

March 14, 1996

HO-6563  
DECIDED  
ITEM

Mr. Jack Fraunhoffer, Director  
Site Development & Community Relations  
Mallinckrodt Chemical, Inc.  
Mallinckrodt & Second Street  
P. O. Box 5439  
St. Louis, MO 63147

SUBJECT: NRC INSPECTION CONDUCTED ON FEBRUARY 13, 1996 AT MALLINCKRODT  
CHEMICAL, INC. (INSPECTION NO. 040-06563/96001 (DNMS))

Dear Mr. Fraunhoffer:

This refers to the inspection conducted on February 13, 1996, at Mallinckrodt Chemical, Inc., St. Louis, Missouri. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with you and your staff. This also refers to the telephone conversation with Mr. Tom Byrd, of your staff, on March 6, 1996, regarding the results of wipes collected during the inspection.

The inspection was an examination of activities conducted under your license as they relate to radiation safety and to compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and independent measurements.

No violations of NRC requirements were identified during the course of this inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and the enclosure will be placed in the NRC Public Document Room (PDR).

Sincerely,

Original Signed By

J. W. McCormick-Barger, Chief  
Decommissioning Branch

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PDR

Docket No. STB-401  
License No. 040-06563

Enclosure: Inspection Report No.  
040-06563/96001 (DNMS)

cc w/encl: C. Gaskin, NMSS  
PUBLIC (IE07)

**Attorney Work Product**  
Prepared in Anticipation of Litigation

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 040-06563/96001(DNMS)

Docket No. 040-06563

License No. STB-401

Licensee: Mallinckrodt, Inc.  
3600 North Second Street  
St. Louis, MO 63147

Inspection Conducted: Onsite February 13, 1996  
In office review of wipe data on March 6, 1996

Inspection by: Kenneth J. Lambert 3/14/96  
Kenneth J. Lambert Date  
Radiation Specialist

J. W. McCormick-Barger for 3/14/96  
Edward L. Kulzer Date  
Radiation Specialist

Approved By: J. W. McCormick-Barger 3/14/96  
D. W. McCormick-Barger, Chief Date  
Decommissioning Branch

Inspection Summary

Inspection on February 13, 1996 (Report No. 040-06563/96001 (DNMS))

Areas Inspected: This was a routine announced inspection of the licensee's radiation safety program. The inspection included a review of the licensee's organization, facility, environmental sampling, posting, and independent measurements.

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

## DETAILS

### 1. Persons Contacted

\*Jack Fraunhoffer, Director, Site Development and Community Relations  
\*Thomas Byrd, Senior Environmental Specialist  
\*Sol Guber, P.E., Principal Project Engineer

### 2. 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 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 conduct a general cleanup of Plant 5 buildings (Columbian-Tantalum processing plant). 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 when the remediation of the buildings would be performed.

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 upon finalization. Licensee representatives indicated that the report would not be finalized until questions they have regarding NUREG-1500 and NUREG-1507 are resolved.

### 3. Organization

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 apparent violations of NRC requirements were identified.

4. Materials and Facility

The possession of up to 3,000 kilograms of thorium and uranium each, for possession only, is 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 apparent violations of NRC requirements were identified.

5. Training

License Condition 13, of License Amendment 2, dated July 12, 1993, requires that all employees assigned work in a restricted area shall attend refresher training in 10 CFR Part 20 and the Mallinckrodt, Inc., Radiation Protection Program at intervals not exceeding 12 months. The extent of the training shall be commensurate with job functions. Written tests shall be administered to determine the effectiveness of the training and records of the test results shall be maintained.

Licensee personnel made infrequent visits to the processing buildings. Visits were generally made by maintenance personnel, who were accompanied by the Radiation Safety Officer (RSO) or the Health Physics Specialist (HPS). Refresher instructions were provided by the RSO or HPS prior to entering the buildings.

The training records were reviewed which indicated that training had been conducted in 1993 and 1994 for some individuals. In 1995, annual training was initiated for all plant personnel. This was a 1-hour training session which discussed the basics of radiation, site issues, impact of a site, and summary. In addition to the 1-hour basic training provided to all personnel, maintenance personnel received an initial 4-hour radiation safety course which was last conducted in February 1996.

No apparent violations of NRC regulations were identified.

6. Environmental Sampling

License Condition 14 requires the licensee to perform quarterly air measurements for radon and TLD measurements within onsite buildings. There were 21 locations within and around the Plant 5 buildings, associated with the processing of Columbian and Tantalum, where TLD's were deployed. TLD records were reviewed for the period from April 1993

to January 1996. The maximum exposed location was along the south boundary of Plant 5 at Building 238's wall, the average quarterly TLD measurement was 230 millirem (mr).

To determine radon concentration, the licensee used a track-etch detection system. To determine the total effective dose equivalent (TEDE), based on a workers exposure of 2000 hours per year, the radon concentration was converted to a committed effective dose equivalent (CEDE) and added to the TLD measurement for 2000 hours. This would be the exposure to an individual who worked in the area for eight hours per day for a year. Since the Columbian and Tantalum process was not operational and the buildings locked, the licensee had determined a more realistic worker exposure based on a occupancy rate of 10 percent. The TEDE, based on a 10 percent occupancy, ranged from 1 to 124 mr for the period of April 1993 to April 1994. The maximum TEDE was 124 mr, and was located on the first floor of Building 238, in the area of the URO dryer.

No apparent violations of NRC requirements were identified.

7. Posting and Labeling

A tour of Plant 5 buildings indicated that building entrances were posted with "Caution Radioactive Material" signs and additional signs which warned that entry was for authorized persons only. The buildings entrances were padlocked to secure against unauthorized entry.

No apparent violations of NRC requirements were identified.

8. Independent Measurements

Direct radiation measurements were conducted using a Ludlum Model 12 portable survey instrument coupled to a Geiger-Mueller (G-M) pancake detector, last calibrated on July 26, 1995. The background measurement was determined to be 50 cpm and the efficiency was 0.338, using a strontium-yttrium-90 plated source. Exposure rate measurements were conducted at several locations in the buildings using a Ludlum Model 19 exposure rate instrument, last calibrated on April 6, 1995. The background measurement was determined to be 8 microroentgens per hour ( $\mu R/hr$ ) (0.08 microsieverts per hour ( $\mu Sv/hr$ )).

Direct measurements were performed at two locations on the floor of Building 238 and were 14,800 and 6900 disintegrations per minute per 100 square centimeters (dpm/100  $cm^2$ ) (247 and 115 becquerels per 100 square centimeters (Bq/100  $cm^2$ )) beta/gamma activity. Wipes were collected at each direct measurement location and analyzed for gross alpha and beta activity. The two wipe results analyzed indicated less than (<) 5 dpm (<0.1 Bq)/100  $cm^2$  each for gross alpha and gross beta activity.

Exposure rate measurements were performed at several locations in buildings 238, 247, and 248. The exposure rates ranged from 8 to 80  $\mu\text{R/hr}$  (0.08 to 0.8  $\mu\text{Sv/hr}$ ). See attached figure for location of direct measurements and exposure rate measurements.

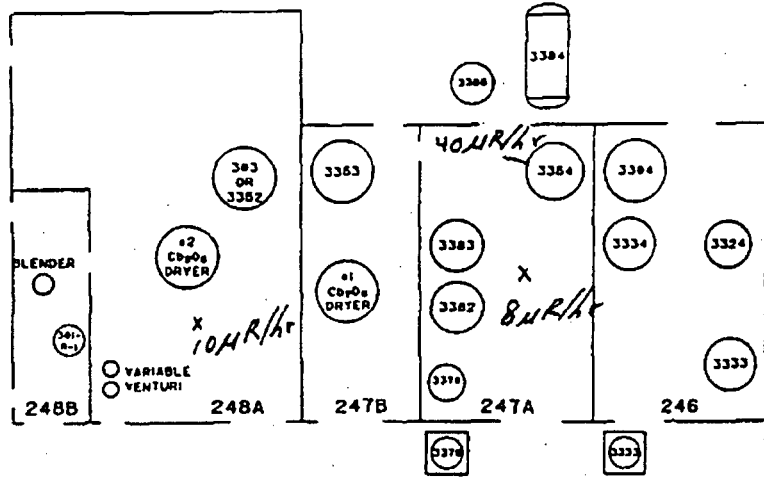
9. Exit Meeting

An exit meeting was conducted on February 13, 1996, with the individuals specified in Section 1 of this report. The preliminary findings of the inspection were discussed, which indicated no violations of NRC requirements were identified. The licensee did not identify any information discussed as being proprietary.

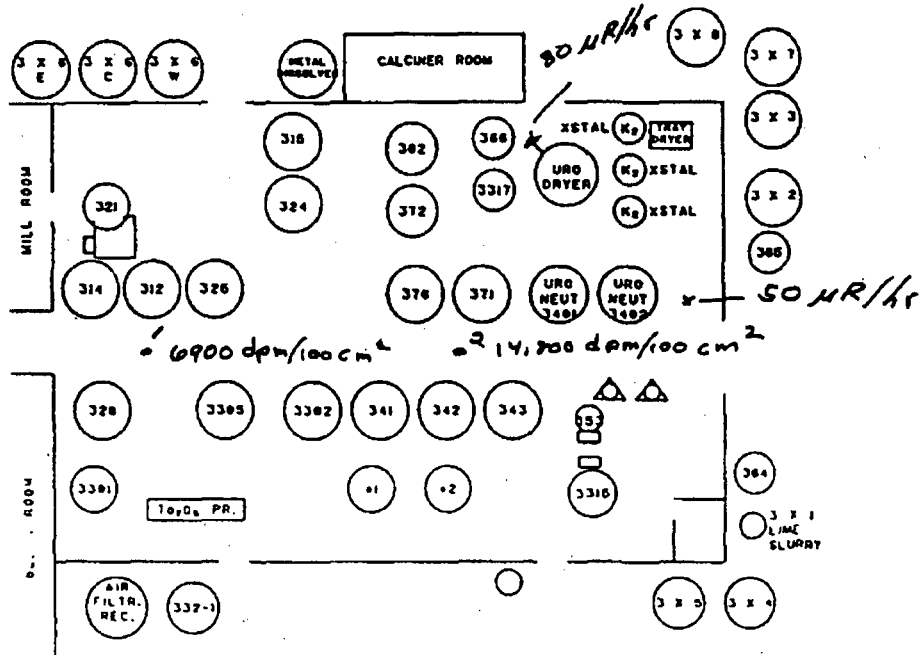
Attachment:

Figure A: Buildings Diagram

Attachment  
Figure A



FIRST FLOOR LAYOUT



BLDG. 238  
FIRST FLOOR LAYOUT