

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 040-06563/96002(DNMS)  
Docket No. 040-06563  
License No. STB-401  
Licensee: Mallinckrodt, Inc.  
3600 North Second Street  
St. Louis, MO 63147  
Date: November 21, 1996  
Inspectors: David W. Nelson, Radiation Specialist  
Donna Moser, Project Manager  
Approved By: B. L. Jorgensen, Chief  
Decommissioning Branch  
Attachments: 1. General Layout  
2. Building 235 East Pad Drawing  
3. Drawing of 235 East Brick Wall

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EXECUTIVE SUMMARY  
Mallinckrodt, Inc.  
Report No. 040-06563/96002(DNMS)

This was a routine announced inspection that consisted of discussions with licensee personnel, tours of the facility and the performance of surveys consisting of direct and indirect measurements.

In addition to the direct and indirect measurements, soil samples were collected in the Building 235 East Pad area. At the time of the exit meeting it was intended to send the soil samples to the Oak Ridge Institute for Science and Education (ORISE) for alpha spectroscopy analysis. However, ORISE temporarily suspended analyses by alpha spectroscopy and stopped analyzing samples. The decision was made to issue the report prior to sending the soil samples to ORISE for analysis.

Discussions were held concerning licensee plans to remediate a small area of the site and construct new facilities on the remediated spot. NRC staff indicated that prior NRC review and approval is not required; however, followup review will include this area in the overall decommissioning plan for the entire site. The area must be treated as a restricted area until final site release, at which time a demonstration will be required to establish that the area has not been recontaminated by other remediation activities.

The inspection did not identify any violations of NRC regulatory requirements.

## DETAILS

### 1.0 Background

Mallinckrodt was first issued License No. STB-401 on June 26, 1964, for the processing of ore to extract Columbium and Tantalum. The license authorized the possession of thorium and uranium in natural or synthetic ores up to 30,000 kg of each. The license did not authorize the extraction of thorium or uranium from the ore. The license was active, utilizing the Plant 5 facilities until October 1985 when processing of ores was discontinued and the facility was placed in a standby status. During a three month period in 1987, the facility was operated to conduct research and assess the extraction of Columbium and Tantalum from Thailand tin-slag. At the end of the three month period, the facility was returned to standby status.

From May through September 1992, the licensee's contractor packaged and shipped drums containing processing residues to an authorized radioactive waste disposal facility and conducted a general cleanup of Plant 5 buildings. The cleanup consisted of removing and cleaning debris from the floor of the buildings and drumming the material for waste disposal. Contaminated equipment was either packed for disposal or left in the buildings to be addressed during future decommissioning activities.

Characterization of the Plant 5 area was conducted from September 1994 to March 1995. The characterization included sampling locations in the outdoor areas surrounding the processing buildings. The licensee is currently preparing a characterization report, which will be submitted to the NRC.

A general layout of the site is displayed on Attachment 1.

### 2.0 Inspection Observations and Findings

#### 2.1 Management Oversight (IP 87104)

The licensee's authorized Radiation Safety Officer reports to the Director, Site Development and Community Relations. The Director,

Site Development and Community Relations reports to the Director, Site Engineering and Planning who reports to the Plant Manager and Vice-President of Operations.

No violations of NRC requirements were identified.

#### 2.2 Materials and Facilities (IP 87104)

The possession (only) of up to 3,000 kilograms of thorium and uranium each, is currently authorized by NRC Source Material Licensee No. STB-401. Mallinckrodt's facility at 3600 North

Second Street is a large chemical processing facility, of which the licensed operations were located at three areas of the facility, Plant 5, Plant 6 and Plant 7N. Plant 6 and Plant 7N along with several other areas of the facility were being remediated under DOE's Formerly Utilized Sites Remedial Action Program (FUSRAP). Plant 5, the main processing plant for the extraction of Columbian and Tantalum ores, was not involved with DOE's FUSRAP program. The Columbian and Tantalum processing was conducted in Buildings 238, 246, 247A, 247B, 248A, and 248B of Plant 5.

No violations of NRC requirements were identified.

### 2.3 Posting and Labeling (IP 87104)

A tour of Plant 5 buildings indicated that building entrances were posted in accordance with the regulatory requirements. The entrances to the buildings were locked to secure against unauthorized entry.

No violations of NRC requirements were identified.

### 2.4 Independent Measurements

Direct radiation measurements were conducted using a Ludlum Model 2241-2 portable ratemeter and scaler coupled to a Geiger-Mueller (G-M) pancake detector, last calibrated on July 23, 1996. The efficiency of the detector was calculated to be approximately 0.25, using a technetium-99 plated source. Exposure rate measurements were obtained using a Ludlum Model 19 exposure rate instrument, last calibrated on October 31, 1996. Fourteen dose rate measurements were obtained at one meter distance from the surface of the soil in the building 235 east pad area (see Attachment 2). Four soil samples were also collected in the same east pad area (see Attachment 2). 20% of the building 235 east exterior brick wall surface was scanned (counts per minute (cpm)) and six, 60 second counts were obtained at various locations on the surface of the same wall (see Attachment 3).

The scanning counts per minute measurements on the building 235 east exterior wall ranged from 60 to 70 cpm with a background measured to be approximately 60 cpm. Direct 60 minute counts on the wall ranged from 70 to 88 cpm.

Building 235 East Wall 60 minute Counts (Attachment 3)

| <u>Location</u> | <u>cpm</u> |
|-----------------|------------|
| A               | 70         |
| B               | 70         |
| C               | 86         |
| D               | 76         |
| E               | 88         |
| F               | 69         |

Direct measurements performed one meter from the surface of the soil in the east pad area ranged from 8 to 30 microroentgens per hour (uR/hr) (0.08 to 0.30 microsieverts per hour (uSv/hr)). Background measurements varied considerably because of the presence of contamination throughout the Mallinckrodt facility.

Building 235 East Pad Direct Exposure Measurements (Attachment 2)

| <u>Location</u> | <u>uR/hr</u> |
|-----------------|--------------|
| A               | 8.0          |
| B               | 12.0         |
| C               | 13.5         |
| D               | 12.5         |
| E               | 8.5          |
| F               | 12.0         |
| G               | 12.5         |
| H               | 10.5         |
| I               | 12.0         |
| J               | 12.0         |
| L               | 25.0         |
| M               | 14.0         |
| N               | 9.5          |

No violations of NRC requirements were identified.

3.0 Discussions With Licensee

By facsimile dated October 9, 1996, Mallinckrodt submitted an Expansion Project Work Plan Summary for Surface Decontamination and Final Survey for an exterior area adjacent to Building 235 (Work Plan). The Work Plan described remediation and final survey activities for a small area east of Building 235 where Mallinckrodt intends to install a new equipment support structure. Building 235 is located in the Plant 5 area. A concrete pad located to the east of Building 235 was removed to install a new 20' X 30' X 2' deep concrete pad/structure. In addition, the licensee removed the outer layer of bricks from the Building 235 east external wall. Both the old pad and the wall were known to be contaminated with isotopes of uranium, thorium and radium. Mallinckrodt initially requested release of the area from the NRC prior to building the new concrete pad. As a result of outstanding issues, the NRC staff

stated that a thorough review of the work plan and final survey report could not be completed prior to the deadline for construction. Outstanding issues that need to be resolved regarding site decommissioning include surface and soil release levels, background measurements, and data conversion. NRC staff also indicated that NRC approval is not required to remediate this area and construct an equipment support pad to continue plant operations. However, NRC staff clearly stated that any remediation activity conducted without NRC approval is subject to future review and further remediation may be required. The meeting concluded that Mallinckrodt will continue remediation activities of the Building 235 East concrete pad area and conduct final survey measurement prior to construction of the support pad. The final survey information obtained for this area will be included with the final survey report that will be submitted for final release of the entire Mallinckrodt site. All outstanding issues will be resolved as part of the review of the Decommissioning Plan for the entire Mallinckrodt site. NRC staff also notified Mallinckrodt that this area must be treated as a restricted area until site release and that the final survey report must demonstrate that this area was not recontaminated by other site remediation activities.

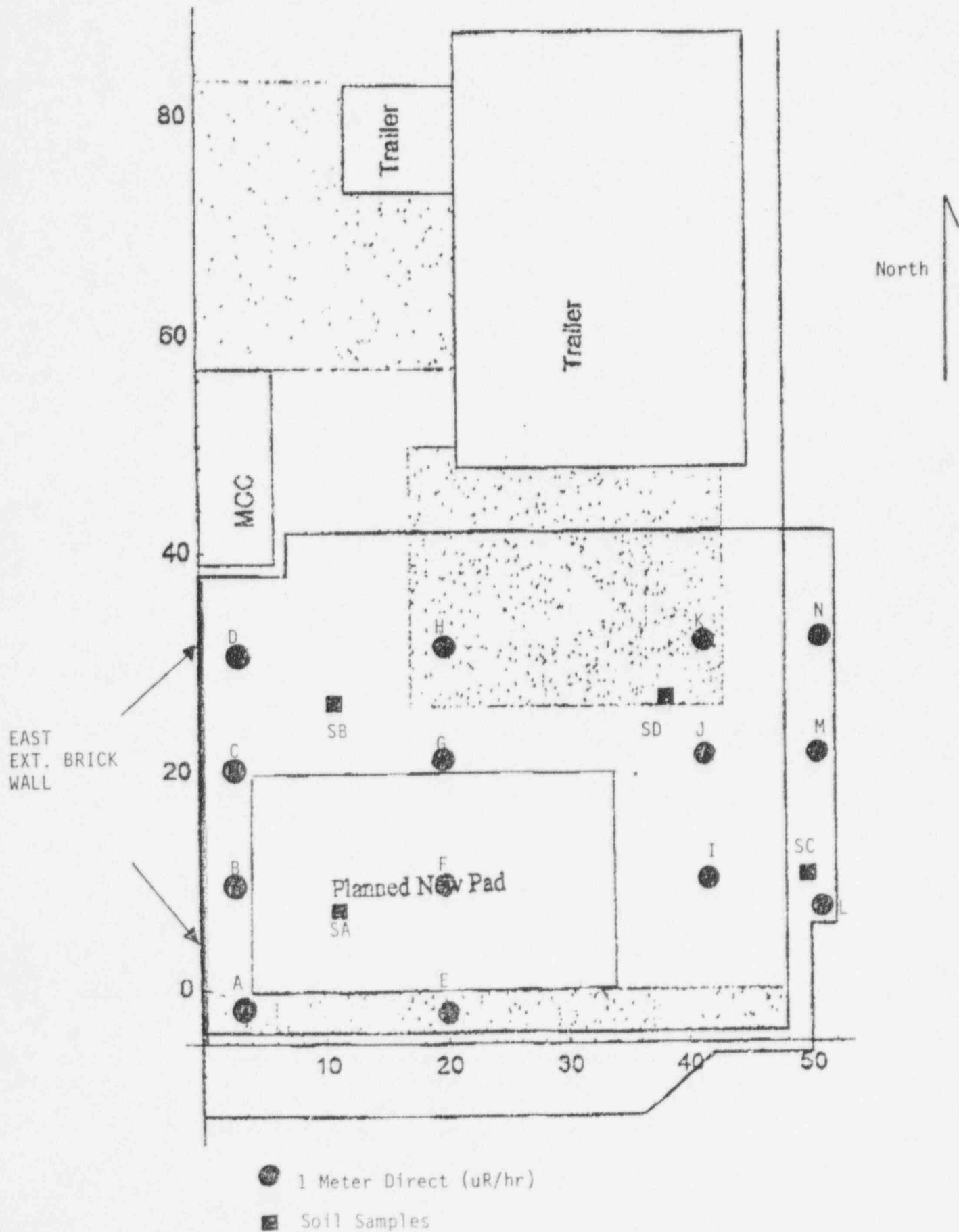
#### 4.0 Exit Meeting

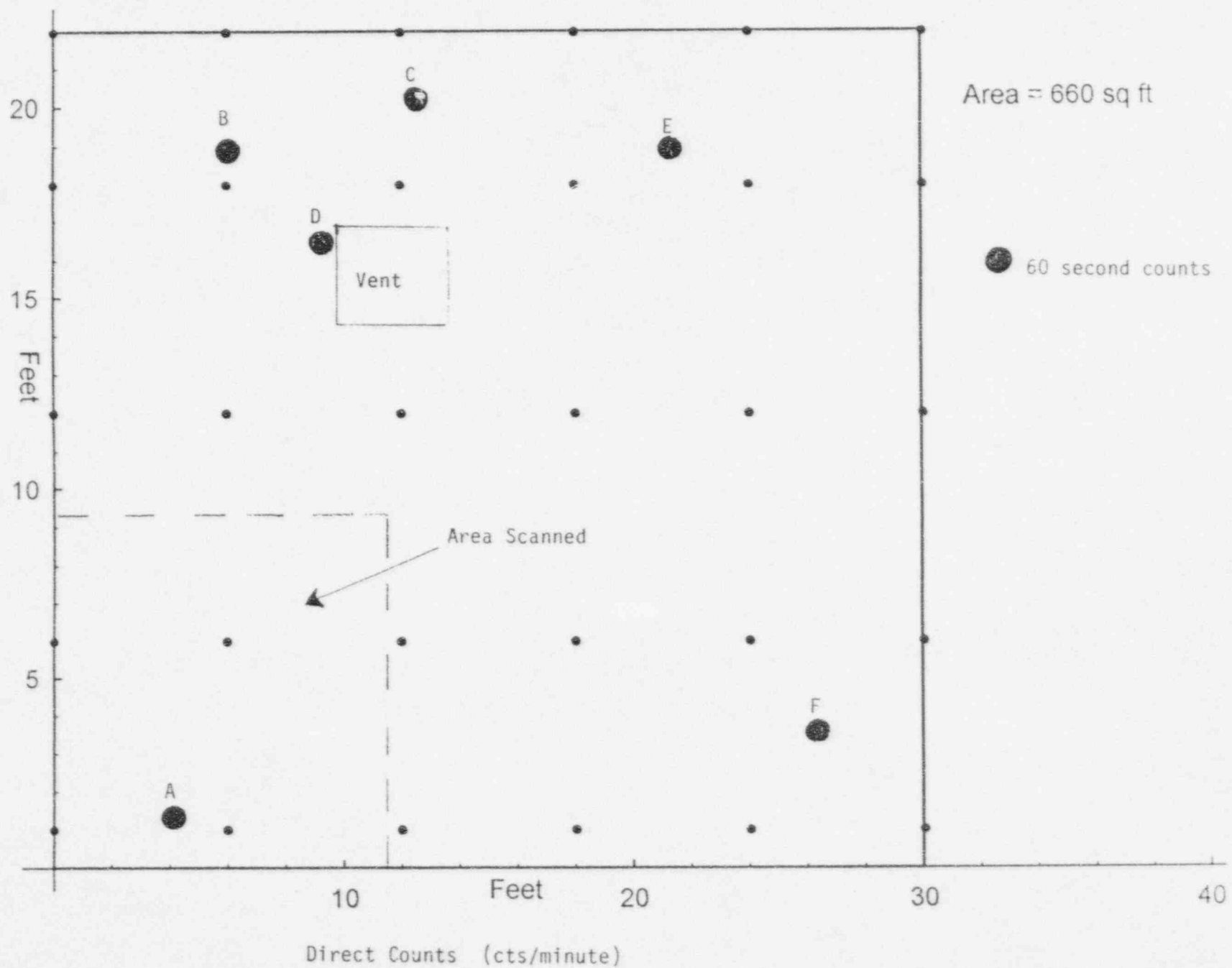
An exit meeting was conducted on November 21, 1996, to discuss the preliminary results of the inspection. The results of the surveys were discussed with Mr. Thomas Byrd via telephone on January 16, 1997.

#### Partial List of Persons Contacted

Robert Boland, P.E. Environmental Program Manager  
Thomas Byrd, Senior Environmental Specialist  
Sol Guber, P.E., Principal Project Engineer

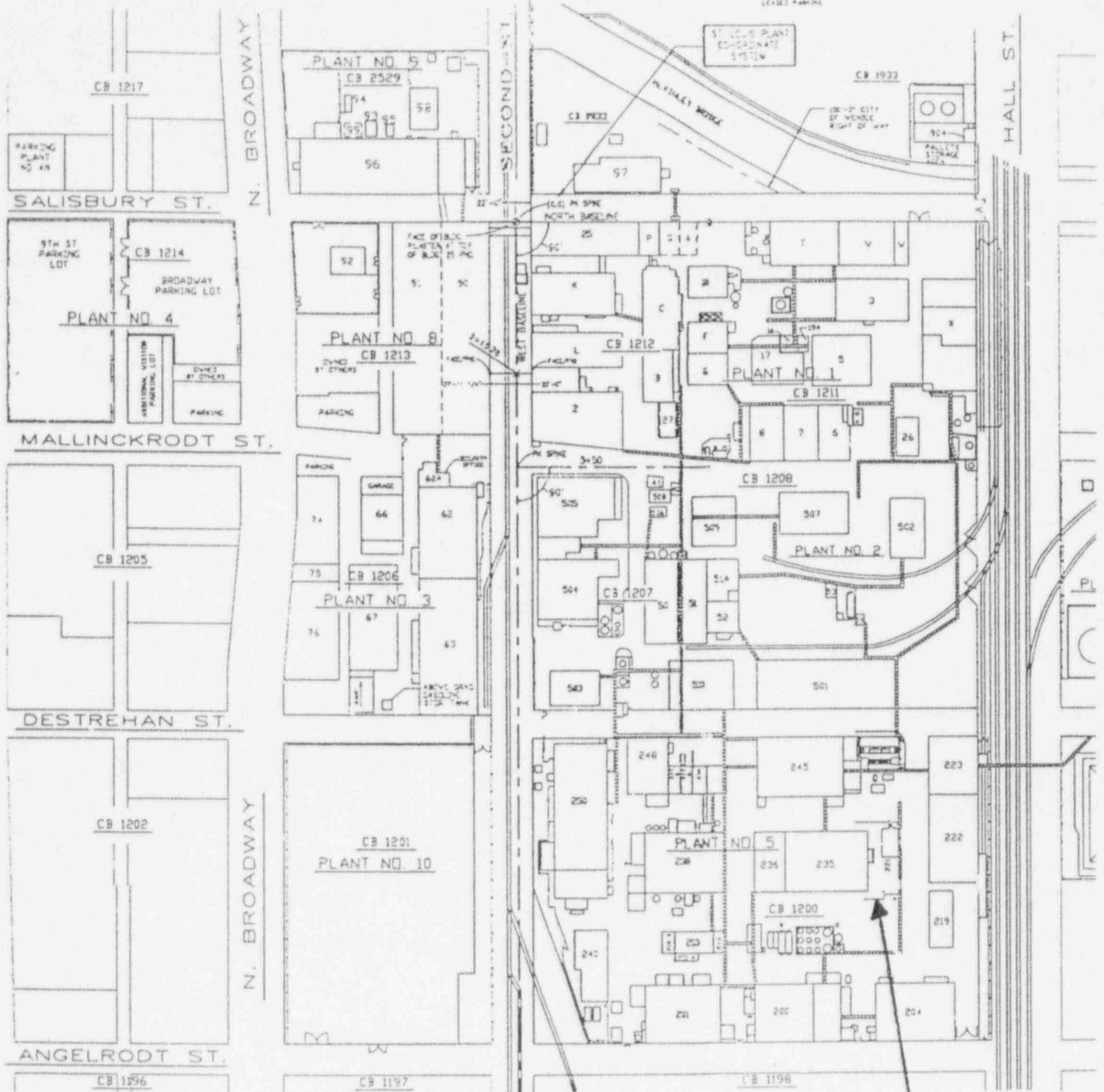
## Building 235 East Pad



Building 235 East Exterior Brick Wall FC 83-23 Limit of 1100 Beta DPM/100 cm<sup>2</sup>



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MALLINCKRODT ST. LOUIS

EAST PAD