



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

January 31, 2000

MEMORANDUM TO: Theodore S. Sherr, Chief  
Licensing and International  
Safeguards Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

THRU: Charles W. Emeigh, Section Chief *c. Emeigh*  
Licensing Section  
Licensing and International  
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and Safeguards, NMSS

FROM: Leslie Fields, Project Manager *LF*  
Licensing Team 1  
Licensing and International  
Safeguards Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

SUBJECT: SITE SPECIFIC ADVISORY BOARD MEETING SUMMARY

The Nuclear Regulatory Commission (NRC) staff attended the 5th Site Specific Advisory Board (SSAB) meeting on Thursday, December 16, 1999, in Muskogee, Oklahoma (see Attachment 1). The meeting began with an update of the decommissioning activities at the Fansteel facility, followed by discussion of the document "Questions and Answers Related to Fansteel Inc.'s Decommissioning Plan" (see Attachment 2) prepared by Earth Sciences Consultants, succeeded by board discussions, and concluding with questions from the audience. Approximately 3 or 4 members of the public were in attendance along with SSAB members and other local representatives. Attachment 1 contains the list of attendees.

John Hunter of Fansteel gave a brief summary of activities at the Fansteel facility as follows:

The first request to decommission the Fansteel facility was made in 1991, formalized and resubmitted in 1994, and updated in 1996. On March 31, 1999, NRC asked Fansteel to separate the decommissioning plan into 2 separate plans for unrestricted and restricted release. Fansteel resubmitted the plan as two separated plans and is holding 12 acres for restricted release.

On June 1, 1999, a tornado struck Fansteel's facility.

On June 4, 1999, NRC completed an Operation Readiness Review inspection.

On June 29, 1999, Fansteel submitted a report of completed repairs after tornado damage. According to Hunter the cost of the repairs was estimated to be \$1.7 M.

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On October 14, 1999, the State of Oklahoma Attorney General submitted his request for hearing regarding the Fansteel decommissioning plan. Fansteel's responses to the State of Oklahoma hearing request were submitted on October 29, 1999.

Hunter stated that he does not know when the hearing will be held or what subjects will be allowed.

Joseph Harrick of Earth Sciences discussed the document "Questions and Answers related to Fansteel Decommissioning Plan"

The main focus of this part of the meeting was to address issues of concern and present answers to questions that have been raised as a result of the decommissioning plan.

Fansteel's Responses to Board's Concerns

The construction of the containment cell and how it will affect the surrounding environment were the main topics of discussion. The Board asked the question, how will the containment cell affect the railroad. Hunter stated that the railroad will stop about 800 feet short of the containment cell, therefore, there will be no impact to the railroad. It was mentioned that an article has been published in the Muskogee Daily Phoenix where a reporter has the same concerns as the State of Oklahoma Attorney General's office regarding possible contamination to the Arkansas river. Fansteel stated that any contamination from leachate will be cleaned up in the trench before reaching the river. Fansteel reinforced that residues of the operating processes will not go into the containment cell. Questions pertaining to who will be long term caretaker were discussed. Fansteel mentioned that a quasi-state entity and a sovereign nation have shown interest in becoming long-term caretakers. The possibilities for radiation releasing to the atmosphere and flooding concerns were discussed. The Board informed the public that air sampling data can be obtained from the Fansteel Muskogee facility and that Fansteel is outside the 500-year flood plain. The Board asked if an Environmental Impact Statement (EIS) will be prepared and Hunter stated that NRC will prepare an EIS and the ground work has started.

The Board entertained questions from the audience

The question was asked what will become of the Site Specific Advisory Board Committee once the decommissioning plan has been approved. The Board responded by stating that the committee will stay active during the Fansteel operating life.

With respect to air sampling, the question was asked whether or not Fansteel will measure radiation into the atmosphere. Fansteel responded by stating that they will do air sampling during the initial construction of the containment cell. Current air data is kept on site and available upon request.

A member of the audience stated that in 1987 the Arkansas river flooded and does shift from time to time, in fact the containment pond appeared to have been breached. The question was asked whether or not flooding issues had been considered. The Board responded by stating that the Federal Emergency Management Agency (FEMA) has indicated Fansteel is outside the 500-year flood plain. It was also stated that flooding issues had been reviewed and addressed.

Theodore S. Sherr, Chief

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There was a concern by a member of the audience that the Board members do not have enough technical expertise to verify if NRC safety standards are acceptable. The question was asked whether or not other auditors overlook the values and safety measures at Fansteel to confirm if they are acceptable. The Board responded by stating that State of Oklahoma regulates water quality, Occupational Safety and Health Administration regulates occupational safety, and NRC regulates nuclear safety.

The meeting concluded at 9:30 PM.

John Hunter of Fansteel has reviewed this document and has no objection to the content. All comments have been enclosed.

Docket        40-7580  
License        SMB-911

Attachment: "Questions and Answers  
                  Related to Fansteel Inc.'s,  
                  Decommissioning Plan"

cc:     Mr. John J. Hunter  
         Corporate Manager of Process  
         Engineering and  
         Facilities Construction  
         Fansteel, Inc.  
         Number Ten Tantalum Place  
         Muskogee, Oklahoma 74403-9297

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**5<sup>th</sup> Site Specific Advisory Board meeting  
List of Attendees  
December 16, 1999  
Fansteel 40-7580**

<b>NAME</b>	<b>ORGANIZATION</b>
John Hunter	Fansteel
Joe Harrick	Earth Sciences Consultants
Elizabeth Ubinger	Earth Sciences Consultants
Don Cook	Cook Construction
Orville Eaton	SSAB member
Lauren Brookey	STB
Leslie Fields	NRC
Dean Steinbach	Earth Sciences Consultants
Paul Handa	Kaiser
Gary Richards	Fansteel
Pat Gwin	Cherokee Nation
Bonnie Hefner	Fansteel
Gwen Coburn	Public
Dave Dillon	Oklahoma Dept. of Envirmt Quality
Scott Robinson	Port of Muskogee
David Gerard	Muskogee Daily Phoenix
Thomas Harris	Public
Doris Gunn	Public
Eldine Stevens	United Keetoowoh Indian Tribe

**Questions and Answers Related to  
Fansteel Inc.'s Decommissioning Plan**

**December 15, 1999**

**Fansteel Inc.  
10 Tantalum Place  
Muskogee, OK, 74403-9297  
Ph 918-687-6303  
Fx 918-687-6112**

**Questions and Answers Related to  
Fansteel Inc.'s Decommissioning Plan**

**December 15, 1999**

**Questions and Answers**  
**on**  
**Fansteel Inc. Restricted Release Containment Cell**  
**For Distribution to All Interested Parties**

**General Questions**

- Q. What does Fansteel Inc. (Fansteel) manufacture or produce?**
- A. Fansteel is a specialty metals manufacturer of cutting and milling tools, tool-holding devices, coal mining tools and accessories, construction tools, castings, and forgings. The Muskogee facility was a basic manufacturing facility producing tantalum and niobium ingots, columbium oxide, bars, powder, alloys, and compounds as raw material for other Fansteel operations. Manufacturing began at the Muskogee plant in 1958 and stopped in late 1989.**
- Q. What are the radioactive constituents of concern at the Fansteel Muskogee site?**
- A. Natural uranium and natural thorium.**
- Q. What are natural uranium and natural thorium?**
- A. Uranium and thorium are naturally occurring radioactive metallic elements present in small quantities throughout the Earth's crust.**
- Q. Why are natural uranium and thorium present at the plant?**
- A. Fansteel's Muskogee facility produced tantalum metal and columbium oxide. An acid-digestion process was used to extract the tantalum and columbium from ores and slags. Uranium and thorium were present in the ore and slags in small amounts and ended up in residues from the manufacturing process. These residues have been stored on site.**
- Q. Are uranium and thorium hazardous?**
- A. Exposure to high concentrations of uranium and thorium poses a health risk. However, the concentrations of uranium and thorium that will be present in the containment cell will be below health hazard levels. The containment cell will not emit measurable levels of uranium and thorium.**

- Q.** Did the plant have governmental approval to possess uranium and thorium?
- A.** Fansteel holds an approved Nuclear Regulatory Commission (NRC) license which authorizes it to possess natural uranium and thorium present in the process residues and as a contaminant in soils and sediments at the Muskogee facility.
- Q.** How long has the plant possessed uranium and thorium?
- A.** Fansteel's Muskogee facility produced tantalum and columbium oxide from 1958 until late 1989.
- Q.** How much uranium and thorium are present in the ore residues?
- A.** The uranium and thorium present in the original ores and slags remain in those residues at concentrations of about 0.0015 pound each of uranium and thorium per pound of ore.
- Q.** How much radioactive material is present at the site?
- A.** Presently, there are about 95,000 tons of residue at the Fansteel site containing about 44 curies of uranium and thorium combined which is about 93 percent of the total radioactive material at the site. The remaining radioactive material is in soils on the site.
- Q.** What are Fansteel's plans to clean up the site?
- A.** Fansteel has refitted its manufacturing plant to process the entire inventory of on-site residues to make commercial products. The processing will take 10 to 12 years to complete, but will reduce the radioactive inventory at the site by 93 percent. Any residual radioactive material from the new manufacturing process will be transferred off site.
- Q.** What are Fansteel's plans for the remaining activity?
- A.** The remaining 7 percent of radioactive material is present in soils located on site. These soils contain natural uranium and thorium above NRC-approved closure limits. They will be solidified and stabilized in cement and placed in an engineered containment cell.
- Q.** Why will the soils not be transferred off site?
- A.** The cost of off-site disposal of the entire inventory of soils would be prohibitively expensive. Furthermore, there is additional risk associated with transport to an off-site disposal location.

Q. What will happen to the property when process operations are finished?

A. Upon completion of the process operations, more than 100 acres of the site will be suitable for future unrestricted use. Only 12 acres or less will be reserved.

#### Regulatory Requirements

Q. How long has Fansteel had an NRC license?

A. The Fansteel facility received its first source material license, SMB-911, on January 27, 1967.

Q. Are Fansteel's plans acceptable to the NRC?

A. Fansteel's plans are in accordance with all current NRC guidance and regulations. Fansteel has worked closely with the NRC to develop a sound plan.

Q. Do the most current NRC regulations apply to Fansteel?

A. Yes. Current regulations were developed with Fansteel and other similar licensee's, in mind.

#### Containment Cell

Q. What is the containment cell?

A. The containment cell is a concrete-like structure that will encapsulate and stabilize soils and building rubble containing low levels of uranium and thorium. Because the entire inventory of radioactive residues will be processed, only the contaminated soils and building rubble will be included in the containment cell. The cell will be isolated further from the environment by means of a cover system. This cover system consists of a thick blanket of compacted soil capped by a protective layer of riprap (rock) that acts as armor <sup>barrier</sup> against surface erosion and prevents ingress by burrowing animals and plant roots.

Q. Will the containment cell be built on native soils?

A. Yes; however, the bottom surface will be engineered by compacting the soil to provide a stable foundation. Geotechnical testing will be performed to ensure the compaction requirements are met.

Q. What will be the height of the containment cell when complete?

A. The cell will extend above surrounding grade by about 2 feet and the surface of the cap will be vegetated so that the cell will be indistinguishable from the surrounding area.

Q. What is the size of the cell?

A. Twelve acres are set aside for the restricted area. However, the current estimate of anticipated soil volume will occupy a 6-acre area.

Q. Will water infiltrate through the cell?

A. Over a long period of time, a small quantity of water will infiltrate through the cell and eventually leak through.

Q. How much water (leachate) will leak through the cell?

A. An indiscernible 0.0000014 gallon per minute per square foot which equates to 0.4 to 0.8 gallon per minute over a 6- to 12-acre area.

Q. Will this leachate contain uranium and thorium?

A. The leachate may contain uranium and thorium but at concentrations less than 3.5 picocuries per liter. This concentration is well below the current NRC regulatory criteria for groundwater as specified in Fansteel's NRC license.

Q. Will the leachate reach the Arkansas River?

A. It is highly unlikely that the leachate will reach the Arkansas River due to the low flow of the leachate which probably would be absorbed into the subgrade before reaching groundwater and due to the groundwater interception trench that was constructed and located between the containment cell and the river.

Q. If the leachate did reach the Arkansas River, would it harm the quality of the river?

A. If the leachate would reach the groundwater and could pass through the interceptor trench, it would then encounter the average 8,700,000-gallon-per-minute flow of the Arkansas River where it would be imperceptible because the average river flow is more than 10 to 20 million times the possible leachate flow (depending on the size of the cell).

- Q. Has Fansteel reviewed the migration of the Arkansas River?
- A. The geologic history of the Arkansas River indicates that the river will not migrate onto the Fansteel property because the river is cut into the underlying bedrock. During the end of the last ice age, glacial meltwaters caused a rise in the water level of the Arkansas River causing it to extend over the present Fansteel property. A repeat of this type of event is unlikely unless another ice age occurs.
- Q. Has Fansteel reviewed the possibility of upstream dam failures?
- A. The containment cell was specifically designed to withstand maximum credible floods due to an upstream dam breach or maximum spillway discharges.
- Q. Has there ever been flooding at the site?
- A. No. The maximum recorded flow of the Arkansas River at Muskogee (from U.S. Geological Survey data since 1898) was 314,160,000 gallons per minute on May 23, 1943. At this flow, water would not reach the cell location. In addition, Federal Emergency Management Agency documentation indicates Fansteel is outside the 500-year floodplain.
- Q. What sources supply drinking water for area residents and the facility?
- A. Other than some private wells in rural areas, Lake Fort Gibson, upstream from the Fansteel Muskogee site, is the primary source of drinking water for the Fansteel property and Muskogee area. Fansteel is not aware of any use of the shallow aquifer or surface water for drinking purposes. Muskogee Municipal Authority was not aware of any shallow aquifer use in the local area.
- Q. What is the location of the nearest downstream municipal water intake on the Arkansas River?
- A. Based on discussions with the Oklahoma Department of Environmental Quality and the Arkansas Department of Health, there are no municipal water intakes from the Arkansas River downstream of the Fansteel site prior to its confluence with the Mississippi River.
- Q. What would happen to the cell in the event of a tornado?
- A. Since all of the natural uranium and thorium will be encapsulated and stabilized below ground with a capping system on top, a tornado would not cause a release from the cell.

- Q. Will the containment cell increase the radiation exposure to the public?
- A. The radioactive material in the cell is isolated from the public and would not emit radiation above background; therefore, the cell would not increase the radiation exposure to a member of the public.
- Q. Is Fansteel in a residential area?
- A. No. Fansteel is located in an industrial park.
- Q. Will Fansteel be using public roads to build the containment cell?
- A. The containment cell is located on the Fansteel property; therefore, no public roads will be utilized during construction of the cell. Public roads would only be used to bring in new fill material.
- Q. Will Fansteel take care of dust problems during cell construction?
- A. Dust control measures will be implemented during all construction activities so that off-site migration will not occur.
- Q. Is Fansteel going to place controls on the cell?
- A. As required by NRC regulations, controls will be implemented on the cell.
- Q. What types of controls or physical barriers will be used?
- A. In accordance with NRC guidelines, physical controls will be placed on and around the containment cell to restrict access, protect the cell, and allow for periodic monitoring. These controls will include fencing, cell cover system, appropriate signs, groundwater monitoring wells, and radiation survey.
- Q. Is Fansteel proposing a long-term caretaker for maintenance and monitoring of the cell?
- A. Several caretaker institutions are being considered. A steward will be named prior to the finalization of the Decommissioning Plan.
- Q. What items are included in the maintenance and monitoring budget?
- A. The budget includes periodic inspections, long-term groundwater monitoring, reporting, grass mowing, fencing repair, road repair, and cell cover repair.

**Q.** Is the Fansteel cell like any other landfills in Oklahoma?

**A.** No other similar landfills exist in Oklahoma. This is an engineered cell designed to conform to higher standards than any other landfills in the state. NRC regulations require the cell to be designed to last at least 1,000 years.

**Q.** How will the decommissioning project affect the Fansteel property value?

**A.** The containment cell will enhance the overall value of the Fansteel property. When the project is complete, more than 100 acres of the site will be suitable for future unrestricted development. Only 12 acres or less will be reserved.

**Q.** What is the estimated radioactive inventory in the cell?

**A.** Fansteel estimates that the stabilized containment cell will contain less than 3.2 curies of uranium and thorium. This is about twice the average radioactive material found in the same quantity of natural materials such as shale, igneous rocks, or granite.

**Q.** Why select a containment cell for decommissioning of soils?

**A.** Fansteel looked at three decommissioning alternatives: off-site overseas processing, off-site domestic processing, and on-site with third-party processing. Fansteel has chosen to apply to the NRC for an on-site, self-managed process. This option was selected based on public exposure to risk, control of materials, and economics.

**Q.** What would happen should the containment cell not be approved?

**A.** The cost for removal and off-site disposal of soils would be prohibitively expensive. Fansteel would be unable to pay for such an undertaking and public funds would be required. In addition, higher risk of exposure to the public and traffic accidents would occur due to off-site disposal.

#### **ALARA**

**Q.** What is ALARA?

**A.** ALARA means as low as reasonably achievable. In order to terminate a license, Fansteel must demonstrate that the dose criteria have been met and must demonstrate whether it is feasible to further reduce the levels of residual radioactivity.

- Q. Did Fansteel use the concept of ALARA to develop the Decommissioning Plan?
- A. Yes. In consultation with regulatory agencies, the ALARA analysis presented in NRC guidance was modified to better represent the Fansteel Muskogee site. Results of the ALARA analysis are presented in the Decommissioning Plan.
- Q. In performing the ALARA analysis, did Fansteel evaluate the population density of Muskogee County?
- A. The 1996 population density for Muskogee County was used in the ALARA analysis.
- Q. What other factors were used in the ALARA analysis?
- A. Other site-specific parameters used in the ALARA analysis include the area being evaluated, dose from the cell, radionuclide constituents, and cost of remediation.

#### Dose Analysis

- Q. What are the dose criteria under restricted release conditions?
- A. According to NRC regulations, the residual radioactive exposure originating from the cell to the average member of the public cannot exceed 25 millirem per year which is about 7 percent of the total annual dose to an average American, according to the National Council on Radiation Protection and Measurements. In addition, residual radioactive material at the site must be reduced so that if the institutional controls were no longer in effect, the radiation from residual radioactive material that is distinguishable from background would not exceed 100 millirem per year.
- Q. Does Fansteel meet the dose criteria under closure guidelines?
- A. Fansteel more than meets the dose criteria under the closure guidelines.
- Q. If the engineered cover failed, would the containment cell meet the dose guidelines?
- A. Fansteel's cell would meet the dose criteria if the engineered cover failed.
- Q. What is the expected dose to an individual from the engineered containment cell?
- A. The expected dose to an individual from the containment cell is essentially zero.

Q. How does the dose from the containment cell compare to other sources of radiation?

A. The following list taken from The University of Michigan's Division of Radiation Protection and Health Physics (<http://www.umich.edu/~radinfo/>) and the National Council on Radiation Protection and Measurement (NCRP Report No. 94), with the exception of the cell, gives examples of radiation sources and the associated dose:

- Containment cell with cover – 0.00027 millirem per year
- Cigarette smoking – 1,300 millirem per year
- Medical (X-rays) – 53 millirem per year
- Building materials – 3.6 millirem per year
- Smoke detectors – 0.0001 millirem per year
- U.S. round trip by air – 5 millirem per trip
- Cosmic radiation – 28 millirem per year
- Radon – 200 millirem per year
- Living in Muskogee – 340 millirem per year

Q. How could a member of the public receive a dose from the cell?

A. It would be virtually impossible for any member of the public to receive any significant dose from the containment cell. A person would have to burrow into the containment cell in order to receive a dose from the cell.

#### Groundwater Issues

Q. Will Fansteel have monitoring wells on the restricted release area?

A. Yes, and the long-term maintenance budget provides for groundwater monitoring.

Q. Will Fansteel have any closed monitoring wells on site?

A. Yes. There will be closed monitoring wells and boring locations on site that have been or will be closed in a manner consistent with Oklahoma regulations. Closed wells and borings will actually reduce the permeability of the in-place materials.

Q. Does the design of the containment cell allow for sufficient depth between the bottom of the cell and groundwater?

A. Yes. The base elevation of the containment cell was designed to be approximately 10 feet above the maximum groundwater elevation.

Q. Is the groundwater beneath the containment cell connected with the Arkansas River?

A. The groundwater beneath the site drains toward the Arkansas River which is why an interceptor trench was installed between the containment cell location and the river.

Q. What happens to the water collected in the interceptor trench?

A. The water collected in the interceptor trench will either be used in the processing of residues or will be treated in the on-site treatment plant. The collected water will continue to be treated in this manner until the water meets the NRC license criteria as set forth in the Decommissioning Plan.

#### Financial Assurance

Q. Is Fansteel providing funding for long-term care?

A. Yes. Fansteel is providing financial assurance for long-term care of the restricted area.

Q. Is groundwater sampling included in the Decommissioning Funding Plan (DFP)?

A. The funding plan states that groundwater monitoring (sampling) will be included.

Q. Is air sampling included in the DFP?

A. Currently it is not. The NRC does not consider post-construction airborne contaminants to be a concern.

Q. Is replacement of the containment cell addressed in the DFP?

A. Repair of the containment cell and cover is addressed in the DFP. The containment cell is designed to last at least 1,000 years without replacement.

Q. Does Fansteel require any public monies to implement this plan?

A. No, Fansteel will fund the entire plan with its own monies.

### **Aesthetics and Socioeconomics**

**Q.** How will the cell affect tourism in Muskogee?

**A.** While it will require speculation to comment on the impact the containment cell would have on tourism, it is believed that installation of the cell, if anything, would have a positive impact. This belief is based on the fact that the containment cell will be aesthetically similar to local land use patterns and the stabilized residues should represent a smaller perceived risk to tourists in comparison to the unstabilized form.

**Q.** How will the cell appear from the roadways?

**A.** The containment cell will blend in with the surrounding area and will have a protective fence surrounding the cell.

**Q.** What activities can take place adjacent to the cell area?

**A.** Any public activity can take place in the area adjacent to the cell due to the low (essentially zero) dose expected from the engineered containment cell and cover.