

Docket 70-36  
License SNM-33

APR 23 1993  
4-23-93

Mr. J. A. Rode, Plant Manager  
Hematite Nuclear Fuel Manufacturing  
Combustion Engineering, Inc.  
P.O. Box 107  
Hematite, MO 63047

Dear Mr. Rode:

SUBJECT: STORAGE OF SNM IN KARDEX UNIT (TAC L21643)

This refers to Combustion Engineering's (CE) telecom on March 30, 1993, followed by letters dated April 13 and April 22, 1993, concerning the fact that the actual number of storage shelves in the Kardex unit differed from that which you had reported in your application dated February 19, 1993. In a phone conversation between M. Tokar (Nuclear Regulatory Commission) and J. Conant (CE) on April 6, followed by a letter dated April 7, 1993, we informed you that CE should not load or store special nuclear material (SNM) in the Kardex unit until we had received and reviewed requested information concerning the root cause, safety implications, modifications to the Kardex unit, and actions taken to prevent recurrence of this type of incident.

Based on the information provided in your April 13, 1993, letter and discussions with your staff on April 14, 1993, we concurred with your proposed action to return the Kardex to its "as-designed" condition, of 330 shelves at 6-9/16 inch spacing, and to confirm that this action had been completed via a preoperational acceptance inspection. We understand, based on the statements in your April 22, 1993, letter, that CE has completed the modification and preoperational inspection of the Kardex unit and that the unit is now in conformance with the design configuration (viz., 330 shelves at a nominal 6-9/16 inch spacing). Therefore, we believe that our concerns regarding the Kardex unit have been adequately addressed and that SNM can be loaded and stored in the Kardex unit.

If you have any questions regarding this matter, please call me at (301) 504-2468 or Dr. Michael Tokar at (301) 504-2590

Sincerely,

Original Signed By:

Elinor G. Adensam, Acting Chief  
Licensing Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

cc:

Mr. J. F. Conant, Manager  
Nuclear Materials Licensing  
Distribution (Control No. 290S)

Docket No. 70-36  
NMSS R/F  
GFrance, RIII

PDR/EPDR  
FCSS R/F  
MAdams

NRC File Center ETenEyck  
Region III JGreeves  
FCLB R/F

S-4  
NF05  
1/0

OFC	FCLB	C	FCLB	C	FCLB	C	FCLB	C	FCLB	
NAME	MK1asky		SSoong		VPharpe		MTokar		EAdensam	
DATE	4/13/93		4/23/93		4/23/93		4/23/93		4/23/93	

C = COVER 501186 E = COVER & ENCLOSURE N = NO COPY

70-36-107-1000  
70-36-107-1000  
70-36-107-1000  
70-36-107-1000

MEMORANDUM TO FILE: Docket No. 70-0036, Combustion Engineering

MEMORANDUM FOR: Roy J. Caniano, Chief, Nuclear Materials  
Safety Branch

FROM: George M. France, III, Fuel Facilities  
Inspector

SUBJECT: TRIP REPORT-APRIL 14, 1993, MEETING WITH  
CE HEMATITE/CORPORATE, NMSS AND REGION III  
AT NRC HQ CONCERNING AS-BUILT MEASUREMENTS  
OF PELLET STORAGE AND RETRIEVAL RACK  
(KARDEX UNIT)

On April 14, 1993, representatives of NMSS, Region III, and the licensee's staff met at NRC HQ to discuss the criticality concerns of the Kardex unit.

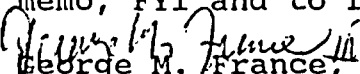
While examining the unit to provide data for software to control movement of pellet trays, a staff engineer and a member of the vendors staff noted that the dimension of the shelf spacing was an inch less per shelf than originally specified. Consequently, the as-built spacing would allow up to 414 trays (5 5/8"), instead of the planned design for 360 shelves (6 9/16"). Since, the criticality parameter is based on moderation control, the new shelf spacing will only increase K-eff by 3%. Hence, the as-built measurements do not cause a degradation of criticality safety parameters.

The "root cause" of the problem was due to inadequate communication between CE Engineering and the installer, inadequate compensation for the delay between original procurement and ultimate installation and the impact of changing the installation vendor, and inadequate compensation for the flexibility in the hardware design that permitted variations in the shelf spacing.

The licensee will resolve the problem by having installers reconfigure the shelves to the originally planned dimension of 6 9/16" spacing. The installation should be completed by April 23, 1993. The reconfiguration of the shelf spacing should match the original plan submitted in the license amendment application.

The licensee requested the NRC to release the prohibition on storing Special Nuclear Material (SNM) in the Kardex unit. NMSS will take the matter under staff review.

A copy of the licensee's presentation will be attached to this memo, FYI and to file.

  
George M. France, III  
Fuel Facilities Inspector

# AGENDA

## KARDEX PROCUREMENT

- INTRODUCTION A. E. SCHERER
- SAFETY BASIS J. F. CONANT
- KARDEX FINDINGS J. A. RODE
  - SEQUENCE OF EVENTS
  - ROOT CAUSES
  - FOLLOW UP
- RECTIFICATION J. A. RODE
- INDEPENDENT CONFIRMATION A. E. SCHERER
- SUMMARY A. E. SCHERER

CE/WRC Meeting Attendees

4/14/93

2 P.M.

OWFN 4B11

SEAN Soong, NRC/NMSS

Marc Klaszy NRC/NMSS

Bob Klotz ABB-CE

HAL ESKRIDGE ABB-CE HEMATITE

E.G. ADENSAM NRC/NMSS

Richard Milstein NRC/NMSS

A.E. SCHERER ABB-CE

**J. A. Rode ABB-CE**

John T. Greeves NRC/NMSS

JOHN E. CONANT ABB-CE

Michael Tokar NRC/NMSS

Blankshie

ABB/CE

FRANCE

NRC/RTE

**SAFETY BASIS**  
**PROCUREMENT AND**  
**PREOPERATIONAL INSPECTION**

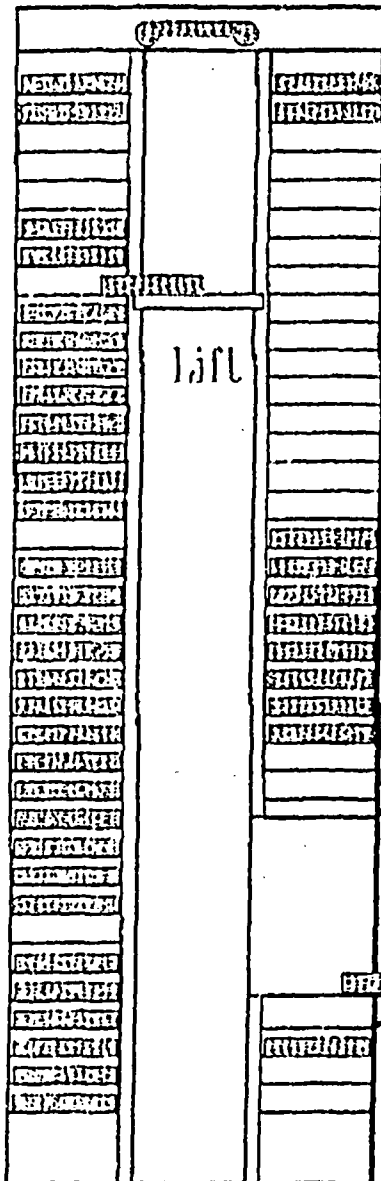
- THE PROCESS USED ON THE CONSOLIDATION PROJECT TO PROCURE SYSTEMS THAT MAY AFFECT NUCLEAR SAFETY IS: COMMERCIAL PROCUREMENT FOLLOWED BY "PREOPERATIONAL INSPECTION."
  
- THE PRACTICE OF "PREOPERATIONAL INSPECTION" ASSURES THAT ATTRIBUTES IMPORTANT TO SAFETY ARE ACCEPTABLE BEFORE A SYSTEM IS DEDICATED TO NUCLEAR SERVICE.
  
- BY THE NATURE OF THIS PROCESS, A COMMERCIALY PROCURED SYSTEM IS OCCASIONALLY FOUND TO BE NOT ACCEPTABLE FOR ITS INTENDED USE. THIS SITUATION MAY RAISE A COMMERCIAL ISSUE, BUT IS NOT A SAFETY CONCERN AS LONG AS THE SYSTEM IS NOT PLACED IN SERVICE IN AN UNACCEPTABLE CONDITION.

- THE "PREOPERATIONAL INSPECTION" METHOD OF DEDICATION OCCURS LATE IN THE PROCUREMENT PROCESS. LICENSE APPROVAL ALSO OCCURS LATE IN THE PROCESS, AND "UNACCEPTABLE DISCOVERIES" CAN PRODUCE AN OVERLAP IN SCHEDULE, AS OCCURRED IN THIS SITUATION.
- THIS TOO IS NOT A SAFETY CONCERN, AS LONG AS THE "PREOPERATIONAL INSPECTION" OCCURS BEFORE THE SYSTEM IS PLACED IN SERVICE.

# The Kardex

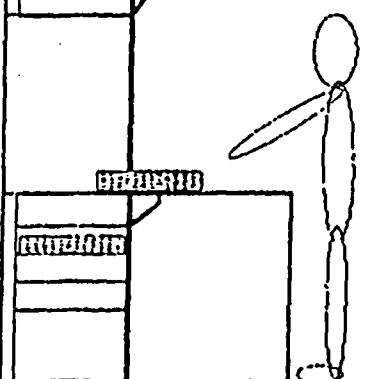
- A computer controlled multi-module storage bin.
- The Hematite Kardex is a six module unit.
- Each module consists of a computer controlled elevator and a stack of storage shelves in front of and behind the elevator.

Hoist →



Storage Shelves ←

Computer Controls



# Kardex Storage System

P. R. Rohde  
KARDDEX, INC.  
9/27/82

**ASDA**  
**ASDA**  
ASDA BROWN BOVENI



# The Kardex History

- Specified in 1989.
- Purchased early in 1990 for installation at Windsor.
- Purchase included installation at Windsor.
- Shipped to Hematite in 1992.
- Shelves installed at Hematite in February, 1993, by an Ohio-based installation crew.
- Spacing error discovered March 27, 1993, (Saturday) during preoperational checkout.
- Management was informed March 29, 1993 (Monday).  
A hold was placed on the loading of the Kardex.
- NRC was informed March 30, 1993 (Tuesday).

E. A. Roppel  
April 13, 1993  
jar93119093



# The Kardex Error

- The shelf spacing - 6 9/16" - was specified in the original 1989 hardware/installation procurement document.
- The license amendment submitted in August, 1992, based on this spacing, specified a maximum of 360 Kardex pans filled with pellets.
- Installation of the Kardex at Hematite was covered by a separate Purchase Order to the St. Louis representative.
- This provided for the initial installation of six modules.
- The installer was given a copy of the original Purchase Order which specified 6 9/16" spacing.
- The installer based the spacing on parts supplied - not the Purchase Order specified spacing.
- This resulted in 414 shelves at 5 5/8" rather than 330 at 6 9/16" spacing.

# The Root Cause

- Inadequate communication between Combustion Engineering and the installer.
- Inadequate compensation for the delay between original procurement and ultimate installation (including the impact of changing the installation vendor).
- Inadequate compensation for the flexibility in the hardware design that permitted variations in the shelf spacing.

# RECTIFICATION

- COMBUSTION ENGINEERING HOLD WAS PLACED ON THE INTRODUCTION OF SNM INTO THE KARDEX.
- WILL BE RETURNED TO THE "AS DESIGNED" CONDITION BY ADJUSTING THE SHELF SPACING TO 6 9/16". COMBUSTION ENGINEERING INTENDS TO COMPLETE THESE MODIFICATIONS BY APRIL 23, 1993.
- EQUIPMENT CHECKOUT AND PREOPERATIONAL ACCEPTANCE TESTING IS IN PROGRESS AND WILL BE COMPLETED PRIOR TO THE RELEASE OF ANY SYSTEM, STRUCTURE, OR COMPONENT FOR ACTIVE SERVICE.

# **FOLLOW UP ACTIONS**

- **COMMERCIAL IMPLICATIONS OF THE COMMUNICATIONS DIFFICULTIES ENCOUNTERED IN THE PROCUREMENT, PROCESS WILL BE REEVALUATED.**
- **COMMERCIAL ADVANTAGES OF EARLY DETECTION OF DEVIATIONS FROM THE SPECIFICATION, RATHER THAN RELYING SOLELY ON INSPECTION AT THE COMPLETION OF PROCUREMENT WILL BE ASSESSED.**

## SUMMARY

**BASED ON CLARIFICATIONS PROVIDED IN APRIL 13, 1993 LETTER AND APRIL 14, 1993 MEETING, WE BELIEVE:**

- 1. COMBUSTION ENGINEERING HAS AN EFFECTIVE PROCESS TO ENSURE THE SAFETY OF THE SYSTEMS, STRUCTURES AND COMPONENTS BEING INSTALLED IN ITS CONSOLIDATION PROJECT.**
- 2. COMBUSTION ENGINEERING PROPERLY IDENTIFIED, EVALUATED AND REPORTED DISCREPANCIES IN THE "AS-BUILT" KARDEX BEFORE PLACING IT INTO OPERATION.**
- 3. COMBUSTION ENGINEERING INTENDS TO RETURN THE KARDEX TO THE "AS-DESIGNED" CONDITION BY APRIL 23, 1993 AND NOT INTRODUCE SNM UNTIL THOSE MODIFICATIONS ARE COMPLETE, AND THE PREOPERATIONAL INSPECTION HAS BEEN COMPLETED.**

**THUS THE NRC IS IN A POSITION TO  
REMOVE THE RESTRICTIONS IMPOSED BY  
THEIR LETTER OF APRIL 7, 1993.**