaluate all releases from the facility to demonstrate compliance with 10 CFR 20.106. This was identified as an apparent violation of 10 CFR 20.201(b).

The inspector also noted that environmental samples with less than the 225 micrograms per liter ($\mu\text{g}/\text{l}$) of uranium were routinely disposed of in the laboratory sink that discharges to a holding tank and leach field. As of the date of the inspection, SFC had not evaluated the uranium concentration in the tank or the leach field. Because uranium may have concentrated above regulatory limits, this was identified as an unresolved item.

NRC is concerned about the use of unlined storage ponds, as well as the leaking storage ponds at the site. SFC undertook a significant effort to eliminate environmental contamination through leaks in the floors and sumps. However, a potentially larger source of licensed materials, in direct hydraulic contact with the formations, is associated with the use of these unlined ponds. It is reasonable to suspect that licensed materials are continuously being released into the underlying strata. These releases into the ground do not indicate a program that has incorporated the ALARA concept. NRC understands that the discovery program will quantify the amount of environmental contamination from these ponds, and that based on that data, SFC will evaluate available options. NRC expects SFC to perform timely evaluations and implement a solution that more completely incorporates the ALARA concept.

The enclosed copy of our inspection report also identifies other areas examined during the inspection. Within these areas, the inspection consisted of selective examination of procedures and representative records, interviews with personnel, independent measurements, and observations by inspectors.

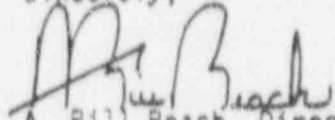
In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC Public Document Room.

Sequoyah Fuels Corporation

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Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

A handwritten signature in dark ink, appearing to read "A. Bill Beach". The signature is fluid and cursive, with the first name "A." and last name "Beach" clearly distinguishable.

A. Bill Beach, Director
Division of Radiation Safety
and Safeguards

Enclosure:
Appendix - NRC Inspection Report
40-8027/90-07

cc:
Oklahoma Radiation Control Program Director

Native Americans for Clean Environment
P.O. Box 1671
Tahlequah, Oklahoma 74465

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 40-8027/90-07

License: SUB-1010

Docket: 40-8027

Licensee: Sequoyah Fuels Corporation (SFC)
P.O. Box 610
Gore, Oklahoma 74435

Facility Name: Sequoyah Facility

Inspection At: Gore, Oklahoma

Inspection Conducted: November 15-16, 1990, and January 16-18, 1991

Team Members:

Gary R. Konwinski
Gary R. Konwinski, Project Manager, Uranium
Recovery Field Office, Region IV

2-28-91
Date

G. Michael Vasquez
G. Michael Vasquez, Health Physicist, Nuclear
Materials Licensing Section, Region IV

3/1/91
Date

Approved:

William L. Fisher
W. L. Fisher, Chief, Nuclear Materials
Licensing Section, Region IV

3/1/91
Date

Inspection Summary

Inspection Conducted November 15-16, 1990, and January 16-18, 1991
(Report 40-8027/90-07)

Areas Inspected: Special, announced inspection conducted November 15-16, 1990, and an unannounced inspection conducted January 16-18, 1991, and in-office reviews of licensed activities related to environmental protection and compliance with the Order Modifying License (Order). The inspection included an overview of SFC actions in response to the Order, an overview of the environmental monitoring program, licensee main process and solvent extraction building discovery program, surface water monitoring program, ground and surface water data review, and information available to SFC regarding environmental contamination under the main process building.

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Results: Within the areas inspected, one apparent violation was identified:

- ° Failure to evaluate or measure, as required by 10 CFR 20.201(b), all releases from the facility to demonstrate compliance with 10 CFR 20.106. In addition, as indicated in Section 5.2, Chapter 5 of the SFC license renewal application dated August 23, 1985, as supplemented, SFC committed to an action level of 225 micrograms/liter uranium for environmental water samples such that for samples exceeding this value, SFC will "investigate and take proper mitigating measures if necessary." However, no investigation or proper mitigating measures were taken. It was noted that several licensee personnel and managers were aware that licensed materials were in the ground, and furthermore, it was known that this material could migrate through foundation and utility bedding material. (paragraphs 5 and 6)

One unresolved item was identified:

- ° Uranium concentrations above regulatory limits may have resulted from discarding environmental samples into a holding tank and associated leach field (through the laboratory waste sink). (paragraph 7)

Two open items were also identified:

- ° The licensee had not yet considered whether the ground-water monitoring program should monitor other trace metals that, over the years, may have concentrated in waste solutions moving with the surface water and/or ground water. (paragraph 5)

The licensee was unable to define a basis for the uranium environmental water action level of 225 micrograms/liter (ug/l). (paragraph 6)

In response to the Order, the licensee undertook an aggressive environmental discovery program of subsurface contamination under and around the main process building. Licensee actions went beyond the requirements of the Order as a site-wide environmental discovery program was initiated. This report documents those licensee actions in response to the Order and the preliminary findings of the discovery program.

Although these extensive actions are now being taken, interviews with SFC managers and SFC staff indicated that there was an awareness of the existence of environmental contamination beneath the main process and solvent extraction buildings. Many of these individuals were aware that this contamination could migrate into and through the ground into ground-water. However, no one interviewed was sensitive to the significance of this contamination nor to the amounts of materials released.

A review of the ground-water monitoring program that is described in SFC's license renewal request dated August 23, 1985, as supplemented, was determined to be inadequate to detect the environmental contamination at the site, the amount of licensed material that had been released, and the direction of ground-water movement. In addition, these wells had little or no completion

data, thereby indicating that this monitoring program has been and continues to supply data that may be misleading. However, SFC's aggressive environmental discovery program has installed 146 new wells that should be adequate to determine the extent of subsurface contamination. Once data has been obtained and evaluated, licensee representatives have indicated that an adequate ground-water monitoring program will be submitted for incorporation into the license.

In review of SFC's environmental program, two other concerns have been identified. The use of unlined ponds to hold contaminated waste solutions has resulted, and continues to result, in the unnecessary release of licensed materials into the environment. The practice of releasing contaminated waters into the combination stream at a slow rate, so that they are diluted with better quality waters, may have resulted in the unnecessary release of licensed material to the environment. These two concerns raise questions about the licensee's ALARA program.

SFC's procedures and practices for sampling and analyzing ground-water were also reviewed. In general, sample handling and analyses appeared adequate; however, the inspector identified one example of an inadequate laboratory procedure. Although the procedure required filtering, laboratory personnel were appropriately not filtering the water samples.

DETAILS

1. Persons Contacted

Sequoyah Fuels Corporation

- °*Reau Graves, President
- *Jim Mestepey, Senior Vice President
- *Mike Nichols, Manager, Health, Safety, and Environment
- *Carol Couch, Manager, Environment
- Don Knoke, Manager, Facility Laboratory
- Sue Smith, Supervisor, Waste Treatment and Solid Waste
- Richard Parker, Manager, Maintenance (currently Manager, Operations)
- Kenny Schlag, Hydrologist
- *Joe Bohanon, Quality Assurance (QA) Engineer

°Denotes attendance at exit interview on November 16, 1990.

*Denotes attendance at exit interview on January 18, 1991.

The inspectors also interviewed other Sequoyah Fuel Corporation (SFC) site personnel and consultants during the course of the inspection.

2. Introduction

As documented in the AIT followup inspection report (NRC Inspection Report 40-8027/90-05, dated November 20, 1990), on September 20, 1990, approximately 1 week after SFC's notification to NRC about the subfloor process monitor, NRC issued an Order Modifying SFC's license. The Order required SFC to: (1) ensure the integrity of the floor in the Main Process Building, minimize the process solutions on the floor, and repair sumps and floors as necessary; (2) characterize the quantity and location of licensed material under and around the main process building; (3) identify all potential pathways for migration of licensed material beyond the main process building; (4) examine present and past monitoring well data, determining whether the monitoring well program has been adequate to identify migration from the main process building; (5) determine whether licensed material has migrated beyond the restricted area; and (6) develop a plan to identify other locations on SFC property that could have environmental contamination. As indicated in SFC's October 16, 1990, letter to NRC, SFC was unable to meet the deadline specified in the Order for completing all of the environmental discovery actions due to circumstances beyond SFC's control. Therefore, the Region IV Regional Administrator relaxed the time limits on the Order. On December 18, 1990, SFC submitted the final report on the environmental characterizations related to the Order. In addition, SFC proceeded with actions beyond the Order's requirements by implementing an aggressive site-wide environmental discovery program.

3. Floor and Sump Integrity

To comply with the first condition of the Order, SFC stopped all activities that intentionally placed liquids in sumps and floors until the integrity of the sumps and floors were ensured. All sumps and floors in the main process building were then carefully inspected by members of SFC's engineering staff for breaches in integrity. Where defects or suspected defects were found, repairs were made and areas reinspected. Notably, SFC went beyond the Order by inspecting all floors and sumps in all buildings onsite, and then setting up a routine, proceduralized floor-and-sump inspection program. Typically, SFC plans to inspect floors and sumps on a quarterly, semiannual, or annual frequency.

4. Overview of SFC's Environmental Monitoring Program

Characterization of the site from a liquid monitoring perspective should consider both surface water and ground water. Surface waters at the site consist of precipitation, which creates runoff and directly enters the surface impoundments, and process waste water. These waters and naturally occurring subsurface waters make up the ground water that exists at the site.

The environmental monitoring program for the site consisted of ground water, surface water, soil, sediment, vegetation, and air monitoring at various site locations. Ground water and surface water environs will be the primary focus of this section of this report. Soil and sediment will be discussed briefly, while, vegetation and air, although indicators of potential radionuclide pathways, will not be discussed. The liquid environmental monitoring program, as described in Source License SUB-1010, consists of 14 surface water grab samples collected at various frequencies. Additionally, 73 ground-water monitoring wells are sampled. The monitor well locations, well designation, and area monitored are shown in Table 1. Of these wells, 10 monitor fertilizer spreading areas, 4 are plugged (and therefore monitor nothing), 28 monitor Pond No. 2, 19 monitor the lined raffinate storage ponds, and 12 are located in areas that monitor the restricted area boundary. There are many other wells on the SFC property that have been plugged relative to past operating practices or that remain open and are not monitored. These wells may or may not have been part of previous ground-water monitoring programs, but are not currently part of the environmental monitoring program specified in the license.

A review of Table 1 indicates that a wide variety of detail exists for the monitor wells that SFC is utilizing. SFC maintained detailed logs and thorough completion details for the majority of the wells associated with the raffinate ponds; fewer details were available for the wells associated with Pond No. 2. The 270 land application area had good well completion data available for the monitoring sites as did the wells associated with the Rabbit Hill fertilizer area. The majority of wells associated with monitoring the restricted area boundary had few or no completion details, and little or no information from boring logs.

The utilization of data from monitor wells, in the absence of completion details and logs of soil borings, has a high likelihood of yielding meaningless information. This was the case for many of the SFC monitor wells. Logs of the soil borings associated with the more recently completed monitor wells indicated that an interbedded sequence of shale and sandstone exists over the entire SFC site. It appeared that portions of the shales and sandstones act as aquitards while more highly fractured or less well cemented sequences of these same units function as aquifers. Therefore, to reliably determine solution movement, monitor wells should be completed in the poorly cemented sandstones as well as more permeable shales. From the data that existed in the SFC files, it was often impossible to determine completed intervals as well as the zones that are being monitored for many of the wells listed in the license. However, data contained in the files indicated that sufficient stratigraphic records exist to construct appropriate cross-sections of the site and choose meaningful completion zones.

In reviewing the environmental program, the inspector noted that as the SFC organizational structure existed, there was no one individual that had overall authority and responsibility for environmental monitoring of liquid effluents generated at the facility. The operations group, the staff reporting to Vice President of Business Development, and the environmental group share responsibilities for the monitoring, reporting, and acquisition of data. This arrangement appears to have caused some confusion as to the specific responsibilities of the various individuals.

5. Licensee Main Process and Solvent Extraction Building Discovery Program

A cursory review of monitor well locations described in the SFC license indicated that none were sufficiently near to the main process building to accurately characterize the extent of material migration. Therefore, after issuance of the Order, SFC immediately began an aggressive environmental discovery program. The licensee's discovery program adjacent to the main process building involved the completion of numerous monitoring wells and 14 hand auger penetrations. The monitoring wells were accompanied with boreholes which represented the initial discovery step to determine the underlying strata at the various locations. Where possible companion monitor wells were established in the shallow shale unit and the deeper sandstone units. Water levels as well as water quality data for uranium, nitrate, fluoride, and specific conductance were collected for wells established in the various strata. In addition to water quality data, information on soil uranium concentrations in the various strata was collected and compiled at 6-inch intervals. Eight monitor wells were completed around the solvent extraction building in a similar fashion to those completed near the main process building. These wells are also sampled for uranium, nitrate, fluoride and specific conductance.

As an analytical spot check on the uranium concentrations in the (surface) soil, an inspector collected seven surface soil samples along a draw from the main process building, past the emergency basin, and outletting near

the restricted area boundary. Uranium concentrations ranged from 23 picocuries per gram of soil (pCi/gm) near the restricted area boundary to over 11,000 pCi/gm near the emergency basin, with an average uranium concentration of 3,700 pCi/gm.

The licensee also completed 24 utility line excavations, discussed in NRC Inspection Report 40-8027/90-05, dated November 20, 1990. These excavations concentrated on utility lines, identified by the SFC engineering group, that either originated, terminated, or passed near the solvent extraction building or main process building. These excavations resulted in the installation of 16 concrete containment barriers and 14 collection sumps. The containment barriers were set into the surrounding bedrock and were designed to reduce or eliminate the amount of seepage that was traveling in the utility line bedding material. When containment barriers were installed, collection sumps were also placed in service. These sumps consisted of perforated pipe placed on the upgradient side of the containment barriers. The sumps in the solvent extraction yard were pumped on a weekly frequency. Seven sumps were also located outside the restricted area, and were pumped on an as needed basis. The volume and quantity of the recovered solutions were logged. This represents a form of corrective action which should be maintained to assure that releases from these points are in conformance with ALARA concepts.

Data collected from the various monitoring locations indicated that seepage waters from a combination of the solvent extraction building, main process building and other non-specified sources have been detected in both the shallow shale unit and the deeper sandstone strata. Elevated levels of uranium, nitrate, fluoride, and specific conductance had been noted to occur. During the period of September 10 to November 12, 1990, a total of 19,689 gallons of seepage waters had been pumped from these sumps, with uranium concentrations ranging from 3.7 µg/l to 578,735 µg/l. All sump waters, except for the one that had the low reading noted above, had uranium concentrations that were elevated above the site background of 10µg/l. As of January 16, 1991, over 500 pounds of uranium had been recovered from the sump waters.

Data associated with these recently completed monitor wells and utility trenches confirmed that licensed material and other process additives migrated beyond the restricted area boundary in two areas. The full extent of migration is not currently known. The potential for migration into other areas is currently under review. In the areas where migration beyond the restricted area had been confirmed, seepage recovery systems are either active or currently being constructed. A judgement on the success or failure of these recovery systems may take months before enough data has been obtained to make this determination.

One location where the licensee's program discovered that uranium had migrated to the unrestricted area was confirmed by elevated concentrations in the saturated bedding materials adjacent to the combination stream pipeline. The original excavation along the combination stream pipeline,

in the solvent extraction building yard, had indicated elevated uranium concentrations. As a result of this, SFC drilled into the pipeline bedding material that surrounded the combination stream piping. This drilling occurred outside the restricted area adjacent to the south yellowcake sump. Initial sampling at this site indicated a uranium concentration of 90,000 $\mu\text{g/l}$ (9,000 times the site background). Subsequent sampling has shown that uranium concentrations have stabilized at about 4,000 $\mu\text{g/l}$ (400 times the site background). To more fully explore the water quality and quantity in this area, SFC installed two additional wells in the pipeline bedding, a recovery well in the pipeline bedding near the yellowcake storage pad, and two wells downstream of the combination stream outfall. The wells downgradient of the yellowcake sump indicated uranium concentrations in the 100 to 300 $\mu\text{g/l}$ range (10 to 30 times the site background). The recovery well was installed in a location where uranium concentrations as of January 18, 1991, were 44,750 $\mu\text{g/l}$, and therefore appeared to be in a location where significant amounts of uranium may be recovered.

The water collection activities associated with the various sumps had created a depressed water surface in the shale materials. The depression encompassed the entire solvent extraction building area and extended roughly 200 feet to the north and south of the solvent extraction building. On the east side the depression extended under the western one-third of the main process building. The effect to the west was unknown because of the lack of data; however, monitoring data associated with the newly installed wells should provide information on the depressed water surface in this area.

To comply with another condition in the Order, SFC developed a facility-wide environmental investigation program. The program included plans to investigate 26 areas at the site to determine ground water and surface water impacts as well as the amount of various constituents that are in the soils at the site. The main process building and the solvent extraction building were Number 1 and Number 2 investigation priorities, respectively. Going beyond the Order, SFC began implementing this site-wide investigation program in October. With the monitoring network that had been implemented at the conclusion of this inspection, SFC had completed most of the drilling phase of the program. SFC made a significant effort to identify areas that are in need of investigation. SFC anticipated that the program and data collection associated with it will be completed in the early summer of 1991.

Work associated with the site-wide investigation program ultimately will involve the monitoring of 154 wells. At the conclusion of this inspection period, 146 out of 154 planned wells had been installed at the site in response to the facility-wide investigation plan. The planned well locations are as follows: 52 near the main process building, 8 near the solvent extraction building, 52 adjacent to the restricted area boundary, 34 inside the restricted area at various locations and (only) 8 from the monitoring program identified in the license.

The 146 ground-water monitoring wells appeared to have utilized appropriate completion and installation techniques. Licensee representatives indicated that the data collected from the wells will be used to characterize the volume and activity of licensed materials at the site, as well as to implement a defensible ground-water monitoring well program.

The inspector also reviewed the ground-water monitoring program, as described in the license, to determine its adequacy. Observation of the monitor well locations indicated that the raffinate ponds and the portion of the restricted area boundary near Pond No. 2 were adequately monitored. Furthermore, the quality and reliability of the monitor well completion data indicated that the raffinate ponds appeared to be adequately monitored. However, the main process area and the features located within the restricted area boundary were poorly monitored from a ground-water perspective. The east side of the restricted area boundary and, to a lesser extent, portions of the north and south sides of the restricted area boundary had no ground-water monitoring wells. Although the east and remaining portions of the north and south restricted area boundaries have numerous wells, these boundaries were not adequately monitored.

Thirty-nine of 73 wells, currently included in SFC's license, monitor either the restricted area or Pond No. 2. Of these 39 wells, 31 contained insufficient completion information, and therefore may be yielding data that is misleading.

SFC's ground-water monitor program, as described in its license appeared inadequate to identify the environmental contamination that exists at the facility, in light of the recent discoveries. The fact that SFC's environmental monitoring program was not adequate to identify releases from the facility, to demonstrate compliance with 10 CFR 20.106 was identified as an apparent violation of 10 CFR 20.201(b) (40-8027/9007-01). In addition, as denoted in Section 5.2, Chapter 5 of the SFC license renewal application dated August 23, 1985, as supplemented, SFC committed to an action level of 225 $\mu\text{g/l}$ uranium for environmental water samples. SFC will, for samples exceeding this value, "investigate and take proper mitigating measures if necessary." However, SFC did not investigate and take proper mitigating measures. Licensee representatives stated that they plan to submit an adequate ground-water monitoring program for NRC review and incorporation into their license.

The 73 ground-water monitoring wells currently listed in the license are required to be sampled on a quarterly or monthly frequency depending upon the location of the well. However, some wells are sampled on both monthly and quarterly frequencies, depending upon the parameters. The water analysis generally consists of gross alpha and gross beta activity, fluoride, uranium, thorium-230, radium-226, nitrate, pH and conductivity. Considering the rate of fluid movement in the monitored formations, the sampling frequency appeared more than adequate for an appropriately

designed ground-water monitoring program. Due to the slow rate of ground-water movement at the site, a semiannual monitoring frequency could be justified. Such a frequency would collect a sufficient amount of data to allow SFC to accurately evaluate ground-water impacts. The parameters that are included in the routine analytical list are sufficient for determining ground-water movement. Without exception, fluoride, uranium, and nitrate were the parameters that became elevated when leakage took place. To a lesser extent, thorium-230 and radium-226 also became elevated.

There are several other trace metals that are known to exist in the yellowcake and slurry products that SFC receives. Considering the years of operation that have taken place and the extent of environmental contamination, there is a high likelihood that some of these trace metals may have become concentrated in the waste solutions which, in turn, may have moved with the ground water. The licensee had not yet considered whether the environmental program should consider monitoring these constituents in the surface water and ground water environments. This was identified as an open item pending further NRC review of the SFC ground-water monitoring program (40-8027/9007-03).

6. Ground-Water and Surface Water Monitoring Programs

Twenty surface water impoundments exist at the site. Construction features range from combination clay and synthetically lined systems with underdrain leak detection, to clay-lined impoundments, to unlined intermittent basins that on occasion receive various qualities and quantities of water. The surface water impoundments, and some of their characteristics, are compiled in Table 2. As can be seen from that table, 11 of the 20 surface impoundments are lined with either clay or clay and hypalon. In addition to the impoundments, there are several fluoride burial pits, two yellowcake sumps, and waste burial areas that are potential contributors of monitored constituents to the ground water. Additional contributions could result from contaminated surface water or surface contamination.

The numerous impoundments that are located on the site may have created a mound of ground water that would not have naturally occurred. This situation is difficult to confirm at this time because the subsurface stratigraphic control for the site and recent monitoring data associated with the recently completed wells have not been adequately characterized. Furthermore, many of the previous monitor wells associated with the impoundments that would have the ability to detect leaking solutions have incomplete or no completion details. Due to this, many of these impoundments may be leaking, but the leakage may not have been detected. The newly installed ground-water monitoring wells are expected to supply sufficient monitoring points to determine the contribution of the various ponds to the environment.

As discussed in Section 5 of this inspection report, SFC has committed to an action level of 225ug/l uranium for environmental water samples. Interviews with SFC personnel and a review of records indicated no knowledge of the basis for this number. Naturally occurring uranium concentrations in the site formations are consistently less than 10 ug/l and therefore, any ground-water sample in excess of this threshold indicates uranium contamination. The inspector noted that numerous monitor wells are detecting uranium values in excess of the site background. If the ground water and surface water monitoring programs are to be meaningful, the monitored constituents must be compared to background, the Environmental Protection Agency (EPA) drinking water standard, or other meaningful values rather than to a 225 ug/l action level which is currently utilized by SFC. The lack of an adequate basis for the established action level was identified as an open item pending further review by NRC (40-8027/9007-04).

Another concern identified by the inspector was that, based on interviews of the SFC operations staff, SFC often dilutes poor quality or contaminated waters with good quality, fresh waters, to ensure the NPDES permit concentrations are not exceeded. SFC normally discharged the contents of all site impoundments, with the exception of the ammonium nitrate storage ponds, from the site through the combination stream. This has included the waters from the sewage lagoon where the sludge has a uranium concentration of 12495 micrograms per gram (ug/g). Other routine inputs to the combination stream include but are not limited to the burial pit sump, fluoride basins, emergency basin, north ditch, north and south yellowcake sumps, the incinerator, roof drains, and the fresh water pond. In aggregate, these sources have been managed to ensure that the NPDES discharge limits for uranium, nitrate, fluoride and pH are not exceeded.

Although it is possible that uranium concentrations similar to those of the sewage lagoon can be expected to exist in the North Ditch/Emergency Basin, SFC had not yet sampled those impoundments. These two impoundments warrant further study to determine the degree of transportation of licensed materials that is taking place.

This practice of diluting waters that may be in excess of NPDES discharge limits with fresh water has been an operational method that has taken place for a number of years. Although SFC has reduced the total quantity of material discharged from the site, the inspector noted that this practice is not consistent with the ALARA concept in limiting releases. When questioned, licensee representatives indicated that SFC had not reviewed other alternatives to handling or treating waters from these contaminated impoundments. The fact that SFC's waste handling program was not adequate to identify releases from the facility, to demonstrate compliance with 10 CFR 20.106 was an additional example of the apparent violation of 10 CFR 20.201(b). In addition, as denoted in Section 5.2, Chapter 5 of the SFC license renewal application dated August 23, 1985, as

supplemented, SFC committed to an action level of 225 µg/l uranium for environmental water samples. SFC will, for samples exceeding this value, "investigate and take proper mitigating measures if necessary." However, SFC did not investigate and take proper mitigating measures.

In summary, the surface water features at the site indicated that many process related solutions were discharged to unlined waste ponds. These solutions were either lost to the atmosphere by way of evaporation, seeped into the underlying formations, or discharged by way of the combination stream. With the exception of the five ammonium nitrate storage ponds and the four raffinate clarifier basins, the other site storage ponds are poorly isolated from the underlying strata. For the most part, direct hydraulic communication exists between all unlined impoundments, noted in Table 2, and the formations. Because of the geology of the area, it is reasonable to suspect that undetermined quantities of the solution pond contents are continually being released into the underlying strata. These releases indicate a program of solution discharge that has not incorporated the ALARA concept.

As part of the overall site investigation program, SFC recently implemented a surface water runoff investigation program that is designed to determine the quantities of the various constituents that are being transported at the site. Sampling occurred at 20 locations, and analyses were performed for pH, fluoride, nitrate, conductivity, and uranium. The sampling locations are strategically located around the site to isolate small watersheds within the SFC property boundary. This program has sufficient design detail to quantify nonpoint surface water contributions by watershed area and should define potential areas of surface water contamination.

7. Ground-Water and Surface Water Collection

The procedures associated with collection and preservation of environmental samples were reviewed during the inspection. The protocol for collecting samples indicated appropriate attention to detail. New, labeled containers were utilized to collect a representative sample volume for the desired analysis. The inspector observed that both SFC and contract personnel collect ground water and surface water samples and document appropriate information on the chain of custody form. This form and the samples were then taken to the environmental laboratory for analysis.

Although the sample collection and bookkeeping were well documented, the inspector noted that the SFC training merely consisted of on-the-job training. Although this training is appropriate, this alone might not ensure that SFC personnel are appropriately and uniformly trained for these tasks. The inspectors noted that SFC had not developed a list of standard elements to be included in this training nor a documentation process that indicated that all elements were completed for each individual involved in this program.

The inspector also reviewed laboratory procedures associated with sample preservation, preparation and analysis. These procedures indicated that standard methods were utilized. It was noted that Environmental Laboratory Procedure SOP-1, "Aqueous Sampling Receiving and Preparation," required that samples be filtered prior to analysis. This procedure also incorporated a chain-of-custody form that had been revised and was no longer used. Although SFC (correctly) did not filter the environmental ground-water samples, a procedure was not in place that accurately described the sample preparation technique nor utilized the correct chain-of-custody form. This situation was brought to the attention of the Manager, Environmental who committed to appropriately revising the procedure.

The inspector found the environmental laboratory orderly, clean, and well maintained. The flow of samples through the facility was well documented. Laboratory analysis techniques were well chosen, and documented for the desired analysis. The inspector noted that SFC did not use outside laboratories for quality control checks, but did run blanks and spikes with many of the routine environmental samples. Although verifying lab results with blanks and spikes is appropriate, it alone may not adequately demonstrate the accuracy of sample analysis. A quality control check would still be appropriate for occasional checks on SFC's environmental laboratory's analyses.

Following analysis, samples having uranium concentrations in excess of 225 ug/l action level were returned to the facility to be discarded. Those samples with uranium in concentrations less than the 225 ug/l action level were discarded into the laboratories waste sink which discharges to a holding tank and a leach field. Because there was no data available on the uranium concentrations in the holding tank or the leach field, and because the potential exists for concentrations of licensed materials above regulatory limits, this item was noted as an unresolved item (40-8027/9007-02).

8. Information Available to SFC Regarding Environmental Contamination Under the Main Process Building

In September, SFC began an internal review, with their senior employees and of their files, to review pertinent information related to the subfloor process monitor and contamination under the main process building. In order to determine the extent of previous knowledge which existed concerning the subfloor process monitor, an inspector reviewed representative historical operations logs for the uranium trioxide area. References to the well were found between 1983 and 1987, with the majority of the references occurring in 1987. The references indicated that the well was pumped regularly, with volumes pumped ranging from 1 quart to 4 gallons. The majority of the references in 1987 were made by a particular operator who provided a complete summary of activities which

occurred on his shift. Discussions with licensee personnel indicated that it was assumed that pumping was regularly conducted by operators following installation of the well in the mid-1970's, although the quality of the documentation depended on the individual operator.

Inspector interviews with senior SFC employees indicated that many employees were aware that the ground under the solvent extraction and main process buildings was contaminated. Problems with the integrity of the floors in the solvent extraction building and in the digestion and boildown areas in the main process building were recognized many years ago. In the middle 1970's, the licensee repaired and placed stainless steel over the floors in the digestion and boildown areas to prevent future degradation. However, the fact that past operations had allowed process liquids that were on the floor to seep into the ground underneath both buildings was well known.

An SFC engineer showed an inspector a November 12, 1986, copy of a memorandum that indicated that a high concentration of uranium in the ground was believed to be leaking into the cooling water system piping. The memorandum noted that "Samples of ground-water process areas indicate that high concentrations of uranium have been present in the past." Also, the memorandum noted that "the plant is built on a layer of sand which is quite permeable and allows migration of any soluble materials."

Therefore, it appears that SFC had substantial knowledge about the potentially elevated uranium levels in the ground under and around the solvent extraction and main process buildings. This was available through the knowledge of its employees and verified by historical files.

9. Exit Meetings

On Friday, November 16, 1990, and on Friday, January 18, 1991, an inspector conducted exit interviews after inspecting the environmental protection program at SFC. Issues related to compliance with the Order and other findings were discussed with SFC managers.

Table 1

Well No.	Area Monitored	Quality of data	Well Completion Date	Date Completed	Log Available	T.O. (feet)
270-1	270 fert. area	good	yes	5/8/79	yes	80.0
270-2	270 fert. area	good	yes	5/8/79	yes	30.0
270-3	270 fert. area	good	yes	5/8/79	yes	25.0
RHM-1	Rabbit Hill fert. area	good	yes	4/25/82	yes	51.0
RHM-2	Rabbit Hill fert. area	good	yes	4/23/82	yes	50.0
RHM-3	Rabbit Hill fert. area	good	yes	4/21/82	yes	50.0
RHM-4	Rabbit Hill fert. area	good	yes	4/28/82	yes	50.0
RHM-5	Rabbit Hill fert. area	good	yes	4/21/82	yes	50.5
RHM-6	Rabbit Hill fert. area	good	yes	4/13/82	yes	50.0
RHM-7	Rabbit Hill fert. area	good	yes	4/20/82	yes	50.0
2301A	R.A. north	good	yes	11/25/86	yes	10.7
2301B	plugged	-	-	plugged	-	-
2302A	plugged	-	-	plugged	-	-
2302B	plugged	-	-	plugged	-	-
2303A	plugged	-	-	plugged	-	-
2305*	Pond #2	poor	no	-	no	38.8
2306*	R.A. south	poor	no	-	no	39.0
2310*	R.A. north	poor	no	10/7/76	no	25.4
2311*	R.A. east	poor	no	11/09/82	no	24.0
2312*	R.A. east	poor	no	10/7/76	no	21.8
2313*	Pond #2	poor	no	04/7/77	no	22.0
2314*	Pond #2	poor	no	04/7/83	no	25.1
2315*	R.A. northwest	poor	no	-	no	37.0
2316*	Pond #2	poor	no	-	no	39
2317*	Pond #2	poor	no	04/7/77	no	19.8
2318*	Pond #2	poor	no	04/7/77	no	20.1
2319*	Pond #2	poor	no	04/7/77	no	23.5
2322-A	raf. ponds	good	yes	04/03/85	yes	32.0
2325*	Pond #2	poor	no	02/7/82	no	21.9
2326*	Pond #2	poor	no	02/7/82	no	15.1
2327	Pond #2	good	yes	02/02/82	yes	27.3
2328	Pond #2	good	yes	02/02/82	yes	28.0
2329	Pond #2	good	yes	02/02/82	yes	23.0
2330	Pond #2	good	yes	02/02/82	yes	22.0
2338	Pond #2	good	yes	01/25/84	yes	29.0
2339	Pond #2	good	yes	01/26/84	yes	20.0
2340A	raf. ponds	good	yes	11/13/85	yes	16.5
2341	raf. ponds	good	yes	04/04/85	yes	20.0
2342	raf. ponds	good	yes	04/02/85	yes	40.0
2343	raf. ponds	good	yes	06/14/85	yes	40.0
2344	raf. ponds	good	yes	04/02/85	yes	23.0
2345	raf. ponds	good	yes	11/12/85	yes	30.0
2346	raf. ponds	good	yes	11/13/85	yes	23.0
2347	raf. ponds	good	yes	11/18/85	yes	28.2
2348	raf. ponds	good	yes	11/13/85	yes	30.8
2349	raf. ponds	good	yes	11/14/85	yes	25.1
2350	raf. ponds	good	yes	11/19/85	yes	26.4
2351	raf. ponds	good	yes	06/17/86	yes	50.1
2352	raf. ponds	good	yes	06/17/86	yes	48.5
2353	raf. ponds	good	yes	06/12/86	yes	54.0
2354	raf. ponds	good	yes	06/12/86	yes	52.0
2355	raf. ponds	good	yes	06/11/86	yes	54.0
2356	raf. ponds	good	yes	06/10/86	yes	52.9

Table 1 (cont.)

Well No.	Area Monitored	Quality of data	Well Completion Date	Date Completed	Log Available	I.D. (feet)
FIP 28	ref. ponds	good	yes	11/11/85	no	-
F-1*	R.A. south	none	no	-	no	-
F-2*	R.A. south	none	no	-	no	-
F-3*	R.A. south	none	no	-	no	-
I-1*	Pond #2	none	no	04/ 7/77	no	22.4
I-2*	Pond #2	none	no	04/ 7/77	no	23.6
I-4	Pond #2	good	yes	09/28/83	no	23.0
I-5	Pond #2	good	yes	05/09/79	yes	25.0
ED-1	Pond #2	fair	no	09/30/76	yes	51.0
ED-5	R.A. west	fair	no	10/05/76	yes	49.5
ED-8	R.A. west	fair	no	10/11/76	yes	50.0
ED-10	R.A. west	fair	no	10/18/76	yes	51.0
ED-11	Pond #2	poor	no	-	no	41.5
M-1	Pond #2	fair	no	10/22/76	yes	27.0
M-2	Pond #2	fair	no	10/20/76	yes	26.0
M-3	Pond #2	fair	no	10/20/76	yes	26.0
M-4	Pond #2	fair	no	10/19/76	yes	28.0
M-5*	Pond #2	poor	no	06/ /74	no	22.0
M-6*	Pond #2	poor	no	06/ /74	no	22.0
M-7*	Pond #2	poor	no	06/ /74	no	15.0

*Data for these wells taken from list compiled by SFC on 01/22/87.

R.A. = Restricted Area

- = data item not available

7 = actual date unknown

Table 2

Impoundment	Lining	Capacity	Estimated Inventory (1000 ft ³)		Sludge Composition	Discharge To	Water Composition	Leaking ^a
			Sludge Vol.	Liquid Vol.				
NO. 1 BASIN	none	133.3	50.0	1.0	* 4 g/l/u	Comb. stream	20 int	unknown
NORTH DITCH/ EMERGENCY BASIN	none	12.5	2.3	6.0	* 0.6 g/l/u	Comb. stream or No. 1 Basin	20 int	unknown sludge
SANITARY LAGOON	none	128.8	14.0	114.8	12495 ug/g	Sewage treatment	5 int	suspected
RAFFINATE CLARIFIER A1	clay and hypalon	336.0	1.0	292.6	* 22 pCi/g Ra-226 *5060 pCi/g Th-230 <270 pCi/g U	Raffinate Clarifier A	150- 200	yes
RAFFINATE CLARIFIER A2	clay and hypalon	336.0	135.0	192.0	* 22 pCi/g Ra-226 *5060 pCi/g Th-230 < 270 pCi/g U	Raffinate Clarifier A4	100 int	yes
RAFFINATE CLARIFIER A3	clay and hypalon	336.0	0.8	289.4	* 22 pCi/g Ra-226 *5060 pCi/g Th-230 < 270 pCi/g U	Pond 3E or 3W	300 int	yes
RAFFINATE CLARIFIER A4	clay and hypalon	336.0	208.0	22.0	* 22 pCi/g Ra-226 *5060 pCi/g Th-230 < 270 pCi/g U	Clarifier A1	150- 200 int	yes

Table 2 (cont.)

Impoundment	Lining	Capacity	Estimated inventory (1000 ft ³)			Discharge To	Water Composition	Leaking ^a
			Sludge Vol.	Liquid Vol.	Sludge Composition			
RAFFINATE Pond #2	clay	2963.0	487.0	1410.0	* 22 pCi/g Rn-226 * 5060 pCi/g Th-230 < 270 pCi/g U	Clarifier A1 Clarifier A3	100-200 100	yes
FLUORIDE SLUDGE SETTLING BASIN #1	none	46.8	29.3	10.7	* 740 pCi/g U	Fluoride Clarifier	35 + rainfall	unknown
FLUORIDE SLUDGE SETTLING BASIN #2	none	46.8	40.0	1.0	* 740 pCi/g U	Fluoride Clarifier	35 + rainfall	unknown
FLUORIDE CLARIFIER	none	102.1	20.0	82.1	* 740 pCi/g U	Comb. stream	35 - rainfall	unknown
FLUORIDE RETENTION BASIN #4	none	69.0	59.0	3.5	* 740 pCi/g U	Pump off rain water to fluoride basins 1 and 2	int	suspected
FLUORIDE SLUDGE HOLDING BASIN #1	none	186.8	171.4	9.0	* 740 pCi/g U	Pump off rain water to fluoride basins 1 and 2	int	unknown
FLUORIDE SLUDGE HOLDING BASIN #2	clay	201.0	186.0	1	* 740 pCi/g U	Fluoride basin #1 or #2	50 int	suspected
POND 4	clay and hypalon	2235.0	1123.0	0	* 22 pCi/g Rn-226 * 5060 pCi/g Th-230 * 270 pCi/g U	Sludge de- watering	100-300 int	no

Table 2 (cont.)

Impoundment	Lining	Capacity	Estimated Inventory (1000 ft ³)			Discharge To	Water Composition	Leaking ^a
			Sludge Vol.	Liquid Vol.	Sludge Composition			
POND 3E	clay and hypalon	2166.0	0	902.0	?	Land Application	int	no
POND 3W	clay and hypalon	2213.0	0	1340.0	?	Land Application	int	yes
POND 5	clay and hypalon	2178.0	0	1464.0	?	Land Application	int	no
POND 6	clay and hypalon	2142.0	0	20	?	Land Application	int	yes
DECORATIVE (Fish Pond)	none	75.0	0	75.0	?	Comb. stream	50 int	unknown

^a - level based upon limited data base