ENCLOSURE 1

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

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Licensee:	Fansteel Incorporated
Facility:	Muskogee Plant
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Attachment:	Supplemental Inspection Information

EXECUTIVE SUMMARY

Fansteel Incorporated Muskogee Plant
NRC Inspection Report 40-7580/99-01

Inspection Scope

The Fansteel facility had been shutdown since 1989. It was redesigned and reconstructed from 1996 through 1998, and facility operations was authorized to restart on March 15,1999. During the period from 1996 to present the licensee had committed to numerous regulatory requirements that would allow the Fansteel project to conduct the following operations: source material recovery, rare metals recovery, radioactive byproduct volume reduction, groundwater remediation, and site remediation. This inspection examined the licensee's operational readiness to implement this proposed long term decommissioning strategy known as the work-in-progress (WIP) material reprocessing project.

The objectives of this inspection were as follows:

(1) To determine if Fansteel was in compliance with their license conditions and commitments for reprocessing and handling radioactive material (RAM).

(2) To assess Fansteel's chemical process safety operational readiness review (ORR), verify that the licensee had implemented acceptable safety significant dominant risk controls, and ensure that these controls were available, reliable, and would perform as designed and/or intended during normal and off-normal operations.

(3) To determine if potential chemical hazards existed that could adversely impact the confinement and safe handling of RAM.

(4) To assess Fansteel's response to and planned recovery from the June 1, 1999, tornado damage.

The inspectors used a risk-informed performance-based approach in conducting this inspection. The inspectors focused on the safety significant functions, activities, equipment, and controls required for startup operations of the new WIP/calcium fluoride (CaF_2) residue process circuit. Other areas inspected included site construction, management organization and controls, operations, site radiation safety, radioactive waste management, groundwater cleanup, and environmental protection programs.

Inspection Findings

- During the week of April 23, 1999, the NRC conducted an inspection of Fansteel's initial operations. The NRC found that Fansteel was not ready to operate as noted by the findings summarized below. The NRC found that corrective actions were needed prior to Fansteel receiving on site any additional high risk bulk chemicals (i.e., anhydrous ammonia, sulfuric acid, phosphoric acid, sodium hydroxide and hydrochloric acid) or introducing any of these chemicals into the residue process. Additionally, the NRC

found that corrective actions were needed for the facility particulate stack monitoring and analysis program (Sections 2 and 4).

- During the week of May 24, 1999, the NRC reinspected Fansteel to determine if corrective actions that Fansteel committed to in a May 3, 1999, letter to the NRC and that were identified in a license amendment dated May 20, 1999, were sufficiently implemented to allow the Fansteel facility to restart reprocess operations. The NRC concluded that licensee corrective actions were appropriate and thorough and that Fansteel was ready to continue Phase 1 operations for the production of cryolite. Licensee management agreed to contact the NRC prior to beginning Phase 2 operations which will use high risk bulk chemicals to extract uranium, thorium, columbium, tantalum, and other compounds (Sections 2 and 4).

- On the evening of June 1,1999, the Fansteel facility received tornado damage. The NRC dispatched an inspector to determine if radioactive material was safe and secure and to assess the licensee's damage recovery efforts. The inspector concluded that the licensee's response and planned recovery efforts were adequate. Operations were not scheduled to resume until July 1999 (Section 5).

- As a result of the inspection, two Non-Cited Violations (NCVs), two Inspection Followup Items (IFIs), and three Unresolved Items (URIs) were identified. An Unresolved Item is a matter about which more information is required to determine whether the issue in question is an acceptable item, a deviation, a nonconformance, or a violation.

Management Organization and Controls, Hazard Identification and Assessment, Operations Review, Training, Standard Operating Procedures, Decommissioning of Fuel Cycle Facilities, and Construction Review

- No changes had been made to the organizational structure since the last inspection. It appeared that adequate oversight had been provided for the current mode of site operations (Section 2).

- During the April 19 - 23 ORR, the licensee did not adequately implement or demonstrate the availability, reliability, and effectiveness of the Final Hazard Analysis Report (FHAR) identified safety significant dominant risk controls for the tank farm and WIP/CaF_2 process operations. However, during the May 24 - 28 Phase I follow-up ORR, the licensee did demonstrate adequate implementation of these controls, as well as their availability, reliability, and effectiveness (Section 2).

- During the April 19 - 23 ORR, the licensee did not adequately implement, use, or maintain written standard operating procedures (SOP), including alarm response procedures, or train their workers/operators in the effective use of SOPs applicable to their areas of responsibility. However, during the May 24 - 28 Phase I follow-up ORR, the licensee did demonstrate adequate implementation, use, and change control maintenance of written SOPs, including alarm response procedures. Operators also demonstrated their understanding and knowledge in the effective use of the SOPs, as well as, alarm response action steps for process upset conditions (Section 2).

- Based on the April 1999 inspection, radiation protection procedures were found insufficient for the scope of work being conducted at the site. However, during the May 1999 reinspection, the licensee demonstrated that they had improved the radiation protection SOPs sufficiently to proceed with operations (Section 2).

- The licensee had reviewed NRC Information Notice 96-70, "Year 2000 Effect on Computer Software," and had taken steps to assure that Fansteel's process operations computers were Year 2000 compliant (Section 2).

Radiation Protection

- The licensee had implemented a radiation protection program that met requirements established in 10 CFR Part 20 and the license (Section 3).

- Although there was some room for improvement in the licensee's control of radiation survey instruments and the timeliness of processing air samples, the inspector determined that the licensee radiation survey instrumentation capabilities and air sampling program met requirements (Section 3).

- The use of an approved action level for airborne activity which is greater than the site specific Derived Air Concentration (DAC) was identified as an Unresolved Item pending resolution of the inconsistency in the license by the NRC (Section 3).

- Site fences were secure and in good condition, and perimeter postings were appropriate (Section 3).

- The inspector found that routine surveys and personnel monitoring records were adequately maintained by the licensee (Section 3).

Radioactive Waste Management and Environmental Protection

- A review of the licensee's environmental monitoring and radioactive waste management programs in April 1999 indicated that the licensee was not appropriately conducting air effluent monitoring. However, by the May 1999 followup inspection, the licensee had appropriately changed the site effluent point of compliance from the plant stack to the site fence line (Section 4).

- The inspectors found that licensee's plant emission was in excess of the site-specific stack discharge concentration action level without processing RAM. Additionally, the licensee had not demonstrated the quality of plant stack sample analyses. These discrepancies would be reviewed during a subsequent inspection and would be tracked as an inspection followup item (Section 4).

- The licensee expressed their intent to develop and implement a French drain procedure for the groundwater corrective action system when initial testing was completed and to train operators in the procedure (Section 4).

Emergency Preparedness and Emergency Response Procedures

- During the April 19 - 23 ORR, the licensee failed to demonstrate the availability, reliability, and effectiveness of safety significant emergency response dominant risk controls, such as chemical release detectors, containment devices, and spill kits. Also, the licensee failed to develop and implement the emergency response kit locator map which would facilitate responding to a chemical event. However, during the May 24 - 28 Phase I ORR, the licensee did demonstrate the availability, reliability, and effectiveness of these controls and had developed and implemented the emergency response kit locator map (Section 5).

- The NRC determined that the question regarding whether, as a result of the tornado damage, NRC reporting requirements of 10 CFR 40.60 or 10 CFR 20.2202 were met would be tracked as an Unresolved Item (Section 5).

- Large bags containing radioactive material in storage in the sodium reduction building were damaged by the tornado. The licensee had not specifically labeled or quantified the amount of radioactivity in each bag of RAM or determined whether the bags required labeling in accordance with 10 CFR 20.1904. The NRC determined that this matter concerning labeling containers of RAM would be tracked as an Unresolved Item pending additional information from the licensee concerning the quantity of RAM stored in the bag containers in the sodium reduction building (Section 5).

- The inspector determined that the licensee's tornado recovery efforts were adequate. The licensee was evaluating whether the tornado event was reportable pursuant to to 10 CFR 20.2202, 10 CFR 40.60, and the license, Part I, Section 2.6 (Section 5).

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Report Details

1 Site History, Status, and Strategy

1.1 Site History

Fansteel's Muskogee plant had been in the rare metals extraction business from 1958 to 1989 when operations ceased. Fansteel produced tantalum and columbium metals that were extracted from uranium ore, thorium ore, and tin slag feedstock using an acid digestion process. The extracted metals were made into ingots, bars, powder, alloys and compounds to be used as feed material for other Fansteel operations throughout the United States. Since 1967, this rare metals extraction facility had operated with either an Atomic Energy Commission or NRC license because of the amounts of radioactive waste (naturally occurring and technically enhanced uranium and thorium ore residues) generated from the process. There is approximately 4.7 million cubic feet of radioactive waste residue in ponds and 0.6 million cubic feet of contaminated soil at the site. Most of the remaining tantalum and columbium feedstock material that contained valuable metals and reconcentrated radioactivity (uranium and thorium) was stored in Pond 2 and Pond 3. The Ponds 2 and 3 residues represent 10,250 metric tons of radioactive material to be reprocessed. Additionally, 500 metric tons of radioactive material from former Ponds 1, 4, and 5 and contaminated soil were contained in barrels and bags that were stored in the sodium reduction building. The concentrated uranium and thorium radioactive waste and byproduct material at the site continues to require licensing by the NRC as "source material," per 10 CFR Part 40.

From 1989 through August 1996 Fansteel conducted limited site remediation and decommissioning of selected site areas and completed the site radiological characterization. In August 1996, the NRC released for unrestricted use approximately 40 acres (Northwest property) and removed the property from the license by amendment.

1.2 Licensee's Decommissioning Strategy

This inspection included assessing the status of the licensee's proposed long term decommissioning strategy to operate the facility for at least 10 years. This strategy known as the WIP material reprocessing project will include uranium and thorium recovery, rare metals recovery processing, radioactive waste volume reduction, and site remediation operations.

Fansteel has been placed under the NRC's Site Decommissioning Management Plan (SDMP). As a SDMP site, Fansteel's decommissioning strategy is to reprocess onsite source material for at least 10 years to reduce the volume of radioactive waste on site. On July 6, 1998, the licensee submitted to the NRC for approval the Fansteel Decommissioning Plan pursuant to 10 CFR 20.1401(b)(3), 10 CFR 40.42(g)(4), and License Condition 25. By license application dated January 25, 1995, Fansteel requested a license amendment authorizing processing of onsite residues for recovery of precious metals. The application described the construction and operation of a facility

designed to reprocess onsite licensed material. This material contains moderate concentrations of natural uranium and thorium (source material) and is designated as work-in- progress (WIP) material. The additional processing will recover rare metals, uranium and thorium, and will reduce the total volume of waste associated with the WIP material reprocessing. The application also discussed radioactive groundwater collection and remediation. Fansteel also requested approval to recover calcium fluoride (CaF_2) from existing onsite waste treatment Ponds 6-9 and onsite disposal of contaminated soils. On March 25, 1997, the NRC authorized Fansteel to proceed with the WIP project and install a French drain groundwater remediation system. On December 18, 1997, the NRC issued License Amendment No.1 which authorized the licensee to reprocess wastewater treatment residues that are located in Ponds 6-9.

On March 15, 1999, the NRC issued License Amendment No. 4 which removed several license conditions (LC) that restricted Fansteel from starting residue recovery operations. As a result of the April 1999 ORR inspection findings, the licensee submitted a license amendment request on May 10, 1999, to remove the ISORE and FHAR as license requirements. The licensee also requested that Part I of the license be modified. Additionally, the licensee requested approval to relocate the airborne release compliance point from the plant stack to the site fence monitors. On May 20, 1999, the NRC issued License Amendment No. 5 pertaining to the above request, and the NRC reinspected the Fansteel operation the following week.

1.3 Site Activities

Since the previous inspection in August 1998, licensee activities have included the following:

- Construction of the WIP reprocessing plant in chemical building A and chemical building C (Chem-A and Chem-C).

- Cold startup testing of the WIP system which began early in 1999.

- On April 1, 1999, Fansteel began reprocessing CaF_2 sludge that contained uranium and thorium residues with an estimated gross alpha and gross beta radioactivity concentration 100 picocuries/gram (pCi/g) to 690 pCi/g. Additionally, the licensee processed some WIP material that may have contained up to 7000 pCi/g radioactivity.

- Completion of the French drain groundwater corrective action system on April 23, 1999, and initial operations in May 1999.

Routine site activities by plant personnel included personnel training, maintenance of the sample stations, radiological surveys, groundwater sampling, small equipment/material decontamination, laboratory work with WIP material, building and grounds maintenance, testing and construction of the WIP/CaF_2 reprocessing plant, and the initial startup of the reprocessing plant using CaF_2 material.

2 Management Organization and Controls (88005)
Hazard Identification and Assessment (88507)
Standard Operating Procedures (88058)
Decommissioning of Fuel Cycle Facilities (88104)
Construction Review (88001)

2.1 Inspection Scope

Fansteel's organization structure and management controls were reviewed to ensure that the licensee had established a staff and programs with defined responsibilities and functions, as required by LCs 10,12,14, and 16, Part I of the license, and 10 CFR Parts 19, 20, and 40. Of particular interest during this inspection was the implementation of the licensee's Integrated Safety Operations, Radiation Safety, Emergency Planning Manual (ISORE) and Final Hazards Analysis Report (FHAR).

One objective of this inspection was to verify the adequacy of the licensee's FHAR to assure that the FHAR included the entire inventory of bulk process chemicals and their on-site locations. A second objective was to verify that the FHAR had addressed all credible process related upset conditions and/or accident scenarios, and identified the dominant risk controls that are relied on to prevent and/or mitigate safety significant risks and potential consequences for Phase I operations. These controls are relied on to prevent and/or mitigate safety significant risks and potential consequences to the Fansteel facility workers, the surrounding public, and the environment.

A third inspection objective was to verify the availability, adequacy, implementation, and use of written SOPs for all applicable operations, including written alarm response procedures, as well as, worker/operator training in the SOPs applicable to their areas of responsibility. These safety significant dominant risk controls are relied on to allow the operators to perform all modes of operation in a safe manner, and to be able to effectively respond to alarm conditions, thereby, preventing or mitigating industrial, chemical, and radiological hazards to themselves, facility workers, the surrounding public, and the environment.

2.2 Observations and Findings

a. Fansteel Site Organization

The organization structure had not changed since the previous inspection. Fansteel's site organization is described in the Radiation Safety Manual (RSM) contained in the renewal application. Section 2.0, "General Organizational Administrative Requirements," of the license and Figure 1 of the RSM states that within Fansteel's site organization a single person may hold more that one position at a time. For example, the general manager also held the positions of plant safety director (PSD) and alternate plant radiation safety officer (APRSO) during the April 1999 inspection. The current site staff consisted of the 26 Fansteel employees and 30 contract personnel. The site management, administrative, and technical staff consisted of several temporary/contract employees onsite including process engineers, a radiation safety technician, chemist,

operations personnel, and site security officer. Additionally, the Fansteel Corporate Vice-President and other officials from the Chicago, Illinois Corporate Office were onsite during the April 1999 inspection.

The site management staff included the general manager, process engineering manager, plant secretary, plant radiation safety officer (PRSO), operations manager, and PSD. The operations staff included process operation crews and mining operations crews. Each crew had a crew leader. Inspectors determined that the licensee's Radiation Safety Committee (RSC) included process engineering and operations personnel along with the standing members of the RSC who were the site general manager, PSRO, PSD, and operations crew leader. The inspector noted that the RSC had convened routinely since the startup of the facility.

The PRSO also served as the utility [maintenance] supervisor, and the corporate manager also served as the alternate PRSO. During this inspection, inspectors noted that the PRSO did not have an established maintenance program for repairing or recalibrating radiation detection equipment. The licensee was using contract equipment and contract radiation protection personnel during the facility startup. Inspectors also noted that while most of the processing equipment and instrumentation were new, the licensee had made repairs and modifications to components without written procedures or controls. When the inspectors asked the plant manager to explain Fansteel's lack of an established maintenance program the manager stated that they would repair equipment as specified by the manufacturers and adopt a "Replacement in Kind" equipment program pursuant to 29 CFR 1910.119.

During this inspection, the radiation protection staff consisted of the PRSO, alternate plant radiation safety officer, radiation safety technician, contract health physicist, contract radiation safety technician, and a radiation safety technician-in-training. Inspectors noted that the contract radiation safety technician and the contract health physicist were leaving the site in April 1999. The inspector determined that the current radiation protection staffing level met requirements.

b. Management Controls

(1) Hazards Assessment

April 19 - 23, 1999, Inspection

The inspectors focused on the chemical tank farm loading, storage, process feed operations, and the WIP/CaF_2 sulfation process which were in initial operations during the course of the inspection. The inspectors conducted a system walk-down of the process piping, equipment, instrumentation, and controls to verify the following:

(a) The FHAR accurately addressed the entire inventory of the WIP/CaF_2 process chemicals, and comprehensively identified and analyzed process upset conditions and/or accident scenarios for the as-built conditions and operations; and

(b) The availability, reliability, and effectiveness of the FHAR identified dominant risk controls to perform as designed and/or intended to prevent and/or mitigate safety significant risks and potential consequences.

In walking-down the in-process operations and through discussions with the Fansteel operations manager and lead process engineer, the inspectors verified the following:

(a) The FHAR adequately addressed the tank farm loading, storage, and process feed operations, and the WIP/CaF_2 sulfation process. Since other residue recovery circuits were in the construction and assembly phase, the inspectors concentrated on the in-process operations. However, the inspectors did review and discuss process flow diagrams, piping and instrumentation drawings, process descriptions, process parameters, process equipment, maintenance programs, SOPs, and operator training for the non-operating circuits, to verify safety basis completeness and accuracy as identified and credited in the FHAR; and

(b) That FHAR safety significant dominant risk controls relied on to prevent and/or mitigate accidents were not adequately implemented, and in some cases did not exist, such as:

- Tank farm local level monitoring devices and indicators;
- Acid/water density checks on incoming bulk chemical feedstock;
- Emergency response procedures and spill kits;
- Scrubber system caustic low-flow indicator;
- Implementation of written SOPs and operator training; and
- The development and implementation of a formalized maintenance program for critical safety equipment.

The inspectors also identified to Fansteel management that these same safety significant dominant risk controls were documented within the FHAR as recommended corrective actions by the licensee's FHAR evaluation team. These findings demonstrated the licensee's failure to implement safety significant dominant risk controls for the tank farm and WIP/CaF_2 process operations and to ensure their availability, reliability, and effectiveness.

May 24 - 28, 1999, Phase I Follow-up Inspection

The inspectors focused on the commitments identified in the May 3, 1999, letter for Phase I operations, specifically, implementation of controls identified in the FHAR. Phase I operations included the chemical tank farm loading, storage, and process feed operations, the WIP/CaF_2 sulfation process, and the off-gas scrubber system. The

inspectors conducted a system walk-down of the process piping, equipment, instrumentation, and controls to verify the following:

(a) The FHAR accurately addressed the entire inventory of the Phase I process chemicals, and comprehensively identified and analyzed process upset conditions and/or accident scenarios for the as-built conditions and operations; and

(b) The availability, reliability, and effectiveness of the FHAR identified dominant risk controls to perform as designed and/or intended to prevent and/or mitigate safety significant risks and potential consequences.

In walking-down the Phase I operations and through discussions with the Fansteel operations manager, PSD, PRSO, and lead process engineer, the inspectors verified the following:

(a) The FHAR adequately addressed the entire inventory of the Phase I process chemicals, and comprehensively identified and analyzed process upset conditions and/or accident scenarios for the as-built conditions and operations; and

(b) The FHAR safety significant dominant risk controls relied on to prevent and/or mitigate accidents were adequately implemented and tested (where applicable). Specific examples included:

- Tank farm local level monitoring devices and indicators;
- Acid/water density checks on incoming bulk chemical feedstock;
- Emergency response procedures and spill kits;
- Calciner scrubber system caustic low-flow indicator;
- Paddle dryer dedicated scrubber system and containment dike;
- Emergency power supply to critical safety equipment;
- Emergency shutdown controls;
- Implementation of written SOPs and operator training in their unit specific operating areas; and
- Development of a formalized maintenance program for critical safety equipment (implementation should be verified after Phase I operations are demonstrated and tested).

(2) Standard Operating Procedures

(a) Regulatory Requirements

As of April 1999, LC 16 required the RSC to review operating procedures for adequacy every two years. Part I, Section 2.4 of the license stated that Fansteel operates under a set of operating procedures to facilitate protection from radiological hazards. Item 8 of the license application states that specific training is held as new or different procedures are introduced. Based on License Amendment No. 5, dated May 20, 1999, LC 16 was deleted. However, Part 1, Sections 2.4 and 4.0, currently state, in part, that the Fansteel plant operates under a set of SOPs. Plant written procedures shall be reviewed, revised, and, approved by the RSC, then implemented in the plant.

(b) Process Operations: Procedures and Training

April 19 - 23, 1999, Inspection

The inspectors focused on the chemical tank farm loading, storage, and process feed operations, and the WIP/CaF2 sulfation process, which were operational during the course of the inspection. The inspectors reviewed the applicable SOPs and conducted a system walk-down of the in-process operations to verify the following:

- SOPs were up-to-date and reflected current plant practices, design and operating conditions;
- Operators were trained in SOP use for all modes of operation, including alarm response and effectively demonstrated understanding and knowledge;
- SOPs included safe operating limits and consequences of deviation;
- SOPs included the FHAR identified safety significant dominant risk controls that are relied on to safely control all process operating modes;
- SOPs were adequately maintained for accuracy and completeness with respect to actual operating and design conditions, and that a program was in place to adequately review and approve changes to the SOPs; and the actual use of SOPs by the Fansteel operations staff.

In walking-down the in-process operations and through discussions with the Fansteel plant manager, PSD, and operations manager, the inspectors verified the following:

- Fansteel operations manager, crew leaders, and process operators were not trained in SOP use; therefore, they were not required to demonstrate understanding and knowledge of the in-process operations;

- A bulk chemical storage SOP was not used when Fansteel operators conducted truck unloading operations for 6,000 gallons of sulfuric acid (H_2SO_4) and 12,000 gallons of sodium hydroxide (NaOH);

- The WIP/CaF_2 sulfation SOP for conducting the in-process CaF_2 operations was not being used;

- SOPs were not being reviewed and updated to reflect current plant practices, and design and operating conditions;

- Alarm response procedures (Alarm Checkout Sheet) to allow operators to immediately, effectively, and safely respond to alarm conditions did not exist; and

- There was no program in place to adequately maintain SOPs current, accurate, and complete, to ensure that operations could be carried out in a safe manner.

These findings demonstrated the licensee's failure to: (1) implement, use, and maintain written SOPs for all applicable process operations, including alarm response procedures; and (2) train all workers and operators in the effective use of SOPs applicable to their areas of responsibility, so that high-risk chemical operations can be performed and controlled in a safe manner.

May 24 - 28, 1999, Phase I Follow-up Inspection

The inspectors focused on the commitments identified in the May 3, 1999, Fansteel letter for Phase I operations, specifically, implementation of written SOPs, including alarm response procedures, and worker and operator training in use of SOPs applicable to their areas of responsibility. The inspectors reviewed the applicable SOPs, conducted a system walk-down of the Phase I operations, and conducted interviews with seven operators (three sulfation and four tank farm) to verify the following:

(a) SOPs were up-to-date and reflected current plant practices, and design and operating conditions;

(b) Operators were trained in SOP use for all modes of operation, including alarm response, and effectively demonstrated their understanding and knowledge;

(c) SOPs included safe operating limits and consequences of deviation;

(d) SOPs included the FHAR identified safety significant dominant risk controls that are relied on to safely control all process operating modes;

(e) SOPs were adequately maintained for accuracy and completeness with respect to actual operating and design conditions. A program was in place to adequately

review and approve changes to the SOPs; and the actual use of SOPs by the Fansteel operations staff.

In walking-down the Phase I operations and through discussions with the Fansteel operations manager, PSD, PRSO, lead process engineer, and operations staff, the inspectors verified the following:

(a) Fansteel operations manager, crew leaders, and process operators were adequately trained in SOP use, and were able to demonstrate their understanding and knowledge of the Phase I operations, as well as, alarm response action steps for process upset conditions;

(b) SOPs were being reviewed and updated to reflect current plant practices, and design and operating conditions;

(c) Alarm response procedures (Alarm Checkout Sheet) to allow operators to immediately, effectively, and safely respond to alarm conditions were in-place and adequately addressed Phase I process upset conditions; and

(d) A program was in place to adequately maintain SOP's current, accurate, and complete, to ensure that operations could be carried out in a safe manner.

The inspectors confirmed that change control documentation was in-place, accurate, and complete for the paddle dryer scrubber system process modification.

(3) Staff Radiation Safety Training and Plant Procedures

The licensee's radiation protection training program was reviewed to determine compliance with 10 CFR 19.12 for radiation safety instructions to workers, Sections 2.3 and 3.0 of the license, and Section 4.0 of the RSM, "Training." The RSM requires that all employees receive radiation safety training including temporary and contract employees. A review of 1999 training documents (lesson plans and student test results) indicated that all personnel had been trained and tested in accordance with licensee's RSM and the requirements of 10 CFR 19.12. Additionally, 10 CFR 19.12(a)(1) requires that the licensee keep workers informed on the storage, transfer, and use of RAM. Random interviews with several contractors confirmed the level of the licensee's training program.

Inspectors noted that some workers involved with the CaF_2 material operations were given general radiation safety instructions such as donning anti-contamination clothing, wearing half-face respirators, and wearing personal air samplers. Inspectors found that workers were aware of good radiation protection practices. The licensee's training program met the requirements of 10 CFR 19.12 and the license.

During the April 1999 inspection, the inspector noted that the licensee had not developed an SOP manual for radiation protection or effluent monitoring in support of plant operations. During the inspection, the PRSO wrote a temporary instruction for collecting plant airborne samples. Section 3.2 of the license states that Fansteel will

develop a radiation work permit (RWP) system for areas of the plant that exhibit levels of airborne radioactivity in excess of the licensee's guidelines and areas requiring special shielding and ventilation, extra monitoring, personnel protective equipment, and special work instructions. The inspector noted that the licensee continued to use some procedures and vendor manuals that needed to be updated for the site's current operations. Inspectors determined that licensee's procedures were not sufficient for the scope of work that was being conducted at Fansteel. The PRSO acknowledged the inspector's findings and stated that they were developing SOPs.

During the May 1999 followup inspection, the inspectors found that the licensee had developed a comprehensive set of radiation protection, industrial safety, environmental monitoring, and process sampling SOPs. On June 3, 1999, the inspector observed that the licensee had implemented a special work permit (SWP) program instead of a RWP program. The inspector determined that an SWP program would be an enhancement to the radiation protection program.

(4) Year 2000 Computer Concern

The inspectors reviewed the licensee's onsite computer systems to determine if computers being used for licensed activities were Year 2000 compliant. The licensee had received NRC Information Notice 96-70, "Year 2000 Effect on Computer Software." The inspectors determined that Fansteel's reprocessing plant operations computer system, Distributed Control Software (DCS), was the only computer equipment that needed to be Year 2000 compliant. The licensee provided the inspectors some of the computer software specifications which explained that the DCS had been tested and validated as Year 2000 compliant. The inspector concluded that the operations plant computer was Year 2000 complaint based on reviewing the DCS supplier's information and discussions held with the DCS supplier.

2.3 Conclusions

No changes had been made to the organizational structure. The licensee's staffing met license requirements.

During the April 19 - 23 ORR, the licensee did not adequately implement or demonstrate the availability, reliability, and effectiveness of the FHAR identified safety significant dominant risk controls for the tank farm and WIP/CaF_2 process operations. However, during the May 24 - 28 Phase I follow-up ORR, the licensee did demonstrate adequate implementation of these controls, as well as, their availability, reliability, and effectiveness.

During the April 19 - 23 ORR, the licensee did not adequately implement, use, or maintain written SOPs, including alarm response procedures, or train their workers/operators in the effective use of SOPs applicable to their areas of responsibility. However, during the May 24 - 28 Phase I follow-up ORR, the licensee did demonstrate adequate implementation, use, and change control maintenance of written SOPs, including alarm response procedures. Operators also demonstrated their understanding

and knowledge in the effective use of the SOPs, as well as, alarm response action steps for process upset conditions.

Based on the April 1999 inspection, radiation protection procedures were found insufficient for the scope of work being conducted at the site. However, during the May 1999 reinspection, the licensee demonstrated appropriate radiation protection SOPs.

3 Radiation Protection (83822)

3.1 Inspection Scope

The licensee's radiation protection program, including procedure compliance, internal and external exposure control, records maintenance, security of radioactive material, and radiological surveys, were inspected to determine the licensee's compliance with requirements established in the license and NRC regulations. Part I, Section 3, of the license describes the licensee's radiation protection program.

3.2 Observations and Findings

a. Radiation Work Activities

Inspectors observed operators unload CaF_2 material in Chem-A building feed tanks. Interviews with operators indicated they possessed sufficient knowledge of radiation hazards for their assignments. Adequate protective clothing and contamination control practices were evident. The inspectors observed that workers conducted personal contamination surveys. The inspectors noted that some equipment and vehicles were not being surveyed when leaving the restricted area. However, the inspectors noted that the site's restricted areas, controlled area, and unrestricted area were not clearly defined by the PRSO. According to the PRSO, routine survey results demonstrated, with the exception of the sodium reduction building, that contamination was nonexistent around the site which was consistent with the current state of operations. The PRSO stated that more stringent area controls and free release surveys would be implemented with increased plant operations. The inspector determined that the licensee's contamination control program was adequate.

b. Occupational Exposures

(1) External Exposure Program

The inspector reviewed Fansteel's external radiation controls for compliance with 10 CFR Part 20 and the license. Fansteel's instructions for personnel monitoring of direct radiation using thermoluminescent dosimeters (TLDs) are found in Section 3.3 of

the license. All Fansteel workers that the inspector came in contact with wore TLDs. The inspector concluded that the TLD program was adequate.

(2) Internal Exposure Program

Requirements

The inspector reviewed the licensee's radiation protection program for controlling internal exposures and detecting internally deposited exposures and assuring compliance with 10 CFR 20.1204 and Section 3.5.1 of the license. The inspector determined that Fansteel had evaluated potential airborne radioactivity hazards associated with operating the reprocessing plant. Section 3.5.1 of the license requires the PRSO to conduct the following:

- During the first three weeks of operation, perform continuous, representative sampling of individual's airborne intake of RAM as necessary to demonstrate compliance with 10 CFR Part 20.

- After the first three weeks of baseline air samples are collected, collect representative samples on a weekly basis in areas with a significant potential for airborne contamination in accordance with NRC Regulatory Guide 8.25, "Air Sampling in the Work Place."

The inspectors determined that in order to comply with the above the licensee had to collect air samples and determine if radiological conditions were significant during process operations and when CaF_2 material was being loaded for reprocessing. The PRSO indicated their intent to comply with the above.

Area Airborne Sampling

Discussions with the PRSO and Operations revealed that the licensee collected air samples when workers handled the radioactive CaF_2 sludge during pond excavation and loading the material into the tanks. The inspectors determined that Fansteel's process involved personnel handling and drying significant amounts of radioactive material. Therefore, the potential existed that airborne radioactivity could exceed 10 CFR Part 20, Appendix B, derived air concentration (DAC) values for Th-228 and Th-232. The PRSO acknowledged that Fansteel had not determined the concentrations of airborne radioactive materials in all areas of the process buildings when work involved the potential for significant exposure. However, inspectors noted that the licensee had collected air samples whenever CaF_2 sludge was being handled. The inspectors reviewed the licensee's area air sampling data. The PRSO's area air sample measurements and personnel protective measures demonstrated that worker exposure had not exceeded 10 CFR Part 20, Appendix B, DAC values. According to the area air sampling data collected between March 29 through April 9, 1999, the measurements ranged from 8.68E-15 µCi/ml to 6.79 E-14 µCi/ml for gross alpha. The inspectors found that the area air sample results were comparable to Fansteel's environmental air sample results. The inspectors concluded that the licensee's initial process area air monitoring baseline program was adequate.

Personnel Air Samples

The licensee's site-specific DAC is based on 50 percent of the thorium-232 limit established in 10 CFR Part 20, Appendix B, Table I (1.0E-12 µCi/ml). Section 3.5.1 of the license establishes the licensee's site specific DAC of 5.0 E-13 µCi/ml. The licensee's action level is 7.5E-13 µCi/ml. The use of an approved action level which is greater than the site specific DAC was identified as an inconsistency in the license which would need to be resolved through NRC project management (Fuel Cycle Licensing Branch). Therefore, this matter would be tracked as an Unresolved Item pending resolution of the inconsistency in the license by the NRC (URI 40-7580/9901-01). The inspectors reviewed personal (lapel) air sampling data that had been collected from March 29 through April 9, 1999. The measurements ranged from 5.84E-14 µCi/ml to 7.36 E-13 µCi/ml for a gross alpha.

Section 3.5.1 of the license states that if the action level is exceeded, the PRSO will identify the source and implement suitable corrective measures. These measures will include immediate notification of the plant manager and area supervisor, shutdown and inspection of suspected equipment, and isolation, control, and elimination of the source. The inspector found that the workers who were exposed to the radioactive material had worn half-face respirators during the RAM work. Additionally, the licensee had been attempting to control and eliminate the primary source of the radioactivity. However, a program weakness existed in the personal air sampling program because the licensee had been taking three days to process air samples and receive results, a length of time which would not permit prompt action should airborne levels increase above action levels.

c. Radioactive Material Postings

Site security was provided during regular business hours by a security guard and by site personnel. Access to the site was limited by locked gates during non-business hours to prevent unauthorized access to the facility. The site perimeter fence was noted to be in good condition.

Site tours and observations disclosed that radiological storage areas (Ponds 2 and 3, Chem-A and sodium reduction buildings) were being properly maintained and posted with "Caution, Radioactive Material" signs. Those RAM storage areas were secure and being controlled within the site boundary in accordance with the requirements of 10 CFR 20.1801. Those RAM storage areas displayed proper radiological postings as required by 10 CFR 20.1902. However, during a site tour the inspectors found that the licensee had stored eight 1,000 kilogram bags of process residues and contaminated soil containing uranium and thorium in the Chem-C building. The inspector's radiation surveys indicated that each bag measured approximately 145 microRoentgen/hour (µR/hr) on contact. The inspectors observed that the Chem-C building was not posted with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)." The inspectors notified the PRSO that the Chem-C building was required to be posted in accordance with 10 CFR 20.1902, and the PRSO posted the area promptly. The PRSO explained that it was an oversight that should have been corrected when CaF_2 material

operations began. The inspector determined that this matter was non-repetitive, of minor significance, and is being treated as a Non-Cited Violation consistent with Section VII.B.1 of the NRC Enforcement Policy.

d. Site Radiation and Contamination Surveys

The inspector conducted onsite and offsite radiation measurements with an NRC instrument. Exposure rate measurements conducted by the inspector were in agreement with licensee measurements. The background exposure rate was about 12 µR/hr. Onsite exposure rate levels ranged from 10 µR/hr to 1,000 µR/hr, and the highest measured value was a few feet above Pond No. 3 surface and the sodium reduction building. Area exposure rates around the site have generally remained unchanged over the last 4 years of inspections. Exposure rates at the Fansteel restricted area boundary were less than the limits specified in 10 CFR 20.1301.

Both fixed and loose radioactivity, as well as ambient gamma radiation exposure rates had been measured throughout the site. Smears for loose radioactivity were counted by both portable and laboratory instrumentation. No significant radiation or loose surface contamination levels were encountered within the restricted area. Loose surface contamination surveys did not detect any contamination levels above 200 disintegrations per minute per 100 square centimeters (dpm/100 cm^2). The licensee was noted to have a low threshold (less than 100 dpm/swipe) for performing decontamination of areas exhibiting removable radioactivity.

The inspector reviewed 1999 radiological surveys for radiation, surface activity surveys, and airborne radioactivity samples. The review revealed that the licensee was in compliance with Section 3 of the license and 10 CFR Part 20.

e. Instrument Calibrations and Operations

Section 7 of the Radiation Safety Manual listed the numbers and types of radiation instrumentations that the licensee owns. The inspectors observed radiation survey equipment around the facility. The licensee's instrumentation did not have current calibration stickers affixed in some cases. A review of the licensee's calibration procedures and calibration sources was conducted. Calibration records, frequency of calibrations, and methodologies were found to be in agreement with industry recommendations and license conditions. Inspectors found that some radiation detection instruments located in the plant and radiation protection laboratory were not operating effectively and were in need of repair. The PRSO had not established a system for identifying defective equipment and getting the instruments repaired. The inspectors observed the PRSO damage a personal contamination survey probe which rendered the detector inoperable. The PRSO carried the survey instrument to the shop for repair, and left another survey meter in its place later that day. The licensee only had two personal contamination meters onsite. The second survey was normally used during routine facility surveys. The PRSO repaired the damaged detector and placed it back in service. However, the inspectors found that the probe had an intermittent short circuit which made that survey instrument unreliable.

The inspectors found that the licensee's smear counter was out of service, but the PRSO had not placed a tag on the instrument to indicate that it was defective. The licensee's air sampling equipment and calibration methodologies were reviewed and found acceptable. The inspector noted that some of the instruments being used by the licensee, such as air flow calibrators and personnel air samplers, were owned by Fansteel's contractor. Consequently, some of the instrument calibration records were not in the licensee's possession. The inspector also noted that the licensee only had one of two gas proportional counters operable during the inspection.

3.3 Conclusions

The licensee had implemented a radiation protection program that met requirements established in 10 CFR Part 20 and the license. Although there was some room for improvement in the licensee's control of radiation survey instruments and the timeliness of processing air samples, the inspector determined that the licensee radiation survey instrumentation capabilities and air sampling program met requirements The use of an approved action level which is greater than the site specific DAC was identified as an Unresolved Item pending resolution of the inconsistency in the license by the NRC.

4 Radioactive Waste Management (88035) Environmental Protection (88045)

4.1 Inspection Scope

The licensee's site environmental monitoring program was reviewed to determine compliance with license conditions involving liquid and gaseous effluent releases (radiological and nonradiological) and groundwater monitoring. The environmental program requirements are identified in Section 3 of the supplement to the license (Part I). The inspectors reviewed the licensee's National Pollution Discharge Elimination System Permit No. OK0001643 and Air Quality Permit No. 94-329-C which are U.S. Environmental Protection Agency programs administered by the State of Oklahoma Department of Environmental Quality (ODEQ). The environmental program consisted of groundwater sampling, ambient airborne radon and air particulate sampling, and liquid effluent sampling of site discharges to the Arkansas River.

4.2. Observations and Findings

a. Gaseous and Particulate Effluent Monitoring

(1) March 1999 Air Emissions Requirements

The inspector reviewed the licensee's gaseous and particulate monitoring program to determine compliance with the March 1999 license. The licensee's site discharge limit was based on the average of the 10 CFR Part 20, Appendix B, effluent concentration limits for uranium-234, uranium-238, thorium-228, and thorium-232. Based on the

Fansteel's plant discharge stacks being the point of compliance during the April 1999 inspection, the March 1999 license required the following in regard to airborne effluents:

- Radioactive process emissions from Fansteel were associated with scrubber emissions from the dryers, calciner, and tank vents.

- Stack releases associated with uranium and thorium would be monitored on a daily basis 24-hours/day by measuring alpha and beta radioactivity in solids sampled and collected in an isokinetic sampler.

- Fansteel was required to use a calculated site specific discharge limit of 2.45E-14µCi/ml for gross alpha radioactivity and 1.22E-14µCi/ml for gross beta radioactivity.

- Fansteel was required to use a calculated site specific action level of 2.79E-14 µCi/ml for gross beta radioactivity.

- Fansteel was required to use a site specific lower limit of detection of 2.45E-15 µCi/ml for gross alpha radioactivity and 5.58E-15 µCi/ml for gross beta radioactivity.

(2) Stack Ventilation and Monitoring System Design

On February 19, 1999, the licensee submitted to the NRC for review and approval Fansteel's proposed airborne particulate ventilation system design. The licensee identified two areas of the WIP/CaF_2 reprocessing facility whereby operations would cause airborne radioactivity to exceed their limit; the uranium/thorium filter cake handling area and the calciner/filter press area. The ventilation and monitoring system for the filter cake area (F-522) featured a large enclosed room with heavy vinyl sheets for isolation, exhaust hoods, and dedicated ventilation fans to maintain the area at a negative pressure. The F-522 ventilation system was still in construction in April 1999 and would be located on the south end of the process facility and would include a high efficiency particulate (HEPA) filter system. The calciner area ventilation system (WS-311) was located on the north side of the processing facility and featured exhaust hoods and fumes for collecting airborne particulates [illegible] calciner area ventilation system included a water scrubber, quencher, and venturi scrubber (CS-312) for removing airborne particulates and acids. During this inspection, the calciner area ventilation system was undergoing initial operations and testing.

The calciner/filter press area ventilation system design included an isokinetic continuous air sampling system which included an in-line venturi tube for maintaining a constant sample flowrate. Based on the following inspection observations, it was determined that the licensee had not demonstrated that the calciner ventilation sampling system was isokinetic or continuously sampling:

- As a modification to the sampling system, the licensee placed a glass bottle in the sample line to remove moisture from samples being collected. This modification made the air samples unrepresentative because inspectors observed that air

particulate matter had impinged on the inside of the bottle and the licensee did not collect the material for counting.

- Inspectors had the licensee remove the sample flange and nozzle from the ventilation stack. The inspectors found that the sample flange and nozzle design that had been installed was different from what the licensee's contractor had designed. Moreover, the licensee stated that they had placed the same sample nozzle that had been installed during in the licensee's previous stack operations.

- The licensee had changed the stack ventilation exhaust fan flowrate from 4,200 standard cubic feet per minute (cfm) to 5,200 cfm without performing an isokinetic sample nozzle probe area size calculation.

- The licensee had not performed a stack flow velocity and sample orifice profile verification on the new stack ventilation system in accordance with the guidance contained in ANSI N13.1 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities."

(3) Air Sample Collection and Monitoring

According to Section 3.5.7 of the March 1999 license, the licensee was required to control stack emissions and collect stack samples 24 hours per day. In the licensee's February 19, 1999, airborne particulate ventilation submittal, the licensee stated that they would continuously monitor stack samples. Process operations and airborne radioactivity discharges out of the calciner/filter press stack began on April 4, 1999. Inspectors found that the licensee did not collect their first stack sample until April 7,1999. From April 7 through 18, 1999, moisture in the sampling lines made it necessary for the licensee to change sampling filters out every four hours. Additionally, the licensee could not obtain filter sample results until the third day after sample collection because Fansteel's analytical methods had to allow natural radioactive decay. Inspectors determined that the licensee's monitoring system and analytical techniques were not adequate.

The inspector concluded that the licensee had not monitored, sampled, or controlled stack emissions on a continuous basis during the initial operation of the reprocessing plant.

(4) Air Sample Measurements and Results

The inspectors reviewed the licensee's effluent sample results since process operations and airborne radioactivity discharges from the calciner/filter press stack began on April 4, 1999. According to the stack sample analyses that were collected from April 7 through 18, 1999, airborne radioactivity ranged from 3.45E-13 µCi/ml to 1.27E-12 µCi/ml. The licensee airborne effluents were in excess of the site specific concentration of 2.45E-14 µCi/ml for gross alpha radioactivity each day of operations. The inspectors found that the PRSO did not have any prescribed procedure to implement when the limit was exceeded. According to the plant manager, they shutdown the operation each time it

was apparent that the limit was exceeded and made operational changes in the plant ventilation system.

Additionally, Fansteel was required to use a calculated site specific action levels of 2.79E-14 µCi/ml for gross beta radioactivity. The inspectors found that the licensee had not performed a single gross beta calculation. The PRSO explained that it was an oversight that should have been corrected when CaF_2 material operations began. The inspector determined that this matter was of minor significance and is being treated as a Non-Cited Violation consistent with Section VII.B.1 of the NRC Enforcement Policy.

(5) May 1999 Air Emissions Requirements

As a result of the inspectors findings from the April 1999 inspection, the licensee submitted a license amendment request to move the site point of compliance for airborne discharges from the plant stacks to the site fence line environmental air samplers. Stack monitoring would be used as a backup monitoring system and process control system. On May 20, 1999, the NRC approved the licensee's request. During the May 1999 inspection, the inspector noted the following:

- Background data had been taken from the environmental air sampling stations;
- Fence line background measured 9.35E-16 µCi/ml to 5.9E-15 µCi/ml gross alpha radioactivity;
- The site-specific air effluent concentration limit is 5.7E-14 µCi/ml gross alpha radioactivity;
- The fence line administrative action level for air effluents is 2.85E-14 µCi/ml gross alpha radioactivity;
- Stack discharge monitoring is the backup to fence line monitoring and has an action level of 4.3E-14 µCi/ml gross alpha radioactivity; and
- Stack effluent flowrate test, isokinetic flow pattern test, and background radioactivity measurements had been conducted.

Section 3.5.10 of Part I of the license states, in part, that if the plant stack discharge limit is reached, then the PRSO will suspend operations until the cause can be identified and corrected. However, a program weakness existed in the air sampling program because the licensee required three days to process an airborne sample and receive the results

The licensee had taken 46 stack background measurements from May 2-18, 1999, which ranged from 6.25E-15 µCi/ml to 3.28E-13 µCi/ml. Out of the 46 stack background measurements, 28 were in excess of the stack discharge action level, which is 4.3E-14 µCi/ml. The inspector further noted that the measurements were high without processing any RAM. Furthermore, the licensee had augmented the airborne particulate ventilation system design by adding a water scrubber that was dedicated to the calciner exhaust. Licensee management explained that they were continuing to test the

processing monitoring and sampling system. However, the inspectors were concerned that licensee's plant emissions were in excess of the stack discharge limit without processing RAM and that the quality of plant stack sample analyses were questionable. These matters would be reviewed during a subsequent inspection and would be tracked as an inspection followup item (IFI 40-7580/9901-02). During the licensee's initial operations, no regulatory effluent limits were exceeded.

b. Groundwater Cleanup

Inspectors toured the groundwater corrective action system (French drain system). The licensee completed construction on the French drain system during the week of April 19, 1999. According to the December 1997, Fansteel Environmental Assessment, the licensee had committed to operate the French drain system concurrent with reprocess operations. However, at the time of this inspection, the licensee had not written an SOP for the French drain system or conducted any training on its operation. The licensee expressed their intent to develop and implement a French drain procedure when initial testing was completed and to train operators in the procedure.

4.3 Conclusions

A review of the licensee's environmental monitoring and radioactive waste management programs in April indicated that the licensee was not conducting air effluent monitoring in compliance with the license requirements. By the May 1999 followup inspection, the licensee had changed the facilities effluent point of compliance from the plant stack to the site fence line. However, the inspectors determined that licensee's plant emission being in excess of the site stack action level without processing RAM and concerns about the representativeness of plant stack sample analysis would be reviewed during a subsequent inspection and would be tracked as an inspection followup item. The licensee expressed their intent to develop and implement a French drain procedure for the groundwater corrective action system when initial testing was completed and to train operators in the procedure

5 Emergency Preparedness (88050)
Emergency Response Procedures (88064)

5.1 Inspection Scope

The primary objective was to verify the availability, adequacy, and implementation of the licensees' emergency response procedures and equipment, emergency readiness state, and worker training for responding to process upset conditions involving high risk chemical hazards. These safety significant dominant risk controls are relied on to detect and mitigate releases and spills of highly hazardous process chemicals, thereby, mitigating chemical and radiological hazards to facility workers, the surrounding public, and the environment.

The inspectors reviewed the licensee's emergency preparedness program as submitted under the February 1999 ISORE. The inspectors reviewed the licensee's emergency

response facilities, equipment, procedures, training, and protocol for coordinating with offsite agencies. Additionally, the NRC assessed the licensee's performance in response to a tornado that damaged the facility on June 1, 1999. The inspector assessed the licensee's investigation and reporting requirements pursuant to 10 CFR 20.2202, 10 CFR 40.60, and the license, Part I, Section 2.6.

5.2. Observations and Findings

a. April 19 - 23, 1999, Fansteel Inspection

The inspectors focused on the chemical tank farm loading, storage, and process feed operations, and the WIP/CaF2 sulfation process, which were operational during the course of the inspection. Through system walk-downs, discussions with Fansteel management and personnel, and document review, the inspectors identified the following:

(1) The licensee had not developed or implemented the emergency response kit locator map to inform licensee personnel and off-site emergency responders to the locations of emergency response equipment. This map identifies the locations of emergency response safety significant protective equipment, supplies, and containment devices, which are essential for mitigating and controlling hazardous chemical releases and spills; and

(2) That emergency response kits were deficient in containing essential chemical release detection supplies and containment devices, such as:

Ammonia detectors;
Drager tubes (hydrochloric acid (HCl) and H_2SO_4);
Sorbent pads or socks;
Containment berms;
Drain covers;
Acid spill kits;
Base spill kits; and
pH (litmus) paper.

These findings demonstrated the failure to have available, reliable, and effective safety significant dominant risk controls to detect and mitigate releases and spills of highly hazardous process chemicals and the failure to identify the locations of emergency response equipment to licensee personnel and off-site responders.

b. May 24 - 28, 1999, Phase I Follow-up Inspection

The inspectors focused on the commitments identified in the May 3, 1999, Fansteel letter for Phase I operations. Specifically, the inspectors reviewed the implementation of emergency response protective equipment, supplies, and containment devices at specific site locations, as well as the development and implementation of the emergency response kit locator map. The locator maps informed licensee personnel and off-site emergency responders of the locations of emergency response equipment. Through

system walk-downs, document review, and discussions with the Fansteel operations manager, PSD, PRSO, lead process engineer, and operations staff, the inspectors verified the following:

(1) That the licensee developed and implemented the emergency response kit locator map to inform licensee personnel and off-site emergency responders to the locations of emergency response equipment. This map identified the locations of emergency response safety significant protective equipment, supplies, and containment devices, which are essential for mitigating and controlling hazardous chemical releases and spills;

(2) That the licensee's' emergency response kits were adequate in containing essential chemical release detection supplies and containment devices specified in the Emergency Response Manual, such as:

Ammonia detectors;
Drager tubes (HCl and H_2SO_4);
Sorbent pads or socks;
Containment berms;
Drain covers;
Acid spill kits;
Base spill kits; and
pH (litmus) paper.

(3) That the operations staff were able to demonstrate their understanding and knowledge in responding to emergency response conditions and the effective use of emergency response kit personal protective equipment, chemical release detection supplies, and containment devices.

c. Tornado Incident Response

(1) Tornado Event

At approximately 7:00 p.m. on June 1, 1999, the Fansteel facility received substantial tornado damage. The NRC contacted the licensee the next morning to receive a facility damage assessment. Initially, the NRC contacted the licensee's Chicago, Illinois, headquarters office, because the Muskogee, Oklahoma, site's telephone system was out of service. Fansteel's headquarters office reported that the Muskogee facility had received substantial damage and the site manager had submitted a damage report. The NRC subsequently contacted the Fansteel site and received a detailed damage assessment from the plant manager and the PRSO during separate telephone conversations. According to the licensee, the following was damaged by the tornado:

- The sodium reduction building which contained at least 500 metric tons of RAM had been damaged substantially.

- The worker change station, lunch building, and the security station had been destroyed.

- Two groundwater pumping stations and the plant effluent discharge station had been destroyed.

- The facility administration office, warehouse, Chem buildings A and C, and the groundwater evaporation building had received minor damage.

- All four site air sampling stations were inoperable due to a loss of electrical power.

The licensee reported that several one ton bags of RAM had fallen out of the sodium reduction building. However, the licensee did not report that any of the bags of RAM had been breached. The licensee reported that the bags of RAM were intact, and no RAM or chemical releases had occurred.

(2) Inspector's Findings

Damage and Recovery Observations

An NRC inspector and an inspector from the Oklahoma Department of Environmental Quality (ODEQ) arrived at the Fansteel site on the morning of June 3, 1999. The inspectors found that the sodium reduction building had been 30 - 40 percent destroyed. At least five or six one-ton bags of RAM had fallen out of the southwest section of the building, and three or four of those bags had been breached. Additionally, the inspector noted that some bags of RAM located on the east side of the building had been breached from the tornado damage, but the RAM bags remained in the building. The inspector observed a crew of workers cleaning up the RAM spill. At least 1,000 pounds of RAM had been recovered and placed in a new bag. However, there appeared to be more than a thousand pounds of RAM remaining to be cleaned up. The spill was being cleaned up under SWP 99-01 which was implemented on the morning of June 3, 1999. The SWP stated that the operation being performed was "Moving the bags in the sodium reduction building, rebag small quantity of material that was discharged from the bags." The inspector noted that the SWP contained a radiological survey form dated June 2, 1999. According to the survey form, radiation levels on the RAM bags measured up to 1.3 millirem/hour. The licensee measured alpha, beta, and gamma contamination. Contamination levels from the spilled RAM measured from 200 counts/minute (cpm) to 5000 cpm. Natural background was generally 50 to 100 cpm beta/gamma radiation. The inspector determined that the licensee's SWP was adequate for the initial cleanup of the RAM and protecting workers from exposure to airborne RAM.

The inspector found that the licensee had other work crews cleaning up the debris around the site. The fence line on the southeast section of the site had been substantially damaged and was under repair. Workers were repairing the plastic covering that was on a pile of contaminated dirt from the French drain

construction. Additionally, workers were rebuilding the two groundwater pumping stations that had been destroyed. Liner material at Pond 3 had been damaged in three areas; however, RAM did not appear to be disturbed. The inspector did not find any other RAM that had been affected by the tornado. One chemical tank that contained sodium hydroxide had received slight damage. The inspector did not find any evidence that chemicals had spilled. The licensee's PSD stated that they would inspect chemical piping and hydro test as necessary.

The NRC determined that the licensee's tornado recovery efforts would be reviewed during a future inspection and would be tracked as an Inspection Followup Item (IFI 40-7580/9901-03).

Investigation and NRC Reporting

Licensee management estimated that it would be at least four to six weeks before Fansteel could resume operations. Overall, the inspector determined that the licensee's tornado recovery efforts were adequate. However, the licensee had not thoroughly investigated or analyzed the impact of the tornado in order to ascertain whether the event was reportable pursuant to to 10 CFR 20.2202, "Notification of Incidents," and 10 CFR 40.60, "Reporting Requirements," and the license, Part I, Section 2.6, "Investigations and Reporting." Specifically, the licensee had not appropriately quantified the amount of RAM spilled and had not evaluated the time that radiological access controls had to be established outside the sodium reduction building. Additionally, the licensee had not considered the impact the tornado had on equipment and facilities' ability to perform their safety functions. The NRC determined that the question regarding whether, as a result of the tornado damage, NRC reporting requirements of 10 CFR 40.60 or 10 CFR 20.2202 were met would be tracked as an Unresolved Item (URI 40-7580/9901-04). In order to resolve this item, more information is needed from the licensee on the amount of material spilled and the amount of time that was required to cleanup the spill and remove the additional radiological controls.

Radioactive Material Container Labeling

At least 500 metric tons of radioactive material from former Ponds 1, 4, and 5 and contaminated soil were contained in hundreds of barrels and bags that have been stored in the sodium reduction building since November 1997. Generally, the sodium reduction building was posted as a RAM storage area consistent with 10 CFR 20.1902(e). However, the inspector noted that the licensee did not have the following knowledge or records concerning the RAM stored in the sodium reduction building:

- how many containers (bags and barrels) of RAM were in storage;
- the quantity of radionuclides, specific activity, or kinds of material in each container of RAM;

- specific labeling that clearly identified the nature of radioactivity in the container such that worker could avoid or minimize personal exposure;

- the quantity of radioactivity or radiation in each container.

Because the licensee had not quantified the amount of radioactivity in each bag of RAM, the licensee could not determine whether the bags required labeling in accordance with 10 CFR 20.1904. The NRC determined that this matter concerning labeling containers of RAM would be tracked as an Unresolved Item (URI 40-7580/9901-05), pending additional information from the licensee concerning the quantity of RAM stored in the sodium reduction building.

5.3 Conclusions

During the April 19 - 23 ORR, the licensee failed to demonstrate the availability, reliability, and effectiveness of safety significant emergency response dominant risk controls, such as chemical release detectors, containment devices, and spill kits, and failed to develop and implement the emergency response kit locator map to facilitate responding to a chemical event. However, during the May 24 - 28 Phase I ORR, the licensee did demonstrate the availability, reliability, and effectiveness of these controls and had developed and implemented the emergency response kit locator map.

The inspector determined that the licensee's tornado recovery efforts were adequate. However, the licensee had not ascertained whether the tornado event was reportable pursuant to to 10 CFR 20.2202, 10 CFR 40.60, and the license, Part I, Section 2.6. Because the licensee had not quantified the amount of radioactivity in each bag of RAM, the licensee could not determine whether the bags required labeling pursuant to 10 CFR 20.1904. The NRC determined that tornado damage reporting requirements and the labeling of bags containing RAM stored in the sodium reduction building will be tracked as unresolved items. The licensee's repair and recovery from the damage caused by the tornado will be tracked as an inspection followup item.

6 Exit Meeting Summary

The inspector presented the inspection results to the licensee representatives at the conclusion of the initial, confirmatory, and tornado inspections on April 23, May 28, and June 4, 1999. Licensee representatives acknowledged the findings as presented. On April 30, 1999, a conference call was conducted with licensee representatives to discuss the inspection findings. Topics discussed during the telephone conference are detailed in Enclosure 2 to this report. A final telephonic exit meeting was conducted on July 6, 1999, to discuss the findings as presented in this report.

On May 27, 1999, NRC management representatives held discussions with Fansteel management during an open public meeting concerning the future state of the facility. Representatives from Fansteel, NRC, OSHA, and State of Oklahoma who attended the open public meeting are annotated on the attachment to this report. Topics discussed during the open meeting are detailed in Enclosure 3 to this report. During these inspections, Fansteel provided proprietary documents to the inspector for review.

However, the inspectors did not incorporate any of the proprietary information in the NRC inspection report.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

*J. Burgess, Plant Radiation Safety Officer
*J. Hunter, General Manager and Assistant Radiation Safety Officer
*M. Mocniak, Vice President and General Counsel
*M. Mooring, Plant Safety Director
*C. Petit, Operations Manager
*G. Richards, Process Engineering Manager

Licensee Contractors

*E. Jakub, Earth Sciences
K. Mahosky, Earth Sciences
D. Tierney, Recovery Dynamics
D. Tourdot, Earth Sciences
*G. Williams, Earth Sciences

State of Oklahoma

*P. Bishop, ODEQ, Radiation Management Section (RMS)
*M. Broderick, ODEQ, RMS, Adminstrator
*M. Calvey, ODEQ, RMS
*E. Heath, ODEQ, RMS
*S. Jantzen, Oklahoma Assistant Attorney General

Occupational Safety and Health Administration

*H. Terrel, OSHA Region 6, Safety Compliance Inspector

Nuclear Regulatory Commission

*L. Carson II, RIV, Division of Nuclear Material Safety (DNMS), Health Physicist
*D. Chamberlain, RIV, DNMS, Director
*C. Hackney, RIV, State Liaison Officer
*J. Olencz, Fuel Cycle Safety and Safeguards (FCSS), Nuclear Process Engineer
*B. Spitzberg, RIV, DNMS, Branch Chief
*G. Smith, FCSS, Nuclear Process Engineer

(*) Denotes those who attended the NRC Public Meeting on May 27, 1999.

INSPECTION PROCEDURES USED

TI 2600/004	Headquarters Inspections of Critical Mass and Rare Earth Fuel Cycle Licensees
TI 2603/001	Chemical Safety Inspections of Fuel Cycle Licensees
IP 83822	Radiation Protection
IP 88001	Construction Review
IP 88005	Management Organization and Controls
IP 88035	Radioactive Waste Management
IP 88045	Environmental Monitoring
IP 88050	Emergency Preparedness
IP 88057	Hazard Identification and Assessment
IP 88058	Standard Operating Procedures
IP 88064	Emergency Response Procedures
IP 88104	Decommissioning of Fuel Cycle Facilities
IP 93001	OSHA Interface Activities

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

40-7580/9901-01	URI	The site-specific DAC/administrative level for airborne radioactivity is less than the site's action level.
40-7580/9901-02	IFI	Demonstration that plant stack monitoring and sample analysis are representative.
40-7580/9901-03	IFI	Followup of Fansteel's tornado recovery efforts.
40-7580/9901-04	URI	Tornado damage and event reporting requirements pursuant to 10 CFR 40.60 and 10 CFR 20.2202.
40-7580/9901-05	URI	RAM container labeling requirements pursuant to 10 CFR 20.1904.

Closed

None

Discussed

None

LIST OF ACRONYMS USED

CaF_2	calcium fluoride
cfm	cubic feet per minute
CFR	Code of Federal Regulations
Chem	chemical
DAC	derived air concentration
DCS	distributed control software
dpm	disintegrations per minute
FHAR	Final Hazards Analysis Report
HCL	hydrochloric acid
H_2SO_4	sulfuric acid
IFI	inspection followup item
IP	Inspection Procedure
ISORE	Integrated Safety Operations, Radiation Safety, Emergency Planning Manual
LC	License Condition
µCi/ml	microcurie (2.22E+6 dpm)/milliliter
µR/hr	microroentgen per hour
NaOH	sodium hydroxide
NCV	non-cited violation
NMSS	Nuclear Material Safety and Safeguards
NRC	Nuclear Regulatory Commission
ODEQ	Oklahoma Department of Environmental Quality
ORR	Operations Readiness Review
pCi	picocurie (2.22 dpm)
pCi/l	picocurie per liter
pCi/g	picocurie per gram
PRSO	plant radiation safety officer
PSD	Plant Safety Director
RAM	radioactive material
RSC	Radiation Safety Committee
RSM	Radiation Safety Manual
RWP	radiation work permit
SDMP	Site Decommissioning Management Plan
SWP	special work permit
TLD	thermoluminescent dosimeter
URI	unresolved item
WIP	work-in-progress

ENCLOSURE 2

AGENDA
ISSUES TO DISCUSS DURING THE APRIL 30, 1999, TELEPHONIC CONFERENCE CALL WITH FANSTEEL, INC. REGARDING THE INSPECTION OF APRIL 19-23, 1999

NRC developed concerns during the inspection regarding the licensee's readiness to operate and comply with license requirements to prevent potential significant risks to the health and safety of the public and workers. NRC believes that the following actions are needed by the licensee prior to the licensee receiving any additional high risk bulk chemicals (i.e., anhydrous ammonia, sulfuric acid, phosphoric acid, sodium hydroxide and hydrochloric acid) on site or introducing any of these chemicals into the residue process.

- Review and implement the PHA identified controls relied on to prevent, and/or mitigate safety significant risks and potential consequences as required by License Condition 10 of the NRC approved license.

- Implement the requirements of 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals" for the storage and use of anhydrous ammonia as required by License Condition 10 of the NRC approved license.

- Implement and use written standard operating procedures for all applicable process operations, including written alarm response procedures and train all workers and operators in the written procedures applicable to their areas of responsibility as required by License Condition 16 and Section 2.4 of the NRC approved license.

- Provide emergency response kits containing protective equipment, supplies, and containment devices appropriate to the chemical risks onsite, at points around the site and develop and implement the emergency response kit locator map to inform licensee personnel and offsite emergency responders of the locations of emergency response equipment as required by License Condition 10 of the NRC approved license, and the supplement to the license Volume IV, Section 2.5 of the Integrated Safety, Operation, Radiation Management, and Emergency Response Manual (ISORE).

- Meet with designated NRC management and staff in Muskogee, Oklahoma, to describe completion of the above noted actions and their readiness to begin processing of licensed material with bulk hazardous chemicals.

- Notify the Director of the Region IV Division of Nuclear Materials Safety in writing two weeks prior to the scheduled startup readiness meeting to allow opportunity for confirmatory NRC inspections prior to the meeting.

ENCLOSURE 3

MEETING AGENDA

ISSUES TO DISCUSS DURING THE MAY 27, 1999, 4:30 P.M. OPEN MEETING BETWEEN THE NRC AND FANSTEEL, INC. REGARDING COMMITMENTS RESULTING FROM THE INSPECTION OF APRIL 19-23, 1999, THE LICENSE AMENDMENT AND THE FOLLOWUP INSPECTION OF MAY 24-27, 1999

During the inspection of April 19-23, 1999, NRC developed concerns regarding the licensee's readiness to operate and comply with license requirements to prevent potential significant risks to the health and safety of the public and workers.

The NRC believed that prompt corrective actions had to be implemented by the licensee prior to the licensee receiving any additional high risk bulk chemicals (i.e., anhydrous ammonia, sulfuric acid, phosphoric acid, sodium hydroxide and hydrochloric acid) on site or introducing any of these chemicals into the residue process.

This meeting will cover the following:

- NRC and licensee opening remarks.
- Fansteel representatives will discuss corrective actions taken on the above noted concerns and Fansteel's readiness and schedule to resume reprocessing of licensed material with bulk hazardous chemicals.
- Based on this week's reinspection, the inspection team will discuss the current status of Fansteel, Incorporated's operational readiness for reprocessing waste and other materials currently onsite, using hazardous bulk chemicals, to recover radioactive components and rare earth metals.
- NRC representatives will discuss the recently approved license amendment.
- NRC representatives will discuss the status of the Fansteel's commitment letter of May 3, 1999.
- NRC and licensee closing remarks.