

July 21, 2003

MEMORANDUM TO: Marc L. Dapas, Acting Director, Division of Nuclear Materials Safety

FROM: Christopher G. Miller, Chief, Decommissioning Branch /RA/

SUBJECT: REPORT OF MEETING BETWEEN NRC (RIII: DNMS) AND WESTINGHOUSE ELECTRIC COMPANY, LLC REGARDING MATERIAL ACCOUNTABILITY AND CONTROL ISSUES AT ITS FORMER HEMATITE FUEL FABRICATION FACILITY

On June 19, 2003, NRC conducted a Public Meeting with Westinghouse Electric Company, LLC (Westinghouse) management, at the Region III Office, to discuss concerns regarding the discovery of a unaccounted for uranium fuel, and to ascertain the licensee's action to address issues regarding its material control and accountability for special nuclear material (SNM). A copy of the meeting notice and list of participants are attached.

Westinghouse was granted authorization, via a license amendment on April 11, 2002, to conduct certain decommissioning activities at its former Hematite fuel fabrication facility. During the conduct of these activities, Westinghouse discovered on two separate occasions (March 24, 2003, and May 28, 2003) uranium fuel pellets and rods which were not accounted for in its inventory records. The NRC invited the licensee to present the details of the two events, including the root cause and corrective action efforts.

During the meeting, the licensee discussed each event time line, the corrective actions implemented to address each discovery, the potential security and risk implications as a result of the inventory control problems, and Westinghouse's actions to ensure all SNM has been inventoried. Westinghouse management indicated that there was no loss of security controls, no criticality concerns, and no excess exposures to the public, employees, or environment as a result of either event. The licensee also discussed the current material inventory and its plans for conducting the 2003 physical inventory. A copy of the licensee's presentation slides is attached.

Attachments: As stated

Docket No. 070-00036  
License No. SNM-00033

CONTACT: G. McCann, DNMS  
(630) 829-9856

\*See prior concurrence

DOCUMENT NAME: G:\SEC\Decom...\Westinghouse.meeting rpt.wpd

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OFFICE	RIII	RIII	RIII	E
NAME	Dziedzic:jc*	McCann*	Miller <i>LM</i>	
DATE	07/18/03	07/21/03	07/21/03	

OFFICIAL RECORD COPY

June 11, 2003

**NOTICE OF SIGNIFICANT LICENSEE MEETING**

THIS MEETING IS OPEN TO PUBLIC ATTENDANCE

Name of Licensee: Westinghouse Electric Company, LLC  
3300 State Road P  
Festus, Missouri 63028  
(639) 937-4691

Name of Facility: Former Hematite Fuel Fabrication Facility

Docket No.: 070-00036  
License No.: SNM-33

Date and Time of Meeting: June 19th, 2003, 1:30 p.m. CDT

Location of Meeting: U. S. Nuclear Regulatory Commission  
Region III  
801 Warrenville Road, Suite 255  
Lisle, Illinois 60532-4351

Purpose of Meeting: Discuss the licensee's actions to address issues regarding  
material control and accountability for special nuclear material.

**NRC Attendees:**

Thomas N. Pham, NSIR  
Joseph W. Shea, NSIR  
Gary L. Shear, Acting Deputy Division Director, DNMS, RIII  
Christopher G. Miller, Chief Decom. Branch, DNMS, RIII  
George M. McCann, Radiation Specialist, DNMS, RIII  
Others, as designated

**Licensee Attendees:**

Thomas Dent, Site Manager, Director, Decommissioning  
A. Joseph Nardi, License Administrator  
Karen Craig, Licensing/QA Manager  
Gary Uding, MC&A Engineer  
Others, as designated

Notice of Significant  
Licensee Meeting

-2-

NOTE: Questions regarding attendance at this meeting, including attendance by NRC personnel, other than those listed above, should be made known to Christopher G. Miller at 630/829-9633 close of business on June 16, 2003.

Approved by: /RA/  
Christopher G. Miller, Chief  
Decommissioning Branch

Distribution:

Docket File  
PUBLIC IE-07  
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OFFICE	RIII		RIII		RIII			
NAME	Bonano:mb		McCann		Miller			
DATE	06/10/03		06/11/03		06/11/03			

**OFFICIAL RECORD COPY**

NRC and Westinghouse June 19, 2003 Meeting

**List of Meeting Participants**

NRC Participants:

Barry Westreich, NSIR/DNS  
Amir Kouhestani, NMSS/DWM  
Tom Pham, NSIR/DNS  
John Lubinski, NMSS/FCSS  
Margaret Chatterton, NMSS/FCSS  
Robert Nelson, NSIR/DNS  
Ralph Way, NSIR/DNS  
Gary L. Shear, DNMS, RIII  
Christopher G. Miller, DNMS, RIII  
George M. McCann, DNMS, RIII

Licensee Participants:

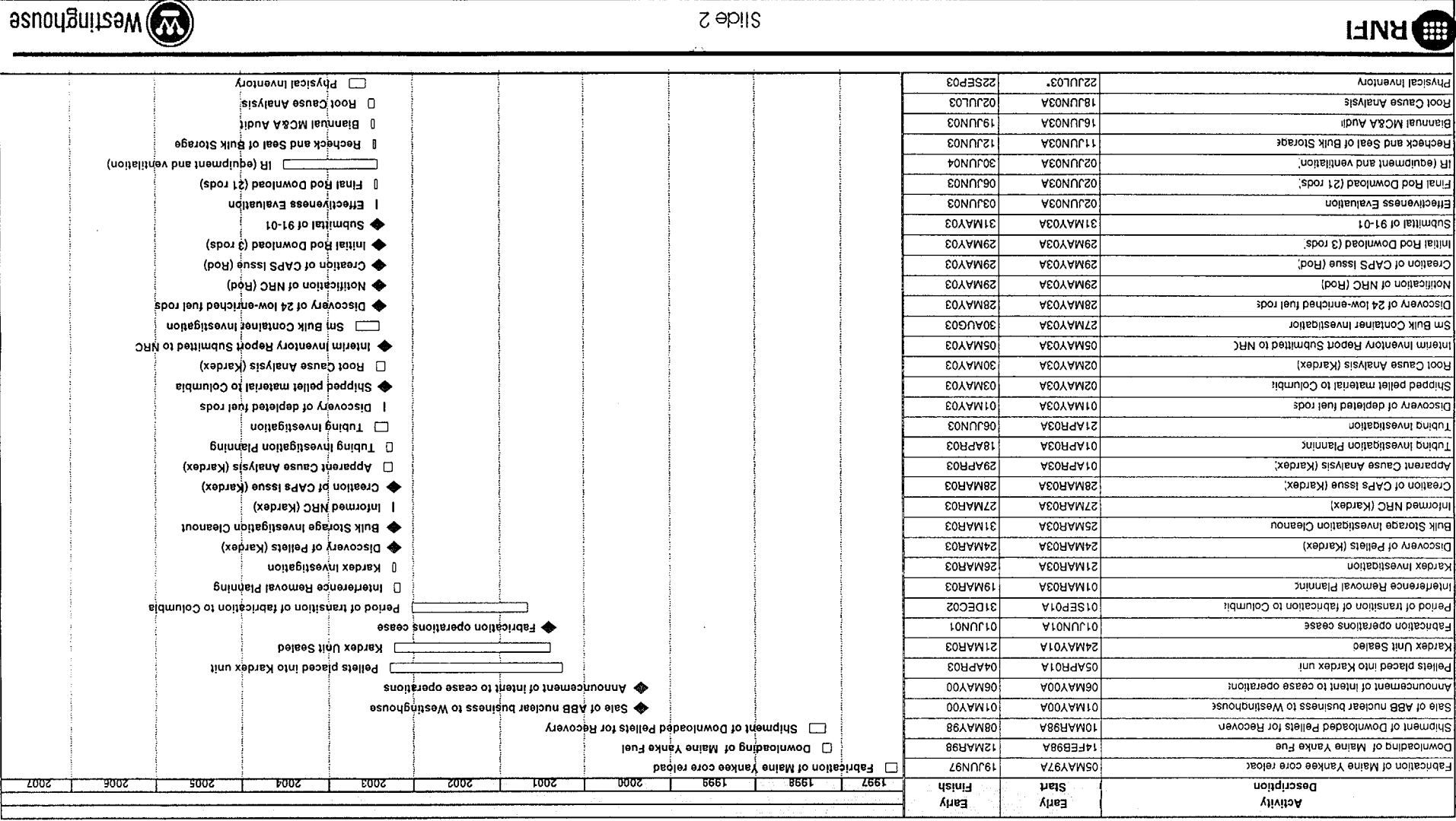
Tom Dent, Westinghouse  
Joseph Nardi, Westinghouse  
Karen Craig, Westinghouse  
Gary Uting, Westinghouse



# Hematite Former Fuel Fabrication Facility Security and MC&A

June 19, 2003

# Timeline of Events

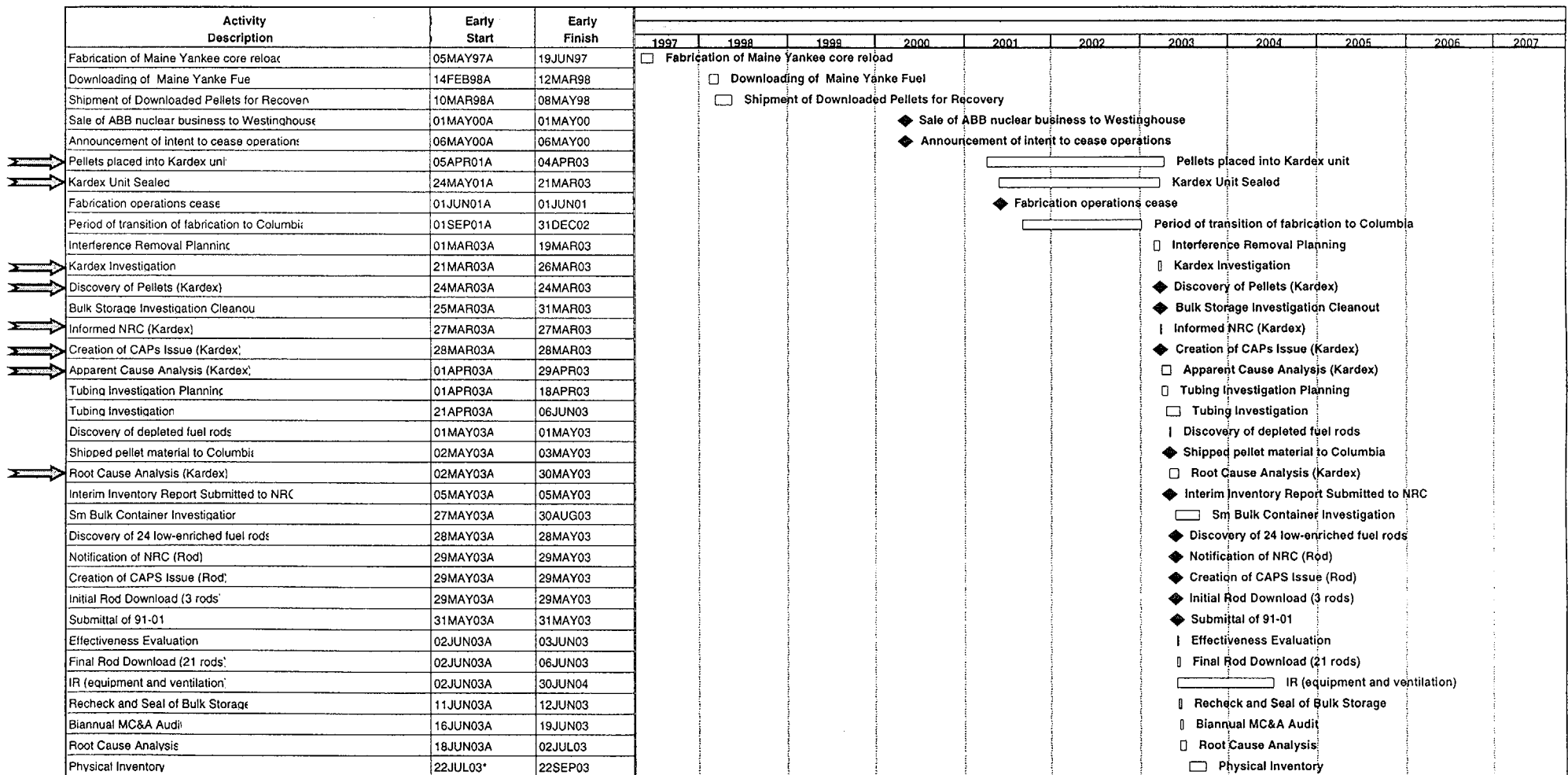


# Pre-D&D Interference Removal

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- Initiated a disciplined effort to isolate contractor responsibility
- Pre-inspected areas and equipment prior to contractor mobilization
- Utilized former fuel operators for effort
- Effort included verification that the Assembly Building Kardex and Ceramic Kardex systems were empty

# Pre-D&D Interference Removal



# Assembly Building Kardex Loss of Accountability

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## Root Cause

- Failure to update HAMIS inventory records by completion of a Manual Kardex Keypad Entry Data Sheet after manual placement of pan into the Kardex storage system.
- Use of an inventory procedure that did not confirm the presence of special nuclear material in the Kardex Units.

# Assembly Building Kardex Loss of Accountability (cont.)

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- Inventory procedure only confirmed the presence of SNM identified in HAMIS
- 1.85 kg U-235 found in the Kardex system would NOT have triggered an inventory discrepancy

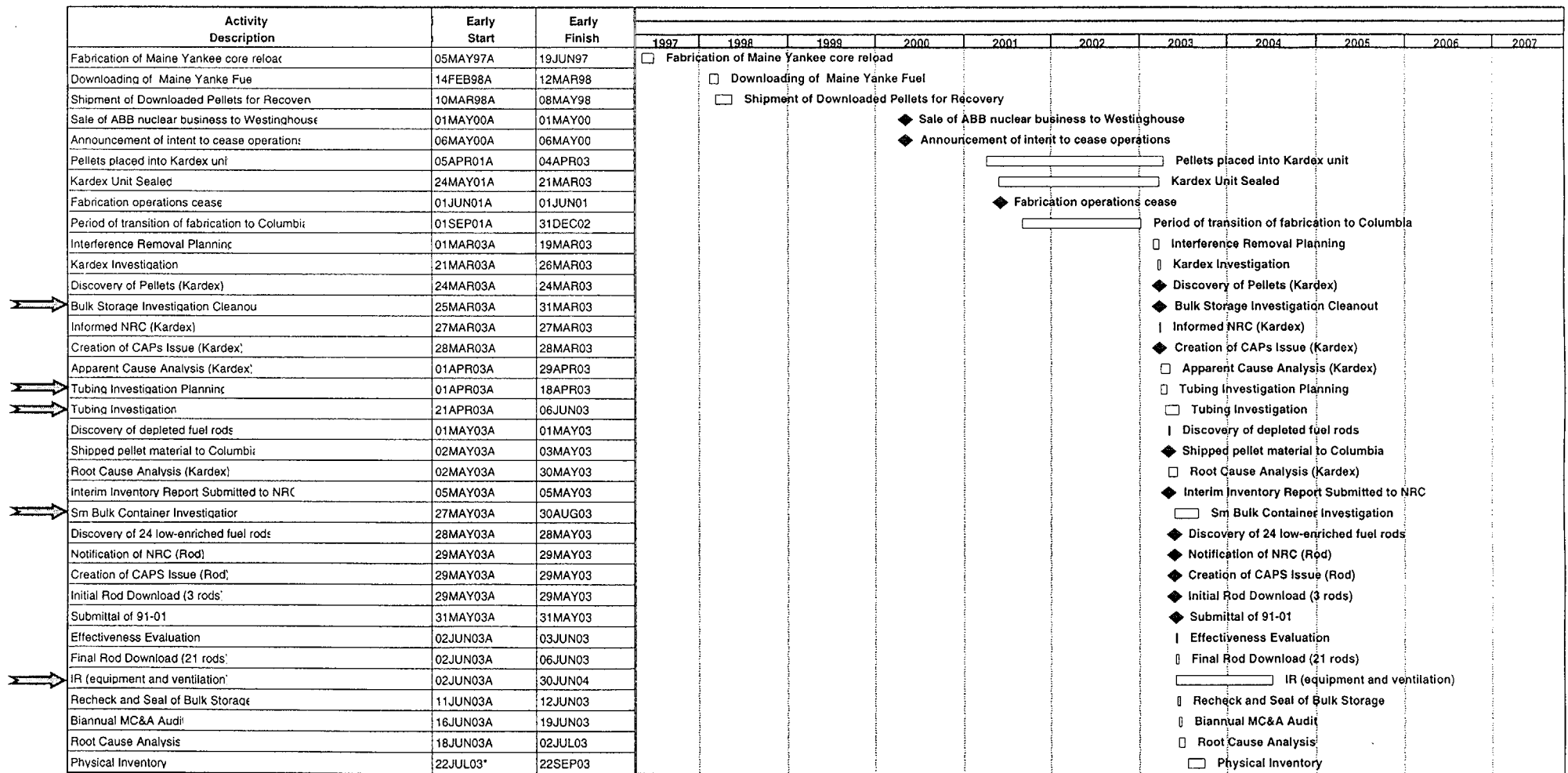
# Assembly Building Kardex Loss of Accountability (cont.)

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## Contributing Cause

- Poor reliability of the Kardex automated storage and retrieval system which required periodic use of manual data entry, and
- Failure of the inventory performed on May 24, 2001 to verify that every Kardex location was empty prior to sealing the systems.

# Corrective Actions to Kardex Findings





# Corrective Actions to Kardex Findings

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- Bulk Storage Investigation Cleanout
  - 44 Bulk Virgin Oxide Hoppers Vessels
  - 3 Vertical Oxidation Furnaces
  - 3 Micronizer Fines Vessels
  - 9 Recycle Hoppers
  - 4 Vacuum Transfer System Pots
  - 4 Press Feed Buffers
  - 8 Blender
  - 4 Nauta Mixers
  - 2 Milling Hoods
  - 3 Dewaxing Furnaces
  - 3 Sintering Furnaces

Total Recovered = 130 kg U

# Corrective Actions to Kardex Findings (cont.)

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- Tubing Investigation
  - Investigated ~30,000 tubes
  - Discovered 24 Maine Yankee fuel rods (~60 kg U)
  - Discovered ~300 depleted rods
- Mock-up Disassembly (3)

# Corrective Actions to Kardex Findings (cont.)

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## Small Bulk Container Recovery

- Small cans and trays in process area
- All cans and trays to be opened and visually verified
- Cans and trays palletized and shrink wrapped
- Miscellaneous equipment opened and inspected (e.g., desk drawers, file cabinets, etc.)

# Small Container Investigation

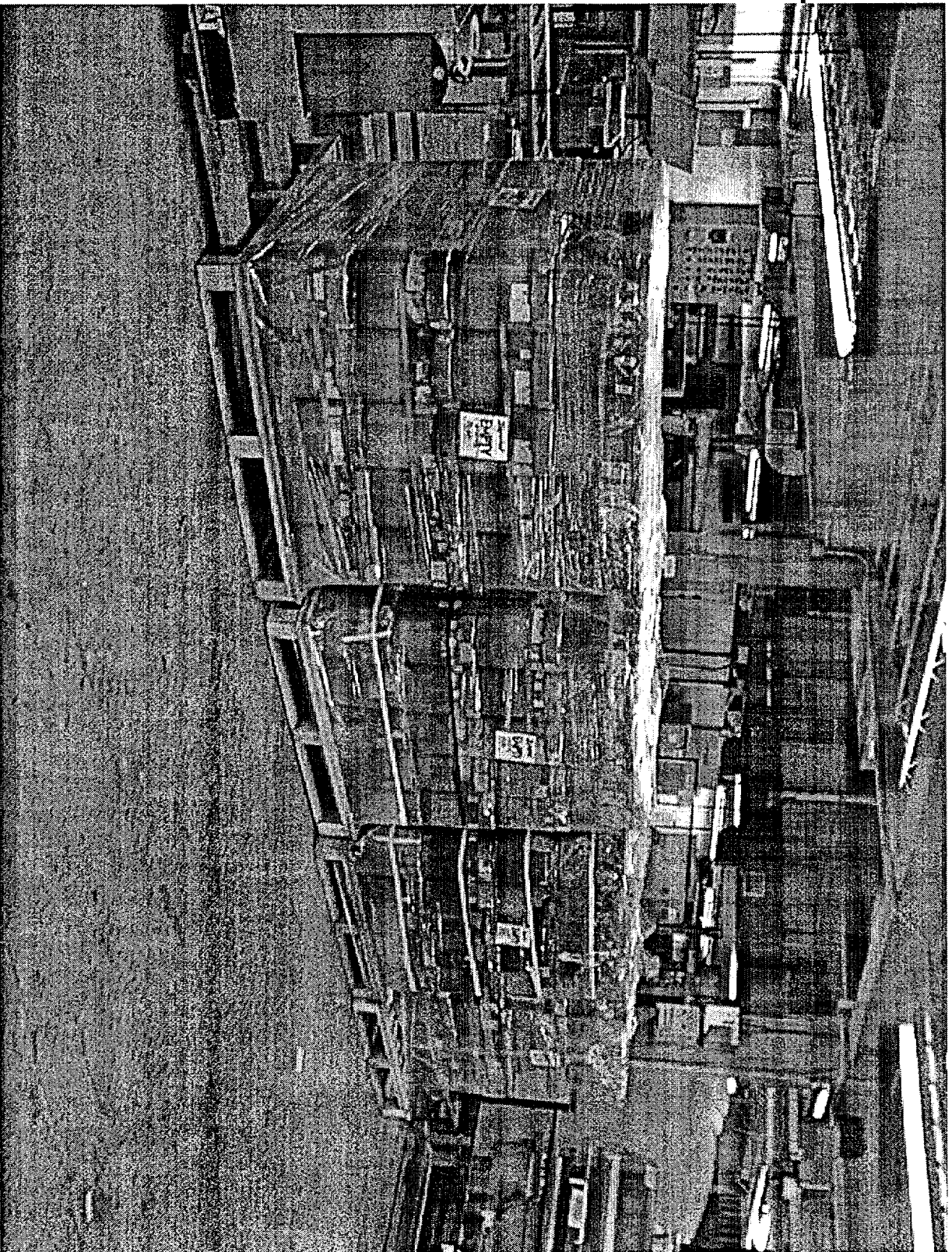
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- Powder cans visually inspected to date ~ 1,100
- Remaining cans for inspection ~ 500
- Grinder pans for inspection ~ 3,450









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# Hematite Former Fuel Fabrication Facility Physical Inventory Status

June 19, 2003



# Physical Inventory

Activity Description	Early Start	Early Finish												
			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
Fabrication of Maine Yankee core reload	05MAY97A	19JUN97	<div><div></div>Fabrication of Maine Yankee core reload</div>											
Downloading of Maine Yankee Fuel	14FEB98A	12MAR98	<div><div><div></div>Downloading of Maine Yankee Fuel</div></div>											
Shipment of Downloaded Pellets for Recovery	10MAR98A	08MAY98	<div><div><div></div>Shipment of Downloaded Pellets for Recovery</div></div>											
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Period of transition of fabrication to Columbia	01SEP01A	31DEC02	<div><div><div></div>Period of transition of fabrication to Columbia</div></div>											
Interference Removal Planning	01MAR03A	19MAR03	<div><div><div></div>Interference Removal Planning</div></div>											
Kardex Investigation	21MAR03A	26MAR03	<div><div><div></div>Kardex Investigation</div></div>											
Discovery of Pellets (Kardex)	24MAR03A	24MAR03	<div><div><div></div>Discovery of Pellets (Kardex)</div></div>											
Bulk Storage Investigation Cleanout	25MAR03A	31MAR03	<div><div><div></div>Bulk Storage Investigation Cleanout</div></div>											
Informed NRC (Kardex)	27MAR03A	27MAR03	<div><div><div></div>Informed NRC (Kardex)</div></div>											
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Discovery of depleted fuel rods	01MAY03A	01MAY03	<div><div><div></div>Discovery of depleted fuel rods</div></div>											
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Biannual MC&A Audit	16JUN03A	19JUN03	<div><div><div></div>Biannual MC&amp;A Audit</div></div>											
Root Cause Analysis	18JUN03A	02JUL03	<div><div><div></div>Root Cause Analysis</div></div>											
Physical Inventory	22JUL03*	22SEP03	<div><div><div></div>Physical Inventory</div></div>											

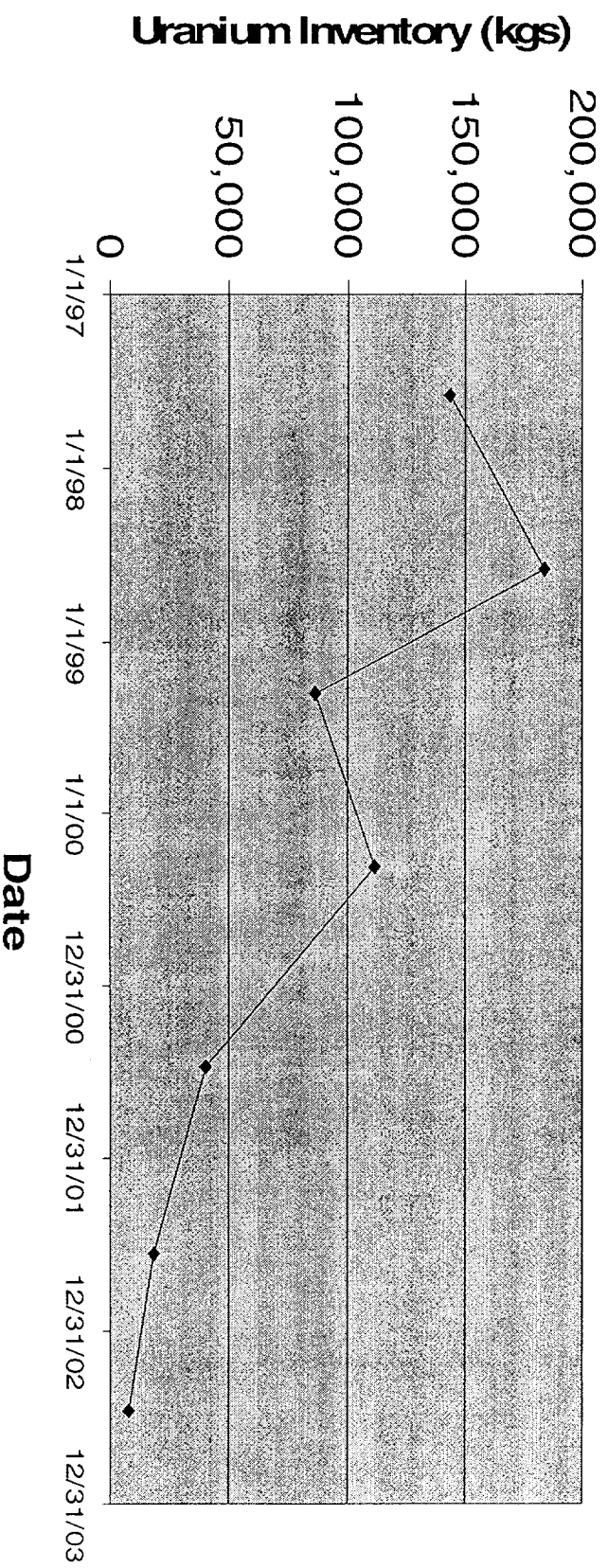
# Review of PI Results

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<u>Date</u>	<u>Ending Inventory</u>	<u>Inventory Difference</u>
7/31/98	7,834,383	185
4/21/99	3,475,917	66,602
4/29/00	4,566,350	(39,947)
6/22/01	1,681,937	44, 968
7/22/02	747,325	(73,602) no book correction
2003	320,000	(50,000) preliminary estimate

# Hematite Inventory

Hematite Inventory vs Time



# Current Inventory Breakdown

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<u>Grams U</u>	<u>Grams U<sup>235</sup></u>	<u>Material Type</u>	<u>Description</u>
7,716,201	314,193	39 Shipping Containers	For shipment to Kazakhstan
53,629	2,655	Residue in 4 containers	For shipment to Columbia
62,500 (est.)	2,542	17 Items on record	Waste material
<u>40,000 (est.)</u>	<u>1,600 (est.)</u>	Ventilation System	Holdup
7,873,000	320,000	Total	

## Shipment to Kazakhstan

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- Work began in August 2002 to action the necessary Logistical, Licensing and Commercial plans.
- A key requirement in preparing the 'Erbid' for despatch was to identify, source and pack suitable containers.

- The container identified was the 3516.
- Base 3516 UK Licence was re-issued in January 2003. Licence approvals were applied for

~~immediately for US, Kazakhstan & Russia.~~

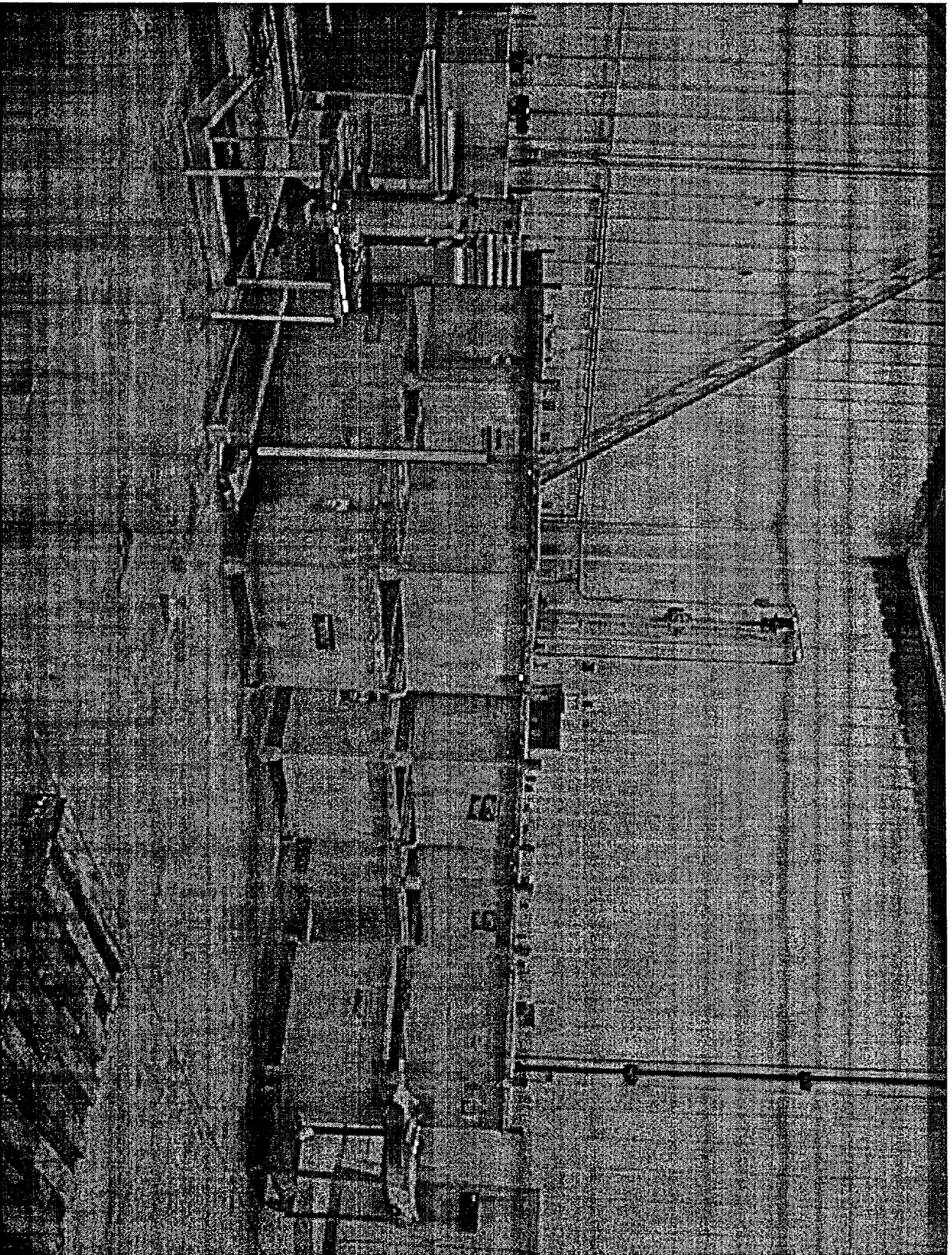


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Westinghouse



# Shipment to Kazakhstan

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- A US license approval has been received; however, the Kazakhstan and Russian licenses have been delayed and are not expected until July.
- A contingency plan was identified in February to move the 'Erbia' to a BNFL Westinghouse facility in the UK for interim storage prior to the issuance of a Kazakhstan license.

## Shipment to Kazakhstan (cont.)

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- A US export license to the UK has been applied for.
- A vessel was booked for 24-26 June. This has now been postponed.
- Shipment is in July however a booking is not possible until a UK export license has been granted.
- A UK export license is expected to be issued by mid July
- NRC will be updated of plans

**Columbia maintains control  
of planning and execution of  
this material movement.**



# 2003 Physical Inventory Plans

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- Draft PI Plan issued and under reviewed
  - Based on full PI in accordance with FNMCP
  - Questions remain on test requirements
- Last PI conducted 7/22/02
- Requirement is annual  $\pm$  30 days
- Current plans are for PI on or before 7/22/03

# Activities Underway

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- Monthly MC&A audit is now effectively a Physical Inventory
- Preparing material on floor for PI
  - Inspecting and sealing empty equipment
  - Packaging waste materials
  - Inspection of small items
- Conducting records review
- Conducting radiation surveys of ventilation system to quantify holdup

# 2003 Physical Inventory Issues

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- Completion of plant inspection effort for small containers will not be completed until August.
  - Delay start?
  - Delay completion?
- Test for adequacy of inventory
  - Will not pass current test requirements

# PI Test Requirements

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- Shipments since last PI
  - Primarily residue materials with higher uncertainty of measurement
  - Large fraction of waste shipments based on gamma scan measurements
- Anticipated ID = 50 kg  $^{235}\text{U}$
- Test criteria estimated to be 9 kg  $^{235}\text{U}$ 
  - Can not pass adequacy test for the PI
- ID Test before was 100 to 200 kg  $^{235}\text{U}$

# Recommendations

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- Reach agreement on appropriate test for adequacy of inventory
- Conduct PI starting on July 22, 2003
- Issue interim report within 30 days
- Complete small items inspection in August
- Issue final report within 60 days that would include the small items inspection effort

# Physical Inventory Conclusions

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- Physical inventory of known uranium within the facility is limited to a small well defined number of items except for ventilation system holdup.
- Monthly audits now essentially constitute physical inventories of known items.
- Taken other steps such as Effectiveness Evaluation
- Past and ongoing equipment inspections limit possibilities of new finds but ??

# Path Forward

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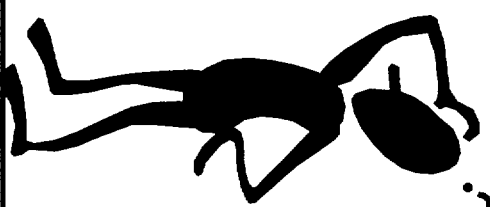
- Continue with small items investigation in an organized manner.
- Maintain questioning attitude for continuing operations.
- Completion of interference removal activities to provide definitive location of items.

## Path Forward

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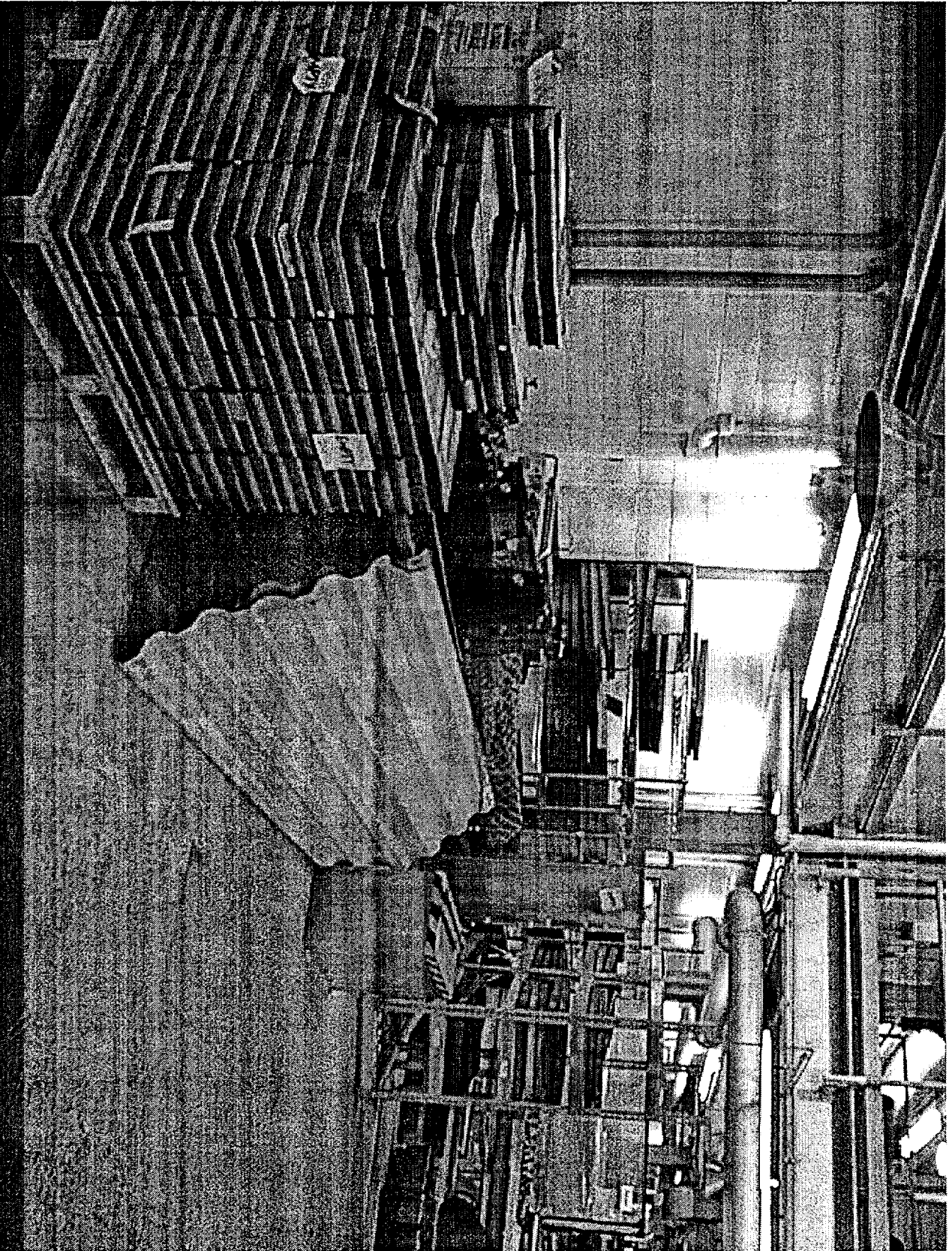
# QUESTIONS?

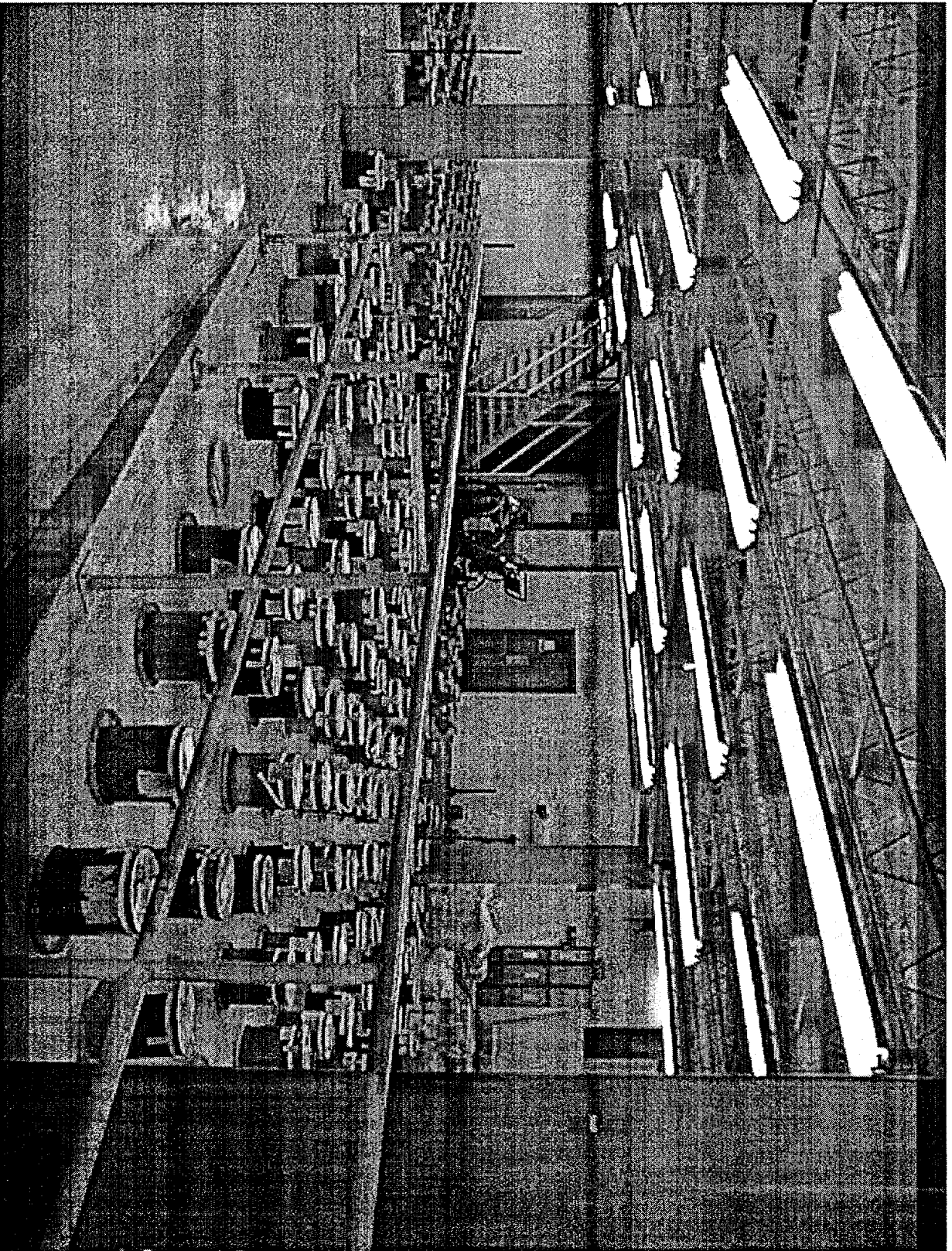




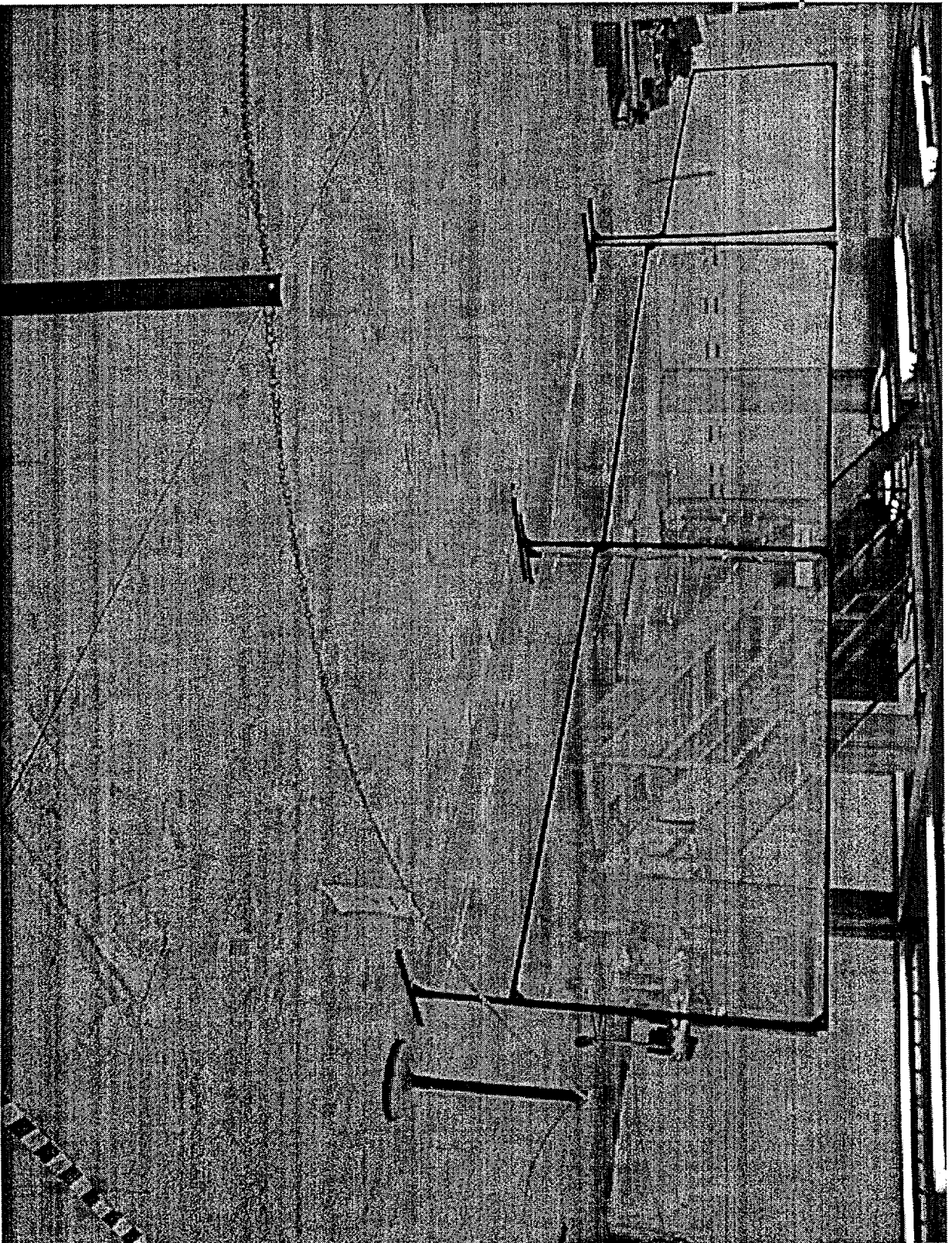
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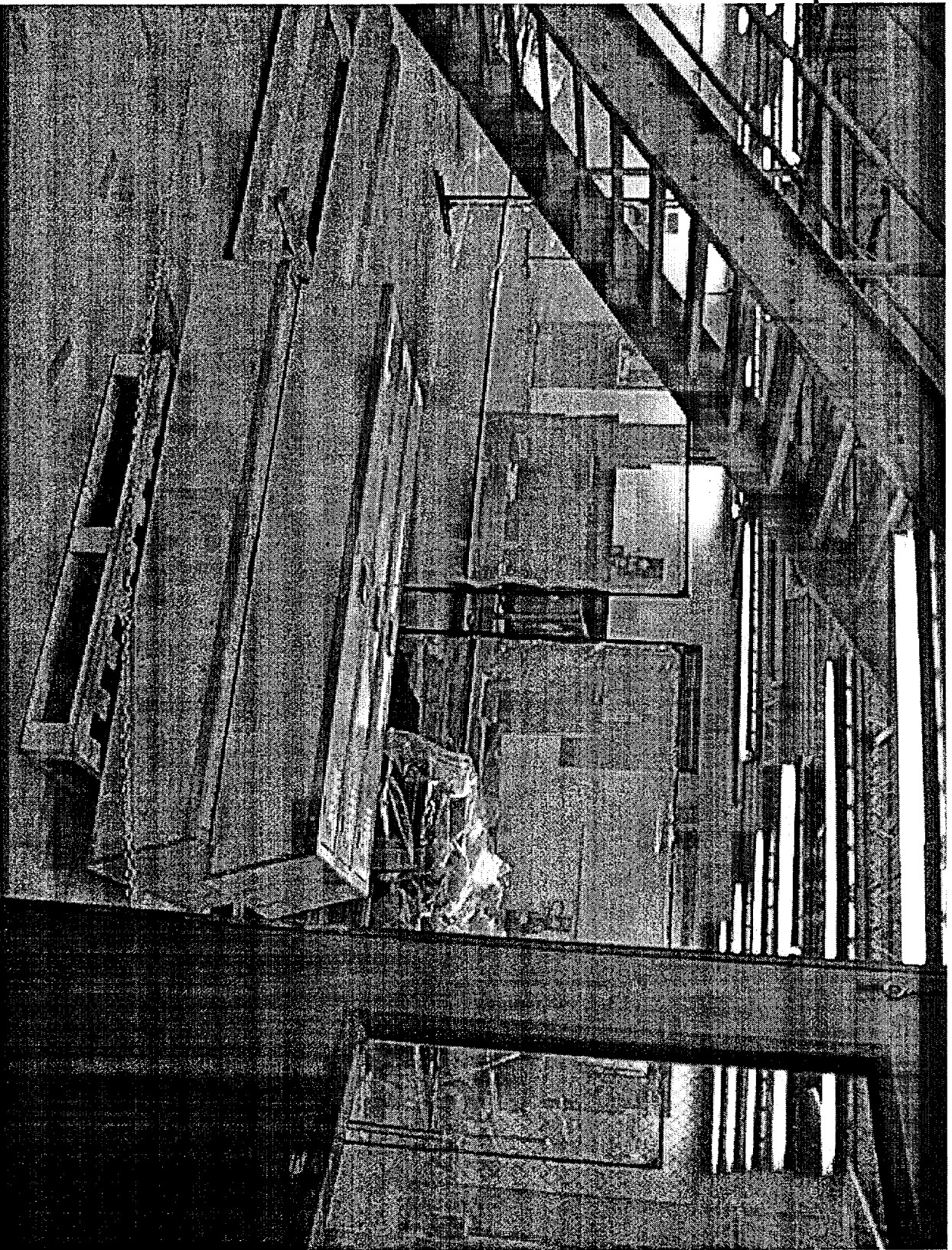
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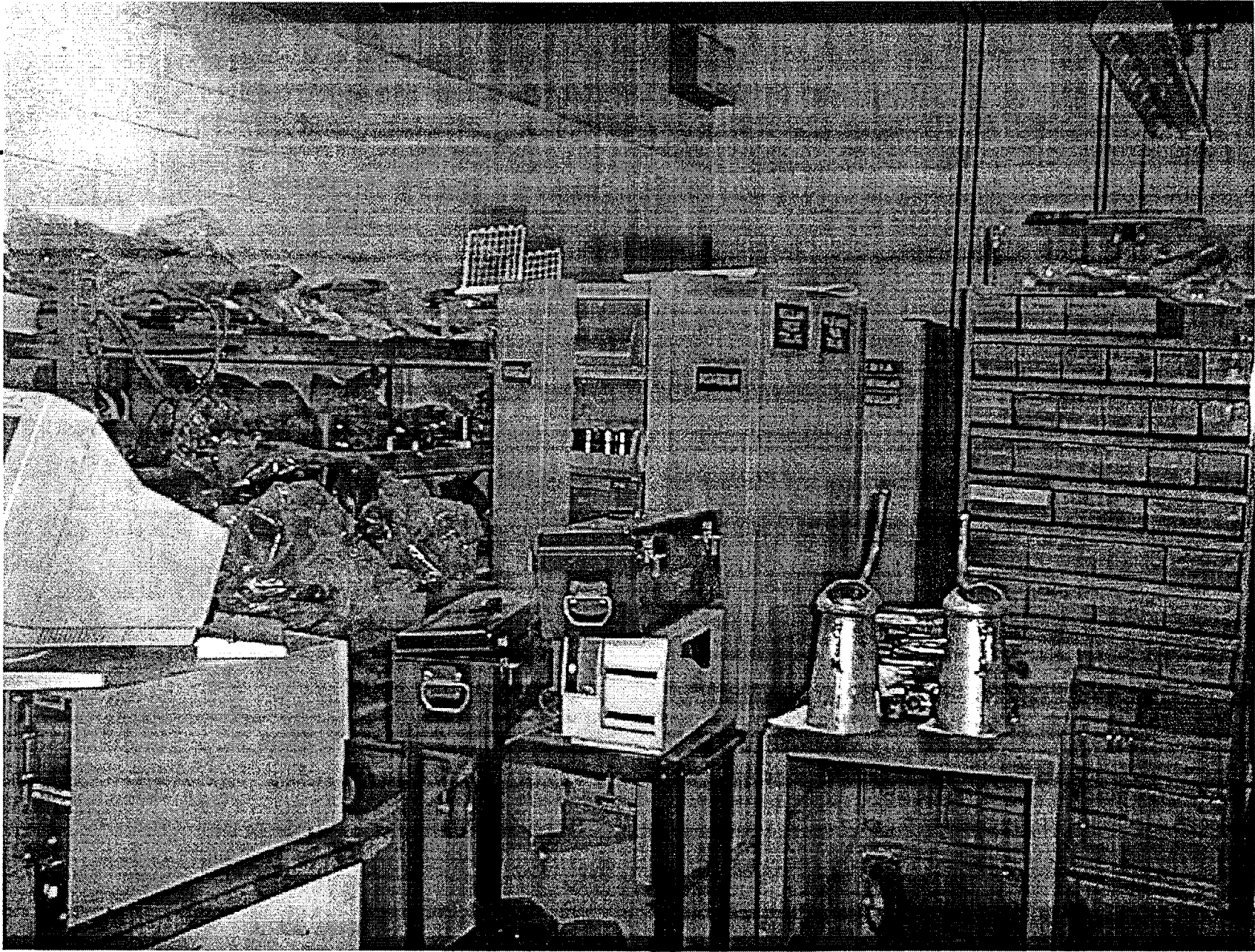


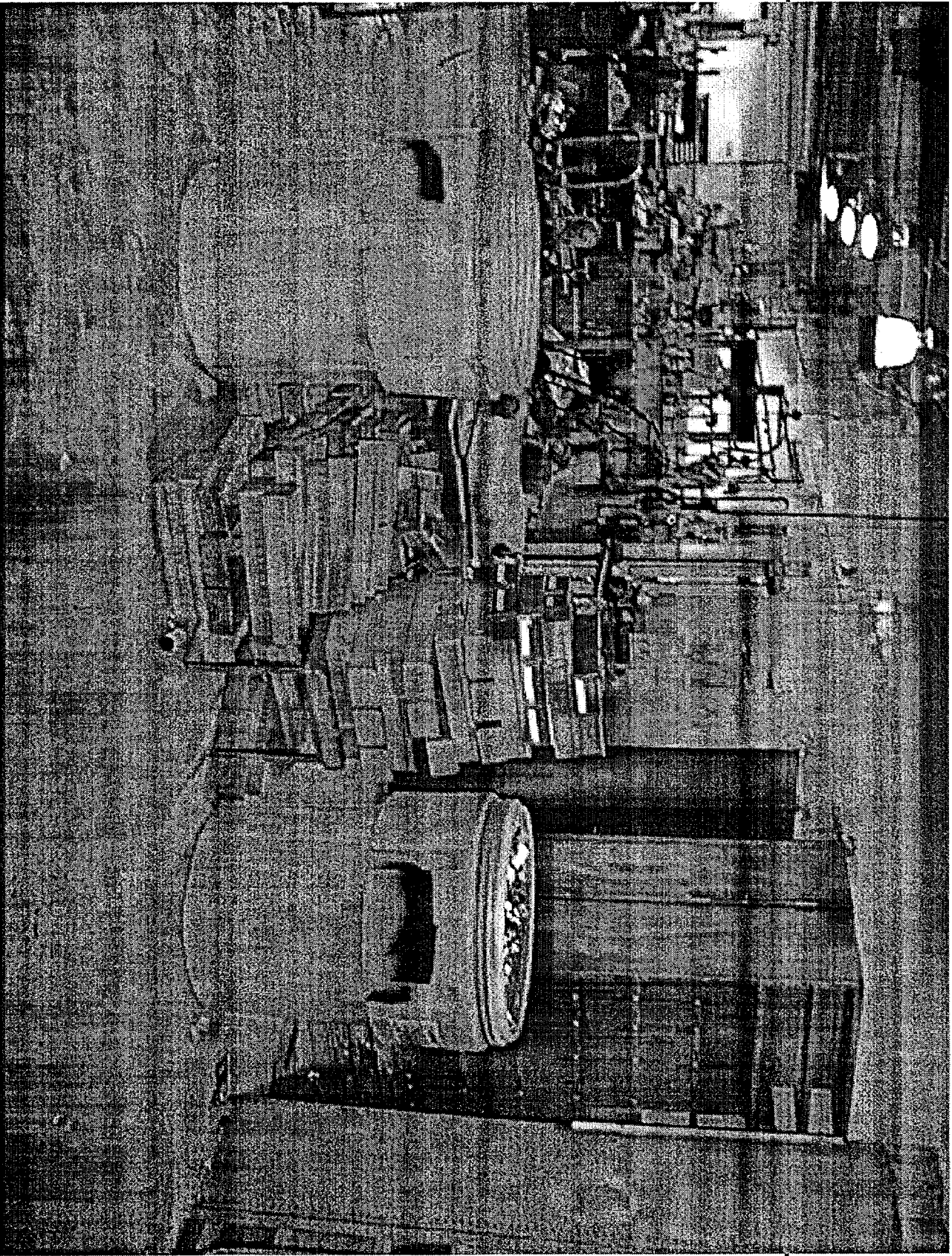




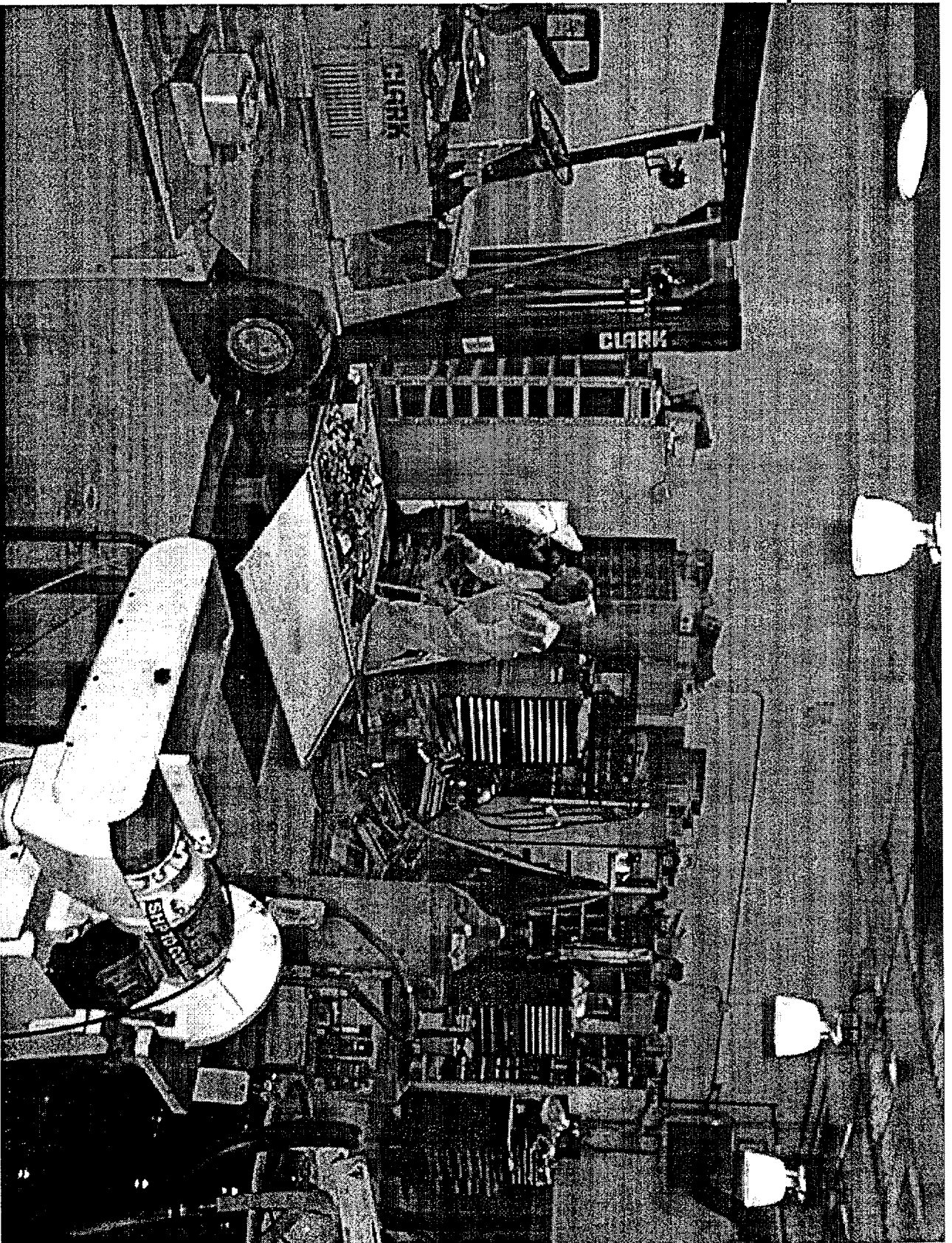




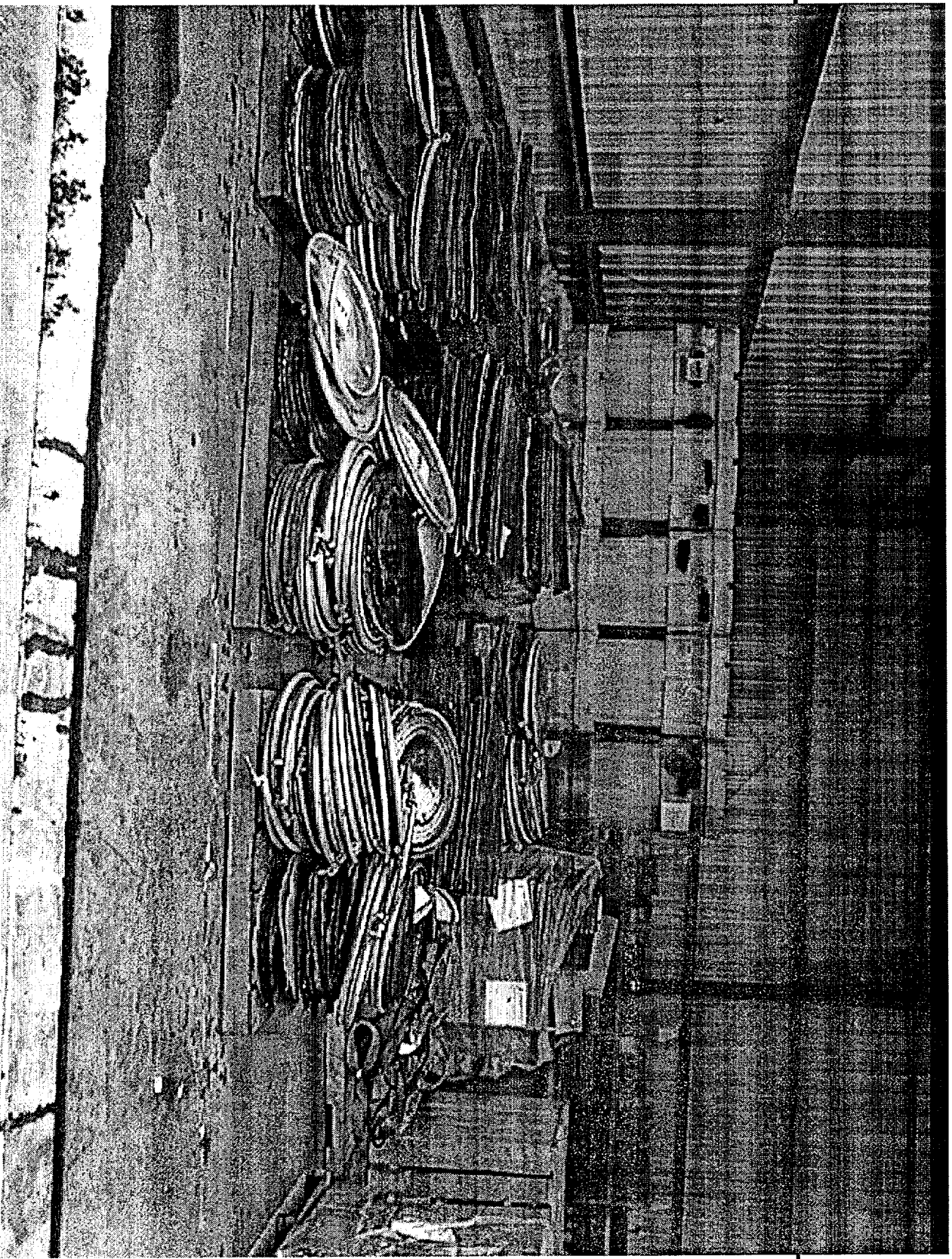






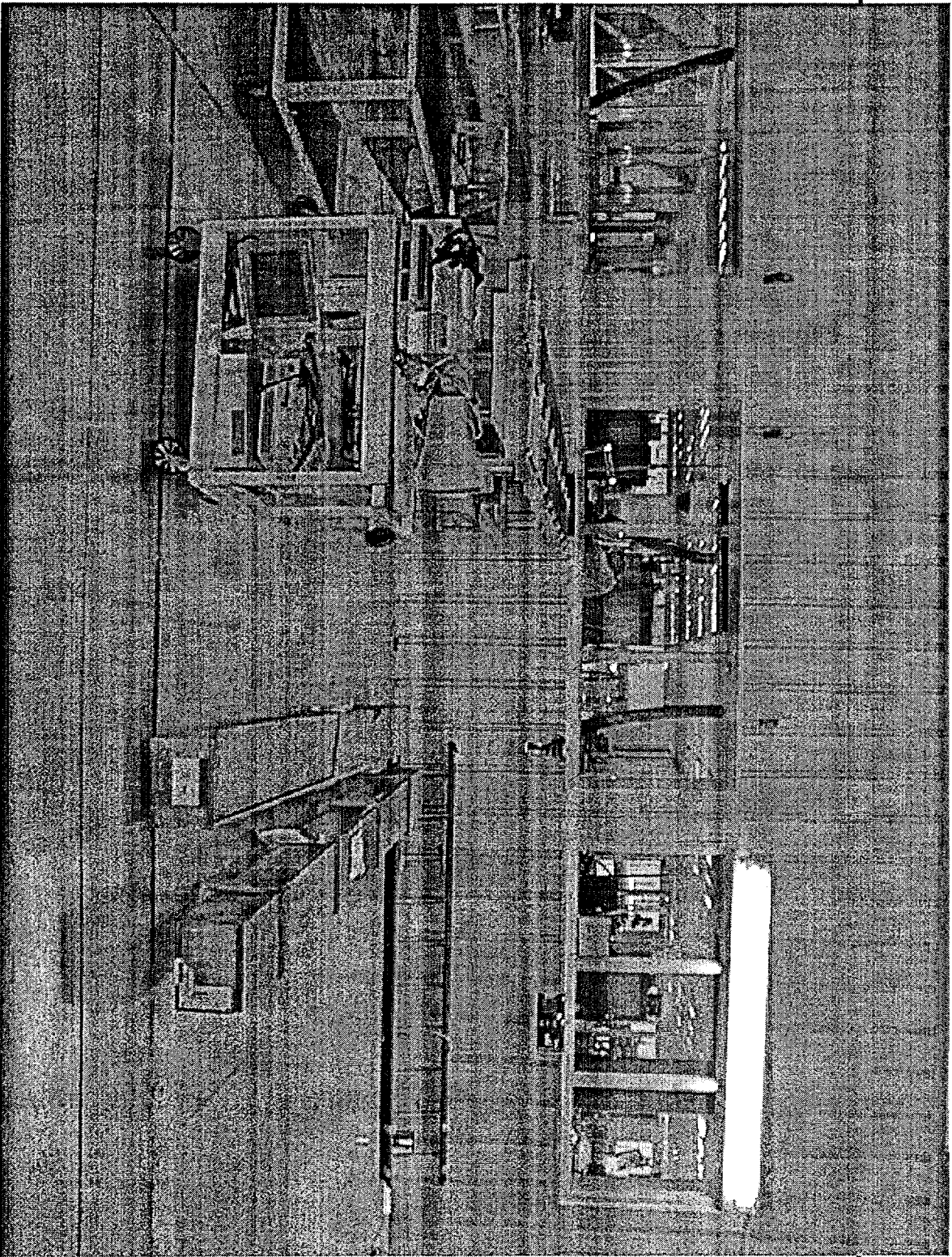






# Tubing Investigation

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Effectiveness Evaluation	02JUN03A	03JUN03	<input type="checkbox"/> Effectiveness Evaluation									
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Recheck and Seal of Bulk Storage	11JUN03A	12JUN03	<input type="checkbox"/> Recheck and Seal of Bulk Storage									
Biannual MC&A Audit	16JUN03A	19JUN03	<input type="checkbox"/> Biannual MC&A Audit									
Root Cause Analysis	18JUN03A	02JUL03	<input type="checkbox"/> Root Cause Analysis									
Physical Inventory	22JUL03*	22SEP03	<input type="checkbox"/> Physical Inventory									



# Tubing Investigation

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## Maine Yankee Fuel Rods

- ABB produced fuel in 1997 for Maine Yankee but did not ship due to MY shutdown
- 84 assemblies totaling 14,795 fuel rods were manufactured for MY
- Rods were downloaded during the first quarter of 1998
- Boron carbide (B<sub>4</sub>C) rods were not downloaded at that time
- May 28, 2003 - 24 low-enriched fuel rods found in a box labeled poison rods. The box contained boron carbide rods in addition to 24 low-enriched fuel rods.



# Effectiveness Evaluation

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- Elevated Risk Items
  - Secure HP sources (completed 6/17/03)
- Medium Risk Items
  - Rod boxes containing depleted pellets

## Extent of Condition - Kardex

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- 360 shelf positions in Assembly Building Kardex that could hold 1 pan with 10 trays per pan
- 132 shelf positions in Ceramic Kardex that could hold 1 pan with 10 trays per pan
- 4,920 total possible trays in both Kardex systems
- Found 1 pan containing 10 trays

# Extent of Condition

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- Operating production goal of 5,000 rods per week
- Bundled and stored onsite
- Single rods stored in rod storage matrix - maximum possible inventory ~ 33,600 rods
- 24 fuel rods found out of 30,000 remaining rods/tubes inspected



# Extent of Condition

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- Ventilation system holdup up to ~40 kg U
- Found ~ 1 kg powder out of 1,100 cans inspected
- 3,450 grinder pans and 500 cans awaiting inspection



# Security

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- No loss of security at any time.
- Temporary increase of site security as a result of 9/11
- Still operating under same basic Physical Security Plan as during operations
- Currently revising Physical Security Plan to accurately reflect D&D operations (i.e., extend fencing, add additional fence lighting)

# Summary

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- Former MC&A system now considered suspect
- Westinghouse reacting quickly and in-depth to address the issue
  - CAPs
  - RCA/Lessons Learned
  - Effectiveness Evaluation
  - NRC Communication
- No change in security

## Summary (cont.)

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- Definition of the scope of the issue highest priority
  - Storage containers/process equipment
  - Tubing
  - Small containers
- Good D&D processes implemented at every step
  - **No excess exposure to the employee**
  - **No exposure to the public**
  - **No impact to the environment**