

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 70-00033/82-03

Docket No. 70-00033

License No. SNM-23 Priority I Category UR

Licensee: Texas Instruments Incorporated

34 Forest Street

Attleboro, Massachusetts 02703

Facility Name: Texas Instruments Incorporated, HFIR Project Areas

Inspection At: Attleboro, Massachusetts

Inspection Conducted: August 31 - September 2, 1982

Inspectors: J. Johansen  
Johansen, Radiation Specialist

10/12/82  
date

R. Ladun  
R. Ladun, Radiation Specialist

10/12/82  
date

Approved By: John D. Kinneman  
John D. Kinneman, Chief  
Materials Program Section No. 1

10/12/82  
date

Inspection Summary:

Inspection on August 31, 1982, September 1, 2, 1982 (Report 70-33/82-03)

Areas Inspected: Special, announced, closeout inspection of a facility engaged in manufacture of research reactor fuel elements, including review of licensee's closeout survey report and independent measurements in the general manufacturing area, fuel manufacturing area, chemical laboratory, metallographic laboratory, roof exhausts from the general and fuel manufacturing areas and hallway and office areas associated with the HFIR project. The inspection involved 32 hours on-site inspection time by 2 NRC region-based inspectors.

Results: No violations were identified. Measured fixed and removable contamination levels are comparable with licensee's closeout survey results.

## DETAILS

### 1. Persons Contacted

- A. \*F. L. Sherman, Manager HFIR Project
- B. #R. J. Schwensfeir, Jr., Manager Nuclear Safety and Materials
- C. #W. H. Daft, Health Physics Technician
- D. R. Churchill, Contracts Manager

#present at entrance interview

\*present at exit interview

### 2. Background

The HFIR Project was engaged in the manufacture of research reactor fuel elements using only high enriched uranium (93% uranium-235) under NRC License No. SNM-23. The HFIR Project facility was located in Building 10 at the Attleboro, Massachusetts site of Texas Instruments, Inc. (see Attachment 1). Manufacturing operations included blending and compacting SNM as enriched  $U_3O_8$  and aluminum powders, hot roll-bonding compacts into aluminum-clad fuel plates, assembling fuel plates into fuel elements. All SNM associated with the HFIR Project, from receipt and storage through processing and packaging for shipment, was confined to the HFIR facility, the Metallographic Laboratory and the Chemical Laboratory subsequent to 1968.

All processing of unclad SNM was performed in the Fuel Manufacturing Area (FMA) in dry boxes or hoods with ventilation conforming to NRC requirements. The FMA was separated by partitions from the surrounding General Manufacturing Area (GMA) and was maintained at a negative pressure relative to the surrounding GMA. No exposed or unclad SNM was processed in the GMA.

Completed fuel elements and fuel plates and scrap containing  $U_3O_8$  were removed from the facility by the US Department of Energy. Contaminated waste was sent to an NRC licensed facility for burial.

No chemical or recovery operations were performed on the SNM during manufacturing processing subsequent to 1968.

### 3. Entrance Interview

The inspectors discussed the purpose and scope of their inspection and the results of the Texas Instruments Closeout Survey Report dated May 17, 1982, with the individuals identified in paragraph 1.

#### 4. Areas Surveyed

Surveys were limited to the roof of Building A-10 (see Attachment 1) near the exhausts from the high efficiency filter system and the fuel manufacturing area (see Attachment 2), the ceiling of the general and fuel manufacturing areas of the HFIR facility (see Attachment 3), the walls, floors, columns and holes in the general and fuel manufacturing areas of the HFIR facility (see Attachments 4 and 5), the offices and hallway of the HFIR facility Project Manager (see Attachment 6), the Metallographic Laboratory (see attachment 7), and the Jarrell Ash Atomic absorption analyzer in the Chemical Laboratory.

#### 5. Methodology and Instruments

##### Methodology

A 5x5 meter chalkline grid corresponding to the licensee's Figure 5.1 of the May 17, 1982, Closeout Survey Report was layed out in the floor of the HFIR project area (see Attachments 3, 4, and 5). Within the 5x5 meter area at least two 1x1 meter grids selected by the licensee and 3 independent 1x1 meter grids were surveyed for direct alpha, beta-gamma radiation levels. At least 2 wipes for removable alpha, beta-gamma contamination (one corresponding to the licensee's wipe) were taken in each 5x5 meter grid of the HFIR facility. Ceiling surveys were taken in areas corresponding to the floor grid of the HFIR area. At least 2 wipes were taken in each ceiling area of the HFIR facility surveyed.

Direct measurements were taken at 0°, 90°, and 180° from north at 1, 2, and 4 meter distances on the roof around the exhaust from the high efficiency filter system and at 0°, 90°, and 225° from north at 0.5 and 1 meter distances on the roof around the exhaust from the fuel manufacturing area.

Direct measurements were taken on the floor in the HFIR office and hallway, on the floor and table tops in the Metallographic Laboratory (see Attachment 6, 7) and on the drawers and control panel of the Jarrell Ash Atomic absorption analyzer in the Chemical Laboratory.

##### Instruments

The following instruments were used for direct measurements:

- \*1. Eberline Model PAC-1SA alpha counter, calibrated August 25, 1982.
- \*2. Eberline Model PAC-4S alpha counter, calibrated June 15, 1982.
3. Ludlum Model 12S microR meter, calibrated August 25, 1982.
4. Ludlum Model 14C-GM with thin end window probe, calibrated June 15, 1982.

\*Determined to be 50% efficient in counting against a Th-230 certified standard of 4,290 dpm dated November 27, 1978.

All wipes were taken to Region I and were counted for 1 minute in a TENNELEC LB 1000 Series Low Background alpha, beta gas flow counting system having an alpha background of 0.03 cpm and a beta background of 1.16 cpm with an alpha efficiency of 20.6% and beta efficiency of 26.3% as of September 7, 1982.

6. Independent Measurements

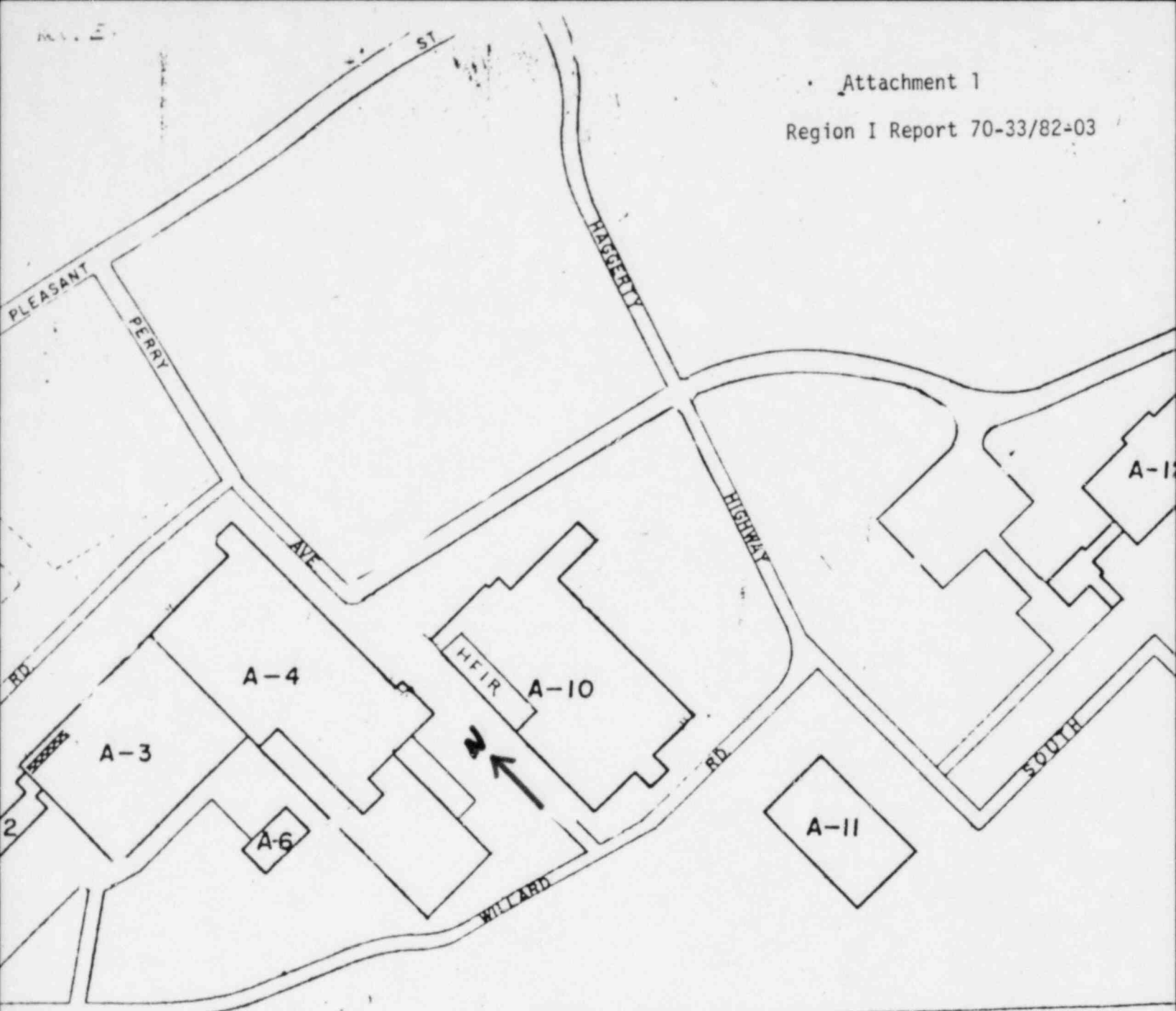
Four hundred ten (410) individual direct alpha, beta-gamma measurements were taken in the facility areas identified in paragraph 4. Direct alpha measurements did not exceed 600 dpm (95% < 50 dpm) except for HFIR area at ceiling grids 12/56, 12/57 (1200 dpm) and 8/67 (1300 dpm) (See Attachment 3) and at floor grids 16/37, 16/38 (800 dpm) and 18/58 (1100 dpm) (See Attachment 4). (Note: 1st number of grid indicates west to east row, 2nd number indicates south to north block on attachments 3, 4, and 5). Direct beta-gamma measurements did not exceed 10 micro R per hour except for levels in the HFIR area at floor grids 11/31 (120 micro R/hr) and 15/71 (90 micro R/hr) (See Attachment 4). A total of one hundred fifty four (154) wipes for removable alpha, beta contamination were taken in the facility areas diagramed in Attachments 3, 4, 5, and 6. All wipes for removable contamination were less than 200 dpm alpha, and 50 dpm beta (majority being less than 10 dpm alpha, 30 dpm beta) with the exception of one wipe on the ceiling pipes in the HFIR area at ceiling grid 8/65, 8/66, 8/67 being 543 dpm alpha and 357 dpm beta.

7. Exit Interview

The inspectors summarized the scope and results of the inspection with the individual identified in paragraph 1.

8. Conclusion

Fixed and removable contamination levels measured during this inspection are comparable to those in the licensee's close-out survey and are within the limits established in Annex C of the facility license (Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for Byproduct, Source, or Special Nuclear Material, dated November, 1976).



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Attachment 2

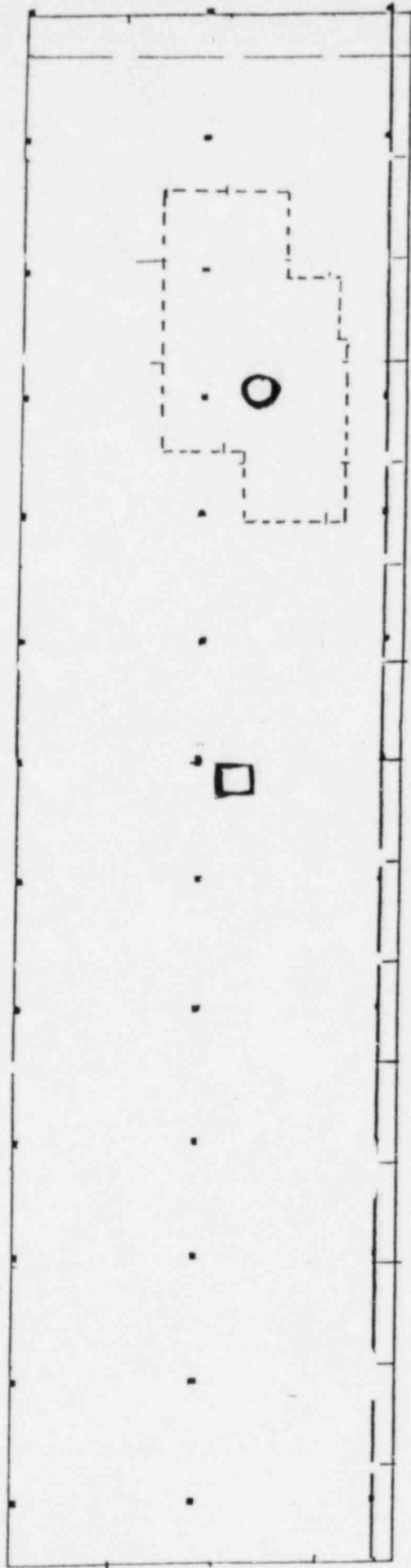
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Approximate Location of Roof  
exhaust ducts

---outline of Fuel  
Manufacturing area.

□ Exhaust High Efficiency  
Filter

○ Exhaust Fuel Manufacturing  
Area



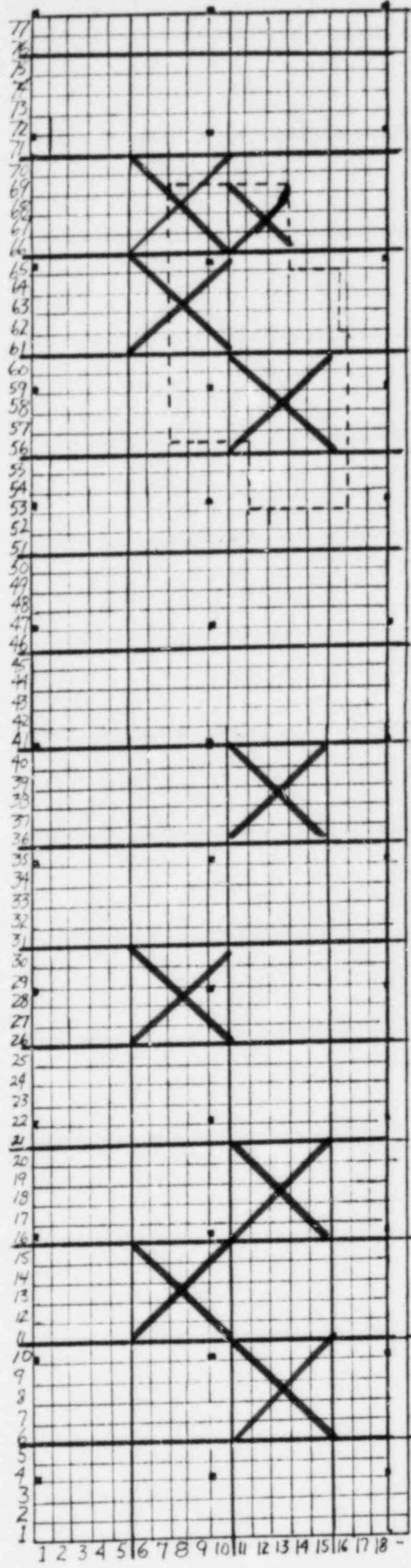
Attachment 3  
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Ceiling/Pipe Areas  
Surveyed

---Outline Fuel  
Manufacturing Area.

X Area Surveyed

■ Columns



Attachment 4

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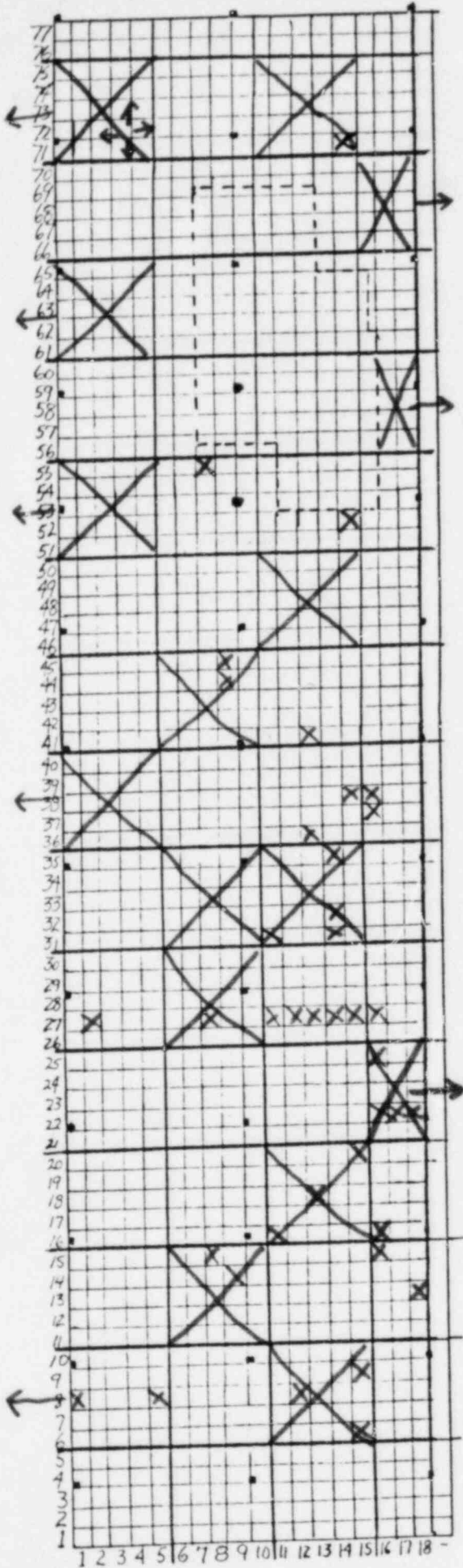
Floor/Walls/Columns/Holes Surveyed  
General Manufacturing Area

---Outline Fuel Manufacturing Area

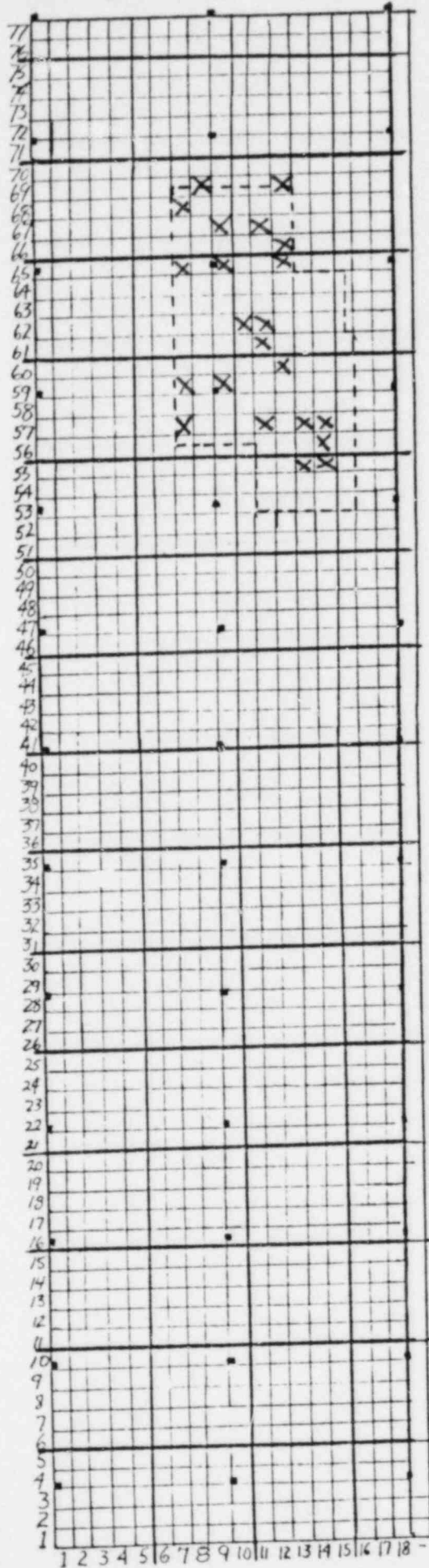
X Area Surveyed

↔ Walls Surveyed

■ Columns







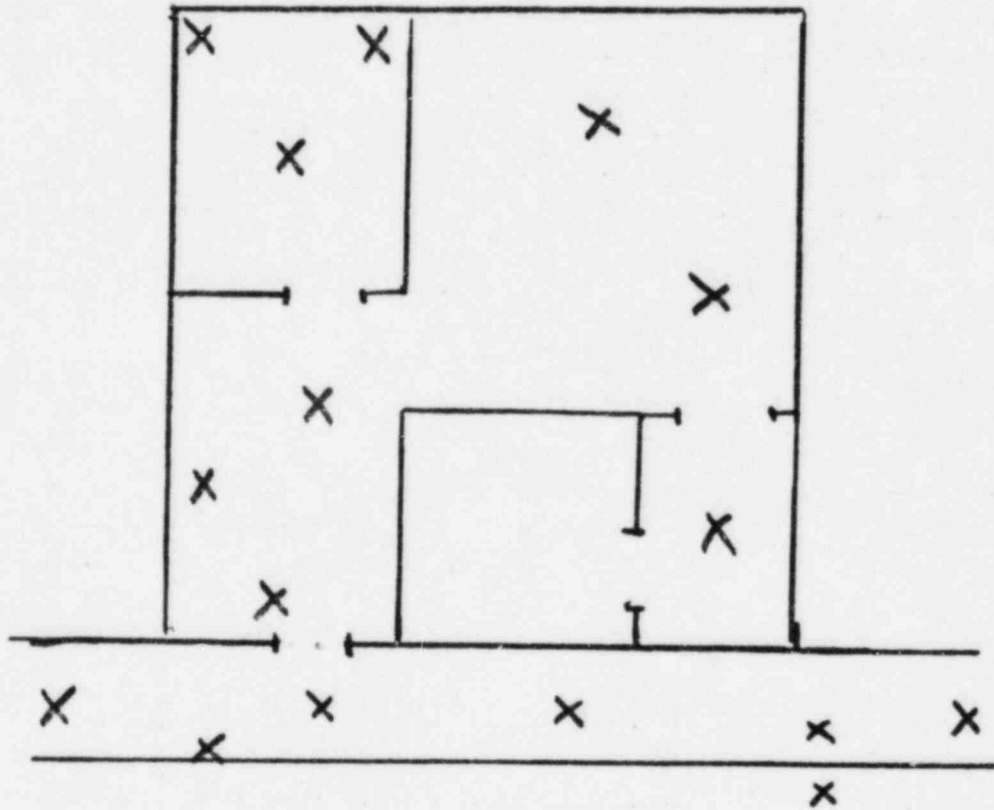
Attachment 5  
 Region I Report 70-33/82-03  
 Floors/Columns/Holes Surveyed  
 ---Outline Fuel Manufacturing Area  
 X Areas surveyed  
 • Columns

Attachment 6  
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Floor Areas Surveyed

HFIR Project Managers  
Officer/Hallway

X - Areas Surveyed



Attachment 7  
Region I Report 70-33/82-03  
Metallographic Laboratory  
X = Areas Surveyed

