

MALLINCKRODT CHEMICAL WORKS, Building No. K

HABS No. MO-1929-F

(~~Mallinckrodt Inc.~~)

Second Street between Salisbury Street and Mallinckrodt Street  
St. Louis, Missouri

HABS

MO

96-SALU,

134 F-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Buildings Survey  
National Park Service  
Great Plains Support Office  
1709 Jackson Street  
Omaha, Nebraska 68102-2571

**HISTORIC AMERICAN BUILDINGS SURVEY**  
**MALLINCKRODT CHEMICAL WORKS, BUILDING K**  
**(Mallinckrodt Inc.)**

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MO  
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134 F-

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**Location:** Second Street, between Salisbury and Mallinckrodt streets, St. Louis, Missouri  
  
USGS Granite City, Illinois-Missouri Quadrangle (7.5'), Universal Transverse Mercator Coordinates: 744185 E; 4282868 N

**Present Owner:** Mallinckrodt Inc.

**Present Use:** K-1-E, Storage  
K-1-W, Processing, Storage

**Significance:** One of 16 buildings at Mallinckrodt Chemical Works associated with the Manhattan Engineer District/Atomic Energy Commission (MED/AEC) – sponsored program to process uranium for use in the development of atomic weapons, the east room of Building K, called K-1-E, was used as a pilot plant to extract radium from pitchblende ore shipped from the Belgian Congo (the Democratic Republic of the Congo).

**PART I. HISTORICAL INFORMATION**

**A. Physical History**

1. **Date of erection:** Building K was built between 1875 and 1897.
2. **Architect:** The architect of the building is unknown.
3. **Original and subsequent owners:** The original and subsequent owner is the Mallinckrodt Chemical Works.
4. **Builder-contractor:** The contractor is unknown.
5. **Original Plan and construction:** There are no original plans for Building K.
6. **Alterations and additions:** A number of windows have been infilled. A fiberglass shed on the west side and a metal shed on the south side have been added.

**B. Historical Context**

Building K was part of the original Mallinckrodt Chemical Works (MCW) Plant, built between 1875 and 1897, judging from a review of three different maps.<sup>1</sup> Compton and Dry, of 1875, show a building resembling this one. Hopkins, published in 1883 shows a building labeled "K," but not in the exact position of today's building. The Whipple Map of 1897 has Building K in its current location, and labels it a manufacturing building. The building was used for a variety of purposes over the years, depending upon the specific needs of MCW.

The use of Building K for uranium processing began in 1944. During MCW's initial uranium processing operations, begun in April 1942, the chief source of uranium was from Canada. However, as work progressed toward the creation of the atomic bomb, more uranium was required than could be supplied solely from Canadian sources. The U.S. Army looked to a high-grade pitchblende ore from the Belgian Congo (Zaire). In about July 1944, MCW began development work to extract and purify uranium from this pitchblende ore. Work with pitchblende ore required intensive safety and

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<sup>1</sup> *Whipple's Fire Insurance Map of St. Louis, Missouri* (St. Louis: A. Whipple, 1897).

**MALLINCKRODT CHEMICAL WORKS, BUILDING K**  
**(Mallinckrodt Inc.)**  
HABS No. MO-1929-F  
(Page 3)

health precautions, because unlike the Canadian black oxide, it contained radium (Ra-226), a decay product of normal uranium (U-238). It was necessary to remove the radium from the uranium oxide before it could be processed further. Once development work for the process had been completed, a pilot radium extraction plant was established in the large room on the east half of Building K, or "K-1-E," as it was known. This pilot plant was used additionally to obtain design data for constructing a new refinery to process pitchblende ore. By the end of 1944, sufficient information had been gathered from "K-1-E" to begin engineering designs for the new refinery.

The operations in Building K-1-E included the following:

The process in K-1-E dissolved pitchblende in nitric acid, then stripped most of the radium along with lead and radium daughters from the liquor by sulfate precipitation and filtration, yielding a "lead gangue cake" that contained the radium. A second step treated the filtered liquor with barium to neutralize excess sulfate; this gave a barium sulfate precipitate that carried down all remaining radium. The lead gangue cake and the barium cake were packaged separately and returned to the government for transfer off-site. This method also eliminated the regrowth of the radon daughter or radium later on in the process.<sup>2</sup>

Pilot plant operations in "K-1-E" yielded properly adjusted and radium-free feed liquor, which was conveyed in containers by hand cart to Plant No. 2 where it was first treated in vessels outside of Building 52, then taken into 52 for final purification, then into Building 51A for denitration and hydrogen reduction to UO<sub>2</sub>.<sup>3</sup>

All the pitchblende work was transferred to Plant 6 in 1946, and uranium processing ceased in Building K.

## **PART II. ARCHITECTURAL INFORMATION**

### **A. General Statement**

1. **Architectural character:** Building K is a nineteenth century brick industrial building with segmented arch windows and doors.

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<sup>2</sup> Mont G. Mason, "History and Background Relative to the Radiological Re-Monitoring of Mallinckrodt by the Energy Research and Development Administration" (St. Louis: Mallinckrodt, Inc., 1977), 15.

<sup>3</sup> *Ibid.*, 15.

**MALLINCKRODT CHEMICAL WORKS, BUILDING K**  
**(Mallinckrodt Inc.)**  
HABS No. MO-1929-F  
(Page 4)

2. **Condition of fabric:** The fabric is in poor condition.

**B. Description of Exterior**

1. **Overall Dimensions:** Building K is rectangular in shape and measures 60' in width x 120' in length. On the east side is a new shed-roof ell with a concrete foundation, green fiberglass walls, corrugated metal roof, and two overhead metal garage doors. On the south side is a shed-roof metal building on a concrete foundation, with one single metal door with upper glass panes.
2. **Foundation:** The foundation is native limestone, 3' high.
3. **Walls:** The brick load bearing walls are one width thick.
4. **Structural system, framing:** Building K uses brick piers with brick load-bearing walls. The interior has two wood 10" x 10" posts supporting 10" x 10" I-beams, retrofitted with C-beams on either side. Ceiling joist are 2" x 10" topped with 1" x 3" floor/ceiling boards. In "K-1-W," steel I-beams have been added as posts.
5. **Porches and steps:** Concrete stairs, enclosed in corrugated metal with fixed four-pane windows to light the staircase, provide access to the second floor on the south side.
6. **Chimneys:** There are no chimneys.
7. **Openings:**
  - a. **Doorways and doors:** Building K has seven exterior doors. On the north side, first floor, is one wood sliding door in K-1-W and one modern metal door in K-1-E. On the second floor, north side, is a modern metal door with 9" wire glass upper panes that leads to a fire escape that has replaced a window. On the south side's first floor is one single wood door with four upper glass panes, one large opening with a sliding wood door, and one wood panel with four upper glass panes on the second floor. On the east side is one large segmented-arch opening with a corrugated metal sliding door.
  - b. **Windows:** The north side has seven large segmented arch windows that have been infilled with brick, concrete block or wood. On the south side are six large segmented arch

**MALLINCKRODT CHEMICAL WORKS, BUILDING K**  
**(Mallinckrodt Inc.)**  
HABS No. MO-1929-F  
(Page 5)

windows, four of which have been infilled with brick or wood, and two original double-hung windows with 12-over-12 lights in wood sash. On the east side are two large segmented-arch windows that have been infilled with brick or fiberglass. On the west side are six segmented-arch windows, three each on the first and second floors, have been infilled with brick, fiberglass or glass block.

8. **Roof:**
  - a. **Shape, covering:** The flat roof covered with asphalt is pierced by a roof monitor, with fiberglass windows, that runs the east-west length of the roof.
  - b. **Cornice, eaves:** No cornice or eaves are present.
  - c. **Dormers, cupolas, towers:** There are no dormers, cupolas, or towers.

**C. Description of Interior**

1. **Floor plans:** There are two rooms on the first floor, "K-1-E" and "K-1-W." "K-1-E," used for storage has some equipment including three hoppers. "K-1-W" has some processing tanks and storage. On the second floor are three rooms; one large room for processing on the west side, one large room on the east side filled with storage, plus one smaller room with two sets of original double doors in it.
2. **Stairways:** There is an interior elevator. There are no interior stairways.
3. **Flooring:** The building has concrete floors with covered metal drainage troughs.
4. **Wall and ceiling finish:** The walls are brick, painted green. The ceilings in "K-1-E" are 1" x 3" tongue-and-groove wood, and the ceiling in "K-1-W" is plywood.
5. **Openings:** There are no openings between "K-1-E" and "K-1-W." The wall between them is concrete block with some hollow clay infill. On the second floor, the original large single room has been divided into two areas by a corrugated metal wall, with a sliding corrugated metal door.

**MALLINCKRODT CHEMICAL WORKS, BUILDING K**  
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HABS No. MO-1929-F  
(Page 6)

6. **Decorative features and trim:** There are no decorative features and trim.
7. **Hardware:** There is no hardware.
8. **Mechanical equipment:**
  - a. **Heating, air conditioning, ventilation:** The building was heated with steam heat from Building C in Plant 1.
  - b. **Lighting:** The lighting consists of green enamel shade fixtures with bulbs on the first and second floors. There are also fluorescent lights on the second floor.
  - c. **Plumbing:** There are no bathrooms.
9. **Furnishings:** There are no original furnishings. "K-1-W," used for processing, contains some tanks.

**D. Site:**

1. **General setting and orientation:** Building K is set within Plant 1, the oldest section of Mallinckrodt Inc.
2. **Historic landscape design:** The building is part of the Mallinckrodt Chemical Works, and is set within an urban industrial area with no landscape design.

**PART III. SOURCES OF INFORMATION**

**A. Original Architectural Drawings:** There are no original drawings for Building K at Mallinckrodt Inc.

**B. Bibliography:**

Mason, Mont G. "History and Background Relative to the Radiological Re-monitoring of Mallinckrodt by the Energy Research and Development Administration." St. Louis: Mallinckrodt, Inc., 1977.

*Whipple's Fire Insurance Map of St. Louis, Missouri.* Vol. III. St. Louis: A. Whipple, 1897.

**PART IV. PROJECT INFORMATION**

This HABS documentation project was undertaken as mitigative recordation required by Section 106 of the National Historic Preservation Act of 1966. The United States Department of Energy Former Sites Restoration Division plans to demolish the buildings.

The documentation was prepared by Alexandra C. Cole, architectural historian at Science Applications International Corporation (SAIC), Santa Barbara, California in February 1997. Large-format photography was done by Bruce Harms of Louis Berger and Associates, Inc., Marion, Iowa, in August/September 1996. Measured floor plans were prepared under the supervision of Michael Poligone of Bechtel National Incorporated (BNI), Oak Ridge, Tennessee, in December 1996.

\*FOR SITE PLANS SEE MO-1929 FIELD NOTES