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Memorandum

To: S. V. Doebler, Vice President
and Plant Manager
Fast Flux Test Facility Closure Project

Date: August 20, 2008

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File No.: ENG-08-WWB-008

Subject: DEACTIVATION COMPLETION OF THE FAST FLUX TEST FACILITY
INTERIM EXAMINATION AND MAINTENANCE CELL

Reference: FHE-08-SWH-001, *Equipment Oil Removal to Support the Interim Examination and Maintenance Cell Deactivation.*

The Interim Examination and Maintenance (IEM) Cell was a shielded, hot-cell complex housing remotely operated equipment necessary for the performance of nondestructive examination of core components, packaging irradiated and non-irradiated fueled and non-fueled components for shipment or dry storage, and provided limited maintenance of reactor plant equipment. The IEM Cell consisted of a main cell area, cell annex, and four operating galleries. The main cell was composed of two regions: one 20 feet x 14 feet x 48 feet and the second 10 feet x 14 feet x 55 feet. The cell annex that made up the remainder of the cell was 10 feet x 14 feet x 34 feet-11 inches.

The hazards within the IEM Cell that required remediation included: irradiated components, bulk elemental sodium in various containers, combustible materials from routine cell operations and oils in equipment gearboxes. The primary objective for IEM Cell deactivation was to leave the cell in a stable configuration for long term Surveillance and Maintenance, plus the IEM Cell had to be left in a configuration compatible with the final Decontamination and Decommissioning end-state as determined by an on-going National Environmental Policy Administration Environmental Impact Statement and the final Record of Decision. The System

Deactivation Summary (SDS) is attached and provides the detailed shutdown status of the cell along with a listing of work packages that were used to complete the field work. A synopsis of the SDS is provided in the following paragraphs of this memo.

Deactivation of the IEM Cell consists of the following:

- All reactor fuel was removed
- All bulk elemental sodium containers were removed
- Irradiated, activated components (i.e., ducts, nozzles, etc.) were removed
- Sodium Removal System ion exchange resin beds were removed
- All sources of stored energy were eliminated
- Transient combustibles (plastic bagging, tape, slings, etc.) were removed
- Equipment lubricating oils were drained to the extent practical
- All ASME tanks were removed from service
- All access ports were permanently sealed with cover plates
- Shielding Windows remain in place with oil drained

Items that remain in the IEM Cell, other than the installed deactivated equipment include:

- Two unirradiated Post-Irradiation Open Test Assemblies
- Two empty Core Component Pots
- Two empty Core Component Containers (CCC)
- One empty Ident-1578
- Up to five empty Ident-69 pin containers (located in the CCCs)
- Miscellaneous small tools and portable equipment
- Small quantities of stable sodium compound residuals at various locations
- Duct cutting chips and fines

The above activity leaves the IEM Cell with a secure boundary to the release of radioactive material and removes transient combustibles, activated components, bulk sodium, and a majority of the oil. This hazard reduction leaves the IEM Cell in a configuration that requires no maintenance during long term Surveillance and Maintenance, provides protection to the environment and the public, and is also available to safely proceed with the various options for Decontamination and Decommissioning in the future when funding becomes available.

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Attachment

ENG-08-WWB-008

Attachment

SYSTEM DEACTIVATION SUMMARY
FOR THE
INTERIM EXAMINATION AND MAINTENANCE CELL

Consisting of 29 pages,
including cover sheet.

System Deactivation Summary for the Interim Examination and Maintenance Cell

1.0 PURPOSE

This report identifies the actions taken to deactivate the Interim Examination and Maintenance (IEM) Cell and the condition of the IEM Cell at the time of deactivation.

2.0 ORIGINAL DESIGN FUNCTION OF THE SYSTEM

The IEM Cell is a shielded, hot cell complex which houses the remotely operated equipment necessary for the performance of nondestructive examination of core components and the maintenance of reactor plant equipment in accordance with the design requirements of Section 1.0 of the System Design Description, SDD-41-11, Part 10, System Design Description for IEM Cell Equipment.

3.0 SYSTEM BOUNDARIES/DESCRIPTION

Ident 45 the IEM Cell Ceiling Valve Assembly (CV) (M-56), located over the IEM Cell, provided access for transfer of core components, waste containers, Closed Loop Ex-Vessel Machine (CLEM) Drip Pots, special plant equipment, Core Component Pots, CLEM Grapples, Control Rods and cell equipment for maintenance and inspection. In addition the CV provided an atmospheric sealed interface with the CLEM, Refueling Floor Valve, Solid Waste Cask and Shielded Cell Transfer Cask (SCTC).

The CV provided the following thru ports to the IEM Cell:

- 9-Foot, 6-inch diameter thru port
- 28-Inch port
- 8.4-Inch Transfer Port

The small tool transfer ports consist of two ports W-29 and W-30. The first port W-29 is located in the shield wall between the cell and the second operating level. The second port W-30 is located in the shield wall between the cell and the third operating level. They were primarily used to transfer remote tools and other necessary supplies into and out of the cell to support day to day operations. These ports also provided an atmospheric boundary for the cell.

Ident-22, the personnel and equipment transfer lock W-15, penetrates the wall between the fourth operating level and the cell and is nominally 42-½" high x 32" wide x 55" between the inner and outer doors. This lock was never used during cell hot operation. This lock was filled with shielding prior to cell hot operation and has never been opened since that time.

The boundary is also comprised of the following items all having double O-Ring seals:

- Ident-48 Radiation Shield Windows
- Ident-49 Periscopes
- Ident-71 Master Slave Manipulators
- Ident-73 Numerous electrical penetrations

4.0 ACTIONS TAKEN TO DEACTIVATE THE SYSTEM

The following actions were taken to deactivate the IEM Cell:

Note: The attached graphic of the IEM Cell lay out and photos will assist with this section.

- The 8-Inch Port Cover was verified to be installed properly, including verification of fastener torques.
- The 40-Inch Offset Adapter Cover Plate was verified to be installed properly, including verification of fastener torques.
- The modified 28-Inch Port Protective Cover (H-4-30649, Item 5), with the attached Filtered Vent to the atmosphere, was installed on the 28-Inch Port.
- 28-Inch Port Gate and 9-Foot 6-Inch Gate inflatable seals were deflated and then isolated from the argon supply and the Cell Atmosphere Processing System (CAPS) vacuum (vent) systems.
- The argon supply to the cell and CAPS Vacuum Systems were isolated from the Fast Flux Test Facility (FFTF) plant systems by closing isolation valves.
- 120 VAC and 480 VAC power was isolated from the IEM Cell Ceiling Valve by verifying external mating machine power cables were disconnected from the IEM Cell Ceiling Valve power receptacles, including the IEM Cell 9-Foot 6-Inch Port Control Panel.
- 120 VAC power to the 9-Foot 6-Inch Port and 28-Inch Port Control Circuits and the Ceiling Valve Alarm Panel C-1161 were isolated by opening breakers.
- Battery back-up power to Ceiling Valve Alarm Panel (C-1161) was secured by removing the storage batteries from their battery box.
- The Ident-91 Small Tool Locks W-29 and W-30 gallery doors were permanently caulked shut. Inflatable seals were deflated. The Argon Supply, Instrument Air, and CAPS Vacuum Systems were isolated from the FFTF plant systems by closing isolation valves. The electrical supply was isolated by opening breakers. The glove box on W-29 was cleaned out, decontaminated, and all radiation equipment removed.

- The Ident-22 Equipment and Personnel Transfer lock gallery door was permanently caulked shut. Inflatable seals were deflated. The Argon Supply, Instrument Air, and CAPS Vacuum Systems were isolated from the FFTF plant systems by closing isolation valves. The electrical supply was isolated by opening breakers.
- The Ident-119 Pressure Purge and Warning System Argon Supply, Instrument Air, and CAPS Vacuum Systems were isolated from the FFTF plant systems by closing isolation valves. The electrical supply was isolated by opening breakers.
- The R-36 IEM Cell Argon Supply and Purification System, Argon Supply, Instrument Air, and CAPS Vacuum systems were isolated from the FFTF plant systems by closing isolation valves. Valves into and out of the cell were also closed. The electrical supply was isolated by opening breakers. Oil was drained from the R-36 vacuum pump.
- The C-1240 IEM Cell Atmosphere Monitoring System was secured by operating procedure.
- The Ident-48 Radiation Shield Windows were drained of their optical coupling oil and the argon cover gas, as well as the seal monitoring gas, have been isolated.
- The Ident-46 Four Ton Crane trolley and hoist assembly were removed from its bridge and oil drained from its gear boxes. After oil drain was complete the trolley hoist assembly was secured on the Maintenance Turntable.
- The Ident-50 Pedestal Mounted Manipulator Boom pivot gear boxes were drained of oil and its boom and arm placed in a vertical position up tight to the tower with the carriage lowered to the bottom stops on a rest block to relieve the load on the hoisting wire ropes. The electrical is secured by opening disconnects and breakers.
- The Ident-51 Wall Mounted Manipulator was positioned at the west end of bridge travel with the boom and arm assembly in a vertical position rotated tight west. The carriage has been lowered to the bottom of travel and set on two rest blocks to relieve the load on the hoisting wire ropes. The electrical is secured by opening disconnects and breakers.
- The Ident-35 Z Column Drive Assembly was removed and oil drained then placed back in place. The electrical has been secured by opening disconnects and breakers.
- Ident-15 Core Component Receiving Station position drive assembly has been drained of oil. The sodium trap was drained of all elemental sodium into its drip cup that has been removed from the cell. The electrical is secured by opening disconnects and breakers.

- Ident-26 Multipurpose Elevator Drive System was removed drained of oil and replaced. The electrical is secured by opening disconnects and breakers.
- The Ident-17-1 and Ident-17-2 Core Component Pot Storage Stations sodium traps were drained of all elemental sodium into their drip cups that were then removed from the cell. The electrical is secured by opening disconnects and breakers.
- All other Idents with relatively accessible gear boxes have had their oil drained and electrical secured. See attached table for details.
- The Ident-74 Maintenance Turntable electrical is secured by opening disconnects and breakers.
- The oil drum that collected oil from each drainage has been removed from the cell.
- The IEM Cell Heating and Ventilation as well as the Pressure Control System have been secure by operating procedure through the Control Room.
- Ident-71 Master Slave Manipulators are left in place with the electrical supply secured by operating procedure and argon gas supply secured with Ident-119.
- Ident-49 Periscopes are left in place, electrical supply secured by operating procedure, and argon gas supply secured with Ident-119.
- Ident-73 numerous electrical penetration electrical power secured by disconnects and breakers as equipment was secured. Argon gas supply secured with Ident-119.
- Transient combustibles (plastics, paper, wood and oil) were gathered and removed from the cell.
- The final condition and status of the equipment in the cell can be seen by reviewing the photos in Section 7.0 of this document.

5.0 CONDITIONS AT TIME OF DEACTIVATION

5.1 Hazards

- 5.1.1 Lead shielding, in the form of bricks, shot, and wool, are located throughout the Ceiling Valve structure, both above and below floor level. Refer to H-4-30660 for the locations of lead shielding. There is also some lead inside the Equipment and Personnel Transfer Lock and attached to the cell window frames.

- 5.1.2 There is no equipment concern due to atmospheric pressure cycling since the cell is vented through a filter to the atmosphere.
- 5.1.3 Small quantities of lubricants have been left in gearboxes. Various items contain greases.

5.2 Radiation Levels

At the time of deactivation there was no known detectable removable or fixed radiological contamination on the external surfaces of the IEM Cell Ceiling Valve or in the operating galleries. In the present configuration of the IEM Cell, there is not reason to suspect that any of the internal contamination will migrate out to the external surfaces.

Radiological contamination, both fixed and removable, can be expected to be encountered under the 8-Inch Port Cover, 28-Inch Port Protective Cover and filter, 40-Inch Offset Adapter Cover Plate, all internal surfaces of the IEM Cell Ceiling Valve, the inside surfaces of the Small Tool Locks and the insides surfaces of piping and tubing systems associated with purging and venting of the IEM Cell Ceiling Valve and Small Tool Lock components.

Since the IEM Cell Ceiling Valve and Small Tool Locks provides radiological shielding from radioactive components and contamination within the IEM Cell, removal of the 8-Inch Port Cover, 28-Inch Port Protective Cover, 40-Inch Offset Adapter Cover Plate, 8-Inch Port Shield Plug, opening of the 28-Inch Valve Gate, 9-Foot 6-Inch Gate, opening of the Small Tool Lock gallery doors, disassembly of the IEM Cell Ceiling Valve structure, and removal of any penetration all have the potential of increasing personnel radiation exposure.

5.3 Reacted Sodium Residuals

All elemental sodium has been removed from the cell. There still remains some fully reacted sodium oxide residuals in the cell from splatters and dripping from earlier operations. These reacted sodium residuals will not be detrimental or hazards to future Surveillance and Maintenance or final Deactivation and Decommissioning activities (i.e., grouting operations).

6.0 **REFERENCE DOCUMENTS**

6.1 Drawings

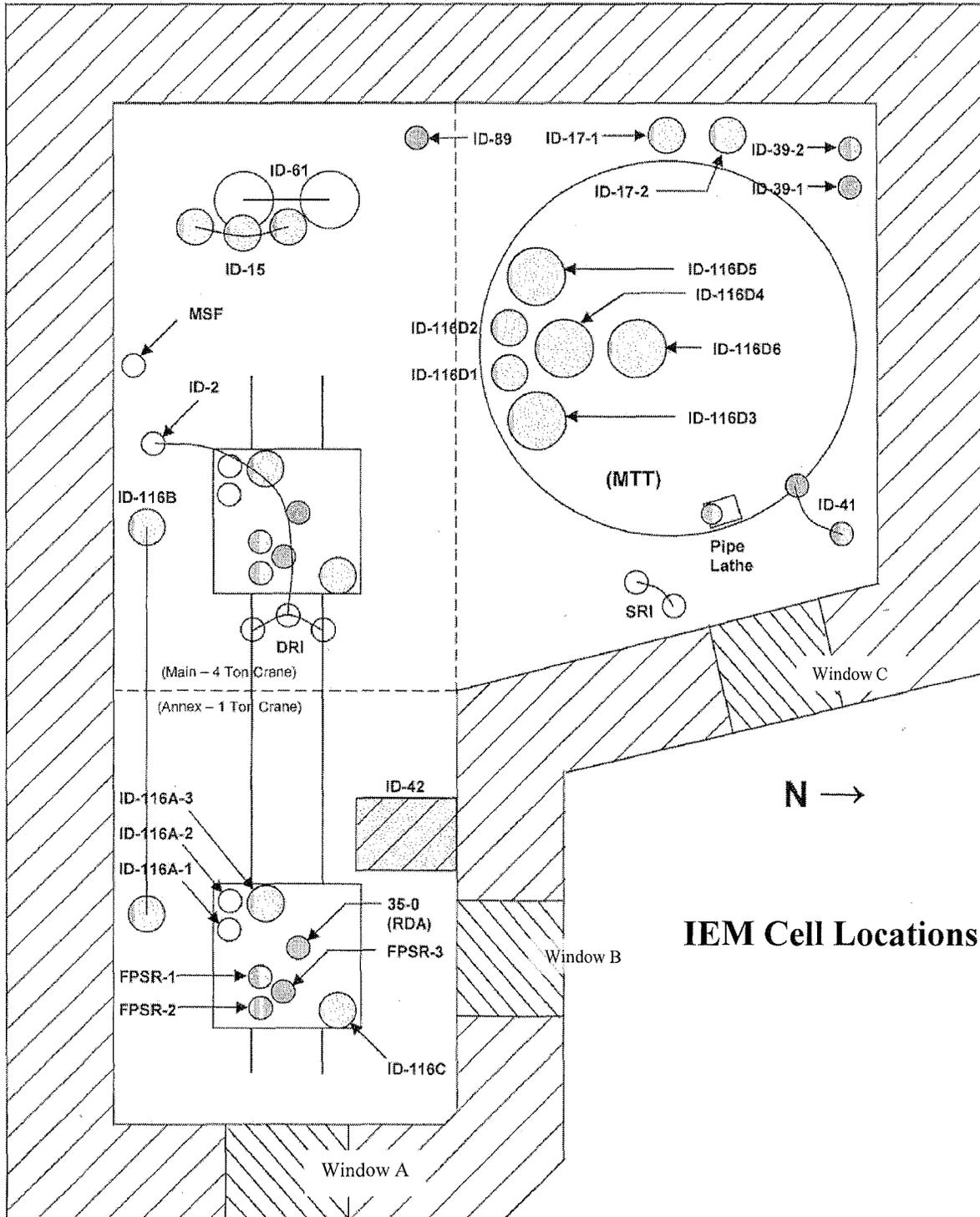
H-4-28094, Interim Examination & Maintenance Cell
H-4-30525, IEM-Cell Power and Control Wire Way Operating Galleries
H-4-33186, IEM Cell Reactor CTMT Building Plan- Operating Floor Levels

6.2 Manuals

SDD-41, Part 10: System Design Description for IEM Cell Equipment

6.3 Work Packages

- 4I-08-758/W - Deactivate IEM Cell Ceiling Valve (M-56)
- 4I-08-661/W - Secure the IEMC Boundary
- 4I-07-8247/W - Deactivation R-36 IEMC Argon Purification System
- 4I-07-3576/W - Partial Lay up of the IEMC
- 4I-08-758/W - Deactivate IEMC Ceiling Valve (M-56)
- 4I-08-661/W - Secure the IEMC Boundary
- 4I-08-657/W - Drain Oil from IEMC Shielded Windows
- 4I-08-666/W - Shutdown the Wall Mounted Manipulator
- 4I-08-668/W - Drain oil and shut down the PMM
- 4I-08-665 - Drain oil and shutdown 4 ton crane
- 4I-06-4819/M - Lay up SRS
- 4I-06-8677/W - SCTC Transfer 07-#4 IEMC to MASF (Ident-42 Pin Weighing System)

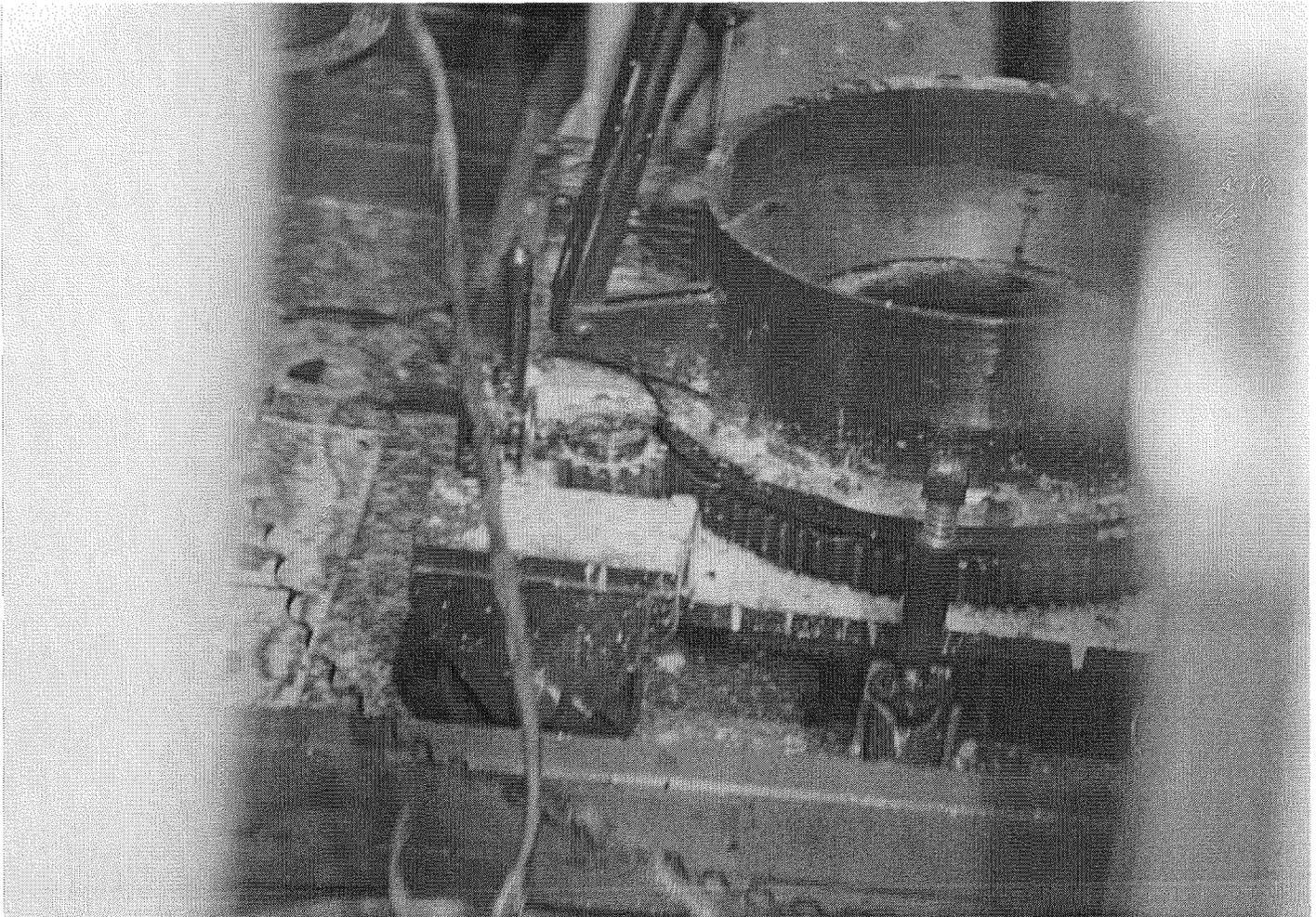


IEM Cell Locations

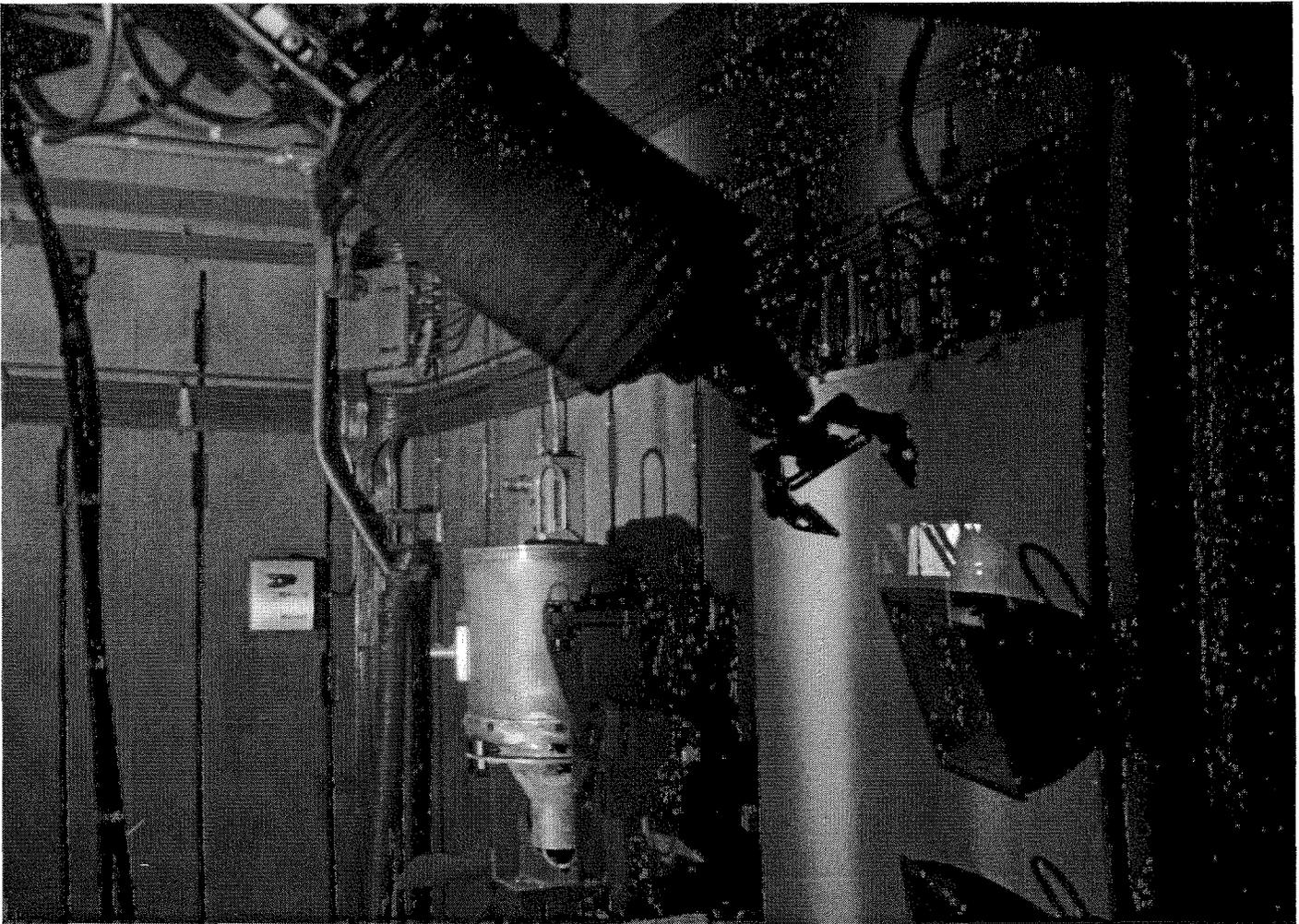
7.0 PHOTOS



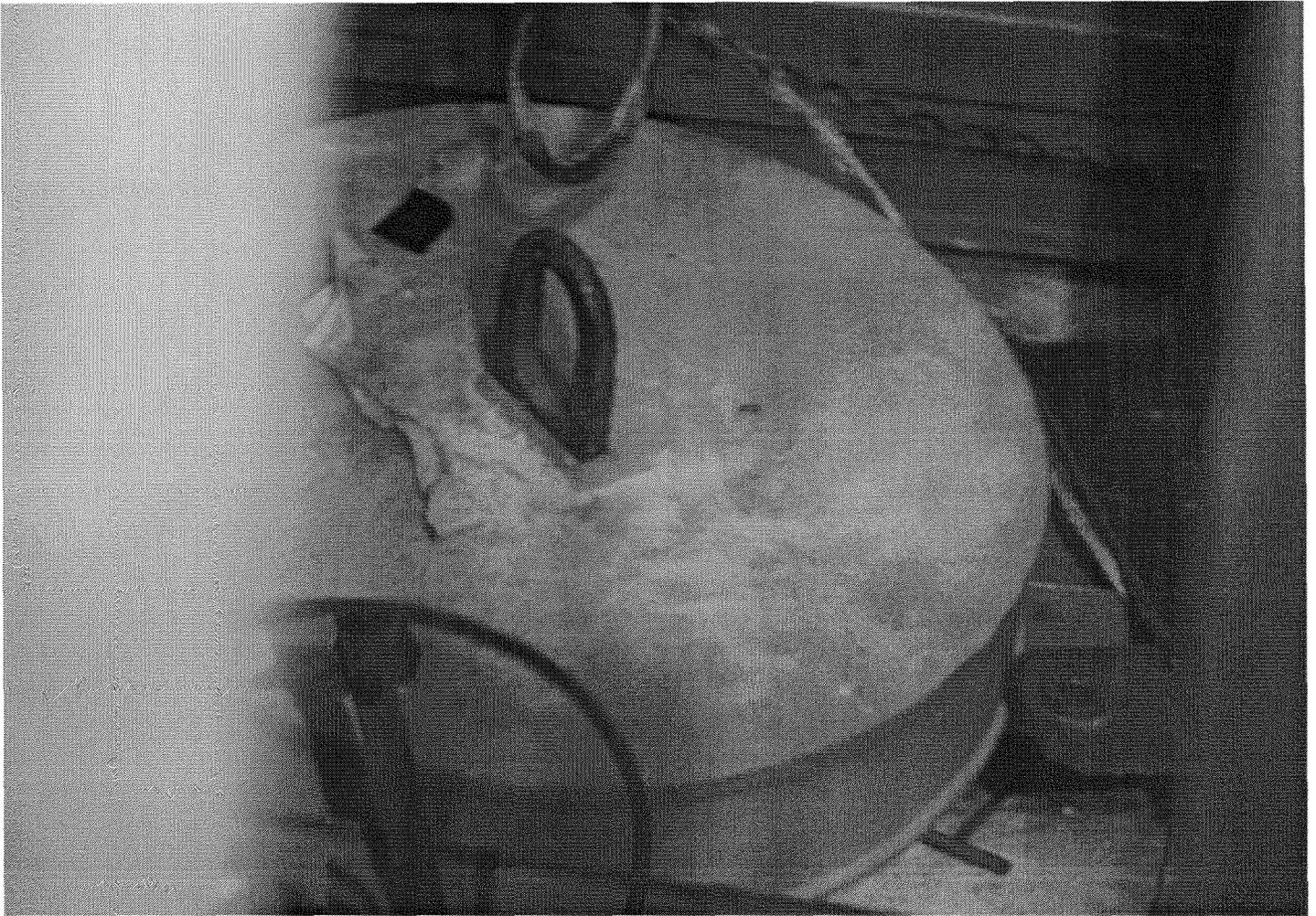
Portion of the Maintenance Turntable, prior to final cleaning, showing small accumulated reacted sodium residuals under the table.



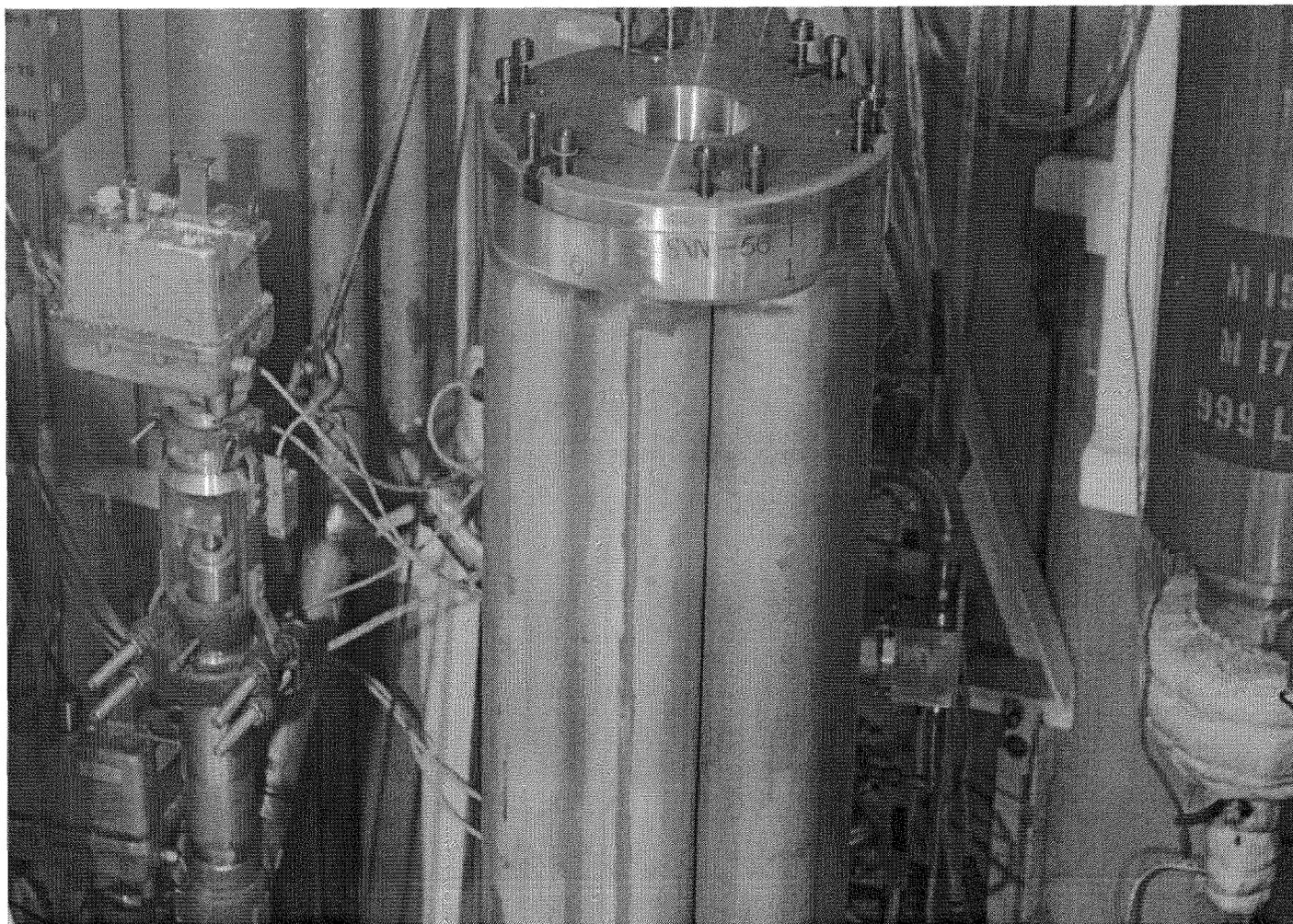
20-inch diameter Open Waste Container Receiving Station, located at the bottom of the main cell in the southwest corner, showing an accumulation of reacted sodium residue.



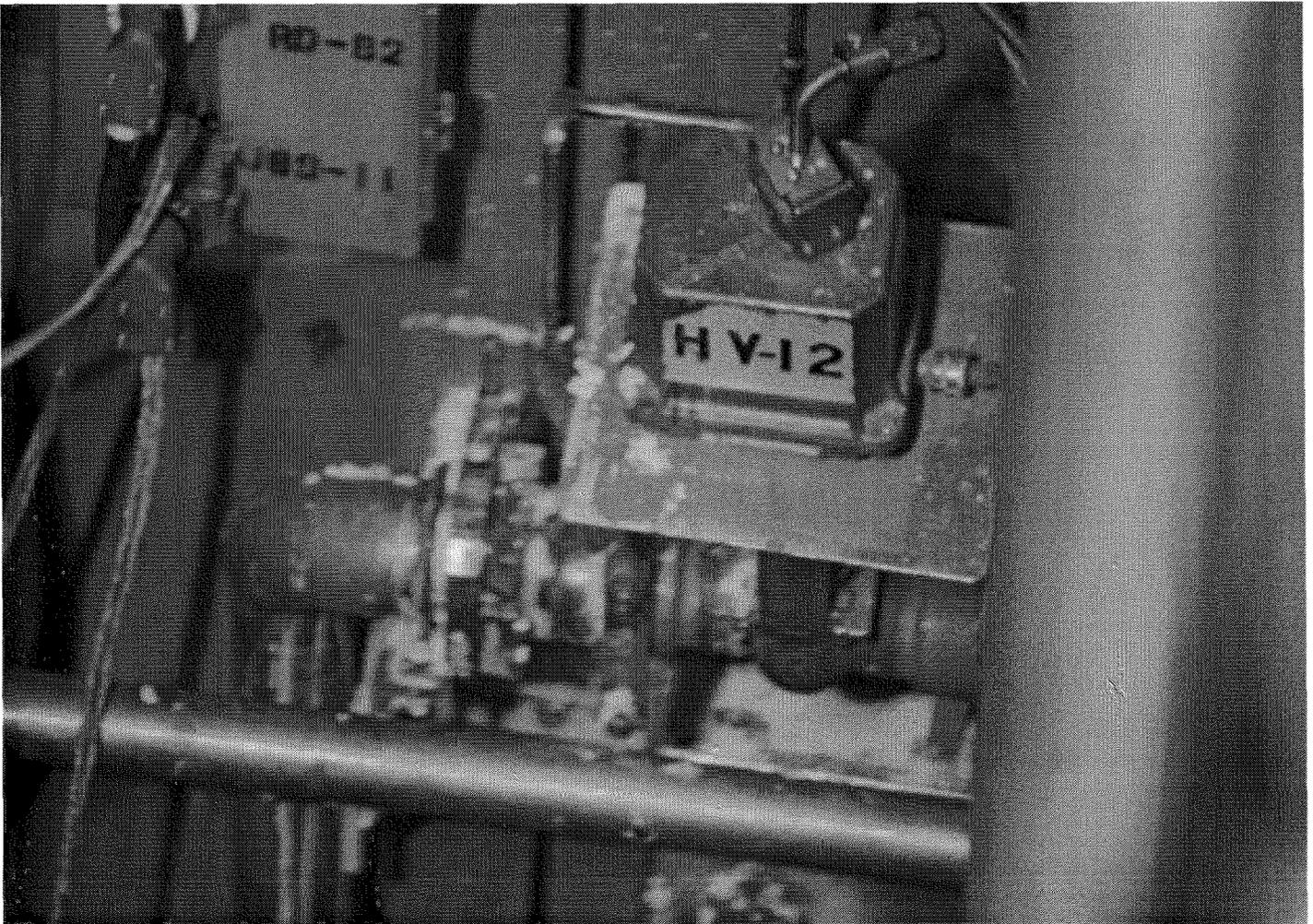
View of the cell in final state as seen through the north window (1B) of the first level. This photo shows the top of the north and west walls.



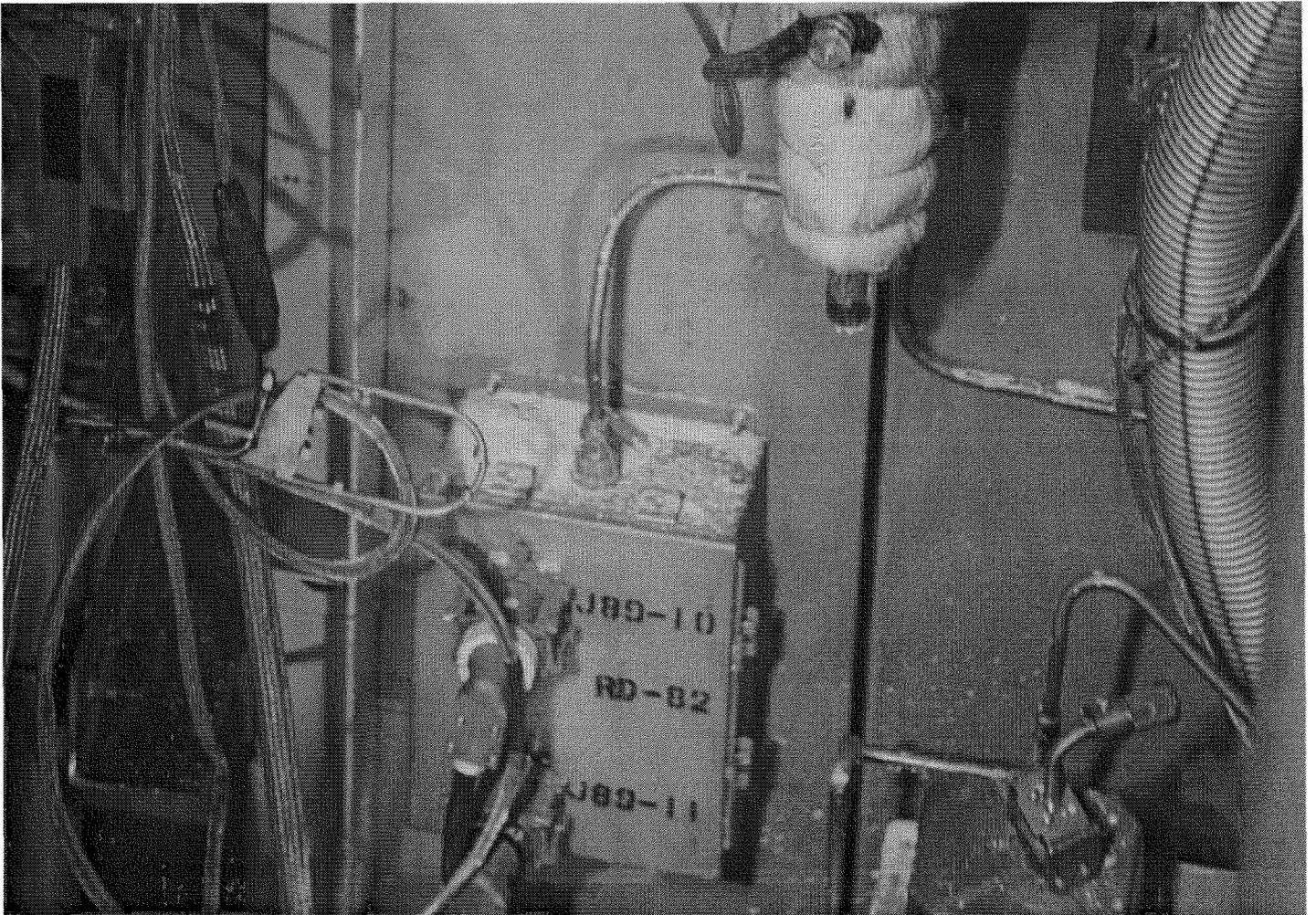
22-inch diameter Shadow Shield located on the southwest side of the lower main cell floor.



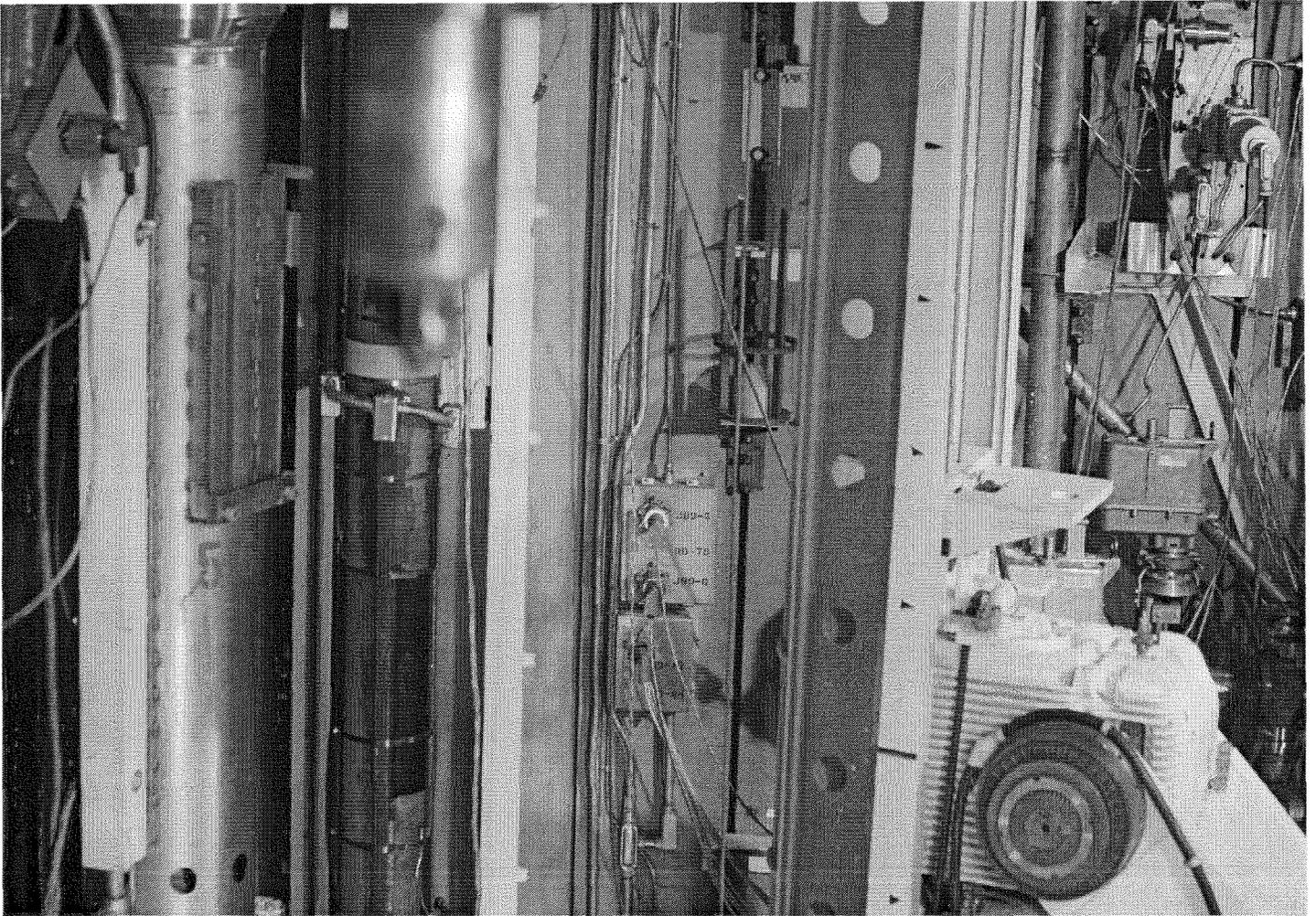
View of cell in final state as seen through the north window (2C) of the second level. Showing the west wall; notice the accumulation of reacted sodium residue on top of the remote valve operator located in the upper left quadrant of the picture.



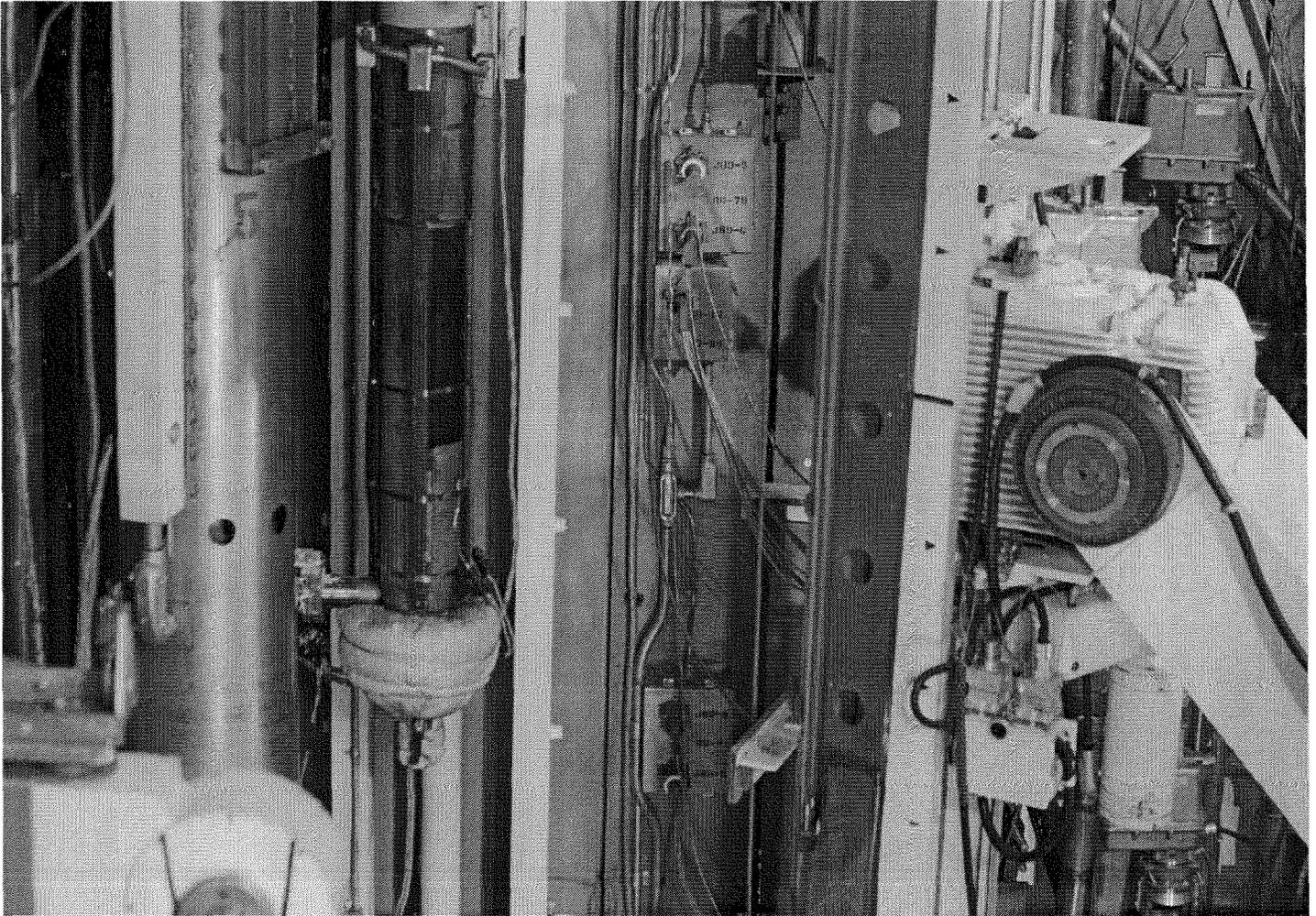
Component Cooling System control valve located on the west wall of main cell. Operator dimensions for reference are 6" x 7-5/8" x 6" high. Note the accumulation of reacted sodium residue.



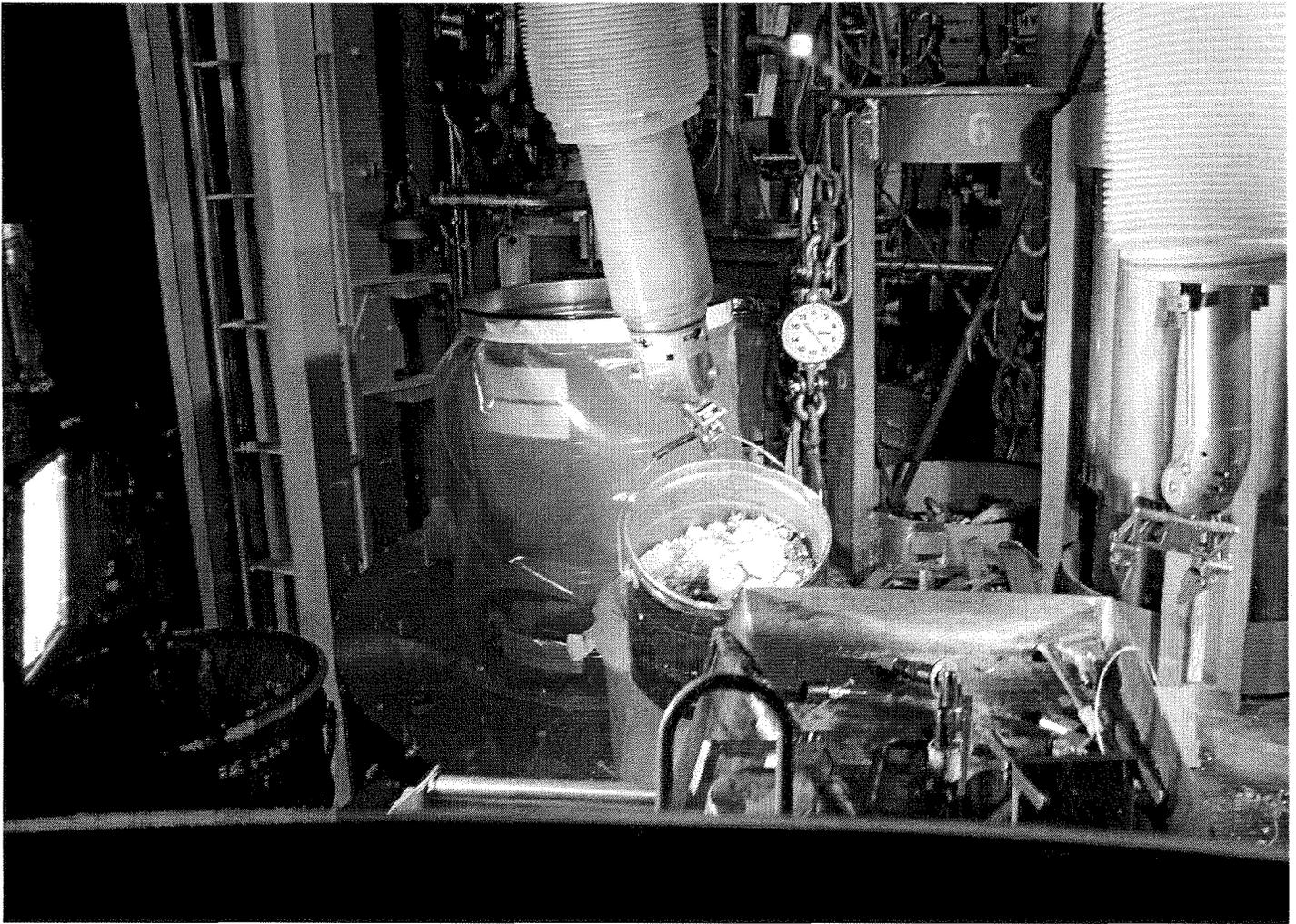
Remote electrical disconnect box (8" x 12" x 4" deep) located on the west wall. Note the accumulation of reacted sodium residue on top of box and surroundings.



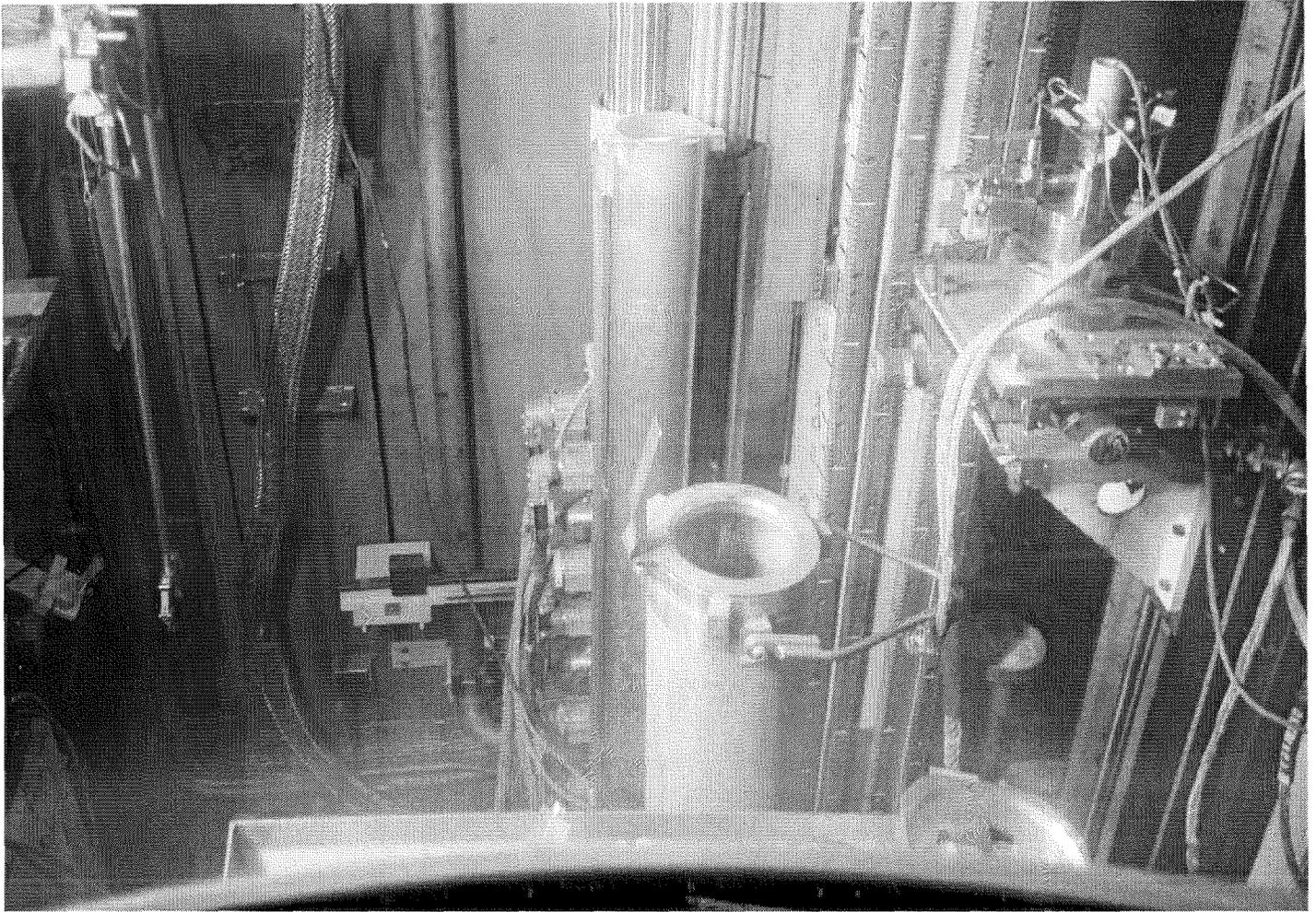
View through the west facing south window (2A window) on the second level of cell showing final condition of equipment in the main cell.



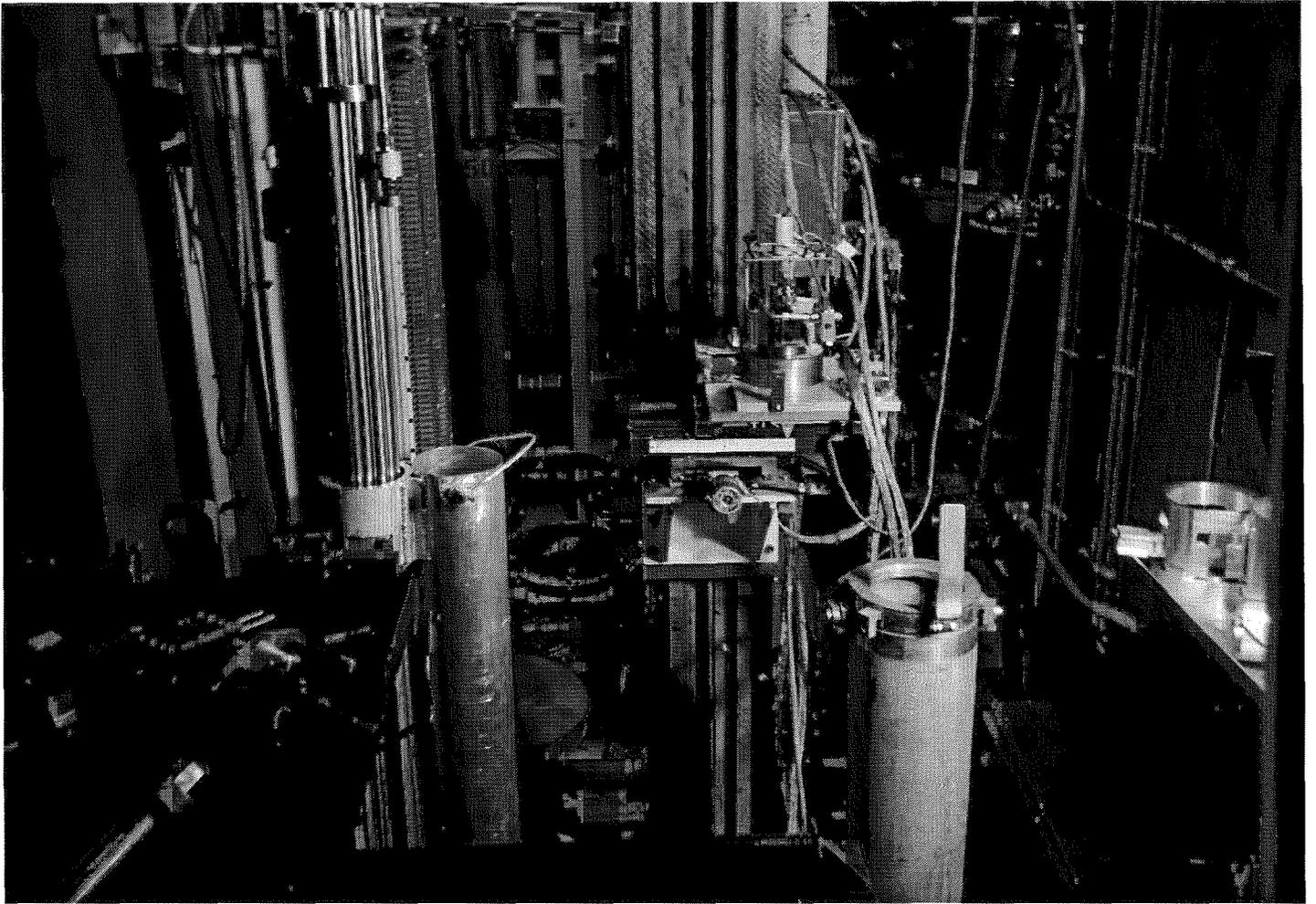
View through the west facing south window (2A window) on the second level of cell showing final condition of equipment in the main cell.



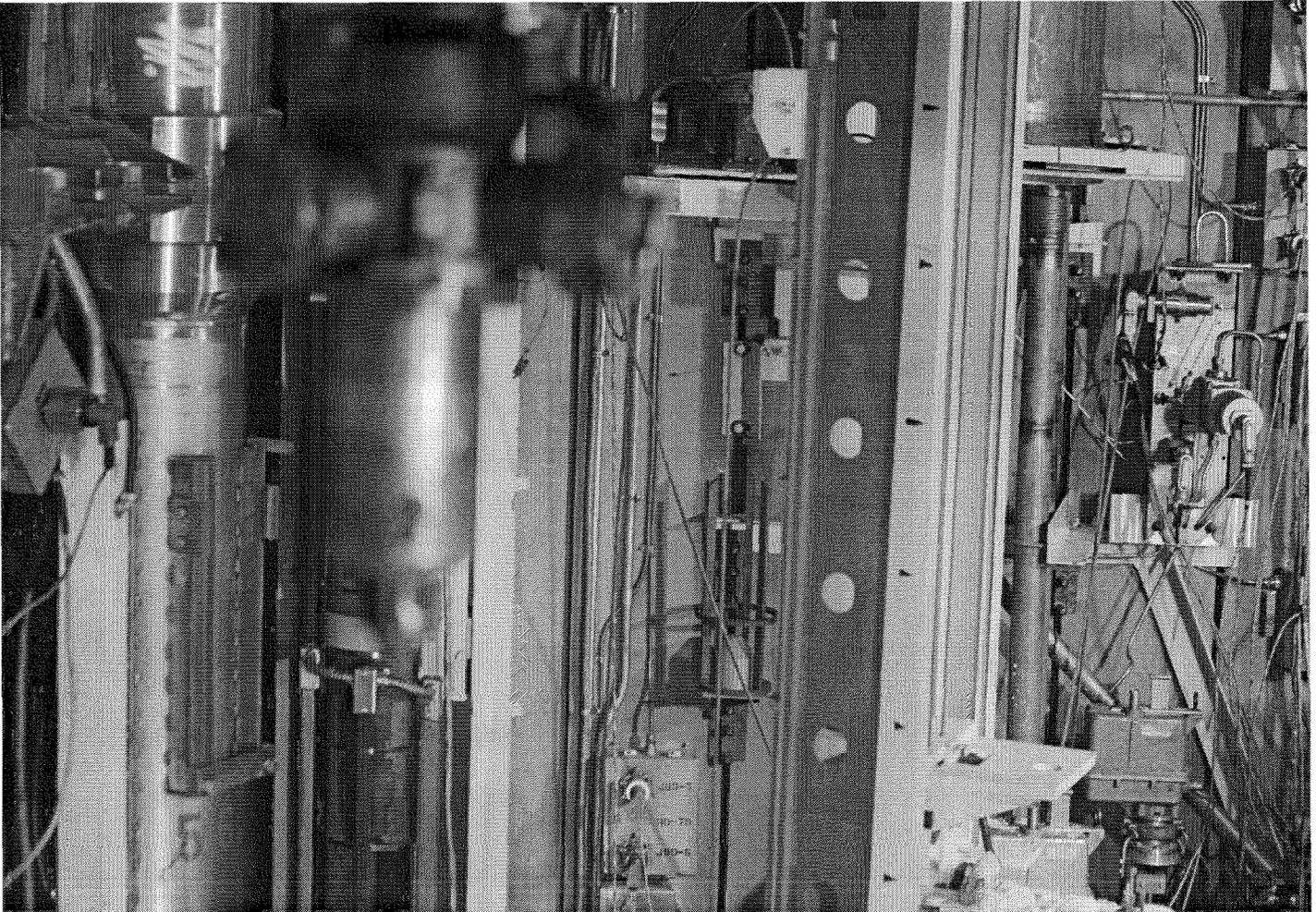
View of Maintenance Turntable through the northern west facing window (3C Window) showing a manipulator holding a 5-gallon bucket of reacted sodium residue and activated metal chips that will remain in the cell. The plastic covered drum behind the bucket has been removed from the cell.



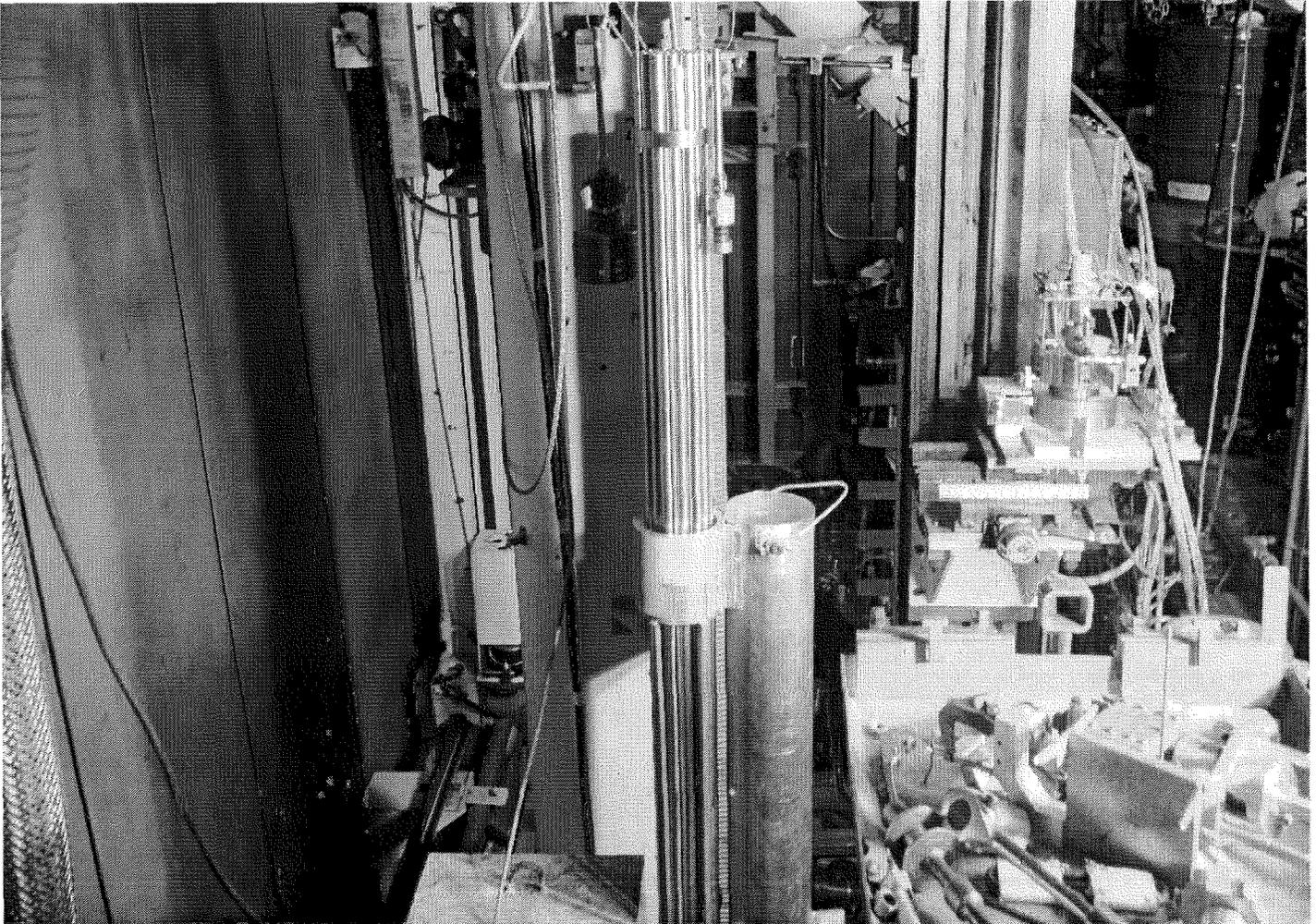
View through the third level south facing window (3C window) of the final configuration of equipment in the IEM Cell Annex.



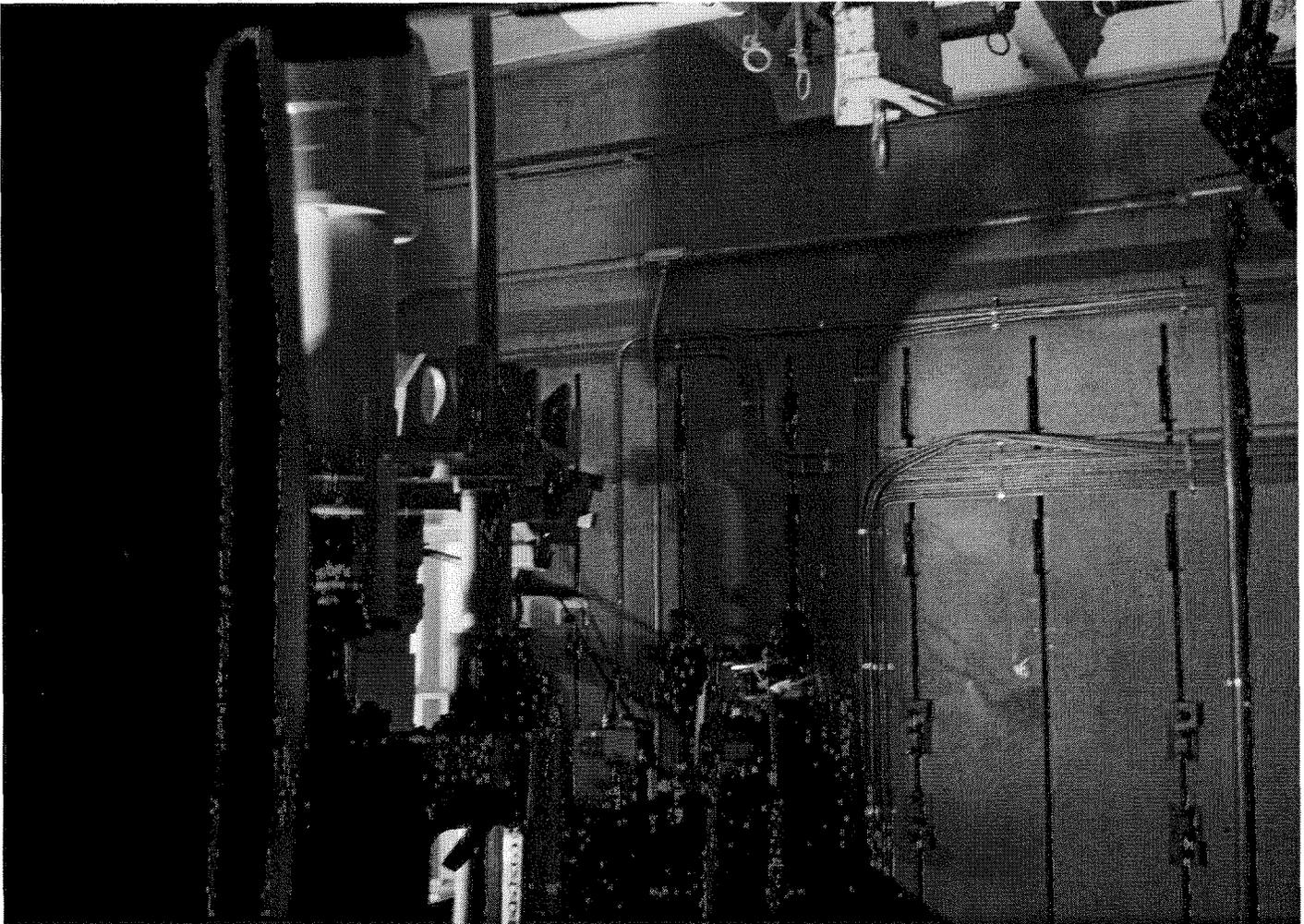
View through the third level southern west facing window (3A window) of the final configuration of equipment in the IEM Cell Annex.



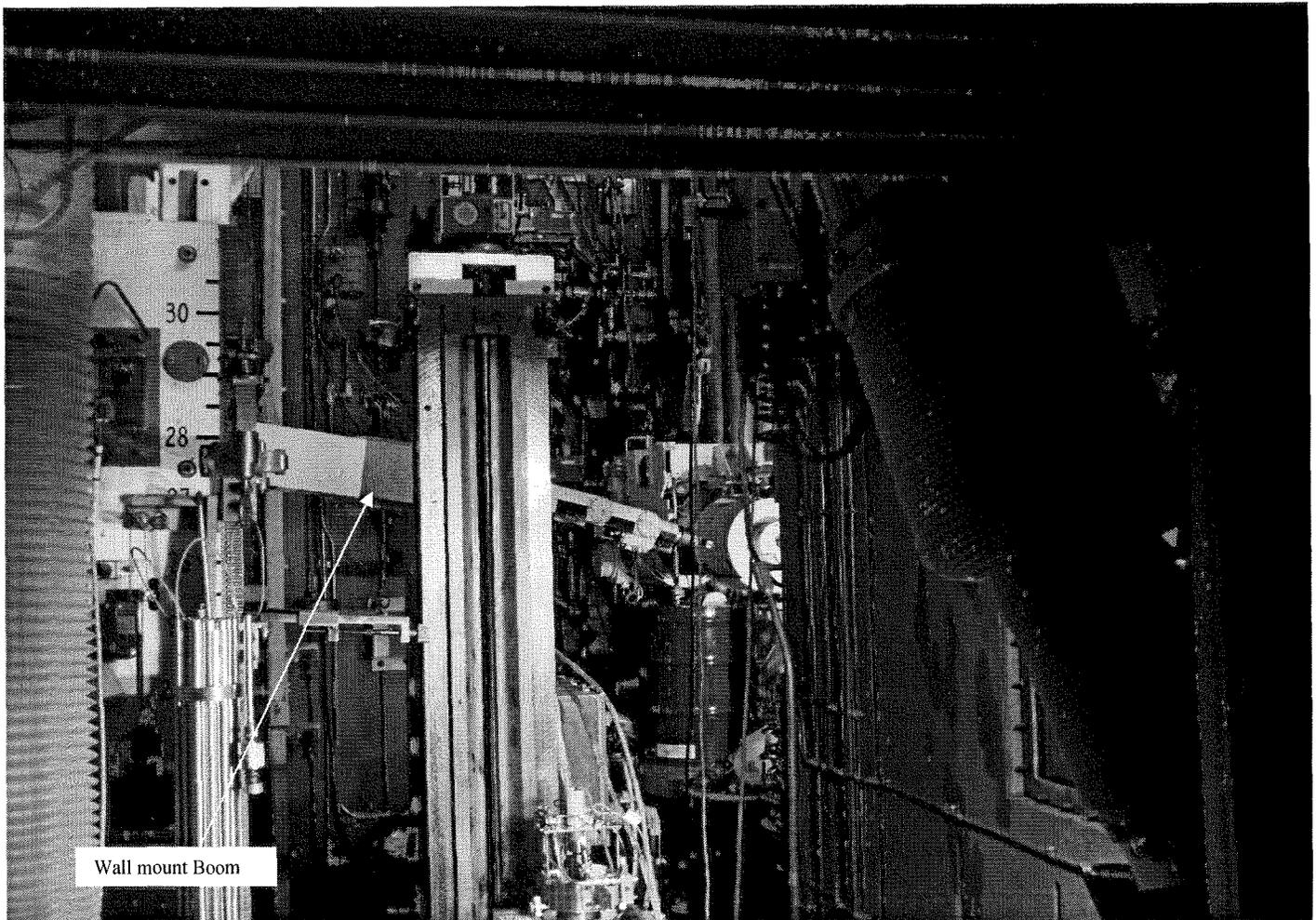
View of the southwest corner of the main cell as viewed from the second level southern west facing window (2A window) of the final configuration of equipment.



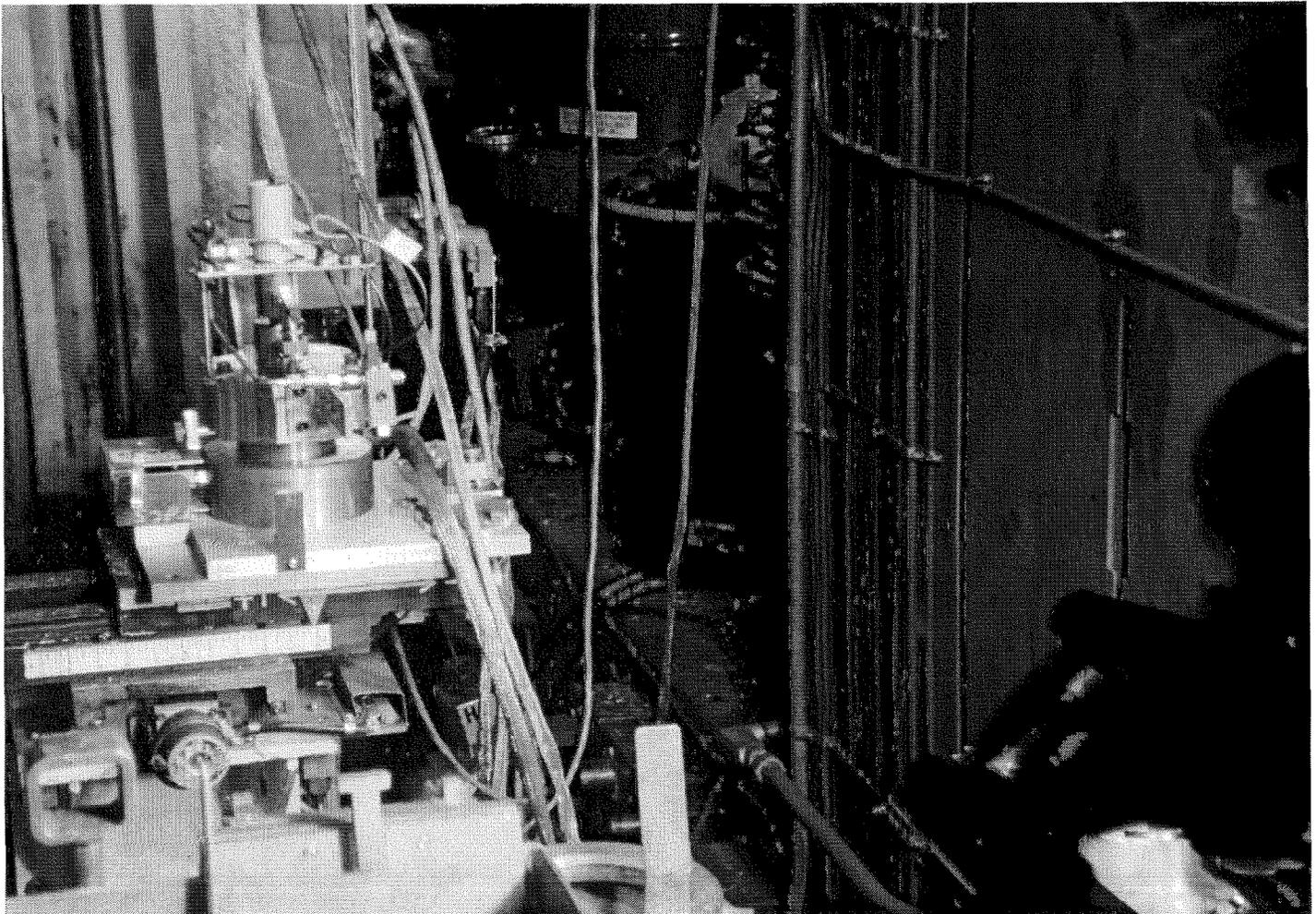
View of the south wall of the cell Annex as viewed from the second level 2A window showing the final configuration of equipment.



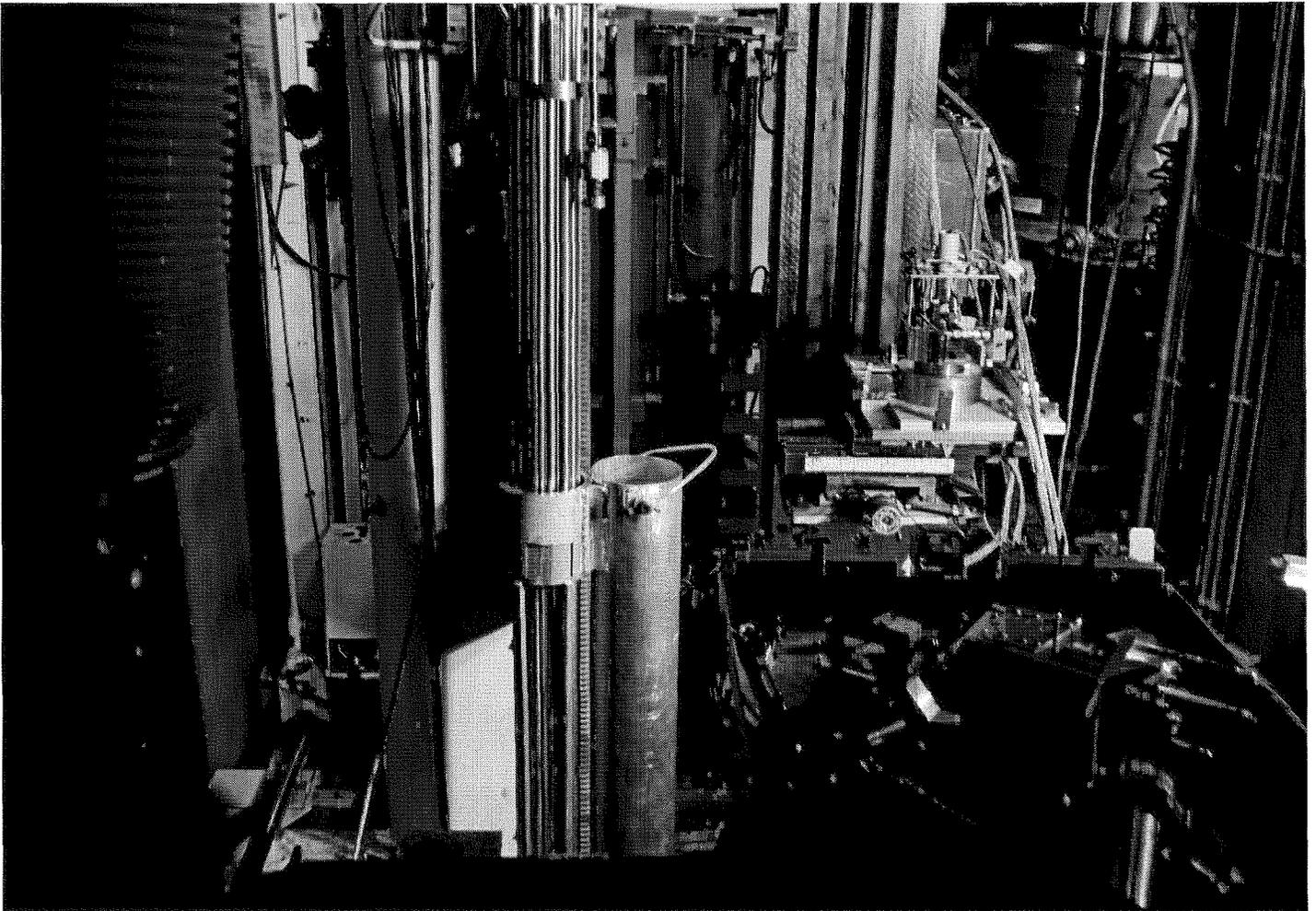
View of the southwest corner at the top main cell as viewed from the first level northern west facing window (1B window) of the final configuration of equipment, except the trolley and hoist of crane in the upper right has been lowered to the Maintenance Turntable its oil drained and secured there.



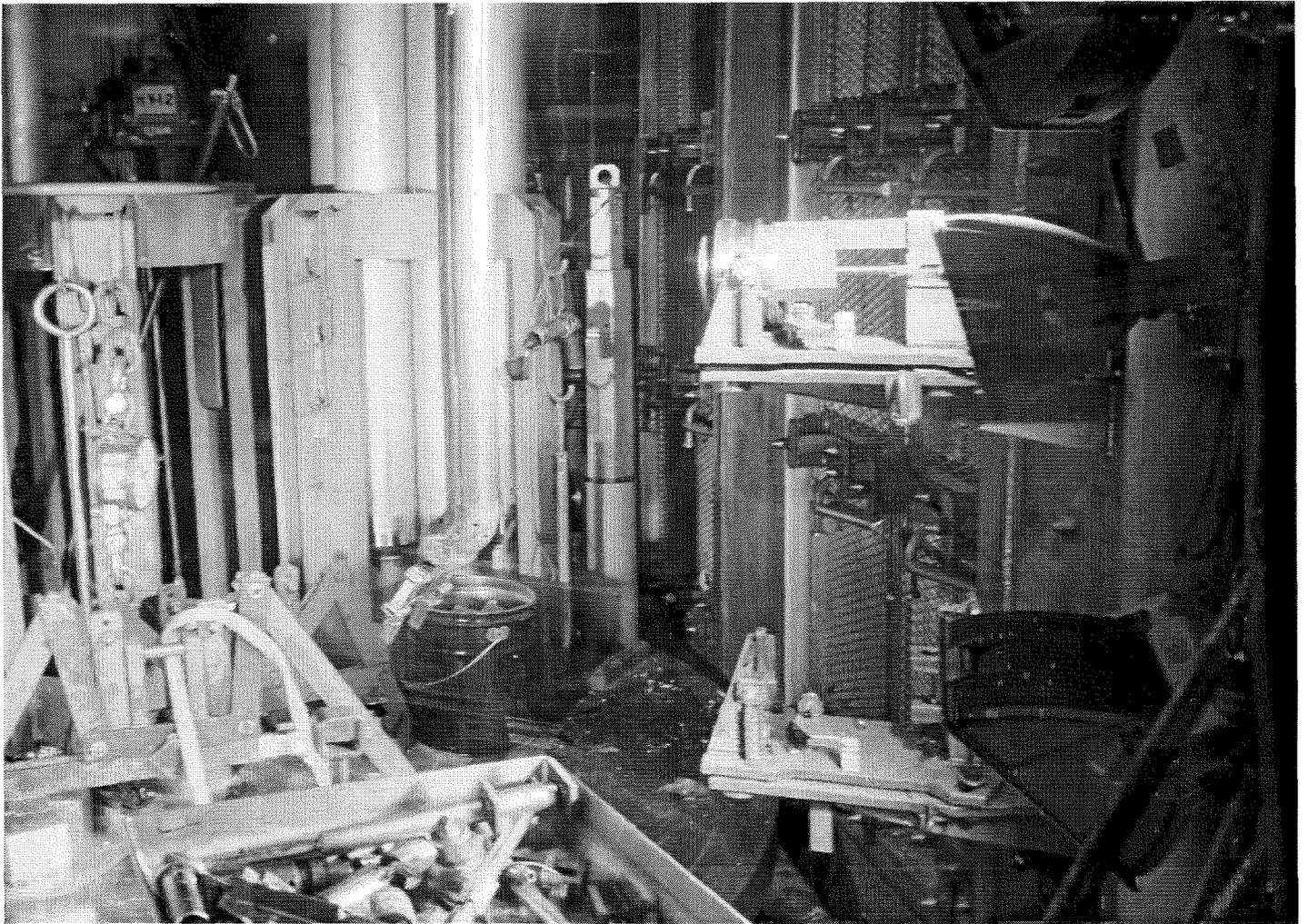
View of the cell as seen through the 2A window. All are seen in their final position except for the wall mounted manipulator boom and attached arm which have been placed in a vertical position instead of horizontal.



The center of picture shows some reacted sodium residue and activated metal cutting chips that have been left on the main cell step wall near the Maintenance Turntable as viewed from the 3A window.



Another view through the 3A window of the final configuration of the IEM Cell.



View of the main cell Maintenance Turntable area as seen through the 3C window. Most of the remote hand tools on the work tray in the foreground have been removed for the final status.

IEM CELL DEACTIVATION

| Equipment Name | Equipment Ident no. | Equipment Number | Electrical Completed By | Mechanical Completed By | Procedures Canceled By | Oil Drain Completed By | Boundary Secured By | Sodium Drained By | Argon/Air/Vent Secured By |
|---|---------------------|------------------|-------------------------|-------------------------|------------------------|------------------------|---------------------|-------------------|---------------------------|
| CLIRA Disassembly Reassembly Station | ID-2 | M-144 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | 4I-07-7327/W | NA | NA | NA |
| Core Component Receiving Station | ID-15 | M-185 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | 4I-07-7327/W | NA | 4I-07-3576/W | NA |
| Core Component Pot Storage Station | ID-17-1 | M-157 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | NA | NA | 4I-07-3576/W | NA |
| Core Component Pot Storage Station | ID-17-2 | M-157 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | NA | NA | 4I-07-3576/W | NA |
| Equipment and Personnel Airlock | ID-22 | WO-15 | 4I-08-661/W | 4I-08-661/W | 4I-08-661/W | NA | 4I-08-661/W | NA | 4I-08-661/W |
| Multipurpose Elevator | ID-26 | WO-15 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | 4I-07-7327/W | NA | NA | NA |
| Core Component Disassembly Reassembly Station | ID-35 | M-131 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | 4I-07-7327/W | NA | NA | NA |
| Core Component Measuring Station | ID-41 | M-158 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | NA | NA | NA | NA |
| Fuel Pin Weighing Station | ID-42 | M-166 | 4I-06-8677/W | 4I-06-8677/W | 4I-07-3576/W | NA | NA | NA | NA |
| Cell Ceiling Valve | ID-45 | M-56 | 4I-08-758/W | 4I-08-758/W | 4I-08-758/W | NA | 4I-08-758/W | NA | 4I-08-758/W |
| 4 Ton Bridge Crane | ID-46 | M-69 | 4I-08-665/W | 4I-08-665/W | 4I-08-665/W | 4I-08-665/W | NA | NA | NA |
| Radiation Shield Windows | ID-48 | W-16 | NA | 4I-08-657/W | 4I-08-657/W | 4I-08-657/W | 4I-08-661/W | NA | 4I-08-661/W |
| Pedestal Mounted Manipulator | ID-50 | M-127 | 4I-08-668/W | 4I-08-668/W | 4I-08-668/W | 4I-08-668/W | NA | NA | NA |
| Wall Mounted Manipulator | ID-51 | M-128 | 4I-08-666/W | 4I-08-666/W | 4I-08-666/W | NA | NA | NA | NA |
| Radioactive Waste Container Station | ID-61 | M-173 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | NA | NA | NA | NA |

IEM CELL DEACTIVATION

| Equipment Name | Equipment Ident no. | Equipment Number | Electrical Completed By | Mechanical Completed By | Procedures Canceled By | Oil Drain Completed By | Boundary Secured By | Sodium Drained By | Argon/Air/Vent Secured By |
|--|----------------------------|-------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|----------------------------|--------------------------|----------------------------------|
| Sodium Removal Station | ID-89 | T-100 | 4I-06-4819/M | 4I-06-4819/M | 4I-06-4819/M | 4I-07-7327/W | NA | NA | 4I-06-4819/M |
| Small tool Transfer Locks | ID-91 | W-29 | 4I-08-661/W | 4I-08-661/W | 4I-08-661/W | NA | 4I-08-661/W | NA | 4I-08-661/W |
| Equipment Mounting Brackets | ID-99 | M-142 | NA | 4I-07-3576/W | 4I-07-3576/W | NA | NA | NA | NA |
| Drip Pot Change System | ID-102 | M-211 | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | NA | NA | NA | NA |
| CLEM Grapple Change Fixture | ID-103 | M-178 | NA | 4I-07-3576/W | NA | NA | NA | NA | NA |
| Pressure Purge and Warning System | ID-119 | M-298 | 4I-08-661/W | 4I-08-661/W | 4I-08-661/W | NA | NA | NA | 4I-08-661/W |
| MOTA Disassembly & Reassembly Station | DRI | NA | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | NA | NA | NA | NA |
| MOTA Sample Removal & Insertion Station | SRI | NA | 4I-07-3576/W | 4I-07-3576/W | 4I-07-3576/W | NA | NA | NA | NA |
| IEM Argon supply and Purification System | NA | R-36 | 4I-07-8247/W | 4I-07-8247/W | 4I-07-8247/W | 4I-07-8247/W | NA | NA | 4I-07-8247/W |
| IEM Cell Atmosphere Monitoring System | NA | C-1240 | SN-82.6-1 | SN-82.6-1 | FFTF Ops | NA | NA | NA | SN-82.6-1 |

Note: Combustibles were collected and removed from the IEM Cell by work package 4I-08-2005.