UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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APR 1 2 1983

MEMORANDUM FOR: Richard Bangart, Director
Division of Vendor and Technical Programs, Region IV

FROM: James P. Knight, Assistant Director
for Components and Structures Engineering
Division of Engineering
Office of Nuclear Reactor Regulation

SUBJECT: LINING AND SEEPAGE PROBLEM AT FANSTEEL, INC., MUSKOGEE, OKLAHOMA

Project Name: Fansteel Metals, Inc., Muskogee, Oklahoma
TAC Number: 40077 (Assistance to Region IV)
PA Number: 172
References:

1) Memorandum, Bangart to Vollmer, Subject "Request for Technical Support for Resolving a Lining and Seepage Problem at Fansteel, Inc., Muskogee, Oklahoma," dated October 5, 1982.

2) Memorandum, Knight to Bangart, Subject "Request for Technical Support for Resolving a Lining and Seepage Problem at Fansteel Inc., Muskogee, Oklahoma," dated October 22, 1982.

3) Report "Site Hydrology Study", for Fansteel Metals Inc., Muskogee, Oklahoma, prepared by TECHRAD, Oklahoma City, Oklahoma, October 1982

Your memorandum dated October 5, 1982 (Reference 1) requested assistance from our office in resolving the lining and seepage problem for Pond Number 3 at Fansteel's facility, Muskogee, Oklahoma. Our memorandum (Reference 2) indicated our ability to provide the requested assistance.

On December 23, 1982, we received a report (Reference 3) prepared by Fansteel's Consultant, TECHRAD, pertaining to the lining and seepage problem. We were asked to review the report by Mike Shopenn of your staff and provide you with our evaluation.

The attachment to this memorandum, prepared by J. Philip, details my staff's evaluation of the subject report. In brief, a leak has developed in the liner of Pond Number 3 that could possibly contaminate ground areas beyond the French

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drain that encircles Pond 3. The staff concurs with the recommended course of action to be undertaken by Fansteel as outlined by TECHRAD (page 31, Reference 3). In addition to these actions, the staff recommends that the licensee, Fansteel Metals Inc.:

1) evaluate the quantity of water leaking from the pond and, if possible, locate the source of the leak. We suggest that the licensee consider pumping from the longitudinal center drain, while monitoring the associated water quantity and piezometric levels. The licensee may also elect to use tracer dyes to locate the leak.

2) prepare and submit to Region IV a course of action for defining and mitigating the consequences of leakage from the pond into the groundwater beyond the French drain.

James P. Knight, Assistant Director
for Components & Structures Engineering
Division of Engineering

Attachment:
As stated

cc: R. Vollmer
G. Lear
L. Heller
O. Thompson
J. Philip
M. Shopenn, RIV
J. Linehan, NMSS

Project Name: Fansteel Metals, Inc., Muskogee, Oklahoma
TAC No.: 40077
PA No.: 172
Prepared By: J. Philip, Geotechnical Engineer, SGEB, DE, NRR
Subject: Liner and Seepage Problem, Pond Number 3

Introduction

Fansteel Metals Inc., operates a source material recovery plant located on the west bank of the Arkansas River about 2-1/2 miles east of Muskogee, Oklahoma. The plant process generates acidic wastes (containing some radioactive source materials) that are stored in an earthen holding pond designated as Pond Number 3 by the licensee. There are other holding ponds at the plant. The general plant grade is between elevation 520 and El 536 (USGS Datum).

Description of Pond Number 3

Settling Pond 3 is located in the north part of the plant, immediately adjacent to the Chemical "C" Building and tank farm (Reference 1). The Pond bottom, which is on shale at El 505, is rectangular and measures 80 feet by 240 feet in plan dimensions. An earth embankment, built of impervious soil, surrounds the pond. Both the interior and exterior slopes of the pond are 3 horizontal on 1 vertical. The embankment crest is at the El 533. To reduce seepage, the interior of the pond is lined with a polyester fabric that rests on a 2-inch thick sand bedding along the slopes and at the bottom of the pond. Along the east-west longitudinal center line of the bottom of the pond, beneath the liner and sand bed, a 4-inch diameter drain (top approximately El 505) surrounded by clean gravel is provided. Seepage from the pond due to a liner leak would flow through the permeable sand bedding (rather than through the

impervious embankment) to the 4-inch drain and pumped back into the pond.

Surrounding the pond and at a distance of about 50 to 80 feet beyond the embankment is a French drain (perforated pipe surrounded by clean gravel). Flow from the drain (invert El 507 at the south west corner of the pond) empties into a low point (invert El 502) located near the northeastern corner of the pond, from where it is pumped to the pond. The French drain lowers the normal groundwater level (El 515 in the vicinity of the pond) in an area directly below the base of the pond. The effect of the French drain has been confirmed by readings on piezometers 9 and 10 located on the crest of the south and north embankment prior to the spring of 1982 (Figures 7 and 8, Reference 1).

Development of Lining and Seepage Problem

In the Spring of 1982, the licensee noticed a marked increase in the flow of seepage into the low point of the French drain at the northeastern corner of the pond. This, coupled with readings in piezometers 9 and 10 indicating flow through the pond embankment (Figure 8, Reference 1), raised the possibility that the liner had developed a leak and the French drain was collecting seepage water from the pond as well as groundwater. The staff was told, in a telephone conversation with Mr. J. Pierett of Fansteel, that the licensee had not attempted to pump the longitudinal drain at the bottom of Pond 3 to handle the suspected leak, had not monitored the quantity of seepage, and had not attempted to locate the source of the leak.

The licensee commissioned Technology Research and Development Inc. (TECHRAD) Oklahoma City, Oklahoma, to investigate the problem. TECHRAD's main objective was to define the general subsurface geology at the Fansteel site and delineate the general groundwater flow patterns by the collection and analysis of hydrogeological data. The data included water level measurements, results of piezometer slug tests, samples of the site soil materials, and available information on the hydrogeologic conditions at the site.

Conclusions and Recommendations

Based on the evidence presented in the TECHRAD study, the licensee concluded that a significant leak has developed in the liner of Pond 3; the staff agrees. In addition to the recommended course of action listed by TECHRAD (Page 31, reference 1) the staff recommends that the licensee:

1) evaluate the quantity of water leaking from the pond and, if possible, locate the source of the leak. We suggest that the licensee consider pumping from the longitudinal center drain while monitoring the associated water quantity and piezometric levels. The licensee may also elect to use tracer dyes to locate the leak.

2) prepare and submit to Region IV a course of action for defining and mitigating the consequences of leakage from the pond into the groundwater beyond the French drain.

Reference

1. Report, "Site Hydrology Study", for Fansteel Metals Inc., Muskogee Oklahoma, prepared by TECHRAD, Oklahoma City, Oklahoma, October 1982.