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# TRANSMITTAL OF THE DRAFT THORIUM/PLANT 9 COMPLEX IMPLEMENTATION PLAN FOR ABOVE-GRADE DECONTAMINATION AND DISMANTLEMENT

01/02/97

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DOE-FEMP EPAS
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REPORT

Department of Energy
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JAN 0 2 1997

DOE-0376-97

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Mr. Thomas Schneider, Project Manager
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Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF THE DRAFT THORIUM/PLANT 9 COMPLEX IMPLEMENTATION PLAN FOR ABOVE-GRADE DECONTAMINATION AND DISMANTLEMENT

The purpose of this letter is to transmit to the U.S. Environmental Protection Agency (U.S. EPA) and Ohio Environmental Protection Agency (OEPA) the enclosed draft version of the Thorium/Plant 9 Complex Implementation Plan for Above-Grade Decontamination and Dismantlement (D&D) for review and approval.

The requirement for delivery of this document to the regulatory agencies is January 6, 1997, pursuant to the schedule for remedial design deliverables provided in Section 6.3 of the draft Operable Unit 3 (OU3) Integrated Remedial Design/Remedial Action (RD/RA) Work Plan (November 1996).

The draft Thorium/Plant 9 Complex Implementation Plan has been prepared to comply with all of the requirements identified in the draft OU3 Integrated RD/RA Work Plan, which implements both the OU3 Record of Decision (ROD) for Interim Remedial Action and the OU3 ROD for Final Remedial Action, and is the first OU3 implementation plan that executes the RD/RA strategies of that work plan. The draft Thorium/Plant 9 Complex Implementation Plan reflects the results of the engineering design, which addresses project-specific decontamination and dismantlement strategies and project-specific material management strategies.

Since the first case study application of the "Disposition Evaluation Methodology for Accessible Metals" (Building 4A) is ongoing, the final decision for disposition of accessible metals from the Thorium/Plant 9 Complex project will be made subsequent to the completed case study of Building 4A. Appendix B of the Thorium/Plant 9 Complex Implementation Plan

has been prepared to address that status and will be updated/amended once a decision is made based on the disposition methodology evaluation for the Thorium/Plant 9 Complex. Notification and a summary of the results of the Thorium/Plant 9 Complex disposition evaluation methodology will be provided to the regulatory agencies when the disposition decision is made.

If you or your staff have any questions, please contact John Trygier at (513) 648-3154.

Sincerely,

Johnny Reising

Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:Murphy

Enclosure: As Stated

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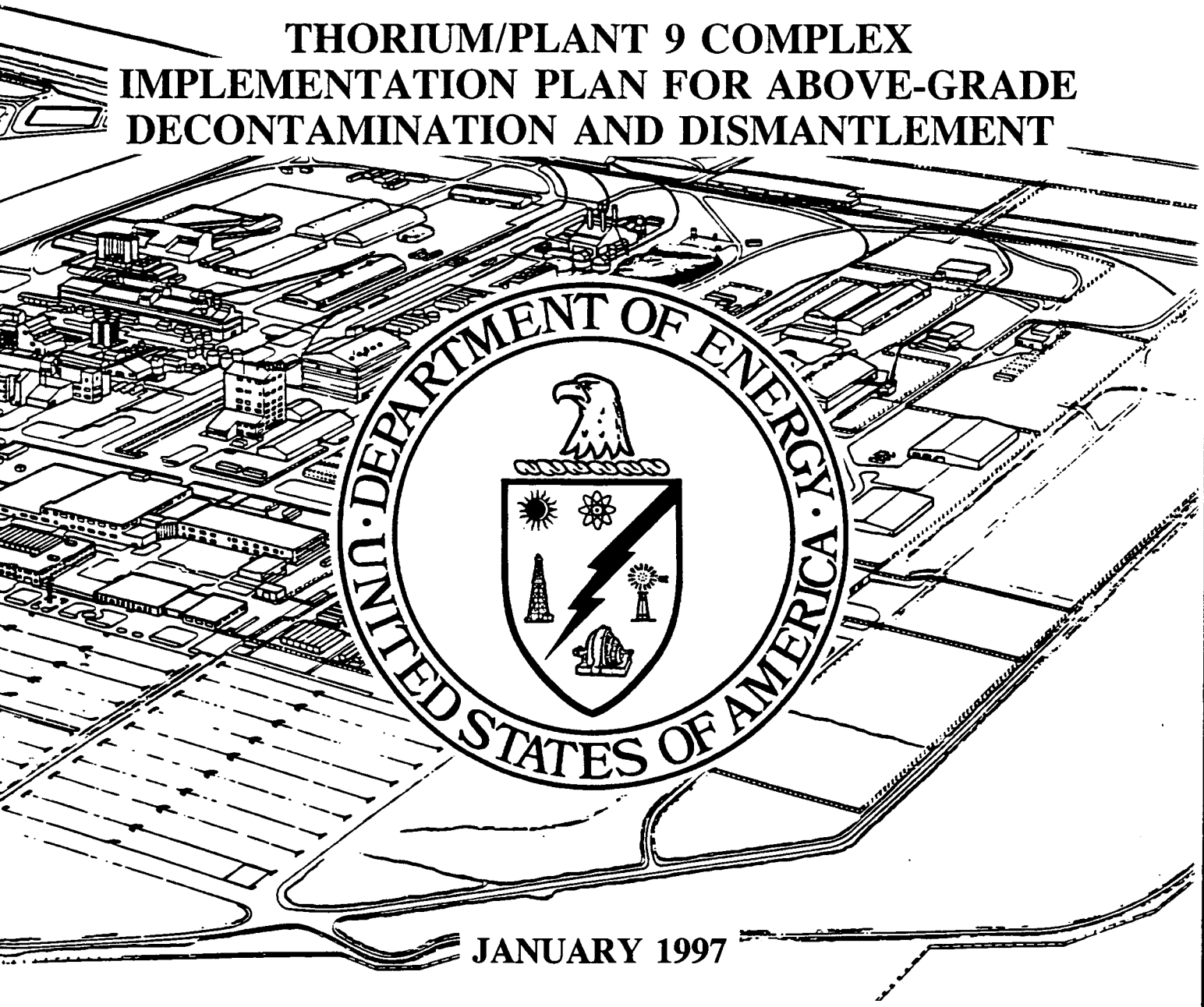
# OPERABLE UNIT 3
# INTEGRATED REMEDIAL ACTION

## THORIUM/PLANT 9 COMPLEX
## IMPLEMENTATION PLAN FOR ABOVE-GRADE DECONTAMINATION AND DISMANTLEMENT




JANUARY 1997

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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ENGINEERING DOCUMENT CONTROL NO. 2503-RA-0005 (REV. 0)

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# OPERABLE UNIT 3
# INTEGRATED REMEDIAL ACTION

# THORIUM/PLANT 9 COMPLEX
# IMPLEMENTATION PLAN FOR ABOVE-GRADE DECONTAMINATION AND DISMANTLEMENT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JANUARY 1997

U. S. DEPARTMENT OF ENERGY
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# NOTATION

## Abbreviations, Acronyms, and Initials

| | |
|---|---|
| ACM | asbestos-containing material(s) |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act, as amended |
| CFR | Code of Federal Regulations |
| CMU | concrete masonry unit |
| COC | Constituents of Concern |
| CPID | Closure Plan Information and Data package |
| DF&O | Directors Findings and Orders |
| DOE | United States Department of Energy |
| D&D | decontamination and dismantlement |
| EL | End-loading [container] |
| FEMP | Fernald Environmental Management Project |
| HEPA | high-efficiency particulate air [filter] |
| HVAC | heating, ventilating, and air conditioning |
| HWMU | Hazardous Waste Management Unit |
| IROD | Operable Unit 3 Record of Decision for Interim Remedial Action |
| N/A | not applicable |
| NESHAPs | National Emissions Standards for Hazardous Air Pollutants |
| NTS | Nevada Test Site |
| OEPA | Ohio Environmental Protection Agency |
| OU3 | Operable Unit 3 |
| OU3 RI/FS WPA | OU3 RI/FS Work Plan Addendum |
| PCB(s) | polychlorinated biphenyl(s) |
| PCDF | permitted commercial disposal facility |
| PPE | personal protective equipment |
| RCRA | Resource Conservation and Recovery Act, as amended |
| RD/RA | remedial design/remedial action |
| RI | remedial investigation |
| ROB | roll-off box |
| ROD | Record of Decision |
| RvA | Removal Action |

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**Abbreviations, Acronyms, and Initials (Cont'd.)**

| | |
|---|---|
| SAP | Sampling and Analysis Plan |
| SCQ | FEMP Sitewide CERCLA Quality Assurance Project Plan |
| SOW | Statement of Work |
| TL | top-loading [box] |
| TCLP | Toxicity Characteristic Leachate Procedure |
| TSI | thermal system insulation |
| USEPA | United States Environmental Protection Agency |
| WAC | Waste Acceptance Criteria |
| WMB | white metal boxes (small) |
| WWTS | waste water treatment system |

**Units of Measure**

| | |
|---|---|
| cm. | centimeter(s) |
| $cm^2$ | square centimeter(s) |
| dpm | disintegration(s) per minute |
| ft. | foot (feet) |
| $ft^2$ | square foot (feet) |
| $ft^3$ | cubic foot (feet) |
| gal. | gallon(s) |
| in. | inch |
| mg/L | milligrams per liter |
| pCi/g | picoCuries per gram |
| $\mu$g/g | microgram per gram |

**Chemical Symbols**

| | |
|---|---|
| Al | aluminum |
| As | arsenic |
| Ba | barium |
| Cd | cadmium |
| Cr | chromium |
| Elem. U | elemental uranium |
| HF | hydrofluoric acid |
| K | potassium |
| $MgF_2$ | magnesium fluoride |
| NaOH | sodium hydroxide |
| Pb | lead |
| Ra | radium |
| Se | selenium |
| Tc-99 | technetium-99 |
| Th-228 | thorium-228 |

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**Chemical Symbols (Cont'd.)**

| | |
|---|---|
| U | uranium |
| U-238 | uranium-238 |
| $U_3O_8$ | uranium oxide |
| $UF_4$ | uranium tetrafluoride |
| UNH | uranyl nitrate hexahydrate |
| $UO_2$ | uranium dioxide |
| $UO_3$ | uranium trioxide |
| V | vanadium |
| Zn | zinc |

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# 1.0 INTRODUCTION

## 1.1 Project Statement

The purpose of this implementation plan is to summarize the Thorium/Plant 9 Complex project-specific remedial design for decontamination and dismantlement of the above-grade portions of the components contained in the Thorium/Plant 9 Complex which is located in Operable Unit 3 (OU3) at the U.S. Department of Energy's (DOE) Fernald Environmental Management Project (FEMP) in Fernald, Ohio. At- and below-grade remediation is not included within the scope of this project. This implementation plan was developed consistent with the remedial design strategy presented in the OU3 Integrated Remedial Design/Remedial Action (RD/RA) Work Plan (Draft, DOE 1996a) and is being submitted to the U.S. Environmental Protection Agency (USEPA) and the Ohio Environmental Protection Agency (OEPA) in compliance with the enforceable milestone established for this implementation plan submittal. Although the remedial design for the Thorium/Plant 9 Complex initially used implementation strategies defined in the OU3 RD/RA Work Plan for Interim Remedial Action (DOE 1995), the completion of the remedial design involved the use of updated RD/RA strategies defined in the draft OU3 Integrated RD/RA Work Plan. The submittal of this implementation plan replaces the submittal of multiple design and construction documents that are described in Sections 4.1 and 4.2 of the draft OU3 Integrated RD/RA Work Plan.

The project implementation details contained in this implementation plan elaborate on programmatic strategies presented in the draft OU3 Integrated RD/RA Work Plan, project-specific strategies developed for the remediation subcontract Statement of Work (SOW)(Part 6 of the bid document), and performance specifications (Appendix B of the draft OU3 Integrated RD/RA Work Plan).

## 1.2 Scope of Work

The above-grade Thorium/Plant 9 Complex decontamination and dismantlement project includes the following major activities:

- Hazardous Waste Management Unit decontamination;

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- asbestos abatement/removal;
- surface decontamination;
- above-grade component dismantlement;
- material management; and
- environmental monitoring.

The following components are included in the Thorium/Plant 9 Complex:

- Building 9A - Special Products Plant;
- Building 9B - Plant 9 Sump Treatment Facility;
- Component 9C - Plant 9 Dust Collector;
- Building 9D - Plant 9 Substation;
- Building 9E - Plant 9 Cylinder Shed;
- Building 9F - Plant 9 Electrostatic Precipitator;
- Building 32A - Magnesium Storage Building;
- Component 32B - Building 32 Covered Loading Dock;
- Building 64 - Thorium Warehouse;
- Building 65 - (Old) Plant 5 Warehouse;
- Building 69 - Decontamination Building;
- Building 78 - D&D Building;
- Building 81 - Plant 9 Warehouse;
- Component G-001 - Railroad tracks;
- Component G-006 - Process trailers; and,
- Component G-008 - Pipe bridges.

In addition to the above listed components, the remediation will include above grade utility poles on the Plant 9 Pad (Component 74K).

The remedial design for the Thorium/Plant 9 Complex was performed in three phases; the performance specifications for decontamination and dismantlement were originally certified for construction on February 21, 1995 for the Plant 9 portion of the complex (Buildings 9A, 9B, 9C, 9D, 9E, 9F, and 81) and on August 1, 1995 for most of the remaining components within the complex (Buildings 32A, 32B, 64, 65, and 78). Building 69 and the miscellaneous

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components (G-001, G-006, G-008) have been added to the complex as a result of the accelerated remediation planning schedule. The third phase of remedial design included the revision of performance specifications to be consistent with those included in the draft OU3 Integrated RD/RA Work Plan. The third phase also included the performance of the disposition evaluation methodology for accessible metals that will be generated during the remedial action. This plan also discusses two preparatory actions that were completed prior to initiation of decontamination and dismantlement: the removal of existing product and waste inventories, and safe shutdown.

The sequence, schedule, and component-specific remediation requirements for at- and below-grade dismantlement are contingent on RD/RA scheduling for soil remediation within the former Production Area and will be addressed in the appropriate RD/RA submittals for the Soil Characterization and Excavation Project (SCEP).

In accordance with the draft OU3 Integrated RD/RA Work Plan, the Thorium/Plant 9 Complex remediation activities have been planned utilizing a performance-based methodology using performance-based specifications as described in Section 3.1.3 and 4.1 of that work plan, and are also included in Appendix B of that work plan. Appendix C of this implementation plan provides a list of those performance specifications which also apply to this project. Also provided in Appendix C of this implementation plan is one additional specification, Specification 01519, which has been written since the submittal of the draft OU3 Integrated RD/RA Work Plan. Since that specification was not included in the draft OU3 Integrated RD/RA Work Plan, it is included in its entirety in Appendix C.

The use of performance specifications for project implementation requires that the remediation subcontractor develop work plans, subject to DOE approval, which will specify proposed remediation methods necessary to accomplish certain tasks and meet project objectives. The sequence for performance of remedial activities may differ from the sequence in which they are presented in this implementation plan since the remediation subcontractor's work plan may propose an alternate sequence. Substantive changes in the scope or intent of this plan will require USEPA and OEPA notification/approval prior to implementation of the activities. Notification to the Agencies will be made for nonsubstantive but otherwise significant deviations to specific methods or techniques proposed in this plan. These will also be

reported in the project completion report prepared following certification of construction completion for this decontamination and dismantlement project.

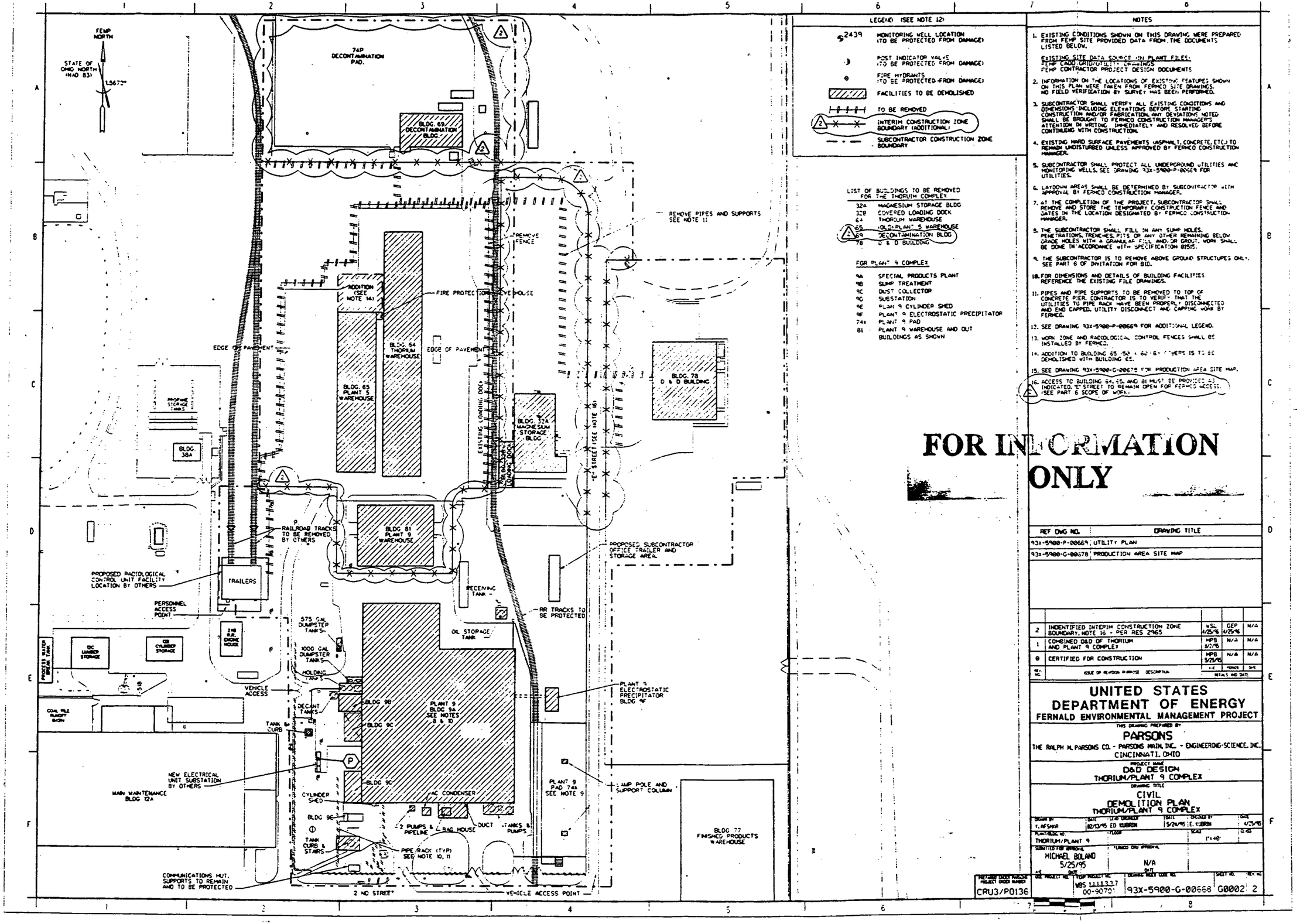
## 1.3 Plan Organization

This implementation plan is comprised of five sections and five appendices. Section 1 contains the remedial action project statement, scope of work, an overview of this implementation plan, and a brief description of the Thorium/Plant 9 Complex. Section 2 describes the overall approach to implementing the Thorium/Plant 9 Complex remediation project, as applied from the draft OU3 Integrated RD/RA Work Plan. That approach includes a sequence for remediation of components, a plan for materials management, environmental monitoring activities, and an overview of the six-task approach for implementing above-grade remediation. Section 3 presents specific notable aspects of the six remedial tasks for each component. Section 4 presents the schedule for remediation and project reporting. Section 5 describes notable aspects of the project management approach.

Appendix A contains a summary table that estimates the types and quantities of environmental and occupational sampling for this project, based on the assumptions in the Sampling and Analysis Plan (SAP) for the OU3 integrated remedial action, contained in Appendix D of the draft OU3 Integrated RD/RA Work Plan, and on the remediation requirements presented in this plan. Appendix B provides a summary of the disposition evaluation methodology for accessible metals. Appendix C provides the list of the most recent performance specifications that were developed for the remediation subcontractor procurement package for this project. Appendix D provides copies of drawings made available during design which show floor plans and elevations of buildings. Appendix E contains selected photographs of notable features of, within, or around the buildings so as to provide an overall perspective of the buildings, associated equipment, and appurtenances.

## 1.4 Location of the Thorium/Plant 9 Complex Project Area

The Thorium/Plant 9 Complex project area is located north of 2nd Street and East of 'D' Street, in the northeast portion of the former production area, as shown in Figure 1-1.




LEGEND (SEE NOTE 12)

- 2439 — MONITORING WELL LOCATION (TO BE PROTECTED FROM DAMAGE)
- POST INDICATOR VALVE (TO BE PROTECTED FROM DAMAGE)
- FIRE HYDRANTS (TO BE PROTECTED FROM DAMAGE)
- FACILITIES TO BE DEMOLISHED
- TO BE REMOVED
- INTERIM CONSTRUCTION ZONE BOUNDARY (ADDITIONAL)
- SUBCONTRACTOR CONSTRUCTION ZONE BOUNDARY

LIST OF BUILDINGS TO BE REMOVED FOR THE THORIUM COMPLEX

| | |
|---|---|
| 32A | MAGNESIUM STORAGE BLDG |
| 32B | COVERED LOADING DOCK |
| 64 | THORIUM WAREHOUSE |
| 65 | OLD PLANT 5 WAREHOUSE |
| 69 | DECONTAMINATION BLDG |
| 78 | D & D BUILDING |

FOR PLANT 9 COMPLEX

| | |
|---|---|
| 9A | SPECIAL PRODUCTS PLANT |
| 9B | SUMP TREATMENT |
| 9C | DUST COLLECTOR |
| 9D | SUBSTATION |
| 9E | PLANT 9 CYLINDER SHED |
| 9F | PLANT 9 ELECTROSTATIC PRECIPITATOR |
| 74A | PLANT 9 PAD |
| 81 | PLANT 9 WAREHOUSE AND OUT BUILDINGS AS SHOWN |

NOTES

1. EXISTING CONDITIONS SHOWN ON THIS DRAWING WERE PREPARED FROM FEMP SITE PROVIDED DATA FROM THE DOCUMENTS LISTED BELOW.

   EXISTING SITE DATA SOURCE (IN PLANT FILES):
   FEMP CADD GRID/UTILITY DRAWINGS
   FEMP CONTRACTOR PROJECT DESIGN DOCUMENTS

2. INFORMATION ON THE LOCATIONS OF EXISTING FEATURES SHOWN ON THIS PLAN WERE TAKEN FROM FERMCO SITE DRAWINGS. NO FIELD VERIFICATION BY SURVEY HAS BEEN PERFORMED.
3. SUBCONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS INCLUDING ELEVATIONS BEFORE STARTING CONSTRUCTION AND/OR FABRICATION. ANY DEVIATIONS NOTED SHALL BE BROUGHT TO FERMCO CONSTRUCTION MANAGER'S ATTENTION IN WRITING IMMEDIATELY AND RESOLVED BEFORE CONTINUING WITH CONSTRUCTION.
4. EXISTING HARD SURFACE PAVEMENTS (ASPHALT, CONCRETE, ETC.) TO REMAIN UNDISTURBED UNLESS APPROVED BY FERMCO CONSTRUCTION MANAGER.
5. SUBCONTRACTOR SHALL PROTECT ALL UNDERGROUND UTILITIES AND MONITORING WELLS. SEE DRAWING 93X-5900-P-00569 FOR UTILITIES.
6. LAYDOWN AREAS SHALL BE DETERMINED BY SUBCONTRACTOR WITH APPROVAL BY FERMCO CONSTRUCTION MANAGER.
7. AT THE COMPLETION OF THE PROJECT, SUBCONTRACTOR SHALL REMOVE AND STORE THE TEMPORARY CONSTRUCTION FENCE AND GATES IN THE LOCATION DESIGNATED BY FERMCO CONSTRUCTION MANAGER.
8. THE SUBCONTRACTOR SHALL FILL IN ANY SUMP HOLES, PENETRATIONS, TRENCHES, PITS OR ANY OTHER REMAINING BELOW GRADE HOLES WITH A GRANULAR FILL AND/OR GROUT. WORK SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION 02515.
9. THE SUBCONTRACTOR IS TO REMOVE ABOVE GROUND STRUCTURES ONLY. SEE PART 6 OF INVITATION FOR BID.
10. FOR DIMENSIONS AND DETAILS OF BUILDING FACILITIES REFERENCE THE EXISTING FILE DRAWINGS.
11. PIPES AND PIPE SUPPORTS TO BE REMOVED TO TOP OF CONCRETE PIER. CONTRACTOR IS TO VERIFY THAT THE UTILITIES TO PIPE RACK HAVE BEEN PROPERLY DISCONNECTED AND END CAPPED. UTILITY DISCONNECT AND CAPPING WORK BY FERMCO.
12. SEE DRAWING 93X-5900-P-00669 FOR ADDITIONAL LEGEND.
13. WORK ZONE AND RADIOLOGICAL CONTROL FENCES SHALL BE INSTALLED BY FERMCO.
14. ADDITION TO BUILDING 65 (5A) & 64 (6A) OTHERS IS TO BE DEMOLISHED WITH BUILDING 65.
15. SEE DRAWING 93X-5900-G-00678 FOR PRODUCTION AREA SITE MAP.
16. ACCESS TO BUILDING 64, 65, AND 81 MUST BE PROVIDED AS INDICATED. "E" STREET TO REMAIN OPEN FOR FERMCO ACCESS. (SEE PART 6 SCOPE OF WORK.)

**FOR INFORMATION ONLY**

| REF DWG NO. | DRAWING TITLE |
|---|---|
| 93X-5900-P-00669 | UTILITY PLAN |
| 93X-5900-G-00678 | PRODUCTION AREA SITE MAP |

| REV. NO. | ISSUE OR REVISION PURPOSE DESCRIPTION | | | |
|---|---|---|---|---|
| 2 | INDENTIFIED INTERIM CONSTRUCTION ZONE BOUNDARY, NOTE 16 - PER RES 2965 | WSL 4/25/96 | GEP 4/25/96 | N/A |
| 1 | COMBINED D&D OF THORIUM AND PLANT 9 COMPLEX | HPB 5/2/95 | N/A | N/A |
| 0 | CERTIFIED FOR CONSTRUCTION | HPB 5/25/95 | N/A | N/A |

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
D&D DESIGN
THORIUM/PLANT 9 COMPLEX

DRAWING TITLE
CIVIL
DEMOLITION PLAN
THORIUM/PLANT 9 COMPLEX

| DRAWN BY | DATE | LEAD ENGINEER | DATE | CHECKED BY | DATE |
|---|---|---|---|---|---|
| T. AFSHAR | 02/13/95 | ED KUBRON | 5/24/95 | E. KUBRON | 4/25/95 |

PLANT/BLDG NO.: THORIUM/PLANT 9 — FLOOR: — SCALE: 1"=40'

SUBMITTED FOR APPROVAL: MICHAEL BOLAND 5/25/95 — FERMCO CRU APPROVAL: N/A

| PREPARED UNDER PROJECT ORDER NUMBER | FEMP PROJECT NO. | DRAWING SHEET CODE NO. | SHEET NO. | REV NO. |
|---|---|---|---|---|
| CRU3/P0136 | WBS 1.1.1.3.3.7 00-9070 | 93X-5900-G-00668 | G0002 | 2 |

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FIGURE 1-1 Thorium/Plant 9 Complex Project Area and Construction Boundaries

## 2.0 GENERAL PROJECT REMEDIATION APPROACH

The overall approach to the decontamination and dismantlement of Thorium/Plant 9 Complex incorporates the applicable programmatic elements and tasks that were described in Section 3 of the draft OU3 Integrated RD/RA Work Plan. This section describes the notable aspects of the overall approach evaluated during remedial design and addressed in the subcontract documents.

### 2.1 Sequencing of Remediation

The main factors which affect the sequence for the remediation of components in the Thorium/Plant 9 Complex are scheduling constraints associated with ongoing projects, and facility use considerations. Decontamination and dismantlement of Buildings 64 and 65 will not begin until completion of the Thorium Overpacking Project (TOP) which is currently scheduled to be completed in April, 1998. The potentially mixed waste presently stored in the Plant 9 Warehouse (81) will be sampled and analyzed. If the wastes are determined to be mixed, treatment will be required prior to disposition. One of the primary locations that would be considered for the treatment project is Buildings 64 and 65. Since it is currently anticipated that these buildings will be available for remediation, the buildings are included in the remediation subcontractor bid package as an option. However, in the event the buildings cannot be removed from service in time to warrant exercising the option, an amendment to this implementation plan will be submitted for Agency approval.

It is anticipated that the remediation sequence begins with Building 9A, Building 69, Building 32A and 32B, and Building 78 being available for decontamination and dismantlement first. Decontamination and dismantlement of the Plant 9 ancillary structures (Buildings 9B through 9F) will start after commencement of Building 9A remediation. Decontamination and dismantlement of Buildings 64 and 65 will commence following the completion of TOP, or, at the completion of the treatment of waste removed from Building 81 if required (explained above). The Plant 9 Warehouse (81) is planned to be the last component in the complex that will undergo remediation. Building 81 is an also active hazardous waste management unit (HWMU), and will be decontaminated in accordance with the RCRA/CERCLA Integrated Process discussed in the draft OU3 Integrated RD/RA Work Plan.

## 2.2 Characterization of the Thorium/Plant 9 Complex

The processes and operations that were performed in the Thorium/Plant 9 Complex components during production included uranium reduction, casting, and related production-support operations in the Special Products Plant (9A), material storage (including hazardous/mixed waste, thorium, and magnesium), and equipment/material decontamination systems. Section 3 of this plan further describes relevant process/production-related information to provide a context for component remediation. The former process operations within the complex utilized both radiological and chemical constituents and generated a wide variety of waste materials.

The radiological survey data compiled during the OU3 Remedial Investigation/Feasibility Study (RI/FS), and provided in the OU3 RI/FS Report (DOE 1996b) provided alpha removable, beta-gamma removable, and total beta-gamma radiological information. This data has been utilized in support of the following Thorium/Plant 9 Complex decontamination and dismantlement planning and design efforts including, but not limited to:

- developing the safety assessment documentation to support the proposed activities;
- enhancing the project-specific health and safety plan and determining potential concerns for worker protection based on the suggested decontamination and dismantlement techniques;
- enhancing the remediation subcontractor's understanding of expected contamination levels;
- determining personnel monitoring requirements;
- determining the number and location of project-specific radiological ambient air monitors;
- identifying potential gross radiological contamination that may require decontamination prior to the remediation subcontractor activities; and,
- determining disposition options for various primary and secondary material streams generated by the project activities.

OU3 RI/FS data that were used to evaluate material, during the remedial design process, for

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treatment and disposition, radiological environmental air monitoring needs, and potential wastewater treatment requirements are presented in Appendix B (Attachment B.III) of the OU3 RI/FS Report and, due to the volume of data, are not repeated in this section.

The most significant results from the remedial design data evaluation are those which are relevant to identifying and managing certain materials for treatment and off-site disposition, consistent with the decisions made in the OU3 Record of Decision for Final Action (DOE 1996c). The results of the evaluation reveal the following:

- the top inch of concrete from both the Enriched Uranium Casting Process Area and the Uranium Machining Process Area in Plant 9 (9A) (see Figure D-3, Appendix D), totalling an estimated 1,699 cubic feet, contains elevated levels of technetium-99 and requires scabbling and off-site disposition;

- potential mixed waste acid brick, totalling an estimated 1,437 cubic feet are located in the Zirnlo Decladding process area, Heat Treating process area, and the Briquetting process area in Plant 9 (9A) and will be dispositioned for off-site;

- approximately 959 cubic feet of potential mixed waste acid brick in Building 69 that has been administratively designated for off-site disposition; and

- approximately 15 cubic feet of mixed waste lead flashing exist in Plant 9 (9A), the Thorium Warehouse (64), and the Plant 5 Warehouse (65) and will be treated and dispositioned either off-site, or recycled.

The result of the material data evaluation, summarized above, is the proper identification of specific materials that have special handling requirements in the project specifications and subcontract scope of work.

## 2.3 Materials Management

The project specific application of material management strategies presented in Section 3.3 of the draft OU3 Integrated RD/RA Work Plan are outlined in this section.

Specification 01120 of the performance specifications (Waste Handling Criteria) and the Waste Management Plan included in the bid document, and discussed in Section 4.1.3 of the

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draft OU3 Integrated RD/RA Work Plan, specifies the remediation subcontractor requirements for managing material resulting from all project tasks. Based on the requirements specified in Specification 01120, a mobilization work plan that details waste handling methods and procedures will be prepared by the remediation subcontractor. Waste minimization will be accomplished, in part, by unpacking equipment and material prior to entering the radiologically controlled area whenever possible, limiting the number of tools and equipment that could become contaminated, and limiting the quantities of hazardous material brought into the construction zone.

### 2.3.1 Primary Materials Management

Primary materials include dismantlement debris and other bulk waste materials from the Thorium/Plant 9 Complex components. As a result of the revision of performance specifications done in the past to address material handling requirements stipulated by amendments to Removal Action 17 in August 1996 and OU3 Final Action ROD, this implementation plan reflects material management applications that are consistent with the requirements for treatment and disposition of materials discussed in the draft OU3 Integrated RD/RA Work Plan.

As discussed in Section 2.2, the results of material evaluation performed during design revealed that certain primary materials must be managed for off-site treatment and/or disposal. Section 2.3.4 discusses how these materials will be segregated, containerized, and dispositioned. An additional evaluation of materials using the disposition evaluation methodology for accessible metals was also performed, and a summary of the results is presented in Appendix B.

### 2.3.2 Secondary Waste Management

Management of secondary wastes includes handling, sampling, storage, and disposition of secondary waste materials generated during remediation. Secondary waste includes vacuumed dust, filters, filter cake, personal protective equipment (PPE), spent consumables, and washwaters. If hydro-cleaning of component surfaces is used, washwaters generated will be controlled by the remediation subcontractor by minimizing its generation, providing

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proper containment, etc. (Specification 01517). If washwaters are generated, floor cracks and edges around equipment foundations will be sealed to contain effluent to the building interior. The building's collection sump may be used for collection of washwaters. Once collected, washwaters will be pumped through a 20 micron prefilter and a 5 micron filter to remove entrained particulate prior to effluent discharge into containers. Washwater may be sampled for constituents of concern if the Waste Water Treatment System (WWTS) Manager specifies analytical data prior to discharge into the FEMP WWTS. Waste water sampling is described in the SAP which is contained in Appendix D of the draft OU3 Integrated RD/RA Work Plan. Samples of washwaters will be collected for only those batches that have been determined (through a review of available process information and existing data) to have potentially elevated levels of contaminants of concern, such as volatile organic compounds, heavy metals, uranium and RCRA-listed constituents. Depending on contaminant concentration levels, pre-treatment may be required. Water added for dust suppression will be controlled and dispositioned to the storm sewer.

### 2.3.3 Estimates of Material Volumes

Materials to be generated during this project have been categorized according to the same classification system that was developed for and described in the OU3 RI/FS Report, and draft OU3 RD/RA Integrated Work Plan, and are estimated in Tables 2-1, 2-2, and 2-3. Estimated material volumes are also presented for lead flashing and scabbled concrete. These latter two types of materials fall within the defined material categories (painted light gauge metals and concrete, respectively), but will be handled separately from the other materials within their respective categories. Where applicable, materials were assigned to a specific container according to current material management strategies, which were described in the draft OU3 Integrated RD/RA Work Plan, and will be documented in the material segregation and containerization criteria (MSCC) form that will be contained in the bid document. The volume estimates associated with each material segregation category are listed according to general material type, volume (bulked and unbulked), and weight, and the type and number of containers needed. Estimates for spent PPE and consumables are included as either regulated ACM or miscellaneous materials, depending on the activity undertaken when these materials were generated.

The volumes and weights in Tables 2-1, 2-2 and 2-3 were developed by reviewing engineering drawings and performing field inspections to identify and quantify materials. Container types and storage configuration are based on the category of material, characteristics of the material, disposition decisions made under the OU3 Final Action ROD, and anticipated alternative disposition based on the results of the disposition evaluation methodology for accessible metals discussed in Appendix B.

Container types and quantities are also estimated in Table 2-1. Container types correspond to those specified in the MSCC prepared during remedial design. Container quantities are estimated based on the weight or volume restriction placed on each type of container to be used. The two primary assumptions that should be noted regarding the material volume and weight estimates are that all materials are assumed to be radiologically contaminated, and any mixed/hazardous wastes and PCB-contaminated wastes are to be containerized separately.

### 2.3.4 Material Handling, Staging, Interim Storage, and Disposition

**Material Handling/Staging**

Pursuant to Specification 01120 materials generated from the decontamination and dismantlement of Thorium/Plant 9 Complex will be reduced in size, segregated, and containerized (if necessary) in accordance with the requirements placed in the MSCC and other subcontract waste management provisions. Containers will then be weighed, inspected, sealed, and tagged for on-site movement. The MSCC will be used by the remediation subcontractor as the basis for all containerizing activities. Although the MSCC provides a high level of detail for the remediation subcontractor, Table 2-1 provides the essential segregation and containerization for this implementation plan. Material size requirements are identical to those provided in the example MSCC contained in Appendix A of the draft OU3 Integrated RD/RA Work Plan.

Pursuant to Specification 01120, the remediation subcontractor will establish a queuing area having a controlled boundary within the construction site. Empty containers and container preparation materials will be delivered to this area for use by the remediation subcontractor.

Compressed gases, explosives, free-liquids, fine particulates, hazardous wastes, corrosive

materials and etiological agents will be containerized separately from debris. Sampling of waste containers designated for off-site shipments will be performed by FEMP waste management personnel in accordance with the OU3 RD/RA SAP (contained in Appendix D of the draft OU3 Integrated RD/RA Work Plan) and WAC of the receiving facilities.

In addition, all generated, removed hazardous waste will be taken once a day either to a satellite accumulation area, or a 90-day RCRA storage area. These areas, which will be controlled by FEMP personnel, will be established in locations which will ensure minimal disruption of construction activities.

Containers used for ACM will require additional preparation, including the use of polyethylene sheeting as secondary containment.

Full containers destined for off-site disposition will be delivered to an on-property packaging/staging area for sampling (if necessary), container inspection, and sealing. Materials destined for on-property temporary storage will be delivered directly to the designated interim storage area.

Pursuant to Specification 01120, waste materials that require movement outside to be containerized will be required to meet the decontamination requirements. If that requirement cannot be attained, the material may be encapsulated or wrapped in fiber reinforced sheeting and sealed prior to movement to prevent migration of contaminants during movement.

The Radiological Requirements Plan (RRP) outlines the requirements that must be met by the remediation subcontractor regarding radiological limits. The RRP is discussed in the draft OU3 Integrated RD/RA Work Plan, Section 3.2.5.

**Interim Storage/Disposition**

Materials not identified for immediate off-site disposition will be placed in the queuing area by the remediation subcontractor to allow FEMP waste management personnel to inspect them prior to their relocation to the designated interim storage facility. The strategy for interim storage of OU3 materials is described globally in the draft OU3 Integrated RD/RA Work Plan. The preferred interim storage location for Thorium/Plant 9 Complex materials includes the

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## Table 2-1 Bulked Material Volume Estimates ($ft^3$)

| Component Designation | Accessible Metals | Inaccessible Metals | Process-Related Metals | Painted Light-Gauge Metals | Lead Flashing | Concrete | Scabbled Concrete[8] | Acid Brick | Non-Regulated ACM | Regulated ACM[1] | Misc. Materials[2] | Component/ Complex Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9A | 25,244 | 218,725 | 23,717 | 876 | 6 | 303 | 1,699 | 1,866 | 4,319 | 3,473 | 17,715 | 297,943 |
| 9B | 559 | 2,759 | 302 | 8 | 0 | 105 | 0 | 0 | 183 | 125 | 685 | 4,726 |
| 9C | 102 | 93 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 39 | 38 | 279 |
| 9D | 293 | 223 | 0 | 0 | 0 | 0 | 0 | 0 | 265 | 12 | 845 | 1,638 |
| 9E | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 4 | 19 | 44 |
| 9F | 68 | 148 | 9 | 7 | 0 | 0 | 0 | 0 | 15 | 35 | 57 | 339 |
| 32A | 1,658 | 663 | 0 | 5 | 0 | 6,530 | 0 | 0 | 0 | 93 | 2,724 | 11,673 |
| 32B | 290 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 426 | 757 |
| 64 | 3,297 | 3,720 | 0 | 212 | 6 | 1,560 | 0 | 0 | 40 | 0 | 2,758 | 11,587 |
| 65 | 4,497 | 1,315 | 0 | 144 | 4 | 0 | 0 | 0 | 0 | 0 | 1,505 | 7,465 |
| 69 | 2,599 | 821 | 57 | 33 | 0 | 7,313 | 0 | 1,245 | 0 | 235 | 2,249 | 14,552 |
| 78 | 3,985 | 14,023 | 1,431 | 97 | 0 | 10,608 | 0 | 0 | 0 | 0 | 7,395 | 37,451 |
| 81 | 1,347 | 761 | 0 | 80 | 0 | 0 | 0 | 0 | 0 | 0 | 143 | 2,331 |
| Miscellaneous[9] | 4,159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,488 | 11,647 |
| Complex Total | 48,112 | 243,288 | 25,516 | 1,469 | 16 | 26,419 | 1,699 | 3,111 | 4,741 | 4,020 | 44,047 | 402,438 |
| Container/ Quantity[3] | None | None | TL[5]/27 | None | B-12[5]/1 | None | B-12[5]/60 | SWMB[6]/39 | ROB[5]/7 | ISO[5]/5 | ROB[5]/46 | |
| Interim Storage Config.[4] | Stockpile | Stockpile | TL | Stockpile | B-12 | Stockpile | B-12 | SWMB | ROB | ISO | ROB | |
| Disposition | To be determined | On-Property | Offsite: NTS | On-Property | PCDF[7] | On-Property | Offsite: NTS | Offsite: PCDF | On-Property | On-Property | On-Property | |

(1) Excludes gutter cleanout which will be placed in drums (volume estimated at less than one drum).
(2) Excludes compactibles which will be placed in a dumpster as refuse for compaction. Miscellaneous materials can be containerized with Non-Regulated ACM.
(3) **TL**: Top-Loading (also referred to a Large Metal Box) holds 970 cubic feet and/or 18.0 tons of material; **ISO**: End-Loading Container/Sea-Land boxes) holds up to 971 cubic feet and/or 42,000 lbs. of material; **ROB**: Roll-Off Box holds 810 cubic feet and/or 16.95 tons of material; **B-12**: B-12 Box holds up to 44 cubic feet and/or 9,000 lbs. of material; and **SWMB**: Small White Metal Box holds approximately 80 cubic feet and/or 9,000 lbs. of material.
(4) Currently, the preferred location for interim storage of containerized and stockpiled materials is the Plant 1 Storage Pad.
(5) Container is volume restricted.
(6) Container is weight restricted.
(7) PCDF: Permitted Commercial Disposal Facility.
(8) Volumes of scabbled concrete are at- and below-grade quantities.
(9) Miscellaneous includes railroad tracks, pipe bridges, and non-process trailers.

## Table 2-2 Unbulked Material Volume Estimates ($ft^3$)

| Component Designation | Accessible Metals | Inaccessible Metals | Process-Related Metals | Painted Light-Gauge Metals | Lead Flashing | Concrete | Scabbled Concrete | Acid Brick | Non-Regulated ACM | Regulated ACM | Misc. Materials | Component/ Complex Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9A | 1,512 | 63,984 | 6,816 | 441 | 3 | 233 | 1,699 | 1,437 | 3,599 | 1,011 | 13,365 | 94,100 |
| 9B | 33 | 852 | 92 | 4 | 0 | 81 | 0 | 0 | 161 | 46 | 524 | 1,793 |
| 9C | 6 | 46 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 14 | 32 | 101 |
| 9D | 18 | 112 | 0 | 0 | 0 | 0 | 0 | 0 | 221 | 10 | 700 | 1,061 |
| 9E | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 3 | 16 | 26 |
| 9F | 4 | 65 | 3 | 3 | 0 | 0 | 0 | 0 | 12 | 15 | 48 | 150 |
| 32A | 99 | 311 | 0 | 2 | 0 | 5,023 | 0 | 0 | 0 | 40 | 1,791 | 7,266 |
| 32B | 17 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 293 | 332 |
| 64 | 197 | 1,423 | 0 | 106 | 3 | 1,200 | 0 | 0 | 25 | 0 | 1,489 | 4,443 |
| 65 | 269 | 640 | 0 | 72 | 2 | 0 | 0 | 0 | 0 | 0 | 789 | 1,772 |
| 69 | 156 | 401 | 28 | 17 | 0 | 5,625 | 0 | 959 | 0 | 116 | 1,513 | 8,815 |
| 78 | 239 | 4,333 | 418 | 49 | 0 | 8,160 | 0 | 0 | 0 | 0 | 4,961 | 18,160 |
| 81 | 81 | 376 | 0 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 120 | 617 |
| Miscellaneous[1] | 479 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,744 | 4,223 |
| Complex Total | 3,111 | 72,562 | 7,357 | 737 | 8 | 20,322 | 1,699 | 2,396 | 4,024 | 1,258 | 29,385 | 142,859 |

(1) Miscellaneous includes railroad tracks, pipe bridges, and non-process trailers.

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## Table 2-3 Material Weight Estimates (tons)

| Component Designation | Accessible Metals | Inaccessible Metals | Process-Related Metals | Painted Light-Gauge Metals | Lead Flashing | Concrete | Scabbled Concrete | Acid Brick | Non-Regulated ACM | Regulated ACM | Misc. Materials | Component/ Complex Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9A | 370 | 1,167 | 116 | 103 | 1 | 6 | 154 | 116 | 201 | 2 | 80 | 2,438 |
| 9B | 8 | 20 | 2 | 0 | 0 | 6 | 0 | 0 | 9 | 0 | 2 | 48 |
| 9C | 2 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 9D | 4 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 2 | 24 |
| 9E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 9F | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 6 |
| 32A | 24 | 14 | 0 | 1 | 0 | 138 | 0 | 0 | 0 | 0 | 22 | 202 |
| 32B | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 8 |
| 64 | 48 | 49 | 0 | 20 | 1 | 33 | 0 | 0 | 1 | 0 | 23 | 174 |
| 65 | 66 | 23 | 0 | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 13 | 115 |
| 69 | 38 | 17 | 1 | 0 | 0 | 216 | 0 | 67 | 0 | 0 | 16 | 357 |
| 78 | 58 | 63 | 6 | 6 | 0 | 281 | 0 | 0 | 0 | 0 | 49 | 463 |
| 81 | 20 | 15 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 43 |
| Miscellaneous[1] | 117 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 128 |
| Complex Total | 760 | 1,381 | 125 | 153 | 3 | 680 | 154 | 183 | 224 | 2 | 222 | 4,013 |

(1) Miscellaneous components include railroad tracks, pipe bridges, and non-process trailers.

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Plant 1 Storage Pad, other existing storage pads, and/or foundations of dismantled buildings. These interim storage locations will be maintained until such time as the material receives a final dispositioned. Interim storage on the Plant 1 pad, or other designated pad, includes both stockpiling and container storage.

**Treatment and Disposition**

The project-specific disposition strategy for materials generated during this project is consistent with the strategies presented in the draft OU3 Integrated RD/RA Work Plan Treatment and disposition decisions for project materials were made in accordance with the requirements stated in the OU3 Final Action ROD.

Table 2-1 identifies the disposition determination for project materials. Treatment will be required prior to the disposal of potential mixed waste acid brick and lead sheeting. Both materials are projected to be shipped to the Envirocare of Utah facility in Clive, Utah for treatment and burial. Accessible Metals (Category A) from the complex are currently being evaluated for potential recycling options. This evaluation is being performed using the "Decision Methodology for Fernald Scrap Metal Disposition Alternatives" developed by DOE-FN to specifically address evaluation of disposition alternatives. This evaluation is briefly described in Appendix B.

## 2.4 Environmental Monitoring

The draft OU3 RD/RA Integrated Work Plan addresses the surface water and groundwater monitoring (Sections 3.6.2.2 and 3.6.2.3, respectively) that will be performed in support of the Thorium/Plant 9 Complex remediation project. Environmental air quality monitoring during the Thorium/Plant 9 Complex decontamination and dismantlement project will consist of two programs: the current site-wide monitoring program as discussed in Section 3.6.2.1 of the draft OU3 RD/RA Integrated Work Plan and the supplemental radiological air monitoring program specifically designed for this decontamination and dismantlement project. The only aspect of environmental monitoring that requires elaboration beyond the discussion in the draft OU3 Integrated RD/RA Work Plan is the supplemental radiological air monitoring program developed for this project.

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Computer modeling of potential emissions from the Thorium/Plant 9 Complex area was performed in January 1995 using contaminant source terms identified in Appendix B, Attachment B.I of the OU3 RI/FS Report. The methodology assumed no controls on emissions release, such as high efficiency particulate air (HEPA) filters on containment ventilation systems, and potential emissions sources were treated as being in gaseous states. The results of the computer modeling indicated that the maximally exposed individual would theoretically be located 956 meters north-northeast of the project area and would potentially receive a maximum Effective Dose Equivalent of $9.1 \times 10^{-7}$ mrem/year from the D&D activities. As discussed in Section 3.6.2 of the draft OU3 Integrated RD/RA Work Plan the FEMP boundary threshold is $1.0 \times 10^{-1}$ mrem/year. Five optimal project emissions receptor locations were identified for supplemental air monitoring and are shown in Figure 2-1. Further justification for selecting only five monitors comes from analysis of data from Plant 7, Plant 4, and Plant 1 Complex-Phase I decontamination and dismantlement projects, which have shown that dismantlement activities resulted in negligible airborne radiological contaminant emissions. Results for airborne uranium contamination during those projects have been approximately 5 percent of the DOE maximum off-site guidelines of 0.1 pCi/m$^3$. The relationship between pCi/year and mrem/year may be understood by the conversion factor used to equate the two terms at the FEMP: if inhaled continuously (24 hours/day, 365 days/year), 0.1 pCi/m$^3$ of uranium in air will result in a dose of 100 mrem/year. It should be noted that various assumptions have been incorporated into this conversion factor.

To establish a background or baseline level with which to compare project results, supplemental air monitors will be set up and operated continuously (24 hours/day, 7 days/week) prior to the Thorium/Plant 9 Complex dismantlement activities. This representative period has been determined based on previous and ongoing OU3 projects, to be sufficient for establishing a representative background. Samples for preliminary background monitoring and dismantlement monitoring will be collected once a week.

For air monitoring to be useful in the evaluation of engineering controls, results from air monitoring will be reported to the construction manager as expeditiously as possible. In consideration of requisite decay periods for samples and time needed to perform analytical and reporting tasks, it is anticipated that the preliminary results of sampling would be delivered to the OU3 Project Manager in no less than seven calendar days from the date that the sample

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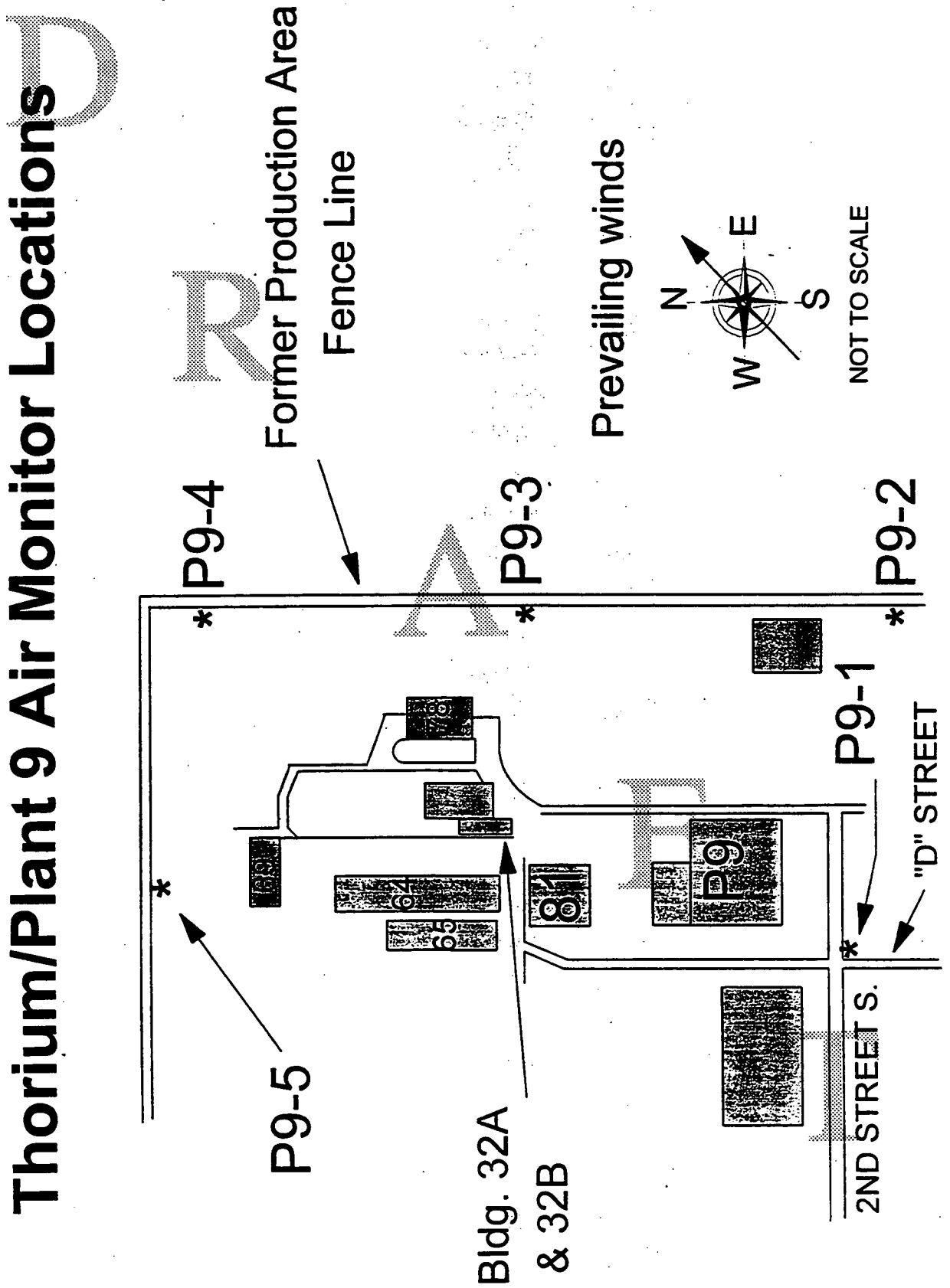


**FIGURE 2-1 Proposed Air Monitoring Locations for Thorium/Plant 9 Complex**

is taken. Preliminary results will provide the data, albeit not validated at that point, needed to evaluate project concentrations against the baseline concentration. If radiological levels from four consecutive weeks of air monitoring are at least twice as high as baseline levels, decontamination and dismantlement activities will be reviewed to determine the effectiveness of engineering controls during remediation and to identify any need for additional mitigative measures. Monitoring data will be validated in accordance with the SCQ requirements, compiled as it becomes available, and used to trend sample results and to further evaluate the effectiveness of engineering controls and any need for mitigative measures.

Additional mitigative measures that might be employed in the event of exceeding the criterion stated above would include an increase in engineering and administrative controls during a particular operation that has been identified as the cause, or probable cause, of the elevated radiological levels. Such controls could include an increase in negative pressure within the enclosed work area using additional HEPA filtration units or additional surface cleaning (wash) steps before removing material from the containment.

## 2.5 Remediation Activities

A general approach to the above-grade decontamination and dismantlement of the Thorium/Plant 9 Complex is described in the following subsections. Section 3 elaborates on this discussion by identifying component-specific interests concerning the six remedial tasks, as applicable. The six tasks are as follows:

- Preparatory Action: Inventory Removal;
- Preparatory Action: Safe Shutdown;
- Hazardous Waste Management Unit decontamination;
- Asbestos Removal;
- Surface Decontamination; and
- Above-Grade Dismantlement.

Although the six remedial tasks are generally described in the order in which they will be performed, the actual order for performing these activities may differ from the sequence presented in this plan as a result of evaluation and selection of alternate methods by the

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remediation subcontractor as approved by the OU3 Project Manager.

As required by Specification 01515 (Mobilization), the following activities will take place prior to the implementation of remediation activities discussed in Section 3. OU3 Project Management, using the FEMP workforce, will establish a break room, clean room, and shower facilities. The remediation subcontractor will mobilize in preparation for the decontamination and dismantlement activities by establishing a material handling and containerization area, access and egress roadways to and from the job site, and the construction zone boundary. The proposed construction zone boundary is delineated in Figure 1-1. The remediation subcontractor will also deliver equipment, materials, and office and storage trailers to the site as necessary to perform remediation activities. All equipment will be inspected by OU3 Project Management and surveyed by radiological control technicians to ensure that no contamination or items prohibited by the FEMP are brought on-site. A sign-in station will be established at the entrance to the job site for posting of permits and health and safety plans. Additional radiological control boundaries will be established prior to starting remediation activities in order to locate contaminated material staging areas as well as access and egress points to and from contaminated areas.

Additionally, the remediation subcontractor is required to develop and submit work plans covering every aspect of the project. One such plan provides details relative to how the remediation subcontractor will protect adjacent facilities (Specification 01515). Other plans are required for controlling fugitive emissions (Specification 15067), storm water run-off protection (Specification 01515), and controlling erosion (Specification 01515). Throughout the remediation activities, the remediation subcontractor will be responsible for notifying OU3 Project Management of conditions in the field that require environmental response. All conditions that necessitate a response will be dealt with immediately.

### 2.5.1 Preparatory Action: Inventory Removal

Existing waste/product inventories from components will be removed by FEMP personnel prior to decontamination and dismantlement operations and transported to interim storage facilities or off-site disposal facilities under the decisions and procedures adopted from Removal Action No. 9. Section 3 provides volume estimates of containerized materials that were removed

during Removal No. 9. Inventory removal was completed for all components except Components 64, 65, and 81 due to the ongoing Thorium Overpacking Project operation (64 and 65) and use as a RCRA storage facility (81). Each of these remaining facilities will undergo inventory removal before OU3 remediation begins in these structures. The volumes of material removed during these preparatory activities will be included in the Project Completion Report.

### 2.5.2 Preparatory Action: Safe Shutdown

Safe shutdown activities were completed in Buildings 9A through 9F on February 5, 1996. These activities were performed by FEMP personnel under Removal Action No. 12. Safe shutdown activities consisted of:

- removal of all salvageable equipment;
- removal of loose, gross contamination;
- removal of hold-up material;
- general clean-up; and
- disconnection of all utilities.

Various types and quantities of hold-up materials were removed from Building 9A during safe shutdown. The purpose of hold-up material removal was to reduce potential hazards from the work environment for the remediation subcontractor; to provide FEMP Health and Safety and Waste Management organizations with known starting conditions that are needed to develop the Safety Analysis, work permits, and Health and Safety Plan for remediation activities; and to aid in determining disposition options for the remediation materials. All systems were inspected to ensure such material was removed and any previously undetected material is located, quantified, and removed. Inspection techniques included visual inspection and/or non-destructive analysis.

A general cleaning operation was performed to remove visible dust and loose debris (including pigeon debris) from building surfaces, walls, and floors. The purpose of this activity was to remove loose radiological contamination held within the dust as well as other hazards (e.g.,

biological and chemical), thereby reducing the potential personnel exposure during D&D remediation activities. Building openings that allow animal access have been sealed to ensure no further intrusion from animals and to minimize the potential migration of loose contamination to the environment.

All steam, potable water, electrical power, fire protection systems, compressed air, communication systems, and radiation detection alarms have been de-energized and terminated at the equipment or at the building exterior to establish the known condition of each energy source within the remediation area. The fire alarm and radiation detection alarm systems have been re-routed and activated.

In addition to Safe Shutdown of Buildings 9A through 9F, other buildings located in the Thorium/Plant 9 Complex will undergo preparatory actions under a "Facility Shutdown" program. The Facility Shutdown program, which is discussed in Section 3.2.2 of the draft OU3 Integrated RD/RA Work Plan, employs preparatory actions similar to Safe Shutdown, but for non-process facilities.

### 2.5.3 Hazardous Waste Management Units

The remedial design for the Thorium/Plant 9 Complex included the assessment of potential contaminants in HWMU No. 35 which is the only HWMU in the complex. HWMU No. 35 — Plant 9 Warehouse (Building 81) will be remediated under the RCRA/CERCLA integrated process which was described in Section 3.5.3.3 of the draft OU3 Integrated RD/RA Work Plan. Remediation requirements for HWMU No. 35 are specified in Section 3.13 of this implementation plan as a component-specific remediation task for Building 81.

Certification of HWMU remediation will be included in the project completion report for above-grade decontamination and dismantlement, which is discussed in Section 4.0 of this implementation plan.

### 2.5.4 Asbestos Removal

The removal of ACM from components will be conducted by a remediation subcontractor

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qualified to conduct asbestos abatement operations. This activity will involve removing all friable types of asbestos, typically consisting of thermal system insulation (TSI) on pipes and equipment. ACM removal strategies to be applied to this project were discussed in depth in Section 3.2.4 of the draft OU3 Integrated RD/RA Work Plan. The project specific requirements for ACM removal are specified in Specification 01516.

### 2.5.5 Surface Decontamination

If the building/component radiological survey results do not meet the criteria defined in Part 8 of the bid document, interior surface decontamination will be performed prior to removal of the exterior structural skin/materials to prepare the component for exposure to the environment and structural dismantlement. The surface decontamination strategies described in Section 3.2.5 of the draft OU3 Integrated RD/RA Work Plan will be applied to the project. The project specific applications of those strategies are provided in Specification 01517, which is included in Appendix B of that work plan.

### 2.5.6 Above-Grade Dismantlement

Above-grade dismantlement activities to be performed during the Thorium/Plant 9 Complex remediation include all of the activities described in Section 3.2.6 of the draft OU3 Integrated RD/RA Work Plan. Project specifications prepared for above-grade dismantlement include the following:

1) Bulk Removal - includes removal of electrical components, piping, construction debris, and heating, ventilation and air conditioning (HVAC) systems (Specification 15066);

2) Interior and Exterior Equipment Removal - (Specification 15065 );

3) Interior and Exterior Transite Panel Removal - (Specification 07415 );

4) Structural Steel Removal - (Specification 05126); and

5) Concrete Removal - (Specification 03315).

Other activities that support this remedial task include lifting and rigging (Specification 14955) and ventilation and containment (Specification 15067).

A general discussion of above-grade dismantlement tasks are described below. The building-specific above-grade dismantlement tasks are discussed in Section 3.

**Bulk Removal**

Prior to breaching any system, the remediation subcontractor and OU3 Project Management will verify that all the systems are de-energized.

All piping, valves, electrical components, conduit, wire, cable trays, construction debris, and HVAC systems will be removed and reduced in size. During removal of piping, pumps, and HVAC ductwork, internal surfaces will be visually inspected to ensure the absence of free liquids or solid materials. If free liquids or solid materials are found, an evaluation will be initiated by the OU3 Project Manager to determine the requirements for material handling and removal (Specification 15066). The evaluation will identify the contents and requirements for containerization, storage, and disposal. If the item fails visual inspection, it shall be considered to be "process related debris" and disposed appropriately, as described in Specification 01120 and the Waste Management Plan.

Methods such as reciprocating saws, portable band saws, and shears are the preferred methods for bulk removal. Methods that volatilize the paint and contamination can be used, provided that additional safety and health requirements for worker protection are met. These methods include the use of respiratory protection and portable air cleaning units. Periodic radiological surveys will be performed to ensure that the potential for airborne radioactivity is minimized and to reduce the potential for cross-contamination. Surface wiping or vacuuming may be required to minimize transferrable contamination.

**Equipment Removal**

Equipment within the Thorium/Plant 9 Complex has been identified and classified based on size and disposition requirements. As equipment is removed, the internal building surfaces and floor area previously covered by the equipment will be visually inspected to ensure the absence of free liquids or solids. If these materials are found, an evaluation will be initiated by OU3 Project Management to determine the appropriate removal and handling requirements for the material (Specification 15065).

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Based on the equipment to be removed and the requirements for removal as specified by Specification 15065, the remediation subcontractor is required to submit for approval a detailed work plan including the sequence, methods of removal and dismantlement, equipment required, catalog cut sheets, drawings and method and materials to control possible generation of airborne contaminants from cutting operations, etc. Staging of removed equipment and size reduction will be proposed by the remediation subcontractor and approved by DOE.

When the building is opened, the equipment will be placed into a container inside the building, if possible, or removed from the building and placed into a container for off-site transport. Depending on the size and configuration of the equipment, a rigging plan may be necessary prior to removal.

<u>Interior Panel Removal</u>

**Transite Panel Removal:** Prior to removing the transite panels, a coating of amended water will be applied to lock down any loose fibers. A screw gun is the preferred method for removing the panels. If the fasteners cannot be removed with a screw gun, then the area around the fastener will be sprayed with a fixative allowing the fastener to be pried out. Prior to any fixation, Specification 07415 requires the remediation subcontractor to demonstrate the proposed method to be utilized. After the screw is pried out, the fixative will be reapplied. If a broken panel is encountered, then the area around the break will be sprayed with amended water or encapsulated with the fixative. HEPA vacuums will be available to collect any loose material. The batt insulation will be removed and containerized. As the insulation is removed, a visual inspection and a radiological survey will be performed on the newly exposed surfaces. Indications of friable asbestos will require gathering the loose material and locking the remaining fibers in place. If radiological survey results indicate the need to perform decontamination or lock down of the areas to levels consistent with surrounding building surfaces, then these activities will be performed. Fasteners and molding that hold the panels and insulation in place will also be removed as part of this operation.

**Metal Panel Removal:** Screw guns are the preferred method for removing the metal panels. Optional methods of drilling or prying the fastener out may also be used to remove the panels. As the panels are removed, a radiological survey will be performed on the newly exposed

surfaces to ensure contamination levels are within the established guidelines. Surface decontamination may be performed to reduce contamination levels as required.

**Exterior Panel Removal**

**Transite Panel Removal:** Specification 07415 specifies that the remediation subcontractor shall maintain the integrity of the exterior of the building until the transite and insulation have been removed and encapsulant, lock-down, or surfactant has been applied to the interior surface of exterior panels. A screw gun is the preferred method for removing the panels. If the fasteners cannot be removed with a screw gun, the area around the fastener will be sprayed with a fixative, thus allowing the fastener to be pried out. As with interior transite, prior to any fixation, Specification 07415 requires the remediation subcontractor to demonstrate the proposed method to be utilized. After the screw is pried out, the fixative will be reapplied. If a broken panel is encountered, the area surrounding the break will be sprayed with amended water and the fragmented pieces will be encapsulated with a fixative. HEPA vacuums will be available to collect any loose material.

A wall climbing device is the preferred method for removing the wall panels thus allowing the panels to be removed and stacked on the wall climber for transport to the ground level.

**Metal Panel Removal:** Screw guns are the preferred method for removing the metal panels. Optional methods of drilling out the fastener or prying the fastener out may also be used to remove the panels. As the panels are removed, a radiological survey will be performed on the newly exposed surfaces to ensure contamination levels are with the established guidelines. Louvers, gutters, downspouts, and flashing will be removed as they are encountered.

**Structural Steel Removal**

In order to prepare the component for structural steel removal, all remaining items, such as non-load bearing steel members, windows and frames, doors, gutters and down spouts, will be removed using mechanical means. As these items are removed, the exposed component surfaces have the potential of holding debris and contamination. These areas will be visually inspected to determine if these surfaces meet the decontamination requirements of Specification 01517. Additional decontamination such as encapsulation of surfaces may be performed as discussed in Section 2.5.5 of this Implementation Plan.

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Hydraulic shears or oxy-acetylene torches may be used to dismantle and size reduce the structural steel frame. The component-specific dismantlement techniques are presented in Section 3 of this document. Prior to and during dismantlement, the area surrounding the structure will be sprayed with amended water to reduce fugitive dust emissions. This water will be controlled and dispositioned to the storm sewer.

The remediation subcontractor will be required, pursuant to Specification 05126, to specify in a structural steel removal work plan the following methods:

- detailed sequence of dismantlement, including equipment;
- methods for contamination control, including fugitive emissions during size reduction;
- methods for cutting/size reduction, including equipment to be used;
- plans for protecting lay down and cutting areas from lead paint chips;
- methods and materials to be used for cutting lead painted steel; and
- calculations to verify structural integrity of partially dismantled structure, as applicable;
- calculations to verify structural integrity of roof to support personnel who may be required there;
- detailed work plan describing personnel tie-offs, pick boards, and walking on or near roof pearlings. All calculations shall be stamped by a Registered Professional Engineer.

Material size reduction requirements for the Thorium/Plant 9 Complex project are specified in the MSCC located in Part 6 of the bid document.

Specification 05126 provides direction to the remediation subcontractor in several other ways relative to the removal of structural steel. It reemphasizes the remediation subcontractor's responsibility for avoiding damage to adjacent structures, material, and equipment during dismantlement activities, and, it specifies that lead-based paint chips and debris, released during structural steel dismantlement, shall be collected and managed in accordance with Specification 01120.

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**Concrete Masonry Unit (CMU) Secondary Containment and Pedestal Removal**

Specification 03315 requires the remediation subcontractor to develop a concrete removal work plan containing information quite similar to that of the structural steel removal work plan discussed above. The CMU secondary containments and pedestals will be radiologically surveyed prior to removal to determine the need for engineering controls, such as an enclosure with ventilation or water sprays to minimize fugitive dust, during removal operations.

Except for the surface removal (top one inch) of concrete in two process areas of Building 9A, the base slabs of the structures will remain in place during this remedial action. Specification 01515 addresses requirements relative to the preparation of the base slab during demobilization. Specifically, all openings in the slab will be filled with granular material and grout to provide a flat uniform surface thus minimizing the chance for water accumulation and migration, and potential safety hazards. All wire and cable will be cut away to grade level from the conduit embedded in the concrete. Conduit and other slab obstructions will be cut away to grade level, plugged, and covered with grout to grade level for positive drainage.

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## 3.0 COMPONENT-SPECIFIC REMEDIATION

This section presents component-specific remediation tasks identified for the Thorium/Plant 9 Complex decontamination and dismantlement project. Background information provided in this section was obtained primarily from the OU3 RI/FS WPA (DOE 1993) and remediation subcontract SOW, including figures showing notable features of the building. Information regarding the remediation approach was obtained from the remediation subcontract SOW, performance specifications, the draft OU3 Integrated RD/RA Work Plan.

### 3.1 Building 9A - Special Products Plant

**Background**

Building 9A (Special Products Plant) is a single-level, irregularly-shaped building with a small penthouse on the roof. It is located on the northeast corner of 2nd Street and 'D' Street, with approximate dimensions of 200 ft. x 260 ft. x 20 ft. The building consists of a structural steel frame with transite siding and roofing panels, some built-up roofing, and a poured-concrete foundation and slab on grade. The floor plan for Building 9A is shown in Figure D-3 of Appendix D. Elevation views are shown in Figures D-4 through D-6. Figures E-2 through E-12 are copies of photographs that show several ground-level views of Building 9A and process equipment contained within the building.

Building 9A contains nine historical process areas. The primary purposes of the plant were uranium reduction, uranium casting, and the following support processes: chip briquetting, scrap metal pickling, derby cleaning, Zirnlo decladding, and the production, machining, and heat treatment of uranium ingots. Each process is discussed below.

**Process Area 1 - Uranium Reduction and Derby Cleaning.** These two processes used similar equipment and occurred in the same area.

Uranium Reduction. Originally, milled dolomite was used as a pot liner for the uranium reduction process. Later, $MgF_2$ (a reaction by-product) was used to line the reduction pots. Liners were formed inside jolters, then filled with a blend of $UF_4$ and Mg, lidded, and furnaced. The uranium produced from the reduction reaction was cooled and separated from the $MgF_2$

and dolomite. The uranium reduction area currently contains three jolters, six liner hoppers, one pot filling/blending machine, one capping and lidding station, 13 reduction furnaces, cooling tanks, and one breakout booth.

Derby Cleaning. The uranium derbies were cleaned with a molten salt treatment that consisted of a 50/50 blend of lithium carbonate ($Li_2CO_3$) and potassium carbonate ($K_2CO_3$). The treatment removed any $MgF_2$ that adhered to the derbies. The operation was conducted in resistance element furnaces originally used for uranium reduction. Currently, eight Rockwell resistance element furnaces are in the area.

**Process Area 2 - Enriched Uranium Casting.** Enriched uranium derbies and recycle metal were remelted to cast 11- and 13-inch diameter ingots for further processing. Graphite crucibles and zirconia-coated graphite molds were used in the induction-heated vacuum NPR furnaces. After pouring an ingot, crucibles were inverted and subjected to flame oxidation to "burn out" residual uranium. Ingots were cooled and separated from the molds and sent for machining. Molds were cleaned and re-coated in Building 9A. Equipment in the area includes two induction furnaces, dust collection equipment, a vacuum system, and an oil reclaimer.

**Process Area 3 - Zirnlo Decladding.** The Zirnlo decladding process operated from 1963 to 1988, and was used for decladding nonirradiated fuel cores of copper and zirconium or nickel and aluminum cladding. Cores were sawed to size and placed sequentially in oxidizing and then reducing baths to remove the clad layers. Equipment in the area includes a reciprocating saw, open tanks, and holding tanks.

**Process Area 4 - Uranium Machining.** A variety of machining processes for uranium ingots were performed in Process Area 4, including top cropping, outer diameter turning, hole boring, and chamfering. Equipment includes saws, lathes, drills, and milling machines.

**Process Area 5 - Triple Beta Heat Treating.** Uranium ingots produced in Building 9A were beta heat treated in NuSal salt in an ingot heat-treating furnace. Originally, the ingots were beta heat treated three times, but later the treatment was a one-step process. The Building 9A ingot heat-treating furnace has been removed.

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**Process Area 6 - Scrap Metal Pickling.** A nitric acid bath was used to remove surface oxidation from metal to be used for remelt feed. The pickling area currently contains a nitric acid tank, a rinse tank, and a fume scrubber.

**Process Area 7 - Briquetting.** Uranium chips from Building 9A machining were dumped into a crusher, put into baskets, centrifuged, and then bathed in nitric acid to remove oxides. The chips were then rinsed twice with water, centrifuged, and briquetted in a press. The nitric acid tank, two water rinse tanks, two centrifuges, chip crusher, briquette press, and fume scrubber have all been removed.

**Process Area 8 - Internal and External Remelt Furnaces.** All equipment has been removed from the internal and external remelt furnace area. Equipment included four vacuum induction furnaces, two vacuum pumps, a crucible "burnout" station, pot charging and mold cleaning stations, a separation booth, and an oil reclaimer.

**Process Area 9 - Thorium Metal.** Thorium was dissolved in nitric acid and precipitated as $ThF_4$ with HF. The $ThF_4$ was then dried, pulverized, blended with calcium and zinc chloride, and thermally reduced to a zinc-thorium derby. The derby was subsequently dezinced and remelted in a vacuum furnace. Turnings from machining the thorium to a final form were acid washed and briquetted for return to the remelt cycle. The thorium metal process was performed during 1954 and 1955, and all equipment has been removed.

Building 9A has undergone or will undergo each of the remedial tasks discussed in Section 2.5 except for HWMU decontamination since this facility does not house a HWMU. Preparatory activities completed in building 9A are summarized below. Surface Decontamination will be performed concurrent with and following material removal but is not discussed in this section since there are no component-specific details beyond what is already provided in Section 2.5.5.

<u>Preparatory Action: Inventory Removal</u>

Table 3-1 shows the storage quantities of containerized material that were removed from Building 9A as part of the inventory removal activity.

**Preparatory Action: Safe Shutdown**

Safe shutdown activities include the removal of all hold-up material within the equipment, piping and ductwork systems. Table 3-2 lists the quantities of hold-up material removed from Building 9A during Safe Shutdown. All systems have been inspected to ensure that these quantities were removed.

**TABLE 3-1 Building 9A Inventory Removal**

| No. of Drums | Description of Material |
|---|---|
| 1 | Discard Process Residues |
| 5 | Non-Recoverable Trash - For Storage or Shipment |
| 1 | Contaminated Soil, Rocks, Sand, Bricks, and Ceramics |
| 1 | Contaminated Asbestos Materials |

**TABLE 3-2 Building 9A Hold-up Material**

| Process Area | Process Area Description | Estimated Hold-up Volume ($ft^3$) |
|---|---|---|
| 1 | Uranium Reduction and Derby Clean | 32 |
| 2 | Enriched Uranium Casting | 28 |
| 3 | Zirnlo Cladding | 31 |
| 4 | Uranium machining | 286 |

**Asbestos Removal**

Individual asbestos work areas will be established within Building 9A. Most of the ACM is in good condition and has not caused any building areas to be designated as asbestos areas because of the concern for friable asbestos. The individual work areas will minimize the amount of area required to be released from asbestos concerns.

The ACM from the equipment, the interior walls, and from areas that have the potential to be disturbed during bulk removal and equipment removal operations will also be removed. If damaged ACM is encountered during removal activities, then an aggressive air sampling test will be performed to confirm the absence of asbestos fibers. If the asbestos fiber count is elevated, then a lockdown, encapsulant and/or surfactant will be applied to the surfaces to

lock down the loose fibers. An additional air sampling test will then be performed to verify the lock down effectiveness.

A final asbestos removal effort will take place subsequent to the completion of the bulk removal and equipment removal operations. The equipment removal will allow for unobstructed movement around the building, simplifying the remaining asbestos removal activities. Approximately 2,996 lineal ft. of pipe insulation will be removed as part of the asbestos removal activity. Approximately 712 $ft^2$ of asbestos-containing floor tile and associated mastic will be removed.

**Surface Decontamination**

Pursuant to Specification 01518 (Surface Removal of Concrete), the top one inch of concrete from Process Areas two and four in Building 9A will be removed using a method that is approved by DOE. The remediation subcontractor will be required to provide a system with all necessary equipment for concrete removal, dust control, containerization and transport of the produced waste. No wetting shall be allowed during the scabbling process. The system shall include a pre- and HEPA filtering system to maintain dust and contaminants below limits established in the Radiological Requirements Plan.

Although the remediation subcontractor is encouraged to investigate all technologies to determine a Best Available Technology, the concrete removal system known as Pentek Moose, Squirrel and Corner-Cutter scabblers is acceptable. Acceptable performance of concrete removal will be achieved when at least one inch of surface has been removed from the entire floor areas of Process Areas two and four. Method of verification that one inch of surface concrete has been removed will be proposed by the remediation subcontractor and approved by DOE-FN.

**Above-Grade Dismantlement**

Building 9A dismantlement will consist of removing the building contents and structure that were described above. Materials to be removed will include piping and conduit; HVAC ductwork and ductwork insulation; equipment (the types of equipment contained in Building 9A are identified in the background discussions at the beginning of this section); structural and miscellaneous steel; concrete masonry unit (CMU) block; roofing material; doors and

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windows; interior transite paneling; and, batting insulation and exterior transite.

## 3.2 Building 9B - Plant 9 Sump Treatment Facility

**Background**

Building 9B - Plant 9 Sump Treatment Facility is a single-level building measuring approximately 20 ft. x 30 ft. x 20 ft. Building 9B adjoins the west side of the Special Products Plant (Building 9A) and consists of a structural steel frame on a poured concrete base and floor with transite walls and roofing. The floor plan of Building 9B is shown in Figure D-7 of Appendix D. Figures E-13 and E-14 of Appendix E are copies of photographs showing the exterior elevation and the interior of Building 9B.

Building 9B treated wastewater from the Special Products Plant, originally with ammonium hydroxide ($NH_4OH$) and later with lime, to remove the bulk of the contaminants before wastewater transfer to the General Sump (Component 18B). Currently, the equipment remaining in Building 9B includes a decant tank, an acid tank, a mix tank, two plate and frame filters, and three filtrate tanks. A single process area has been identified for Building 9B.

**Asbestos Removal**

Individual asbestos work areas will be established within Building 9B. Most of the ACM is in good condition and has not caused any building areas to be designated as asbestos areas because of the concern for friable asbestos. Approximately 365 lineal ft. of pipe insulation will be removed as part of the asbestos removal activity. Additional information on asbestos removal requirements that apply to Building 9B can be obtained in Sections 2.5.4 and 3.1.

**Above-Grade Dismantlement**

Building 9B is constructed of transite panel walls and transite panel roofing on a poured reinforced concrete base. The supporting frame is constructed of structural steel. Materials generated during the dismantlement of Building 9B will include piping and conduit; equipment; structural and miscellaneous steel; roofing material; doors and windows; interior transite paneling; batting insulation; and, exterior transite.

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## 3.3 Component 9C - Plant 9 Dust Collector

**Background**

Component 9C (Plant 9 Dust Collector) adjoins the west side of the Special Products Plant (Building 9A), and measures approximately 20 ft. x 35 ft. x 25 ft. The component consists of a steel dust collector housing mounted on a poured concrete base and pad. The floor plan for Component 9C is shown in Figure D-7 of Appendix D. Figure E-15 in Appendix E is a copy of a photograph of the west elevation of Component 9C.

One process area has been identified for Component 9C. The component contains the dust collector (G42-615), a Hoffman vacuum pump, and two cyclones. The dust collector was used to filter exhausts from the Special Products Plant reduction process.

**Asbestos Removal**

Individual asbestos work areas will be established within Component 9C. Most of the ACM is in good condition and has not caused any areas to be designated as asbestos areas because of the concern for friable asbestos. Approximately 16 lineal ft. of pipe insulation will be removed as part of the asbestos removal activity. Additional information on asbestos removal can be obtained in Sections 2.5.4 and 3.1.

**Above-Grade Dismantlement**

Above-grade dismantlement of Component 9C will consist of removal of the dust collection system components, piping, conduit and ductwork. Materials resulting from dismantlement will include piping and conduit; structural and miscellaneous steel; and HVAC ductwork and ductwork insulation.

## 3.4 Building 9D - Plant 9 Electrical Substation

**Background**

Building 9D (Plant 9 Electrical Substation) is a single-story building which adjoins the Special Products Plant (Building 9A), and measures approximately 16 ft. x 30 ft. x 30 ft. The building consists of a structural steel frame on a poured concrete base and floor with transite roofing and siding. The floor plan of Building 9D is shown in Figure D-8 of Appendix D. Figure E-16

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in Appendix E is a copy of a photograph of the northwest elevation of Building 9D.

**Above-Grade Dismantlement**

Dismantlement of Building 9D will materials consisting of piping and conduit; structural and miscellaneous steel; roofing material; doors and windows; interior transite paneling; batting insulation; and, exterior transite.

### 3.5 Building 9E - Plant 9 Cylinder Shed

**Background**

Building 9E (Plant 9 Cylinder Shed) is a single-story structure located to the northeast of the 2nd Street and "D" Street intersection. The shed is a three-sided, steel-framed structure with transite siding and a concrete floor. The approximate dimensions of Building 9E are 5 ft. x 10 ft. x 8 ft. An isometric view and detail plans of the building are shown in Figure D-9 of Appendix D.

Building 9E was utilized to store pressurized gas cylinders that were required for operations within the Special Products Plant. The storage shed currently contains empty cylinder storage racks.

**Above-Grade Dismantlement**

Materials generated during the dismantlement of Building 9E will include structural and miscellaneous steel; roofing material; and exterior transite.

### 3.6 Building 9F - Plant 9 Electrostatic Precipitator

**Background**

Building 9F (Plant 9 Electrostatic Precipitator) measures approximately 20 ft. x 35 ft. x 25 ft. The component is located on the east side of the special products plant and consists of a structural steel frame with corrugated steel siding and roofing on a poured concrete base and floor. Figure E-17 in Appendix E is a copy of a photograph of the component's southwest elevation view.

Building 9F currently contains the electrostatic precipitator (precipitron) and filters that handled exhausts from vented machining equipment in Building 9A. The electrostatic elements were not electrically powered because of moisture contained in the exhausts.

**Asbestos Removal**

Individual asbestos work areas will be established within Building 9F. Most of the ACM is in good condition and has not caused any areas to be designated as asbestos areas because of the concern for friable asbestos. Approximately 92 lineal ft. of pipe insulation will be removed as part of the asbestos removal activity. Additional information on asbestos removal can be obtained in Sections 2.5.4 and 3.1.

**Above-Grade Dismantlement**

Dismantlement of Building 9F will include the removal of piping and conduit/wire; equipment; structural and miscellaneous steel; roofing material; doors and windows; and, exterior transite.

## 3.7 Building 32A - Magnesium Storage Building

**Background**

Building 32A (Magnesium Storage Building) is a single-level building located directly northeast of the Plant 9 Warehouse (Building 81), with approximate dimensions of 52 ft. x 103 ft. x 17 ft. The building consists of a cinder block wall and reinforced concrete floor construction. Figures D-13 and D-14 of Appendix D show the floor plan and various elevation views of Building 32A. Figures E-21 through E-24 of Appendix E are copies of photographs of elevation views and the interior of Building 32A.

The Magnesium Storage Building housed drummed or bagged magnesium metal turnings utilized in the reduction process in the Metals Production Plant (Building 5A). The building is currently being used for the storage of excess equipment from the CP Storage Warehouse (Building 56A), including computers, office furniture, and miscellaneous equipment.

**Safe Shutdown**

While there are no hold-up materials in Building 32A, there is a requirement that the facility

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be placed in a safe and controlled configuration prior to dismantlement. As described in Section 3.2.2 of the draft OU3 Integrated RD/RA Work Plan, the controlled shutdown, or "facility shutdown", of non-process facilities, will be referred to as safe shutdown.

Safe shutdown of Building 32A will de-energize the support services to the building (electrical, water, etc.) and remove the office equipment currently stored there. Since these are not hazardous materials or wastes, estimates of their volumes are not provided. These activities will be performed by FEMP personnel following existing site operation and maintenance procedures.

**Asbestos Removal**

Individual asbestos work areas will be established within Building 32A. Most of the ACM is in good condition and has not caused any areas to be designated as asbestos areas because of the concern for friable asbestos. Approximately 117 lineal ft. of pipe insulation will be removed as part of the asbestos removal activity. Additional information on asbestos removal can be obtained in Sections 2.5.4 and 3.1.

**Above-Grade Dismantlement**

Materials from the dismantlement of Building 32A will include piping and conduit; HVAC ductwork and ductwork insulation; equipment; structural and miscellaneous steel; CMU block; roofing material with batting insulation; and, doors and windows.

### 3.8 Component 32B - Magnesium Storage Covered Loading Dock

**Background**

The Magnesium Storage Covered Loading Dock (Component 32B) is a single-story shelter measuring approximately 20 ft. x 60 ft. x 15 ft. The rectangular shelter consists of a structural steel frame on a reinforced poured concrete floor with metal roofing. Figures D-13 and D-14 in Appendix D show the floor plan and elevation views of Component 32B. Figures E-21 and E-22 in Appendix E are copies of photographs of the southeast and northwest elevation views of Component 32B.

Component 32B is a covered railroad loading dock with a ramp for vehicle access. The dock

was used for loading and unloading materials, primarily drummed or bagged magnesium metal turnings for use in the Metals Production Plant (Building 5A), which were stored in the Magnesium Storage Building (Building 32A).

**Above-Grade Dismantlement**

Dismantlement of Component 32B will generate materials which will include piping and conduit; structural and miscellaneous steel; and roofing material with batting insulation. The concrete loading dock will be left in place and removed under the SCEP.

## 3.9 Building 64 - Thorium Warehouse

**Background**

Building 64 (Thorium Warehouse) is a single-story, pre-engineered building measuring approximately 320 ft. x 50 ft. x 18 ft. It consists of a structural steel frame, metal siding and roofing, with interior block walls and a concrete shield wall, on a reinforced concrete base floor. Figures D-15 and D-16 in Appendix D show the floor plan and section views of the building. Figures E-26 through E-29 in Appendix E are copies of photographs of the exterior and interior of the building.

Building 64 was originally used to store pallets and drums full of 2.1% enriched uranium in the form of ingots, billets, and top crops. It has since been converted to support thorium overpacking operations. Building 64 contains the two process areas listed below.

**Process Area 1 - Thorium Overpacking.** The north bay is currently being used for overpacking higher enrichment thorium compounds. Remote equipment and video cameras are being used to perform overpacking operations while utilizing concrete block wall shielding. The south bay is used for repackaging low-level thorium compounds and some RCRA mixed wastes. This area is also used to recondition drums and to overpack drums of trash and uranium materials. The process area currently contains the overpacking control station, inert gas blanketing equipment, and a robot fork truck.

**Process Area 2 - Drum Storage.** The center and south bays store overpacked thorium wastes and product and temporarily stored uncharacterized mixed wastes. Thorium materials

originally came from repackaging operations and/or storage in Building 64, the Plant 1 Thorium Warehouse (Building 67), and the Pilot Plant Warehouse (Building 68).

**Preparatory Action: Inventory Removal**

Table 3-3 shows the storage quantities of containerized material that will have been removed from Building 64 as part of the inventory removal activity.

**Safe Shutdown**

Prior to dismantlement, Building 64 will be placed in a safe and controlled configuration by de-energizing all support services (electricity, water, steam, etc.) to the building. Since this building has not historically been used as a process building, there are no quantities of hold-up materials to be removed. All salvageable equipment from the TOP and any concrete shielding blocks will be removed from the building.

**TABLE 3-3 Building 64 Inventory Removal**

| No. of Drums | Description of Material |
|---|---|
| 49 | Non-Recoverable Trash - For Storage or Shipment |
| 22 | comtaminated Soil, Rocks, Sand, Bricks, and Ceramics |
| 1 | Contaminated Water or Sump Liquor, Non-Chloride |
| 2 | Contaminated Solvent or Organic Chemical |
| 3 | Contaminated Graphite - Uncrushed |
| 1 | Contaminated Alumina-Soda Lime, High Chloride |
| 4 | Contaminated Graphite - Crushed |
| 46 | Contaminated Asbestos Materials |
| 54 | Scrap Salts, Low Fluoride, Including Floor Sweepings |
| 11 | Thorium Residues |
| 2 | Sawdust for Oxidation |
| 5 | Clean or Decontaminated Equipment |
| 25 | Miscellaneous Material |

**Above-Grade Dismantlement**

Materials resulting from the dismantlement of Building 64 will include piping and conduit;

equipment (the types of equipment contained in Building 64 are identified in the background discussions at the beginning of this section); structural and miscellaneous steel; CMU block; roofing material; doors and windows; and, interior transite paneling and batting insulation.

### 3.10 Building 65 - Plant 5 Warehouse

**Background**

Building 65 (Plant 5 Warehouse) is a single-story, rectangular building measuring approximately 50 ft. x 210 ft. x 22 ft. It consists of a structural steel frame with non-insulated, corrugated metal siding and roofing on a reinforced poured concrete base and floor. The Building is considered to be one process area, which currently stores drummed thorium compounds. Figures D-17 and D-18 in Appendix D show the floor plan and elevation views of the building. Figure E-25 in Appendix E is a copy of a photograph of the exterior of the building and Figure E-30 is a copy of a photograph of the interior of the building.

**Preparatory Action: Inventory Removal**

Table 3-4 shows the storage quantities of containerized material that will have been removed from Building 65 as a result of the inventory removal (TOP) activity.

**Safe Shutdown**

Safe shutdown activities for Building 65 will consist of de-energizing all support services to the building. There are no quantities of hold-up materials requiring removal from the building.

**Above-Grade Dismantlement**

Materials generated during the dismantlement of Building 65 will include piping and conduit; equipment; structural and miscellaneous steel; roofing material; and, doors and windows.

### 3.11 Building 69 - Decontamination Building

**Background**

Building 69 (Old Decontamination Building) is a single-story building measuring approximately 43 ft. x 83 ft. x 18 ft. It consists of a structural steel frame, with a metal roof deck and built-up roofing, exterior and interior block walls on a reinforced concrete base floor topped with acid brick.

**TABLE 3-4 Building 65 Inventory Removal**

| No. of Drums | Description of Material |
|---|---|
| 11 | Sump Cake - Copper Contaminated, Low Uranium |
| 12 | Non-Recoverable Trash - For Storage or Shipment |
| 5 | Contaminated Steel After Washing and/or Cleaning |
| 11 | Contaminated Soil, Rocks, Sand, Bricks, and Ceramics |
| 21 | Contaminated Asbestos Materials |
| 3 | Sawdust for Oxidation |
| 1536 | Wet Thorium Oxalate Cake |
| 1 | Oxides Clad or Mixed with Zirconium |
| 16 | Reject $UO_3$ |
| 18 | $UO_3$ Product |
| 15 | $UO_3$ Reactor Recycle Tails |
| 19 | $UF_4$ or $ThF_4$ |
| 4031 | Thorium Hydroxide, Dry |
| 20 | Miscellaneous Material (SWIFTS CODE WAS BLANK) |

Building 69 contains one process area, and was used to decontaminate radiologically contaminated scrap metals (ferrous and non-ferrous), miscellaneous equipment, and vehicles. The primary equipment includes five open-top decontamination tanks, a bridge crane, a cleaner/spray washer, fume exhaust ventilation system, air handling units, a vacuum dust collector system, and a scale. Figure D-12 in Appendix D shows Building 69 elevation views.

**Preparatory Action: Inventory Removal**

Table 3-5 lists the storage quantities of containerized material that will have been removed from Building 69 as part of the inventory removal activity.

**TABLE 3-5 Building 69 Inventory Removal**

| No. of Drums | Description of Material |
|---|---|
| 3 | Sump Cake - Copper Contaminated, Low Uranium |
| 171 | Non-Recoverable Trash - For Storage or Shipment |
| 23 | Contaminated Soil, Rocks, Sand, Bricks, and Ceramics |
| 1 | Contaminated Water or Sump Liquor, Non-Chloride |
| 88 | Miscellaneous Material |

**Safe Shutdown**

Safe shutdown of Building 69 will consist of de-energizing the support services to the building and bringing it to a safe and stable configuration for dismantlement. There are no quantities of hold-up materials to be removed from the building.

**Asbestos Removal**

Individual asbestos work areas will be established within Building 69. Most of the ACM is in good condition and has not caused any areas to be designated as asbestos areas because of the concern for friable asbestos. Approximately 325 lineal ft. of pipe insulation will be removed as part of the asbestos removal activity. Additional information on asbestos removal can be obtained in Sections 2.5.4 and 3.1.

**Above-Grade Dismantlement**

Materials generated form the dismantlement of Building 69 will include piping and conduit; equipment; structural and miscellaneous steel; CMU block; above-grade concrete; roofing material with insulation; acid brick; and, doors and windows.

## 3.12 Building 78 - D & D Building

**Background**

Building 78 (D & D Building) is a two-story building measuring approximately 100 ft. x 80 ft. x 32 ft. It consists of a structural steel frame, interior and exterior block walls, metal roof deck with built-up roofing, on a reinforced concrete base floor topped with acid brick.

The building was built to decontaminate used furnace pots and other production equipment, but has never been used for that purpose. It has instead been used to decontaminate vehicles, unused furnace pots, scrap metal and other items. Figures D-19 and D-20 in Appendix D show the floor plan and elevation views of the building. Figure E-31 through E-35 in Appendix E are copies of photographs of the exterior and interior of the building.

**Preparatory Action: Inventory Removal**

Table 3-6 shows the storage quantities of containerized material that will have been removed from Building 78 as part of the inventory removal activity.

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**Safe Shutdown**

Building 78 will be placed in a safe configuration for dismantlement by de-energizing all support services to the building and the removal of all salvageable equipment from the building. No hold-up materials are present in the building.

**TABLE 3-6 Building 78 Inventory Removal**

| No. of Drums | Description of Material |
|---|---|
| 13 | Non-Recoverable Trash - For Storage or Shipment |
| 3 | Clean or Decontaminated Equipment |
| 15 | Miscellaneous Material |

**Above-Grade Dismantlement**

Material generated by the dismantlement of Building 78 will include piping and conduit; equipment; structural and miscellaneous steel; CMU block; roofing material with insulation; and, doors and windows.

## 3.13 Building 81 - Plant 9 Warehouse

**Background**

Building 81 (Plant 9 Warehouse) is a single-story, rectangular building measuring approximately 80 ft. x 100 ft. x 15 ft. It consists of a structural steel frame with noninsulated, corrugated metal siding and roofing on a reinforced poured concrete base and floor. It was originally constructed as a storage warehouse for uranium materials (e.g., primary ingots, derbies, cores, and green salt). Modifications were made (e.g., dikes and berms) to meet site standards for RCRA warehouses in 1990 for hazardous waste storage. Figures D-10 and D-11 in Appendix D show the floor plan and elevation views of the building. Figure E-18 and E-19 in Appendix E are copies of photographs of the exterior and interior of the building.

Building 81 is considered one process area and functions as an interim status RCRA storage facility. All dikes, berms, and floors have been coated with an epoxy sealant. Neither of the two collection sumps lead to the wastewater treatment system. The building has a drum capacity of 1,512 (55-gal) drums and currently contains both liquid and solid wastes.

Building 81 has undergone or will undergo each of the remedial tasks discussed in Section 2.5 except for safe shutdown preparatory activities since no hold-up or salvageable equipment is present. Activities to be performed under surface decontamination are accounted for under the HWMU decontamination.

**Preparatory Action: Inventory Removal**

Table 3-7 lists estimated quantities of containerized material that will have been removed from Building 81 as part of the inventory removal activity.

**HWMU Decontamination**

**Purpose.** The decontamination requirements needed to accomplish remediation goals for HWMU No. 35 (Plant 9 Warehouse), consistent with the RCRA/CERCLA Integration strategy are discussed in Section 3.5.3.3 of the draft OU3 Integrated RD/RA Work Plan.

**Background/Scope.** The entire Plant 9 Warehouse (Building 81) has been designated as an active HWMU since it has been used to store RCRA characteristic and/or listed hazardous wastes after 1989. All drums and containers will be removed from the building prior to turnover to the remediation subcontractor for decontamination and dismantlement. The containerized material that has been designated as RCRA waste have been assigned one or more of the following EPA hazardous waste codes: F001, F002, F005, D002, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D029, D039, and D040. HWMU No. 35 was declared a HWMU due to storage of RCRA hazardous wastes in excess of the 90-day storage limitation for hazardous waste per OAC3766-51-04(e) and 40 CFR 262.34(b).

Based on an evaluation of HWMU No. 35 during design, it was determined based on process knowledge and facility records, that the HWMU floor surfaces will not require any decontamination rinse. The basis for this determination is facility records which show that seven spills have occurred in the HWMU, the largest of which was estimated to be 16 fluid ounces, and for each spill, the wastes were cleaned up promptly using absorbent pads. No waste residues were left on the floor after the cleanup. Each of the seven spill events involved RCRA characteristic wastes. Prior to any reported spills in the area, all cracks in the floor had been sealed with a rubberized compound and the floor had been coated with a chemically resistant sealant. Based on the spill reports and process knowledge of the area,

there is no reason to believe that the concrete debris from the slab will exhibit a RCRA characteristic. The concrete debris that will be generated whenever the floor (pad) of this HWMU is dismantled will be eligible for disposal in the OSDF. The dismantling of the pad will be addressed in the SEP to be developed under the OU5 RD/RA process.

**TABLE 3-7 Building 81 Inventory Removal**

| No. of Drums | Description of Material |
|---|---|
| 1 | Discard Process Residues |
| 35 | Non-Recoverable Trash - For Storage or Shipment |
| 1 | Trailer Cakes, Waste Slurries, Raffinates |
| 37 | Contaminated Soil, Rocks, Sand, Bricks, and Ceramics |
| 2 | Contaminated Water or Sump Liquor, Non-Chloride |
| 1 | Contaminated Solvent or Organic Chemical |
| 1 | Contaminated Asbestos Materials |
| 1 | Dust Collector Bags |
| 14 | Sludges, Cleanout, Non-Oily, For Roasting |
| 3 | Samples, Non-Metallic, Miscellaneous |
| 3 | Lead and Lead-Contaminated Materials |
| 34 | Wet Sump or Filter Cake, Halide Contaminated |
| 5 | U or Th Nitrate Solutions, High Impurity |
| 2 | U or Th Chloride or Fluoride Solutions, High Impurity |
| 1 | Unfired Reduction Charges Plus $MgF_2$ |
| 285 | Thorium Residues |
| 7 | Scrap $U_3O_8$ or $ThO_2$, High Fluoride |
| 5 | Sawdust for Oxidation |
| 2 | Non-Briquettable Chips and Turnings For Oxidation |
| 2 | Miscellaneous Material - Recovery TBD |
| 2 | Uranyl or Thorium Nitrate Solution |
| 1 | $UO_2$ or $ThO_2$ Powder - Refinery Feed |
| 2 | Solid Metal to be Pickled |
| 16 | Miscellaneous Material (SWIFTS CODE WAS BLANK) |

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**Above-Grade Dismantlement**

Dismantlement of Building 81 will generate materials that will include piping and conduit; equipment; structural and miscellaneous steel; roofing material; and, doors and windows.

## 3.14 Component G-001 - Railroad Tracks

**Background**

Within the boundaries of the Thorium/Plant 9 Complex is approximately one half mile of railroad tracks. Historically, rail service was provided to Building 32A and the Plant 9 area. The boundaries of the railroad track removal includes the southern terminus of the tracks on the pad east of Plant 9 and the intersection of the tracks with the northern edge of the Decontamination Pad which surrounds Building 69.

**Above-Grade Dismantlement**

Dismantlement of this component will generate steel rails which will be managed under the Thorium/Plant 9 Complex Waste Management Plan. The wooden railroad ties will be left in place to be removed with other at- and below-grade materials by the Soil Characterization and Excavation Project.

## 3.15 Component G-006 - Process Trailers

**Background**

There are two process trailers in the Thorium/Plant 9 Complex. These trailers are used for office space and break areas.

**Safe Shutdown**

Safe shutdown of the process trailers will consist of de-energizing the electric service. No hold-up materials are present.

**Above-Grade Dismantlement**

The dismantlement of this component will generate structural and miscellaneous steel; wall insulation; and, miscellaneous materials.

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## 3.16 Component G-008 - Pipe Bridges

**Background**

The pipe bridges are steel structures which support the steam lines and other lines required for processing activities which took place in the Thorium/Plant 9 Complex buildings. One bridge crosses 2nd Street and enters Plant 9 on the South side. A second bridge follows an irregular course and enters Building 78 on the West side.

**Safe Shutdown**

Safe shutdown activities will consist of de-energizing all electrical services, disconnection and isolation of steam lines, and disconnecting water lines. No hold-up materials are present.

**Asbestos Removal**

Asbestos removal will consist of removing insulation from pipes and steam lines.

**Above-Grade Dismantlement**

Dismantlement of this component will generate structural steel, pipe and conduit. Concrete support footings will be left in place and removed with other at- and below-grade materials by the Soil Characterization and Excavation Project.

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## 4.0 SCHEDULE

This section presents the planning and implementation schedules for the Thorium/Plant 9 Complex remedial action project. Figure 4-1 presents the schedule for implementation of field activities beginning with the remediation subcontractor's Notice To Proceed and ending with the submittal of the Project Completion Report. Since inventory removal and safe shutdown activities are preparatory actions and were already completed, they are not specifically represented in the schedule. Within Figure 4-1, the primary milestones of the project include initiation and duration of remediation field activities, project completion ("Certification of Construction Completion"), and the preparation and submittal of the Project Completion Report to USEPA and OEPA.

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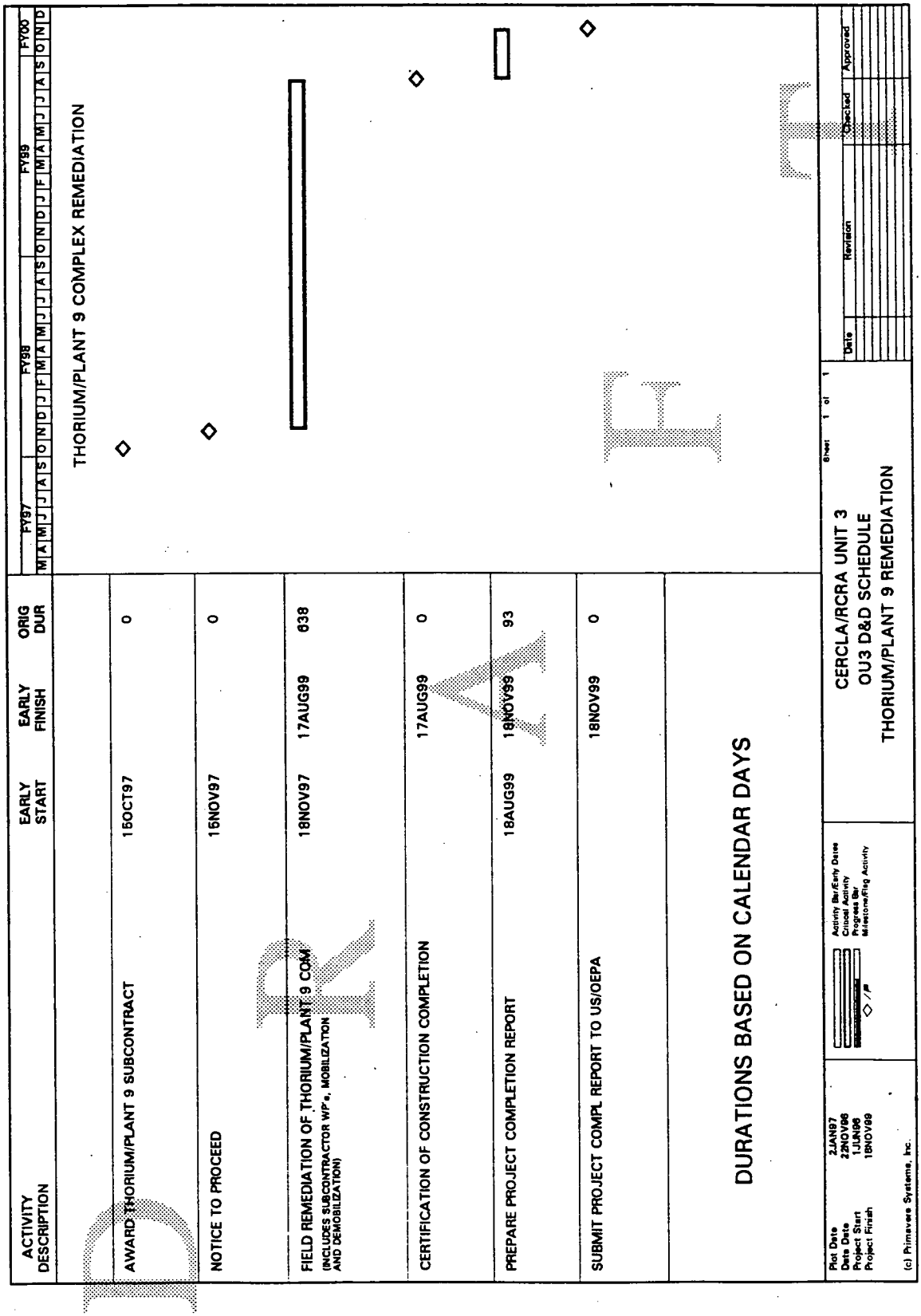


**FIGURE 4-1 Thorium/Plant 9 Complex Remediation Schedule**

## 5.0 MANAGEMENT

The implementation of the Thorium/Plant 9 Complex remediation action will be performed through a coordinated effort by the remediation subcontractors, FEMP organizations, remedial design subcontractor, and DOE project management. Section 7 of the draft OU3 Integrated RD/RA Work Plan provides the overall management structure applied to this remediation project. A description of project-specific management responsibilities have been highlighted for Thorium/Plant 9 Complex in this section.

DOE will provide direct project oversight in two ways, both of which become a concerted effort that ensures performance of remedial activities in adherence to project specifications and requirements. The DOE Office of Safety Assessment will assign a Facility Representative to the Fernald Area Office whose responsibilities will be to perform independent field oversight of all remedial activities performed under this project. This individual will be experienced/knowledgeable in the areas of engineering, construction, quality assurance/quality control, and health and safety; and will be responsible for daily inspections of all field activities and necessary reporting to the DOE Program Manager at the Fernald Area Office. The Facilities Representative will have the authority to stop work if conditions warrant such action. DOE Fernald Area Office will also conduct field oversight through technical leads responsible for construction, engineering, quality assurance and quality control, and health and safety. The DOE Facilities Representative and technical leads will immediately notify the DOE Program Manager of any issues or problems that arise in an effort to seek prompt resolution.

The DOE Program Manager and the environmental management contractor will oversee the remedial action through its Design-Engineering-Construction (DEC) team review and approval process and by performing the following functions:

- ensuring that the selection of qualified subcontractor(s) is based on meeting prequalification criteria, demonstrate a good safety record, possess similar work experience, and rank high on a detailed technical proposal assessment;
- assuring that the apparent low bidder is responsive and responsible;
- reviewing, commenting, and approving of remediation subcontractor work plans;

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- prior to commencing some of the activities (e.g., decontamination), ensuring that the performance specifications going to be met by requiring the remediation subcontractor to demonstrate to the FEMP the ability of its proposed methods to meet the performance specifications;

- conducting an alignment meeting, pre-construction meetings, and weekly coordination meetings with the remediation subcontractor to address all concerns, schedule status, planning, progress, deviations;

- performing quality assurance and quality audits of all remediation tasks to determine adherence to performance specifications by conducting inspections of the remedial activities performed by the remediation subcontractor and those performed by FEMP work forces/labor support contractors in support of the remedial action;

- verifying work is performed in compliance with approved health and safety plans; and

- performing pre-final and final inspections.

The subcontracting strategy allows the prime remediation subcontractor to utilize several lower tier subcontractors, each with specific remediation tasks. One remediation subcontract will include decontamination and dismantlement of the components included within the Thorium/Plant 9 Complex project, which includes the responsibility for material segregation and loading, container weighing, tagging and movement of containers to and from queuing area.

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**REFERENCES**

U.S. Department of Energy, 1993, *Operable Unit 3 Remedial Investigation and Feasibility Study Work Plan Addendum*, Final, prepared by Fernald Environmental Restoration Management Corporation, Cincinnati, Ohio.

U.S. Department of Energy, 1994, *Operable Unit 3 Record of Decision for Interim Remedial Action,* Final, prepared by Fernald Environmental Restoration Management Corporation, Cincinnati, Ohio.

U.S. Department of Energy, 1995, *Operable Unit 3 Remedial Design/Remedial Action Work Plan for Interim Remedial Action*, Final, prepared by Fernald Environmental Restoration Management Corporation, Cincinnati, Ohio.

U.S. Department of Energy, 1996a, *Operable Unit 3 Integrated Remedial Design/Remedial Action Work Plan*, Draft, prepared by Fluor Daniel Fernald Corporation, Cincinnati, Ohio

U.S. Department of Energy, 1996b, *Operable Unit 3 Remedial Investigation and Feasibility Study Report*, Final, prepared by Fernald Environmental Restoration Management Corporation, Cincinnati, Ohio.

U.S. Department of Energy, 1996c, *Operable Unit 3 Record of Decision of Final Remedial Action*, Draft, prepared by Fluor Daniel Fernald Corporation, Cincinnati, Ohio

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# APPENDIX A

## PROPOSED SAMPLING

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# APPENDIX A

## PROPOSED SAMPLING

The following methodologies were developed based on data needs identified in the Sampling and Analysis Plan for the draft OU3 Integrated RD/RA Work Plan. A project specific summary of the sample types are included in this implementation plan and are based on assumptions outlined below.

**Characterization Screening**

Screening has been conducted using X-Ray Fluorescence (XRF) screening of media for lead based paint. Screening has been conducted for fixed and removable radioactive contamination using Geiger-Mueller radiological contamination meters.

**Asbestos**

This category represents samples needed to verify whether a certain material is considered ACM and whether the ACM is regulated or non-regulated.

**Secondary Waste (Decontamination Water)**

General decontamination water will be sampled to determine potential treatment prior to discharge into the WWTS. It is estimated that 8 samples will be required to characterize wash water for isotopic radionuclides, heavy metals, volatile organic compounds, PCBs, oils and grease. Approximately 88 samples may be required evaluate enrichment of batched waste water from equipment decontamination prior to discharge. Those sampled for total Uranium and U-235.

**Nevada Test Site (NTS) Confirmatory**

One per cent of each material/waste stream going to NTS is required to be sampled, and then three samples per container (for that one per cent sampled) in accordance with the NTS Waste Acceptance Criteria (WAC). Based on the materials projected for NTS disposal, it is estimated that 6 samples will be required. Sampling and analysis will have to meet the NVO-325 requirements discussed in the SAP contained in Appendix D of the draft OU3 Integrated RD/RA Work Plan.

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**Permitted Off-site Commercial Disposal Facility**

Mixed waste, such as radiologically contaminated lead flashing and acid brick may be disposed of at an off-site mixed waste disposal facility. If this is necessary, confirmatory sampling will be required to verify whether or not the waste meets the WAC for the disposal facility. Sampling and analysis required for shipment certification will be as specified by the permitted facility's WAC.

**Asbestos Air Monitoring**

Asbestos air sampling will occur over the duration of the asbestos removal activity. Interior and exterior containment perimeter monitoring will be conducted during asbestos removal activities to detect any releases of friable asbestos to protect workers. Occupational breathing zone air monitor samples will also be utilized during asbestos removal within closed areas.

**Radiological Air Monitoring**

Supplemental and existing fence line environmental air monitoring stations established for project specific monitoring will be analyzed weekly by site personnel during decontamination and dismantlement activities.

Occupational air samplers will be worn by at least twenty-five per cent (25%) of the workers in each work group/crew (minimum of 1 worker) when entering a radiological area controlled for contamination or airborne radioactivity. More specific information on radiological worker protection can be found in the Radiation Requirements Plan of the subcontract.

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# APPENDIX B

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# DECISION METHODOLOGY FOR FERNALD SCRAP METAL DISPOSITION ALTERNATIVES

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# APPENDIX B

## DECISION METHODOLOGY FOR FERNALD SCRAP METAL DISPOSITION ALTERNATIVES

A recycling evaluation is being performed for the structural steel that will be generated by the Thorium/Plant 9 Complex dismantling. This evaluation uses a methodology which was developed by DOE-FN to assess alternatives for the disposition of OU3 materials. The methodology considers many factors which are both qualitative and quantitative in nature. The factors include cost of disposal methods and stakeholder preferences. The stakeholder preferences were determined through a series of public meetings and workshops.

Table B-1, "Disposition Summary Matrix for Building 9A Accessible Metals", contains the data or "scores" for each of the seven disposition alternatives for each of the nine performance measures, and represents part of the analysis phase of the Methodology. (Note that Building 9A contains the overwhelming majority of the structural steel in the Thorium/Plant 9 Complex and is considered to represent the entire complex). The scores for performance measures D-G presented in Table B-1 range from 1 to 5 (with 1 being least desirable and 5 being most desirable) and are based on input received from local stakeholders as a result of an ongoing series of public meetings and workshops. Since there was considerable variation in the scores provided by individual stakeholder respondents, the scores are presented in Table B-1 as ranges reflecting the highest and lowest scores received.

Table B-2, "Performance Measure Weight Percents" completes the analytical phase of the Methodology. In this table, each performance measure is listed, along with a corresponding weighting factor, as supplied by public stakeholders. Since there was very little variation between individual respondents in assigning weight percents, the averages of all respondents are presented in Table B-2. The weight factors indicate the relative importance of the performance measures, with higher weight percent indicating higher preference.

Furthermore, the input received from public stakeholders for use in Tables B-1 and B-2 may be considered preliminary at this time. Additional public meetings and workshops are planned

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to facilitate a deeper understanding of the performance measures and disposition alternatives and to share information concerning new technologies, refinement of data, and changes in base assumptions. Another important consideration is that no input from other stakeholders (EPA, Citizens Task Force, DOE) has yet been received regarding scoring for subjective performance measures and weighting factors. As additional input is received and key factors change over time, it is possible that the ranking of alternatives could change.

The alternative decision scenarios are currently still under evaluation and will not be finalized until after the alternative evaluation for the Building 4A materials is finalized. The Building 4A evaluation is scheduled for a public meeting in late January, or early February, of 1997, and cannot be finalized until after this meeting. Until the evaluation decision is finalized for the Plant 4A materials, necessary data would not be available to determine the appropriate route for final disposition of Category A - Accessible Metals from the Thorium/Plant 9 Complex.

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**TABLE B-1 Disposition Summary for Building 9A Accessible Metals**

| ALTERNATIVES | | OSDF | NTS | ENVIROCARE | FEMP MRF | VENDOR MRF | RECYCLE 2000 | PRIVATIZED |
|---|---|---|---|---|---|---|---|---|
| A. NET Present LC Value | | $168M | $169M | $168M | $168M | $169M | $169M | $168M |
| B. Total Undiscounted Cost | LC | $196M | $197M | $196M | $196M | $197M | $197M | $196M |
| | Incremental | $23K | $686K | $116K | $247K | $827K | $933K | $412K |
| | Unit | $15/bcf | $454/bcf | $77/bcf | $164/bcf | $$548/bcf | $618/bcf | $273/bcf |
| C. Schedule Impacts | Total | 1 wk | 5 wks | 5wks | 25 wks | 19 wks | 13 wks | 19 wks |
| | Accel. Scenario | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral |
| D. Local Economic Impacts | | 1 | 1-5 | 1-4 | 1-5 | 1-5 | 1-4 | 1-4 |
| E. Institutional Preferences | | 1-5 | 1-4 | 1-5 | 1-5 | 1-5 | 1-5 | 1-5 |
| F. Local Social Preferences | | 1-2 | 2-5 | 2-5 | 1-5 | 3-5 | 3-5 | 1-4 |
| G. Protectiveness of the Environment | | 1-5 | 5 | 5 | 5 | 5 | 5 | 4-5 |
| H. Public Health Impacts (Facilities) | | 2x10E-4 | 2x10E-3 | 2x10E-4 | 2x10E-4 | 3x10E-4 | 3x10E-4 | 2x10E-4 |
| I. Worker Safety Impacts (Facilities) | | 8x10E-5 | 3x10E-4 | 6x10E-5 | 1x10E-4 | 2x10E-4 | 1x10E-4 | 1x10E-4 |

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**TABLE B-2 Performance Measure Weight Percents**

| Performance Measure | Weight Percent |
|---|---|
| Net Present Value | 5% |
| Total Undiscounted Cost | 6.5% |
| Schedule Impacts | 8.5% |
| Local Economic Impacts | 5.5% |
| Institutional Preferences | 5% |
| Local Social Preferences | 11.5% |
| Protectiveness of the Environment | 21.5% |
| Public Health Impacts | 20% |
| Worker Safety Impacts | 16.5% |
| | Total = 100% |

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# APPENDIX C

# PERFORMANCE SPECIFICATIONS

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# APPENDIX C

## PERFORMANCE SPECIFICATIONS

The performance specifications listed on the following page identifies the project specific application of the specifications that were included in the draft OU3 Integrated RD/RA Work Plan. Only Specification 01519 is included with this appendix since the other project specifications do not differ from those that were presented in the draft OU3 Integrated RD/RA Work Plan.

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| SECTION | TITLE | REV. | DATE |
|---|---|---|---|
| **DIVISION 1 - GENERAL REQUIREMENTS** | | | |
| 01010 | GENERAL REQUIREMENTS | 0 | 9/27/96 |
| 01120 | DEBRIS/WASTE HANDLING CRITERIA | 0 | 9/27/96 |
| 01515 | MOBILIZATION, DEMOBILIZATION, GENERAL SITE REQUIREMENTS | 0 | 9/27/96 |
| 01516 | ASBESTOS ABATEMENT | 0 | 9/27/96 |
| 01517 | REMOVING/FIXING CONTAMINATION | 0 | 9/27/96 |
| 01518 | SURFACE REMOVAL OF CONCRETE | 0 | 9/27/96 |
| 01519 | MEASURES TO PREVENT CONTAMINATION AND REQUIREMENTS FOR DECONTAMINATION OF SUBCONTRACTOR PROVIDED TOOLS, EQUIPMENT, AND MATERIAL | 1 | 12/19/96 |
| **DIVISION 2 (NOT USED)** | | | |
| **DIVISION 3 - CONCRETE** | | | |
| 03315 | CONCRETE REMOVAL | 0 | 9/27/96 |
| **DIVISION 4 - MASONRY** | | | |
| 04225 | MASONRY REMOVAL | 0 | 9/27/96 |
| **DIVISION 5 - METALS** | | | |
| 05125 | NEW STRUCTURAL STEEL | 0 | 9/27/96 |
| 05126 | STRUCTURAL STEEL DISMANTLEMENT | 0 | 9/27/96 |
| **DIVISION 6 (NOT USED)** | | | |
| **DIVISION 7 - THERMAL AND MOISTURE PROTECTION** | | | |
| 07415 | TRANSITE REMOVAL | 0 | 9/27/96 |
| **DIVISION 8 - 12 (NOT USED)** | | | |
| **DIVISION 13 - SPECIAL CONSTRUCTION SYSTEMS** | | | |
| **DIVISION 14 - CONVEYING SYSTEMS** | | | |
| 14955 | LIFTING AND RIGGING | 0 | 9/27/96 |
| **DIVISION 15 - MECHANICAL** | | | |
| 15065 | EQUIPMENT DISMANTLEMENT | 0 | 9/27/96 |

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| | | | |
|---|---|---|---|
| 15066 | INTERIOR DISMANTLEMENT | 0 | 9/27/96 |
| 15067 | VENTILATION AND CONTAINMENT | 0 | 9/27/96 |

**DIVISION 16 (NOT USED)**

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# SECTION 01519

# MEASURES TO PREVENT CONTAMINATION AND REQUIREMENTS FOR DECONTAMINATION OF SUBCONTRACTOR PROVIDED TOOLS, EQUIPMENT, AND MATERIAL

## PART I GENERAL

## 1.1 SCOPE

A. Preventative measures for and decontamination of Subcontractor provided tools, equipment (including vehicles), and material to a level that permits removal from an enclosure/work zone, restricted reuse, or unrestricted release. This section includes, but is not limited to:

- Preventative measures/waste minimization.
- Decontamination area requirements.
- Methods of decontamination activities.
- Control of effluent and waste management activities.
- Relocation, reuse, and release activities for tools, equipment, and material.

### 1.1.1 Project Conditions and Requirements

A. All facilities, unless expressly noted in Part 6 of the IFB/RFP, shall be considered contaminated with radioactive material.

B. The Subcontractor shall establish an inspection area to allow Fluor Daniel Fernald (FDF) to perform tool and equipment inspection and for radiological surveying.

1. The inspection area shall be arranged such that routine access is prevented by means of fencing and/or barrier tape with appropriate posting to identify that the items contained are being held for survey and the area is off limits to individuals other than FDF/Subcontractor radiological survey personnel.

2. Only those items which meet the requirements (as described in this Specification Section) for leaving the work zone should enter the inspection area.

C. The subcontractor should assume that extensive dismantlement and an aggressive decontamination effort will be required to achieve unrestricted release of items that have come in contact with radioactive material or were used extensively in contamination areas. Based on past experience using the best available technologies, decontamination and survey access requirements to meet the release criteria may be difficult to achieve.

D. Hand and portable tools used in contaminated areas for performance of the subcontract are to be considered expendable as specified in Part 4 IFB/RFP, Special Terms And Conditions, Disposition of Subcontractor Provided Equipment, Tools, and Materials That Have Become Contaminated (SC-11).

SECTION 01519

## 1.2 RELATED SECTIONS

A. Work related to this Specification Section shall also be accomplished in accordance with the following Specification Sections:

- Section 01120 - Waste Handling Criteria.
- Section 01517 - Removing/Fixing Radiological Contamination.
- Section 15067 - Ventilation and Containment.

## 1.3 REFERENCE MATERIALS

A. See Part 4 IFB/RFP, Special Terms and Conditions, Disposition of Contaminated Tools, Equipment, and Materials (SC-11).

## 1.4 REFERENCES, CODES, AND STANDARDS

A. United States Department of Energy (DOE):

- DOE Order 5400.5, Radiation Protection of the Public and the Environment.
- DOE/EH-0256T, Radiological Control Manual, April 1994.
- DOE/EM-0142P, Decommissioning Handbook, Chapter. 9, Mar. 1994.

B. 10CFR835 Occupation Radiation Protection

## 1.5 SUBMITTALS

A. The subcontractor must provide FDF with a list of all tools, vehicles, equipment and material to be brought on site which have been used in conjunction with radioactivity in the past including such information as:

- What the items were used for.
- Dates of use.
- Levels of contamination.
- Radioisotopes involved.

This list must be submitted as soon as known but no less than 30 days in advance of bringing the item on site. FDF reserves the right to reject the subcontractor's request to bring these items on site.

1. Any tools or equipment contaminated with a radioactive material other than <1% enriched uranium or thorium-232 will be rejected.

2. Thorium contaminated tools and equipment may only be used in a thorium contaminated area

B. The Subcontractor shall submit the manufacturer's technical information for any decontamination o contamination controlling agents for compliance review prior to use. This information shall include

- Material to be used.
- Intended use.

- Application instructions.
- MSDS Sheets.

C. Before start of decontamination work, the Subcontractor shall submit a Safe Work Plan addressing tool and equipment decontamination for compliance review in accordance with Part 7 IFB/RFP, Subcontractor Work Plan Format Requirements, describing the following:

- Preventative measures to be employed.
- The design and construction of the decontamination area.
- The methods to be utilized for decontamination (see 3.1, C of this Section).
- The methods and equipment for controlling and handling effluent and/or secondary waste produced during decontamination activities.
- Plans for relocating, reusing, or releasing tools and equipment.

## PART 2 PRODUCTS

### 2.1 SUBCONTRACTOR PROVIDED TOOLS AND EQUIPMENT

A. The subcontractor shall furnish all equipment, tools, and material required to perform the work described in the subcontract except where the contract explicitly states FDF will provide the item.

1. The Subcontractor shall deliver approved decontamination and contamination controlling agent materials in original, new and unopened containers bearing the manufacturer's label, and the following information:

   - Name or title of material.
   - Manufacturer's stock number and date of manufacture.
   - Manufacturer's Name.
   - MSDS Sheets.

2. All possible shipping and packing materials will be removed upon receipt at the site prior to entering the controlled area to minimize contaminated waste generation.

B. For the purposes of meeting the "As Low As Reasonably Achievable" ( ALARA) goal for tools, equipment, and materials, it is expected that all reasonable efforts are used to control residual contamination to the extent that there is no detectable contamination on the items using standard field survey instruments when the items are no longer required for use. This includes, but is not limited to, the following:

- Protective measures prior to use of items.
- Preventative measures while items are being used.
- Decontamination upon completion of work activities.

1. All subcontractor furnished tools, vehicles, equipment, and material will be inspected for radioactive contamination by FDF personnel prior to initial entry and upon removal from the radiological controlled area.

2. The Subcontractor shall supply all equipment required to remove and/or control contamination.

3. The Subcontractor shall supply all equipment required to control, filter, and move effluent produced during removal of contaminants.

## PART 3 EXECUTION

### 3.1 APPLICATION

A. Prevention of or Minimizing Contamination

1. The subcontractor shall plan and coordinate all work to minimize exposure of equipment, tools, and vehicles to potential radioactive contamination. Equipment shall be located in the area with the least potential for contamination. (For example, locate equipment outside the facility with leads, hose lines, etc. wrapped and run to the interior of the facility.) Typical examples of equipment where this approach should be used include air compressors, high pressure washers, welders, generators, oxy-acetylene cylinders, and battery chargers.

2. It is the subcontractor's responsibility to evaluate materials, tools and equipment for ease of decontamination and disassembly that may be required for decontamination prior to use on-site. Use of unrestricted release items (i.e. those other than expendable as defined in Part 4 IFB/RFP, Special Terms And Conditions, Disposition Of Subcontractor Provided Equipment, Tools, And Materials That Have Become Contaminated) should incorporate appropriate precautions to prevent contamination which should be implemented prior to and during use. Examples of precautionary measures may include the following which are expected to be implemented as described in the Safe Work Plan:

   - Internal combustion equipment subject to contamination should make use of pre-filters or have a separate source of outside air on the intake.
   - High volume air handling equipment such as blowers, compressors, etc. shall have a filtered inlet to minimize the potential for internal contamination due to build up of low level radioactivity. Vents for air cooling shall be covered in a similar manner.
   - The Subcontractor is prohibited from bringing electrical driven mobile equipment to the FEMP (e.g., fork-lifts) except where only electric driven equipment is available.
   - Protective sheathing/covers, strippable coatings, or protective caps should be used to minimize the potential for contamination (e.g., coating the buckets of man lifts or other walking/standing surfaces). In addition, all openings on equipment, tools, or vehicles that may permit contamination of inaccessible or difficult to clean areas shall be covered and protected.

B. Decontamination Area Requirements

1. Tools and equipment utilized inside an enclosure/building may be decontaminated at a existing indoor debris washing location.

2. The following are examples of options for establishing outdoor decontamination areas.

- Utilize an existing pad.
- Construct a temporary containment area.
  - -- Containment must have a bermed perimeter to ensure runoff control.
  - -- An example of acceptable containment is Herculite with sandbag underlayment perimeters on a non penetrating grade.
  - -- Containment used must be adequate to maintain its integrity.

C. Methods of Decontamination Activities

1. If decontamination becomes necessary, the subcontractor should at a minimum use the following as applicable:

- Dry cleaning.
- Steam cleaning.
- High pressure hot water washing (may be used in conjunction with abrasive techniques and approved decontamination agents) with a minimum of 1,000 psi and HEPA vacuuming.

2. When selecting a decontamination technique other than those identified in 1 above, consideration should be given to those technologies which minimize radiological airborne emissions, secondary wastes, and tool or equipment damage.

3. As an alternative to decontamination, replacement of contaminated components shall be in accordance with the requirements of Part 4 IFB/RFP, Special Terms And Conditions, Disposition of Subcontractor Provided Equipment, Tools, and Materials That Have Become Contaminated (SC-11).

   a. The contaminated components are subject to the cleaning and handling requirements of 3.4, B of this Specification Section.

   b. The contaminated components will be managed and handled per Specification Section 01120 and Part 6 of the IFB/RFP subsequent to the cleaning as directed by FDF.

   c. Actual disposal of the contaminated components will be provided by FDF.

D. Control of Effluent and Waste Management Activities

1. The Subcontractor shall control and collect all waste and effluent generated while removing and/or fixing contamination in accordance with the requirements listed in Part 7 IFB/RFP, Specification Sections 01517 and 01120. Effluent may be either pumped to an existing approved sump or to an effluent holding tank.

2. Management of wastes generated during decontamination activities shall be in accordance with Specification Section 01120 and the Waste Management Plan located in Part 6 of the IFB/RFP.

E. Relocation, Reuse, and Release of Tools, Equipment, and Material

1. The Subcontractor shall perform all decontamination and surveying activities required to verify that the surface contamination limits identified in Table 1 are not exceeded. FDF shall perform final verification surveying.

2. The Subcontractor is to provide a minimum of 24 hours prior notice to FDF of intent to remove tools and equipment from the work area.

3. Release of tools, equipment, and material from Contamination Areas to the Controlled Area

   a. If removable contamination in excess of the limits of Table 1 is present on the tools, equipment equipment or material, then the items must remain in the contamination area for decontamination or the item must be contained such that no contaminated surfaces of the item are accessible without disassembling the equipment or breaching the containment.

   b. Examples of acceptable containment include plastic wrapping, yellow Herculite wrapping, or a sealable hard container. However, the containment used must be adequate to maintain its integrity considering the weather, conditions of storage, and the methods or conditions of transport.

   c. If the removable contamination limits are met but the total (fixed plus removable) limit is exceeded, the item may be labeled or identified as radioactive material by FDF and released to the controlled area.

4. Unrestricted Release Criteria

   a. All items are considered potentially contaminated if they have been used or stored in Controlled Areas that could contain unconfined radioactive material.

   b. Prior to being released from the controlled area, all items will be surveyed by FDF to determine whether both removable and total surface contamination (including contamination on and under any coating) are in compliance with the levels given in Table 1 and that the item has been subjected to the ALARA process as described in part 2.1. B of this Section.

   c. Tools and equipment with detectable radioactivity may be released with the approval of a FDF Material Release Evaluator if all of the following have been met:

      1) Residual radioactivity is at or below the unrestricted release limits identified in Table 1.

      2) All areas must be readily accessible for survey for residual radioactivity including proper surface counting geometry to allow for accurate quantification. Items with inaccessible areas which are likely to be contaminated but are of such size, construction, or location as to make the

inaccessible for survey shall be assumed to exceed the limits for release. The item must either be disassembled to permit an adequate survey to certify that internal contamination is at or below the limits of Table or well documented process knowledge can be applied to provide confidence that contamination in inaccessible areas is not probable. In evaluating the potential for contamination in inaccessible areas, consideration will be given to where the item was used on site and preventative measures taken prior to use such as coverings, wrappings, air intake filters, etc.

3) The decontamination effort performed was such that the residual levels of radioactivity are as low as reasonably achievable and further significant reduction in radioactivity would require unreasonable efforts.

5. Release to an Off-Site Licensed Facility

A. If the subcontractor possesses the appropriate license to receive, possess, use, and transfer the equipment, tools, material, or vehicles with radioactive contamination, subcontractor may elect to remove such items from the site in lieu of decontamination. The responsibility of complying with all state, local and federal regulations during the packaging, shipping, and receipt of the equipment shall be the responsibility of the subcontractor. The subcontractor shall submit a copy of the license and applicable procedures to FDF for compliance review prior to removal of the contaminated equipment. A copy of all Bills of Lading shall be submitted to Flour Daniel Fernald prior to shipment.

B. The Subcontractor is to provide 24 hours notice to FDF prior to shipping radioactive tools, equipment, and/or material.

## 3.2 QUALITY ASSURANCE

A. FDF will perform quality assurance and other oversight activities during the life of project to ensure contract specification are met. All QA requirements required to be met by the Subcontractor will be stated in Part 9 of the IFB/RFP.

## 3.3 QUALITY CONTROL

A. The Subcontractor is to perform or witness inspections and tests of procured material, equipment and items, work in progress and completed items within the bounds of the contract.

## 3.4 UNSUCCESSFUL/IMPRACTICAL SUBCONTRACTOR DECONTAMINATION

A. If FDF determines that the subcontractor has implemented the requirements of this Section and the Safe Work Plan and the subcontractor's decontamination efforts are unsuccessful or decontamination is not practical (as identified below), refer to Part 4 IFB/RFP, Special Terms And Conditions, Disposition of Subcontractor Provided Equipment, Tools, and Materials That Have Become Contaminated (SC-11) for action to be taken.

# SECTION 01519

1. Decontamination may be considered impractical for non-expendable items that are integral parts of equipment and not readily replaceable such as porus materials (e.g. wood and fiberglass), wire rope, chains, brushes, items with finned surfaces, and similar items where contamination may be embedded within the material configuration matrix. These items may not be released if detectable contamination is identified on the surface.

B. All tools, material, vehicles equipment accepted by FDF for disposition must have been cleaned to meet the visual inspection requirements defined in Specification Section 01517 and handled as defined in Specification Section 01120 and the Waste Management Plan located in Part 6 of the IFB/RFP.

Table 1

SURFACE CONTAMINATION LIMITS[a]

| NUCLIDE[f] | FIXED PLUS REMOVABLE | | REMOVABLE[b,e] |
|---|---|---|---|
| | AVERAGE[b,c] | MAXIMUM[b,d] | |
| U-nat, U-235, U-238, and associated decay products, alpha emitters. | 5,000 dpm /100 $cm^2$ | 15,000 dpm /100 $cm^2$ | 1,000 dpm/100 $cm^2$ |
| Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129 | 100 dpm/100 $cm^2$ | 300 dpm/100 $cm^2$ | 20 dpm/100 $cm^2$ |
| Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133 | 1,000 dpm/100 $cm^2$ | 3,000 dpm/100 $cm^2$ | 200 dpm/100 $cm^2$ |
| Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. | 5,000 dpm /100 $cm^2$ | 15,000 dpm /100 $cm^2$ | 1,000 dpm /100 $cm^2$ |

[a] Where surface contamination by both alpha and beta-gamma emitting nuclides exists, the limits established for alpha and beta-gamma emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each object.

[d] The maximum contamination level applies to an area of not more than 100 $cm^2$.

[e] The amount of removable radioactive material per 100 $cm^2$ of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[f] The limits presented for transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, and Ac-227 may be adjusted on a case by case basis. Consult with Radiological Compliance when required to apply these limits for unrestricted release.

**END OF SECTION**

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# APPENDIX D

# DESIGN DRAWINGS

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# APPENDIX D

## DESIGN DRAWINGS

The following drawings are copies of the blueprint drawings that were prepared during the remedial design for the Thorium/Plant 9 Complex - Phase I project. Figures D-1, D-2 and D-12 show plan views of the site, project area and Thorium/Plant 9 Complex area, respectively. Figures D-3, D-7, D-8, D-10, D-14, D-16, D-18 and D-20 floor plans of components in the complex. The balance of the drawings show elevation or isometric views of the components. The key features shown in these drawings (Process Areas and related equipment) are discussed in Section 3 of this implementation plan.

## FIGURES

**FIGURE D-1** Production Area Site Map - Thorium/Plant 9 Complex

**FIGURE D-2** Demolition Area Plan - Thorium/Plant 9 Complex

**FIGURE D-3** Floor Plan of Building 9A

**FIGURE D-4** Original Elevations of Building 9A

**FIGURE D-5** North and South Elevations of Building 9A (After Expansion)

**FIGURE D-6** East and West Elevations of Building 9A (After Expansion)

**FIGURE D-7** Floor Plan of Building 9B and Component 9C

**FIGURE D-8** Floor Plan of Building 9D

**FIGURE D-9** Isometric View and Detail Plans of Building 9E

**FIGURE D-10** Floor Plan of Building 81

**FIGURE D-11** Elevation of Building 81

**FIGURE D-12** Elevation Views Building 69

**FIGURE D-13** Floor Plan of Building 32A and Component 32B

**FIGURE D-14** Elevations of Building 32A and Component 32B

**FIGURE D-15** Floor Plan of Building 64

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**FIGURE D-16 Plan and Sections of Building 64**

**FIGURE D-17 Floor Plan of Building 65**

**FIGURE D-18 Elevations of Building 65**

**FIGURE D-19 Floor Plan of Building 78**

**FIGURE D-20 Elevations of Building 78**

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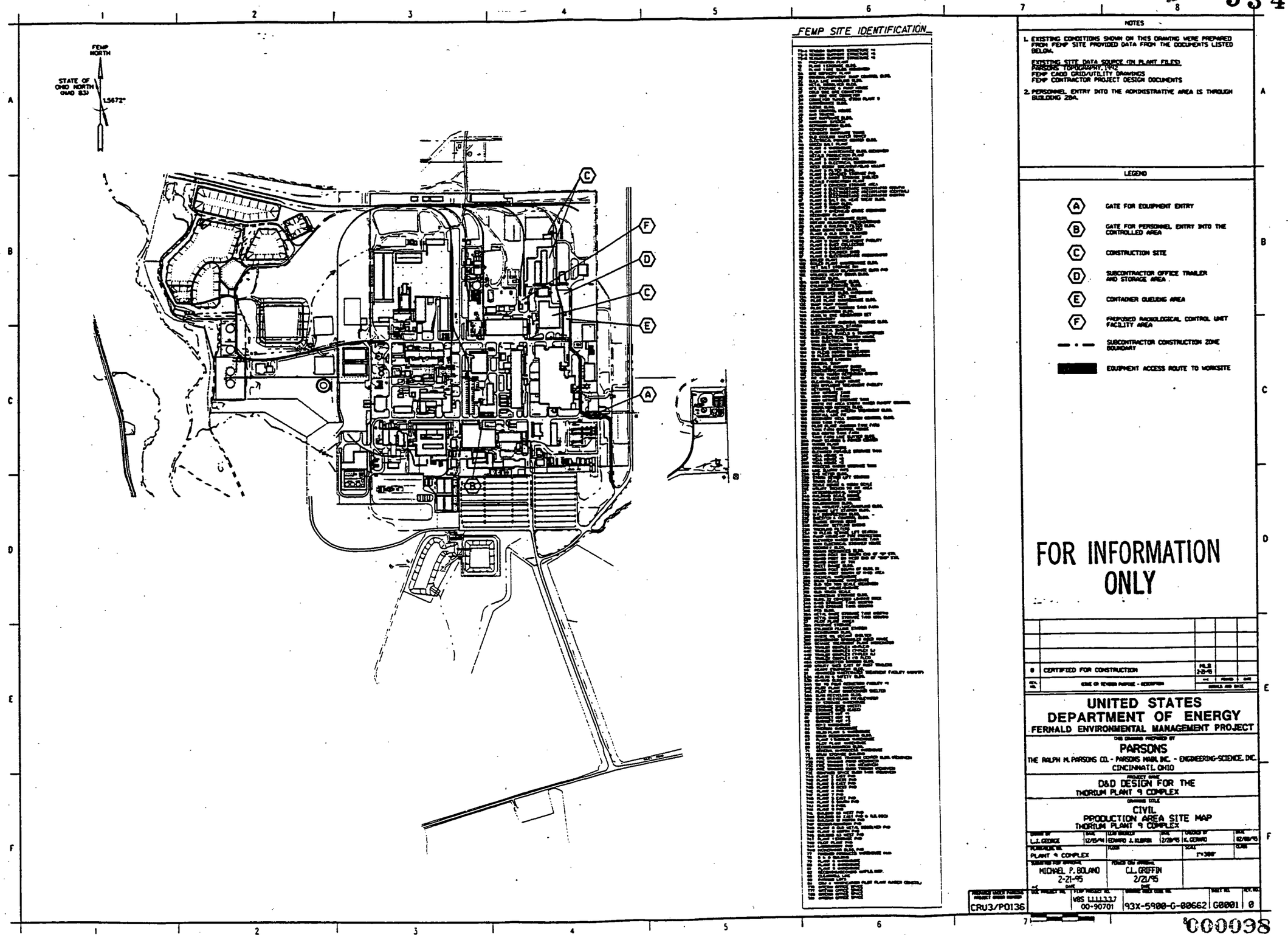


FIGURE D-1 Production Area Site Map
Thorium/Plant 9 Complex

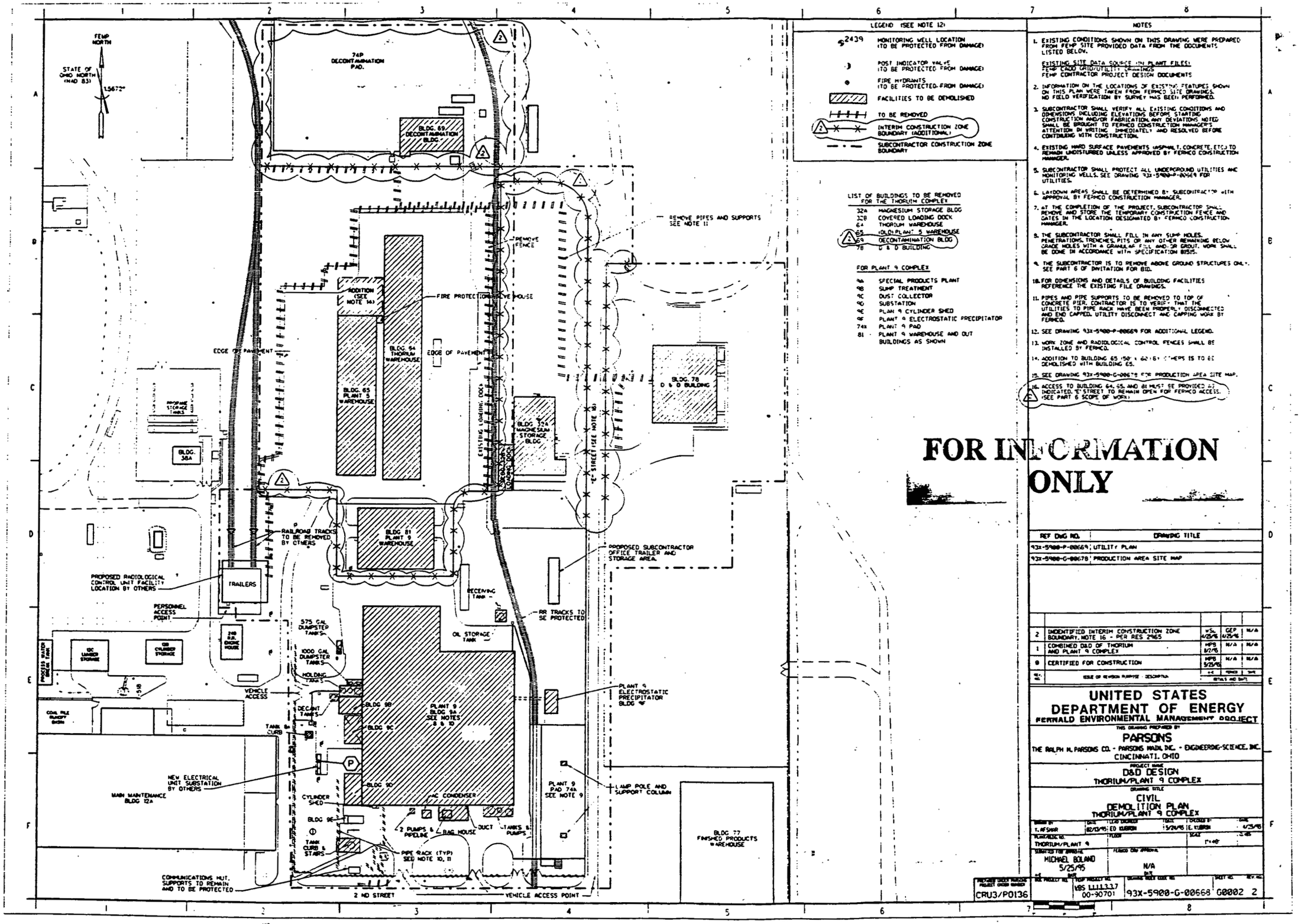


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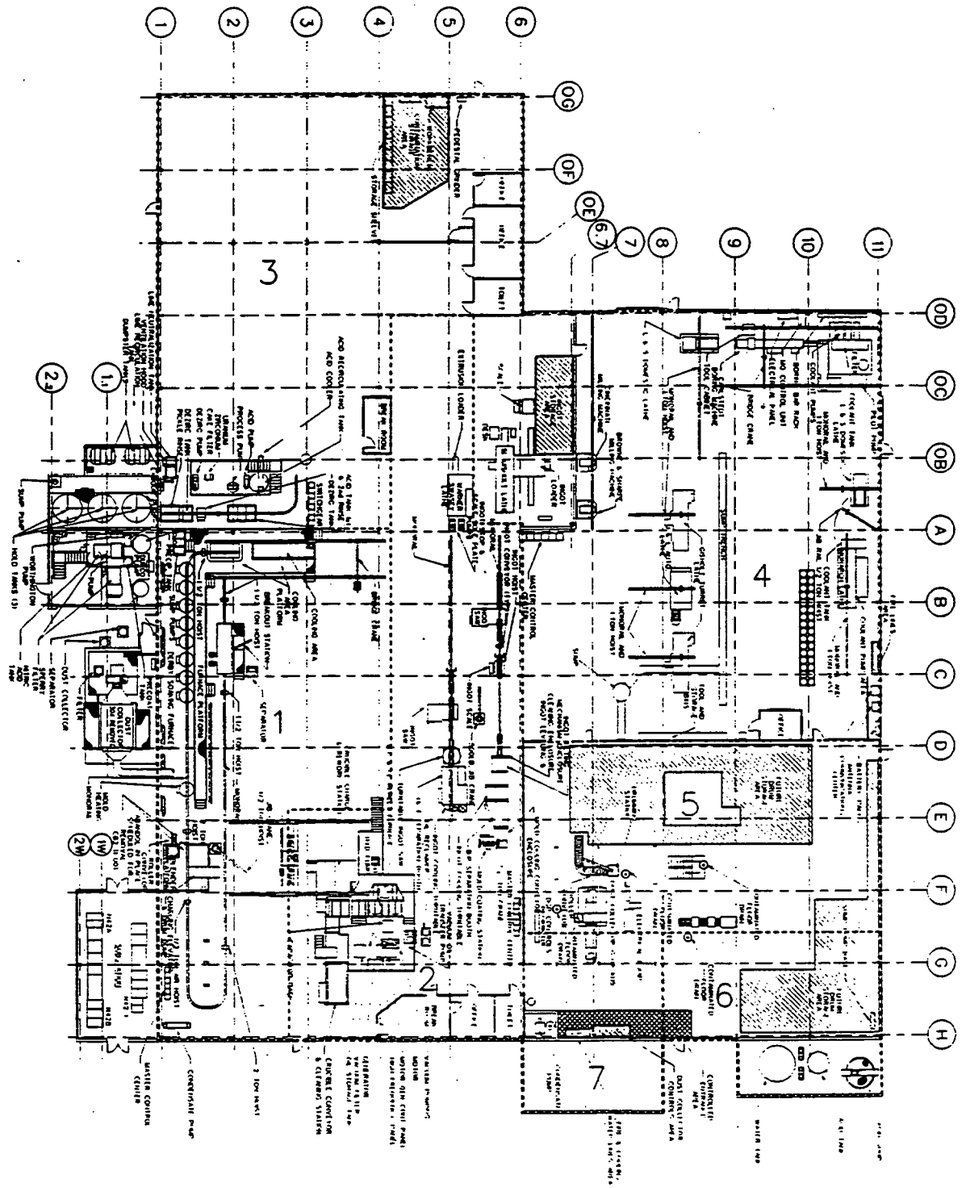
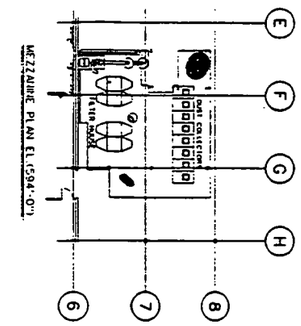
FIGURE D-2 Demolition Plan - Thorium/Plant 9 Complex





LEGEND

PROCESS 1 - URANIUM PRODUCTION AND DERBY CLEANING
PROCESS 2 - ENRICHED URANIUM CASTING
PROCESS 3 - ZIRNLO DECLADDING
PROCESS 4 - URANIUM MACHINING
PROCESS 5 - HEAT TREATING (HISTORICAL PROCESS-
CURRENTLY DUST COLLECTOR)
PROCESS 6 - SCRAP METAL PICKLING (HISTORICAL PROCESS-
CURRENTLY DUST COLLECTOR)
PROCESS 7 - BRIQUETTING (HISTORICAL PROCESS-
CURRENTLY DUST COLLECTOR)

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9A FIRST FLOOR
SPECIAL PRODUCTS PLANT
FLOOR PLAN
1" = 40'

DATE 05-15-95
DRAWN R. Williams

000100

**FIGURE D-3 Floor Plan of Building 9A**

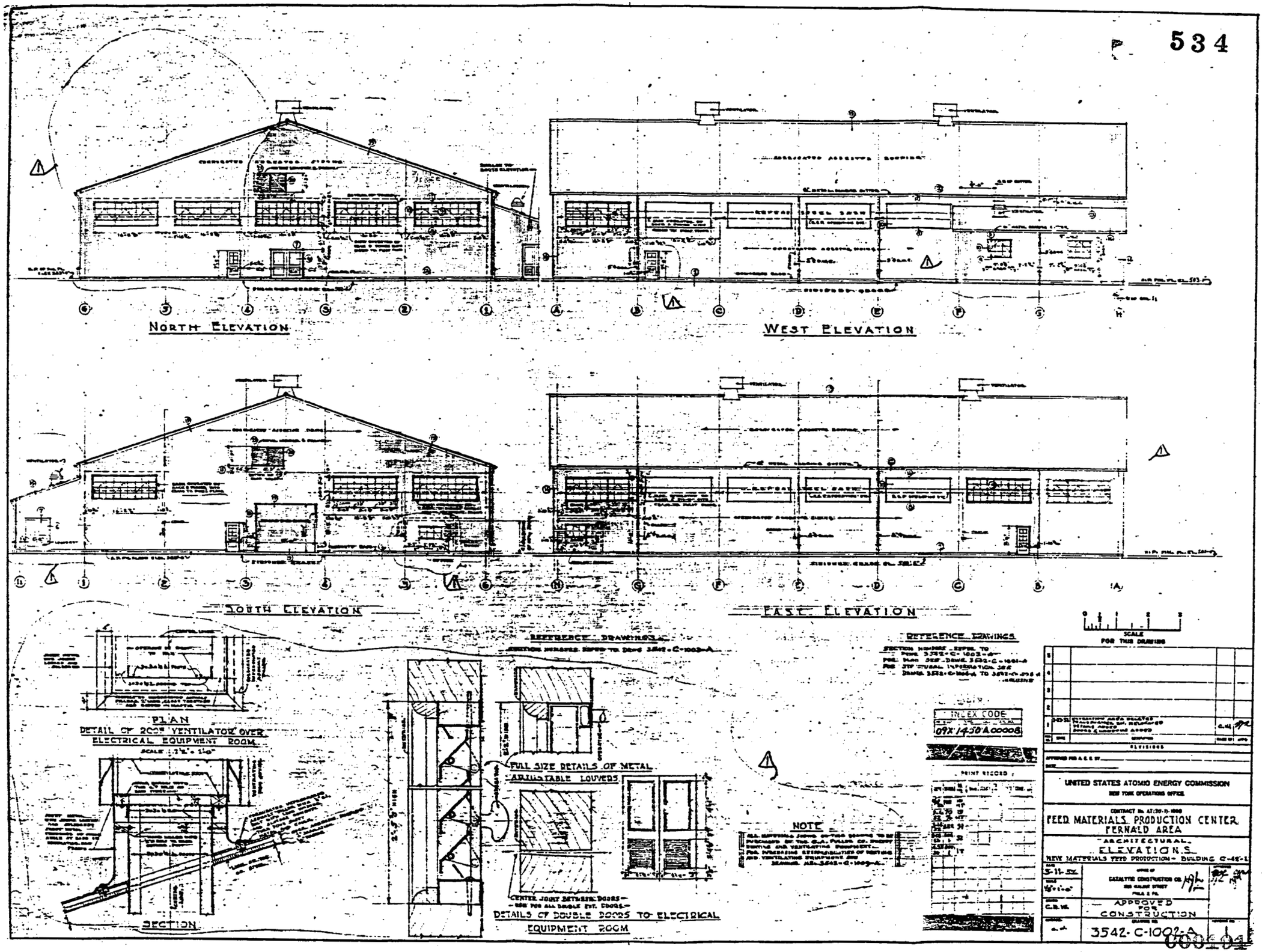


FIGURE D-4 Original Elevations of Building 9A

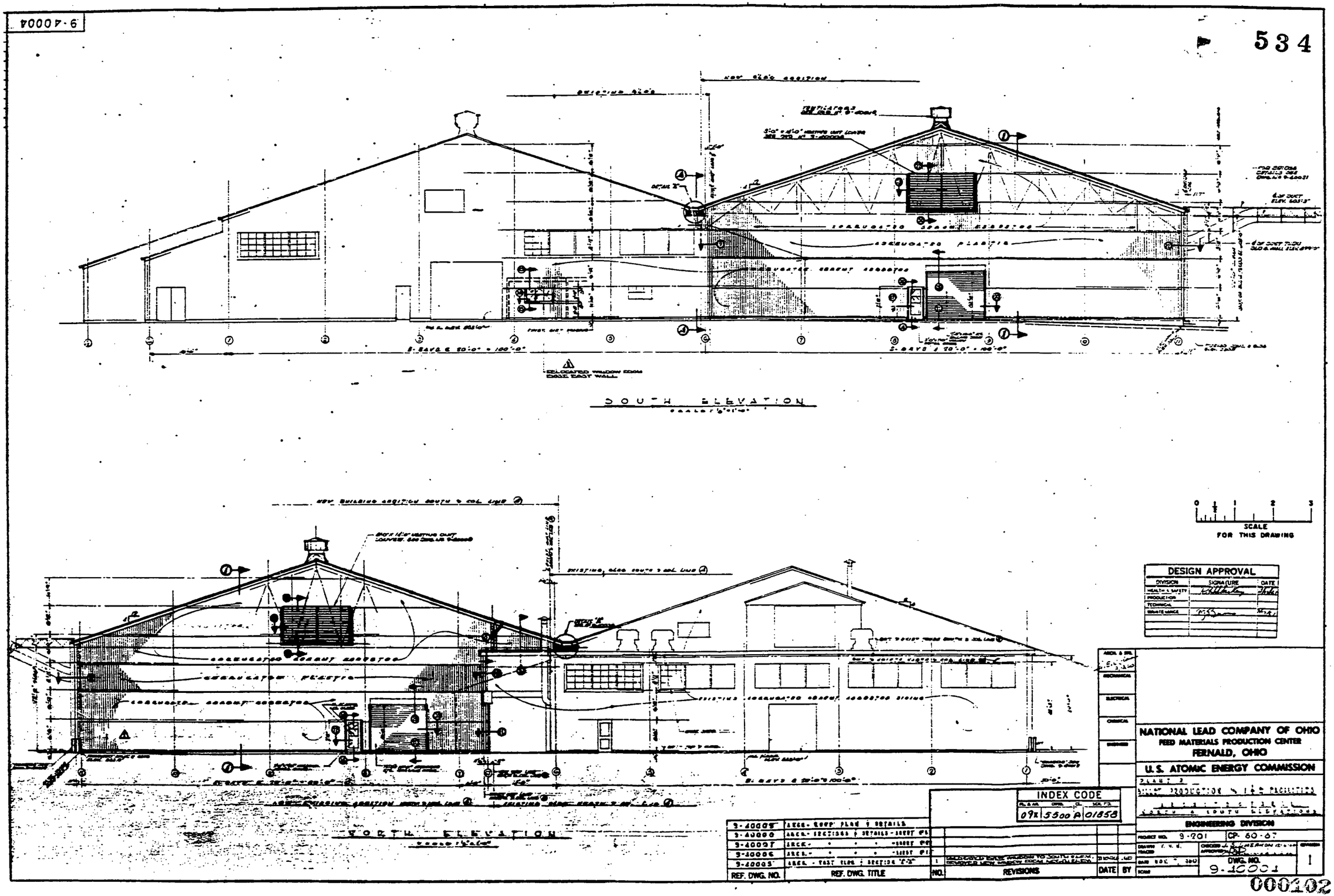




FIGURE D-5 North and South Elevations of Building 9A (After Expansion)

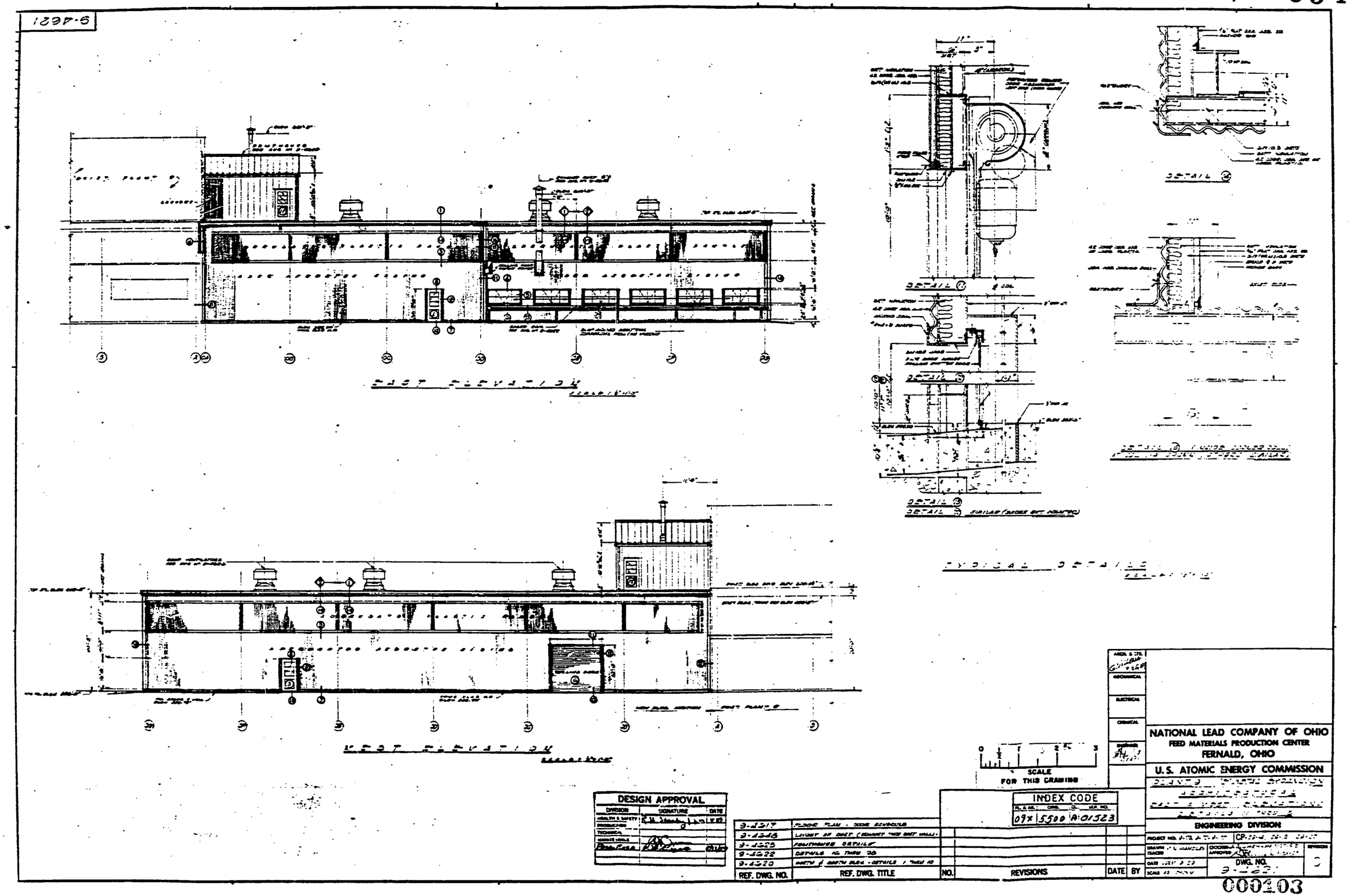


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FIGURE D-6 East and West Elevations of Building 9A (After Expansion)

KEY MAP

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9B & 9C FIRST FLOOR

PLANT 9 SUMP TREATMENT FACILITY AND DUST COLLECTOR

FLOOR PLAN

1" = 15'

DATE 05-15-95

DRAWN R. Williams

000104

**FIGURE D-7 Floor Plan of Building 9B and Component 9C**

FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT CORPORATION

FERMC Fernald Environmental Management Project

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9D FIRST FLOOR

PLANT 9 SUBSTATION FLOOR PLAN

1" = 15'

DATE 05-15-95

DRAWN R. Williams

000105

**FIGURE D-8 Floor Plan of Building 9D**

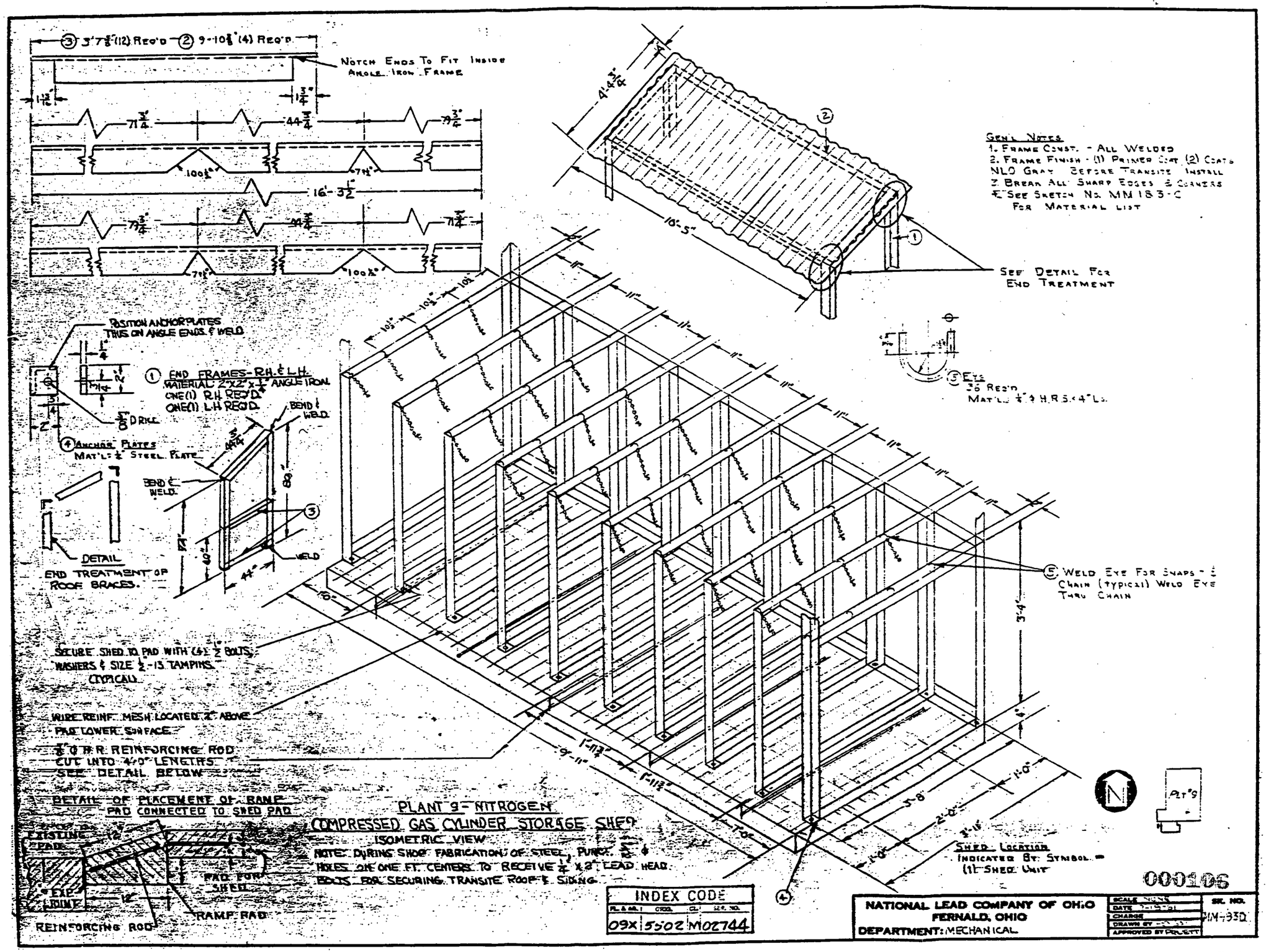



FIGURE D-9 Isometric View and Detail Plans of Building 9E

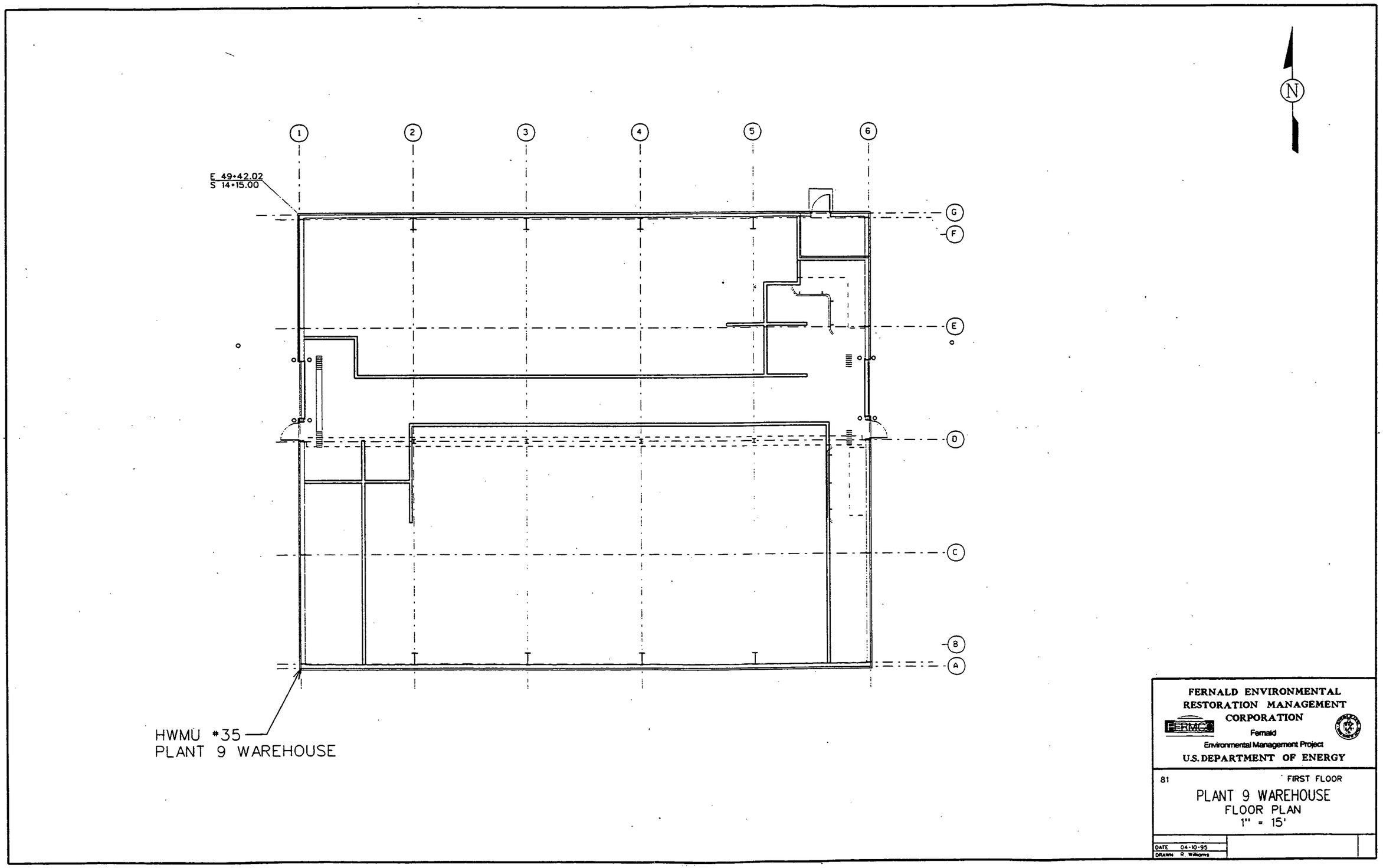
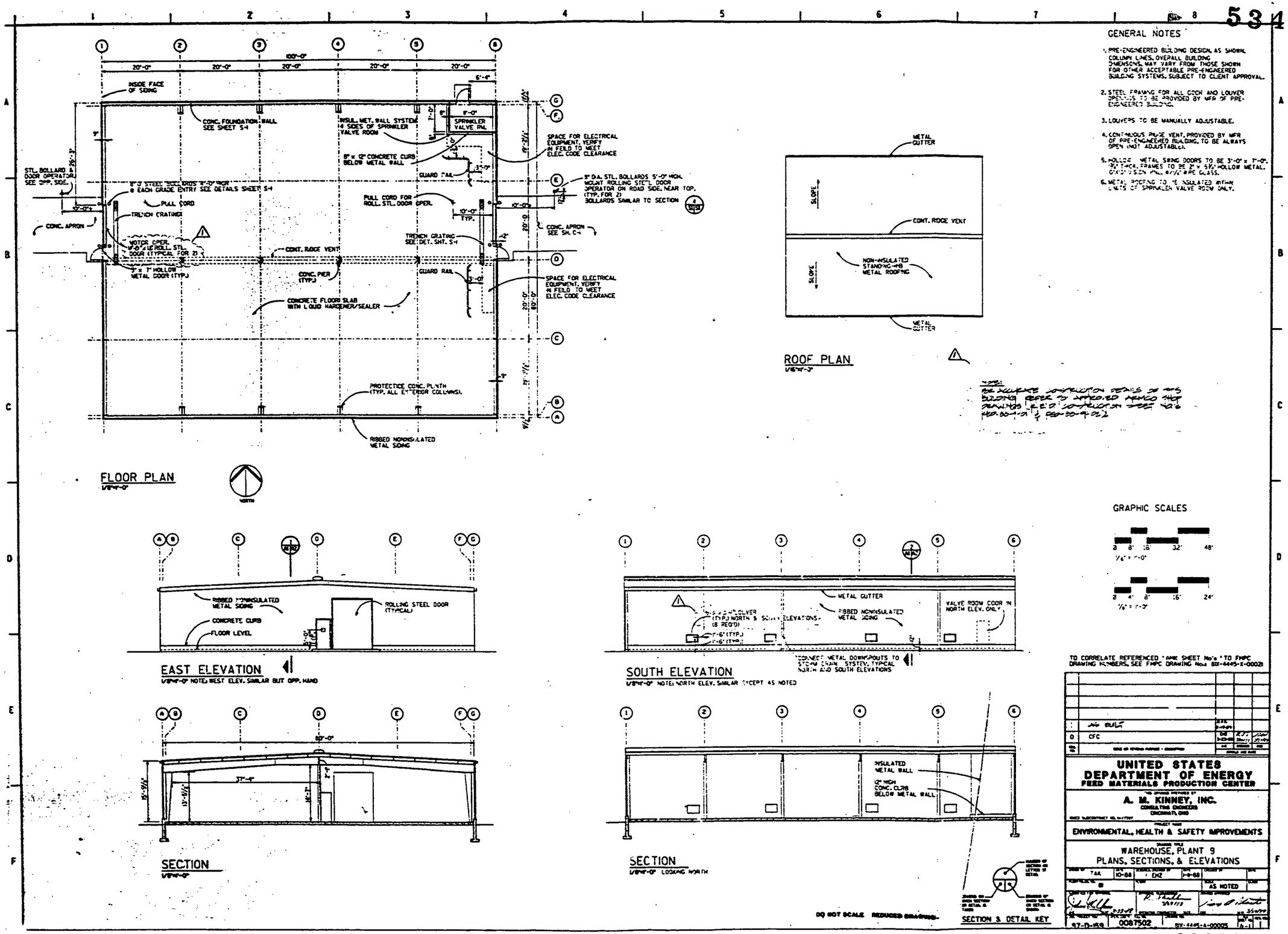





FIGURE D-10 Floor Plan of Building 81




000108

FIGURE D-11 Elevations of Building 81

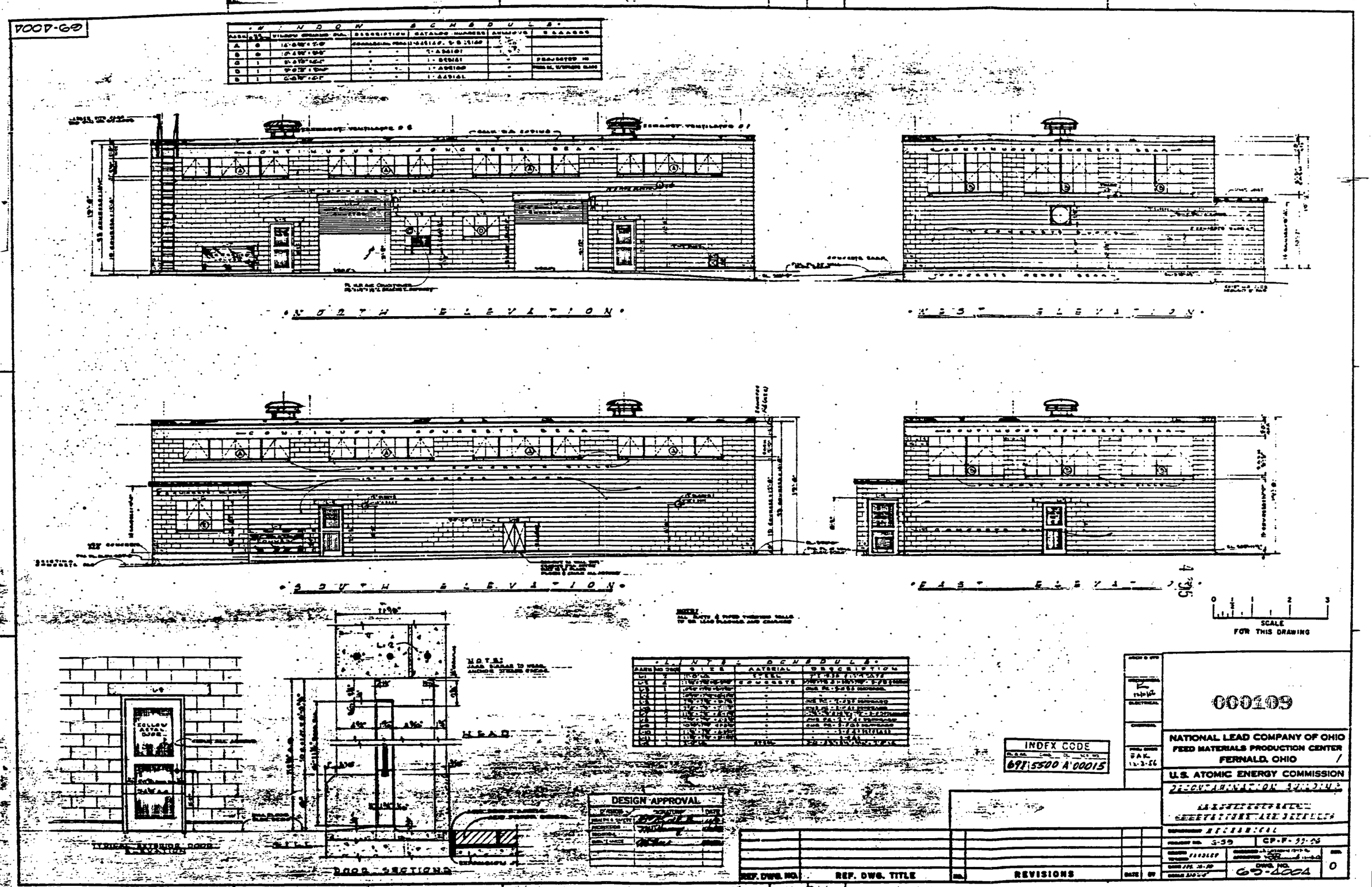
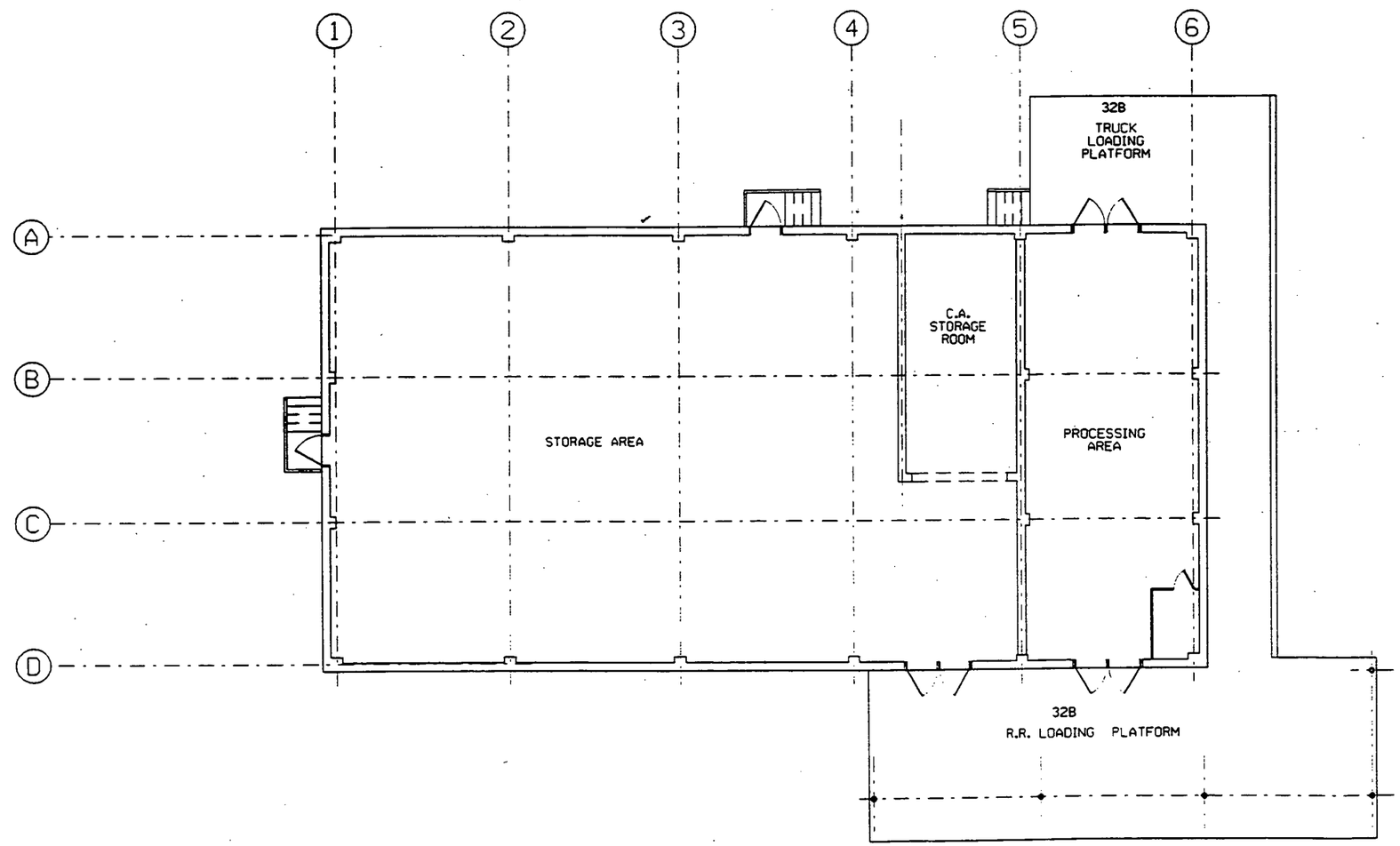



FIGURE D-12 ,Elevation Views Building 69

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BUILDING 32A (& 32B) FIRST FLOOR

MAGNESIUM STORAGE BUILDING

FLOOR PLAN

1" = 10'

DATE 05-15-95

DRAWN R. Williams

000110

**FIGURE D-13 Floor Plan of Building 32A and Component 32B**

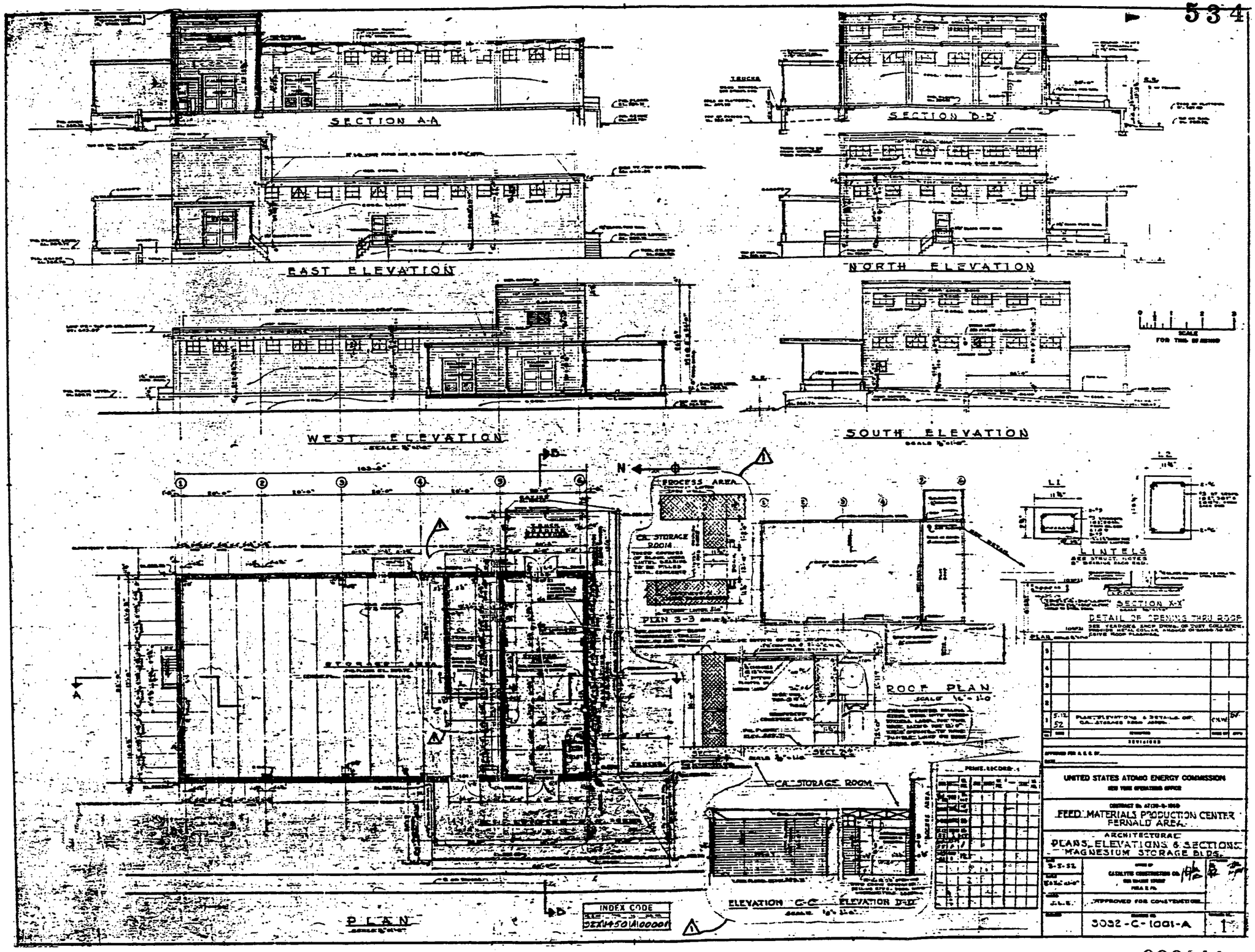


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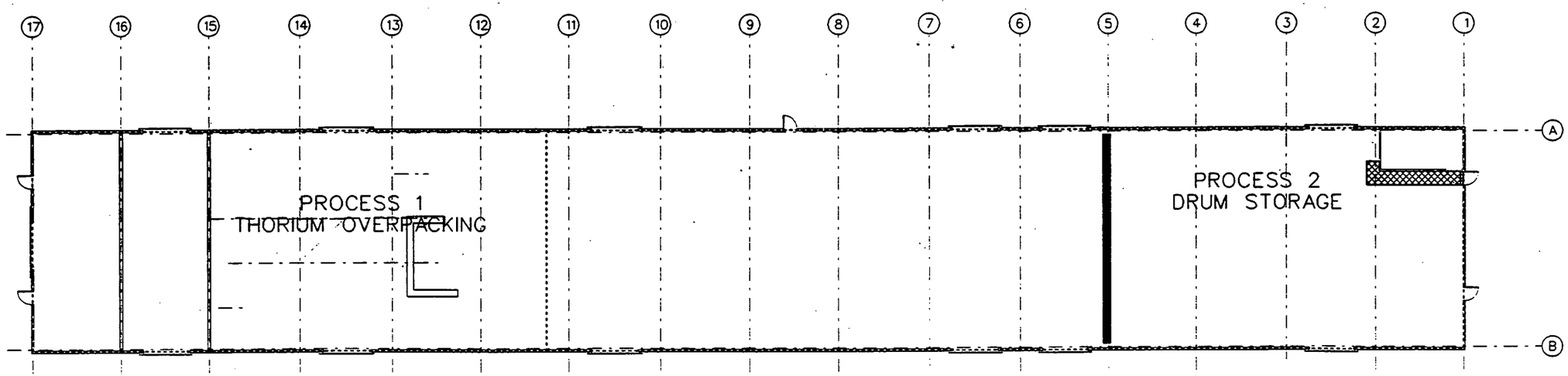
FIGURE D-14 Elevations of Building 32A and Component 32B

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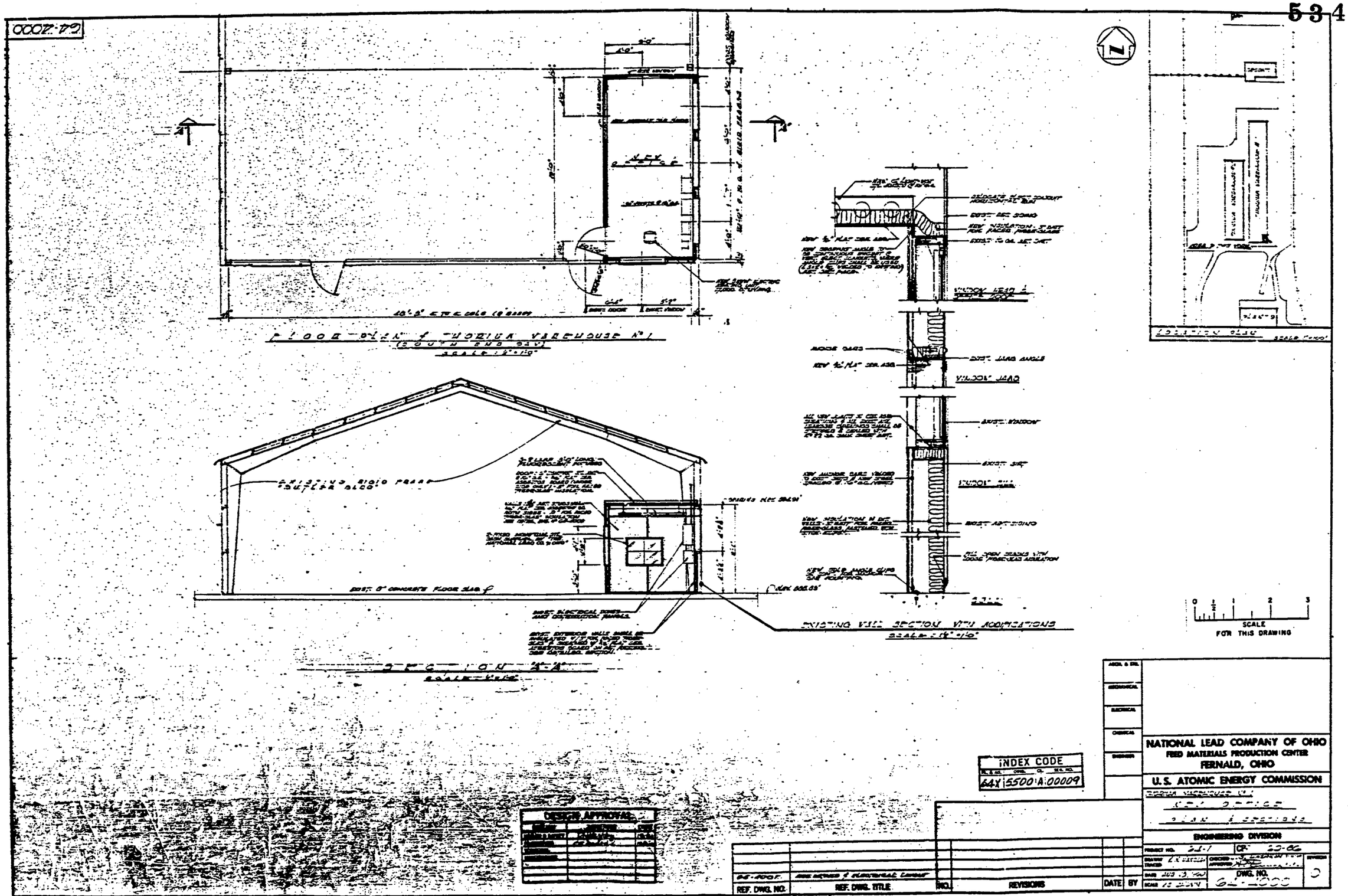
64 FIRST FLOOR
THORIUM WAREHOUSE
FLOOR PLAN
1" = 25'

DATE 04-10-95
DRAWN R. Wilsgms

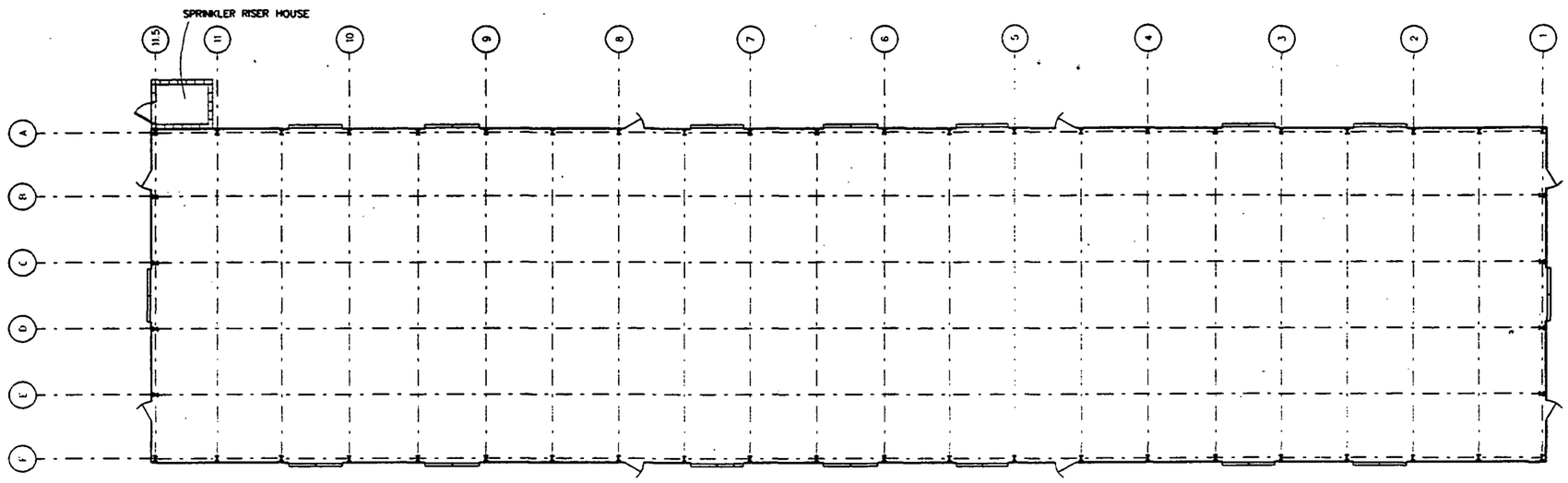
000112

FIGURE D-15 Floor Plan of Building 64




000113

FIGURE D-16 Plan and Sections of Building 64

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65 FIRST FLOOR

(OLD) PLANT 5 WAREHOUSE FLOOR PLAN

1" = 20'

DATE 04-10-95

DRAWN R. Williams

000114

FIGURE D-17 Floor Plan of Building 65

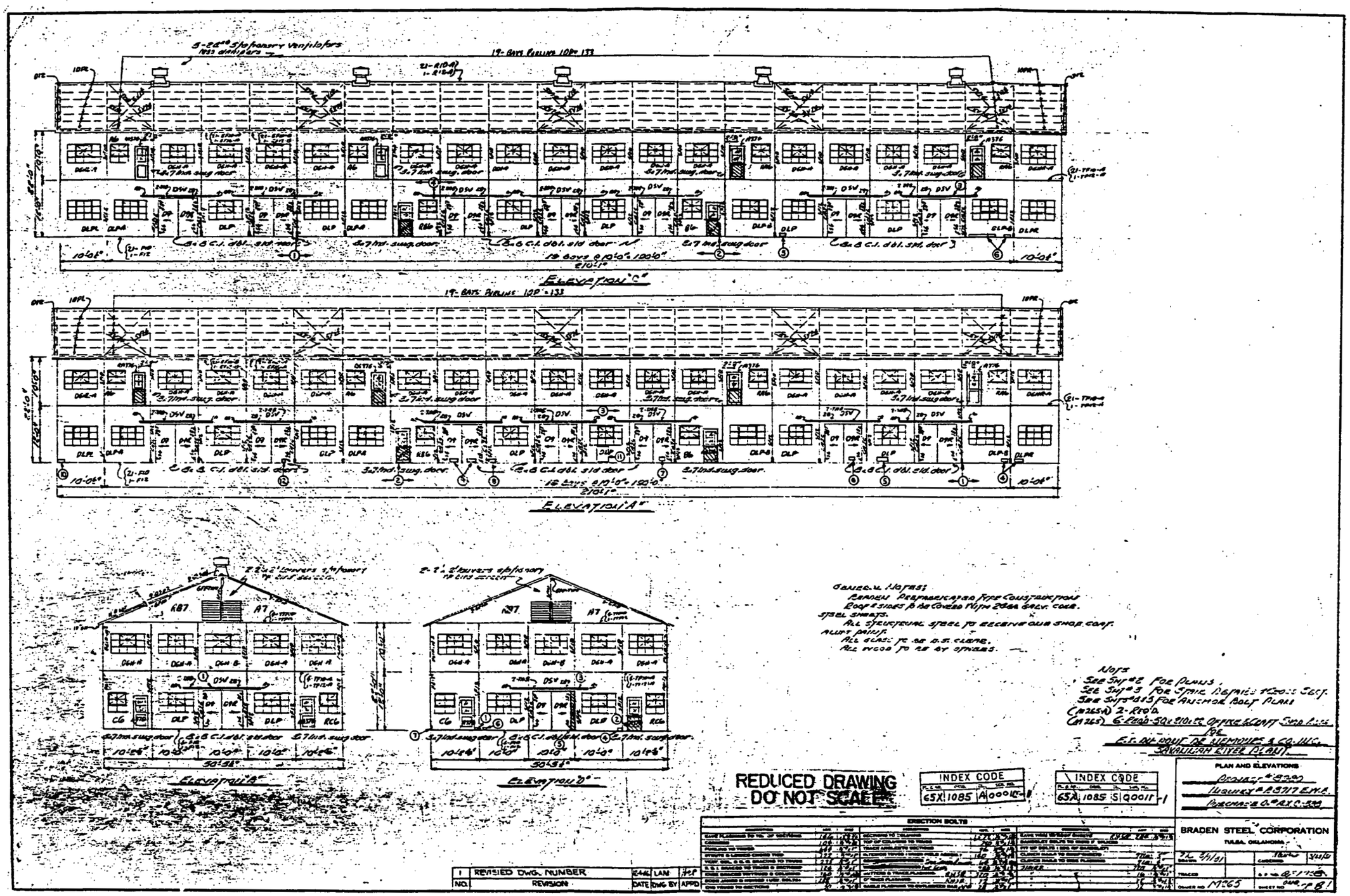


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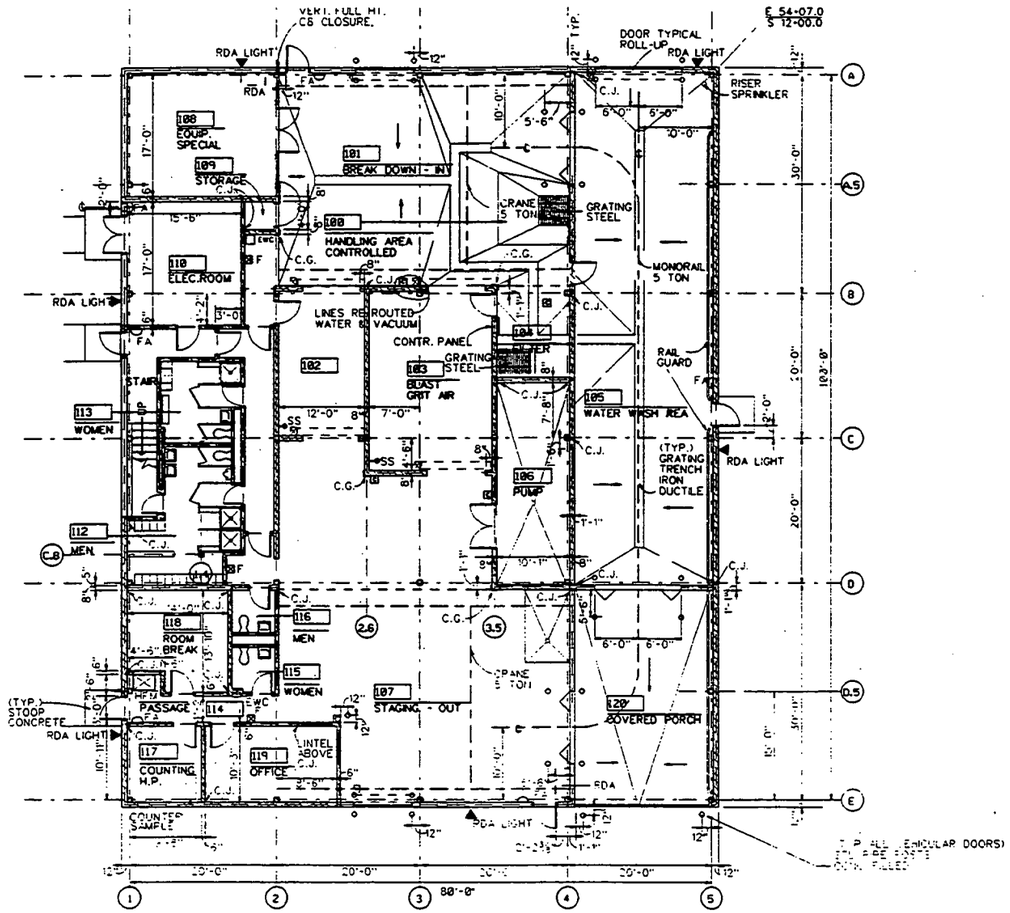
FIGURE D-18 Elevations of Building 65



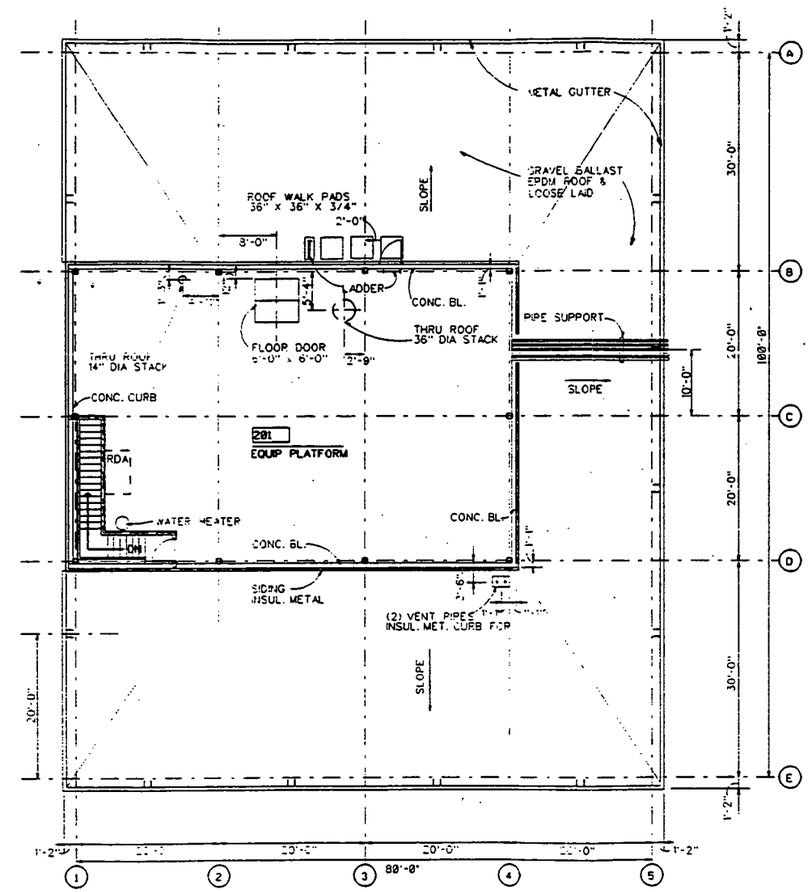

1/8"=1'-0"

FLOOR PLAN

EL. 588'-0"

SEE STRUCTURAL DRAWINGS FOR EPOXY TOPPING. SUMPS, 1/4" FLOOR DEPPESSION FOR SLOPES, TRENCHES, GRATINGS.

FLOOR NOTE




1/8"=1'-0"

PLATFORM LEVEL PLAN

CORNER GUARD ( C.G. )
CONCRETE
STEEL
BATT INSULATION
BOARD INSULATION
CONCRETE BLOCK
SAFETY SHOWER
PULL STATION FIRE ALARM
OF MOTOR OPERATOR INDICATES LOCATION
ROLL ETL. DOOR
IN MASONRY WALLS: CONTROL JOINT

LEGEND

FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT CORPORATION

FERMCO

Fernald Environmental Management Project

U.S. DEPARTMENT OF ENERGY

78 FIRST FLOOR

D & D BUILDING

FLOOR PLAN

1" = 20'

DATE 05-17-95

DRAWN R. Williams

000116

FIGURE D-19 Floor Plan of Building 78

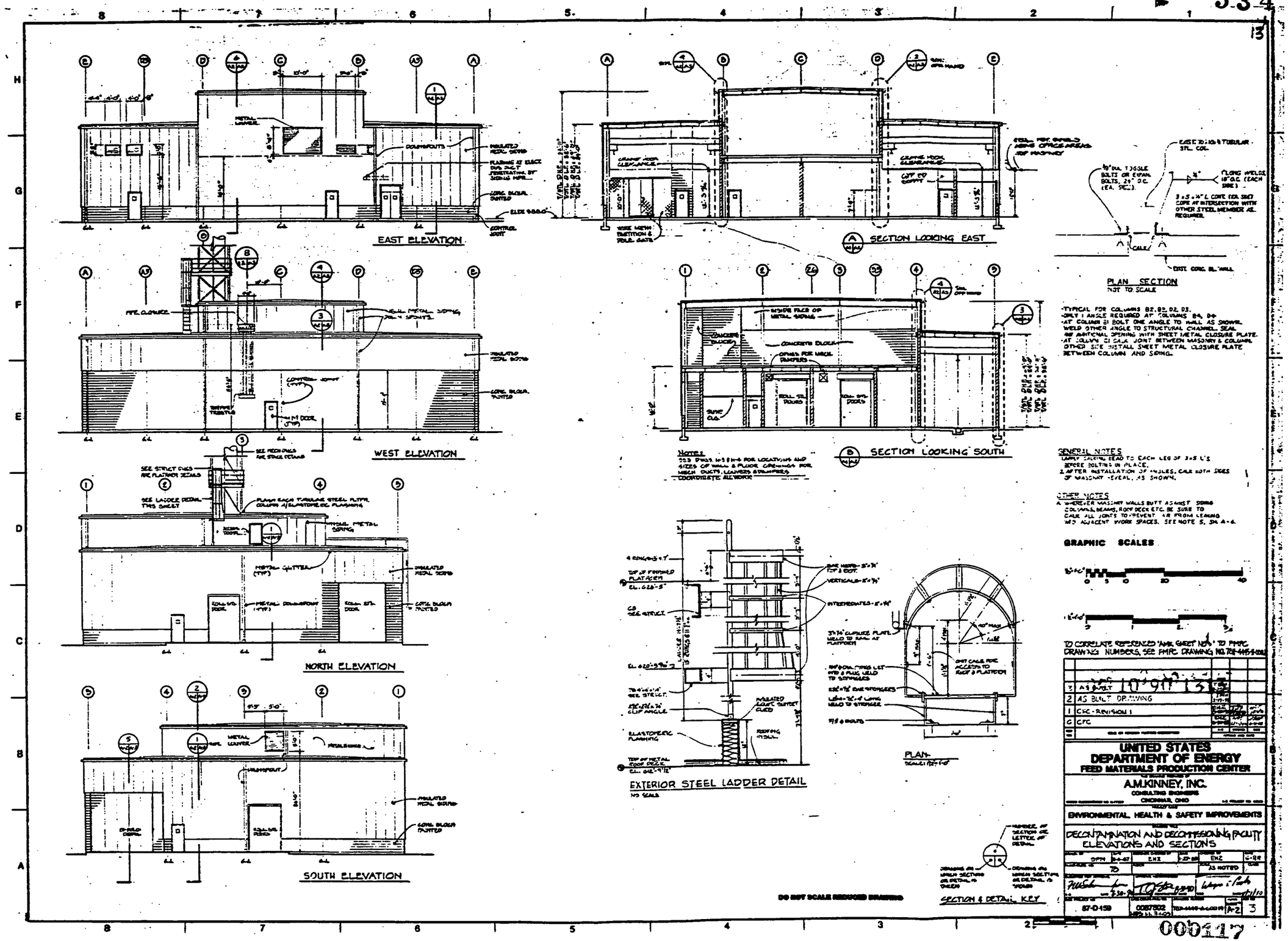



FIGURE D-20 Elevations of Building 78

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# APPENDIX E

# PHOTOGRAPHS

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# APPENDIX E

## PHOTOGRAPHS


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| **FIGURE E-35** | **Building 78 - Second Floor, Glove Bag Unit** | 13 |


[1] **Equipment and/or materials shown in photograph has been removed.** 14

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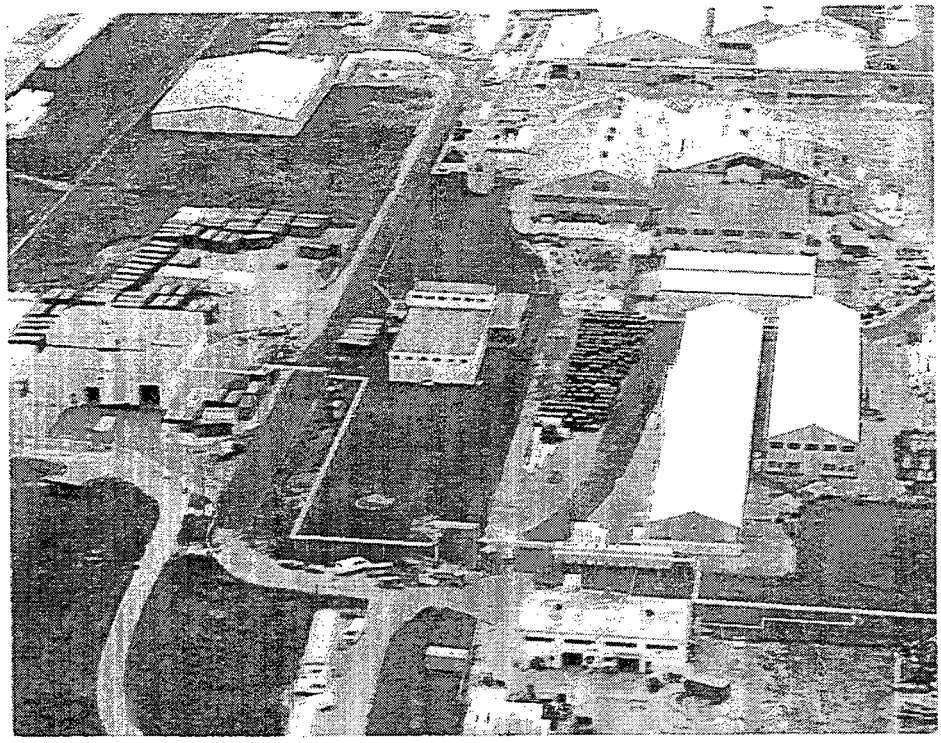

FIGURE E-1 Aerial View of Thorium/Plant 9 Complex, Facing South

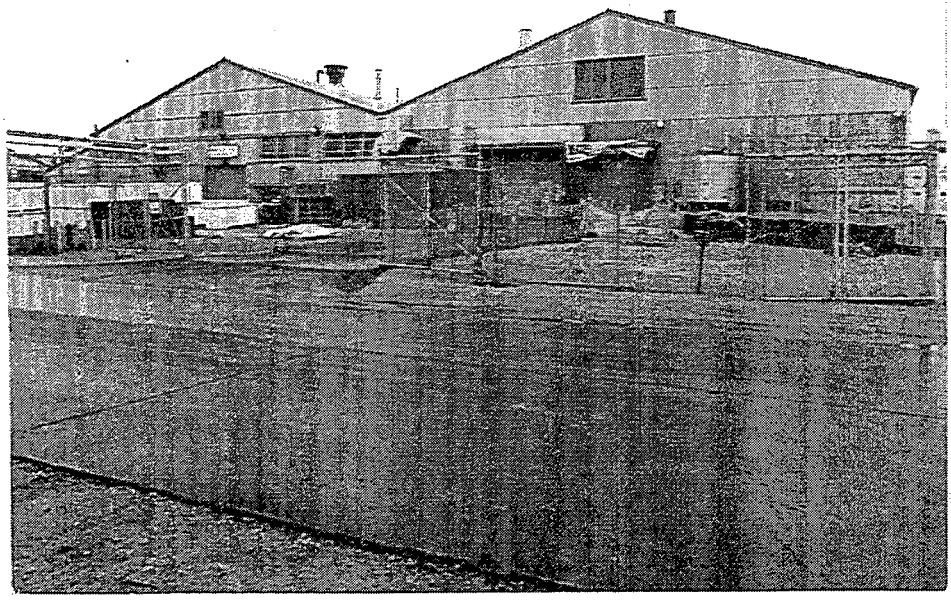

FIGURE E-2 Building 9A - South Elevation

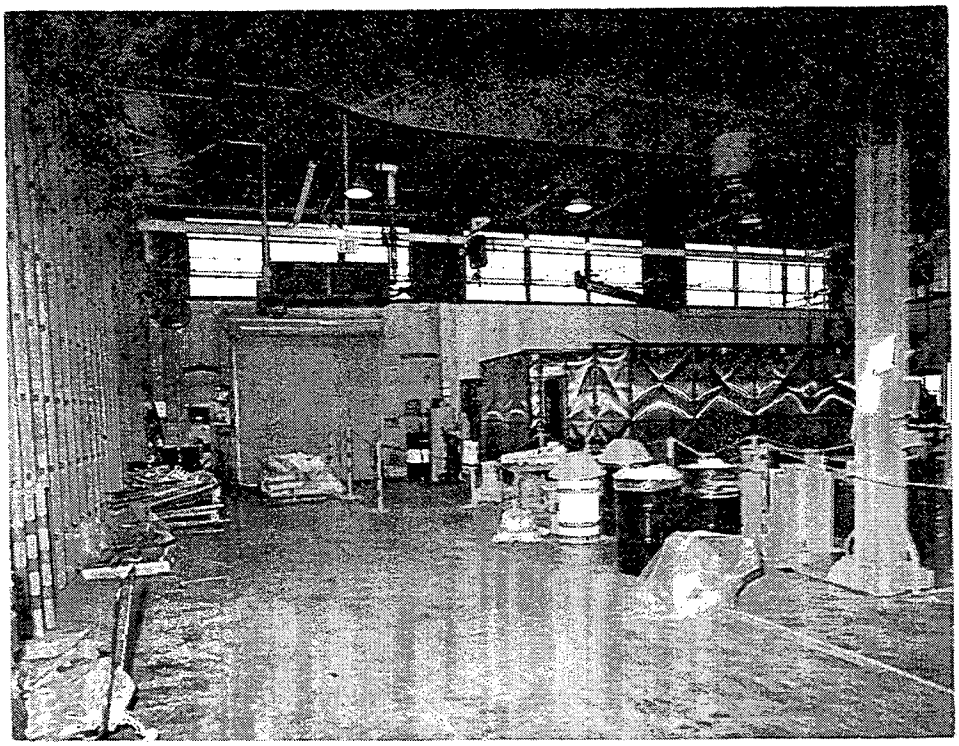

FIGURE E-3 Building 9A - Zirnlo Decladding Process Area, Facing North

FIGURE E-4 Building 9A - Uranium Machining Area, Facing South

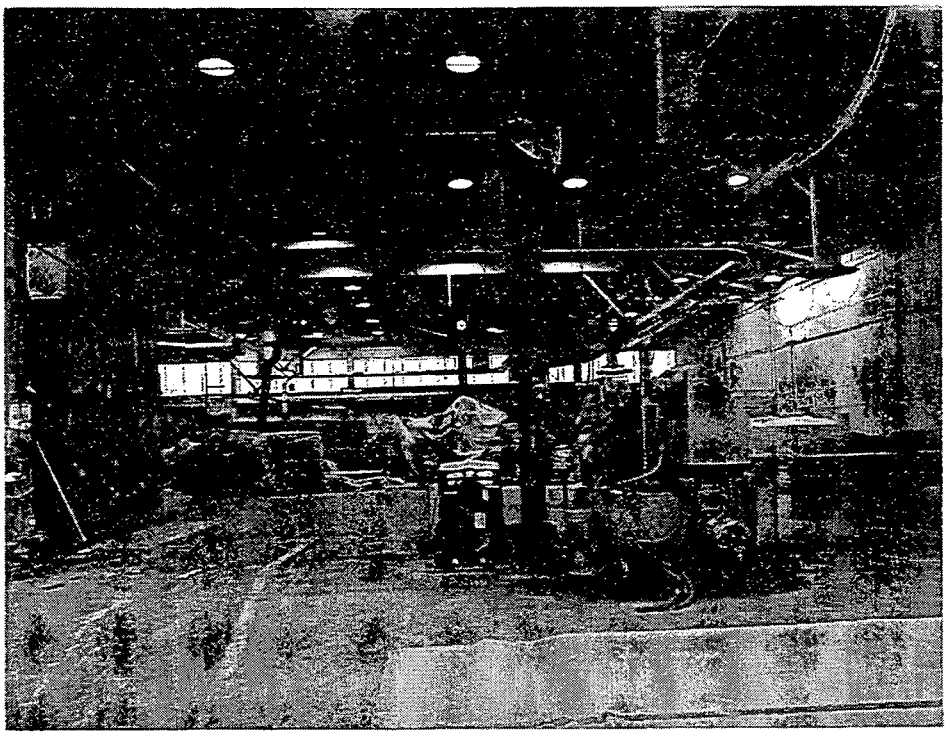

FIGURE E-5 Building 9A - Casting and Machining Area, Facing East

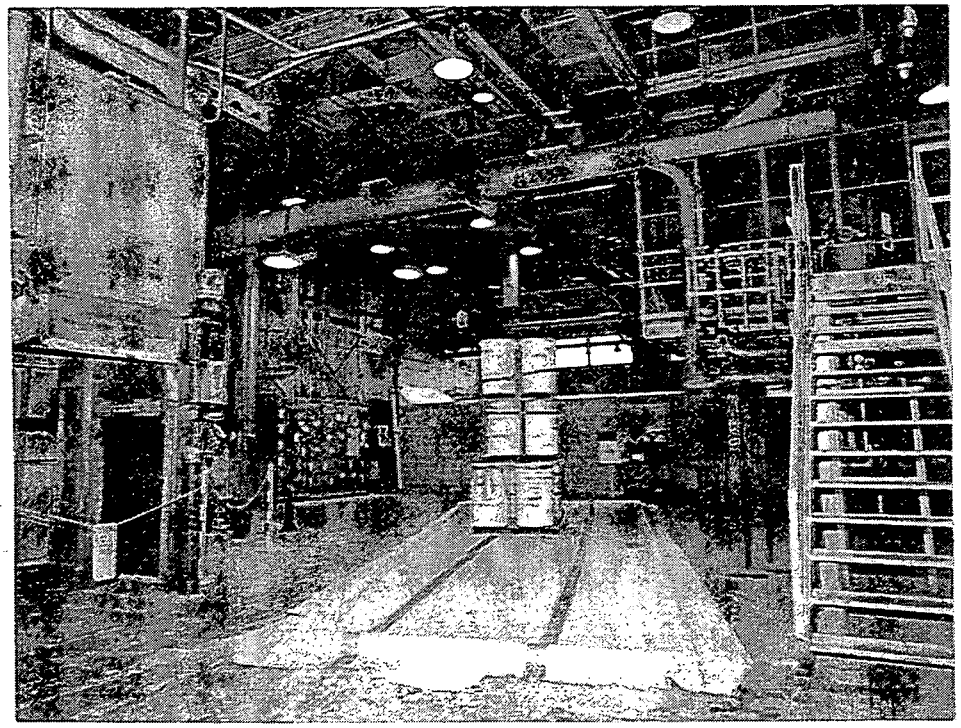

FIGURE E-6 Building 9A - Uranium Casting/Ingot Processing Area, Facing South

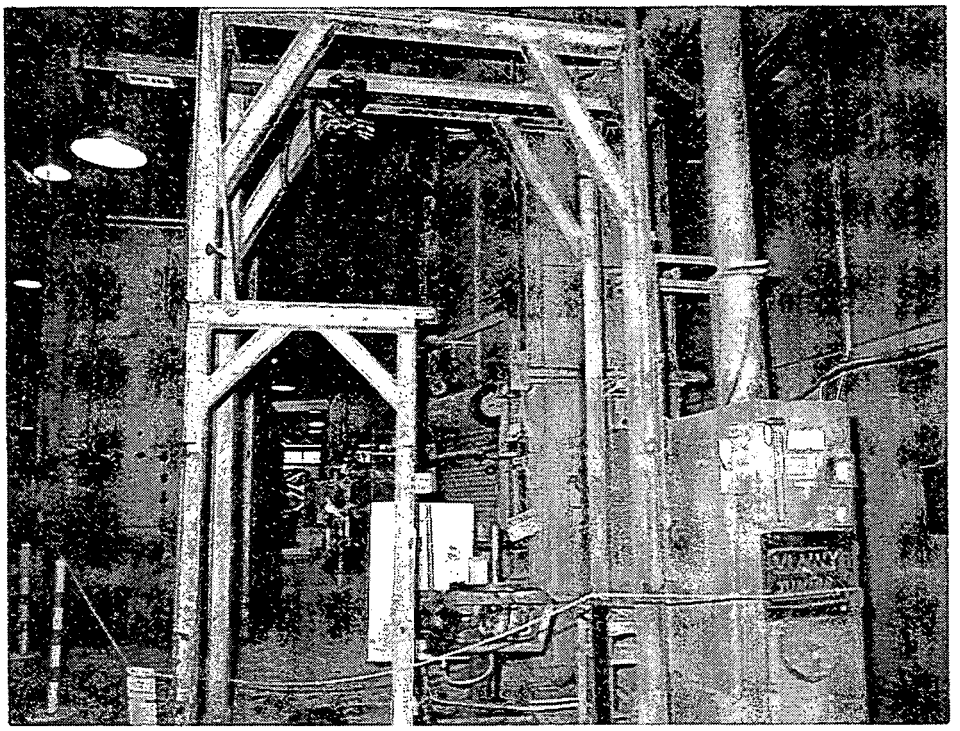

FIGURE E-7 Building 9A - Ingot Cooling and Separation Booth Controls

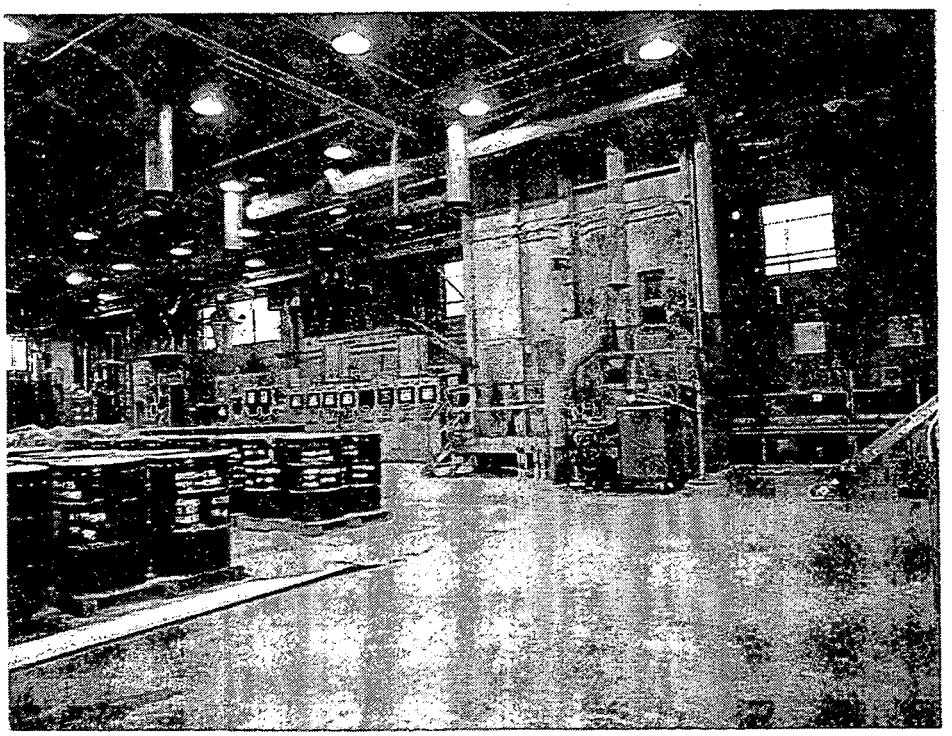

FIGURE E-8 Building 9A - Uranium Production Area, Derby Breakout Station

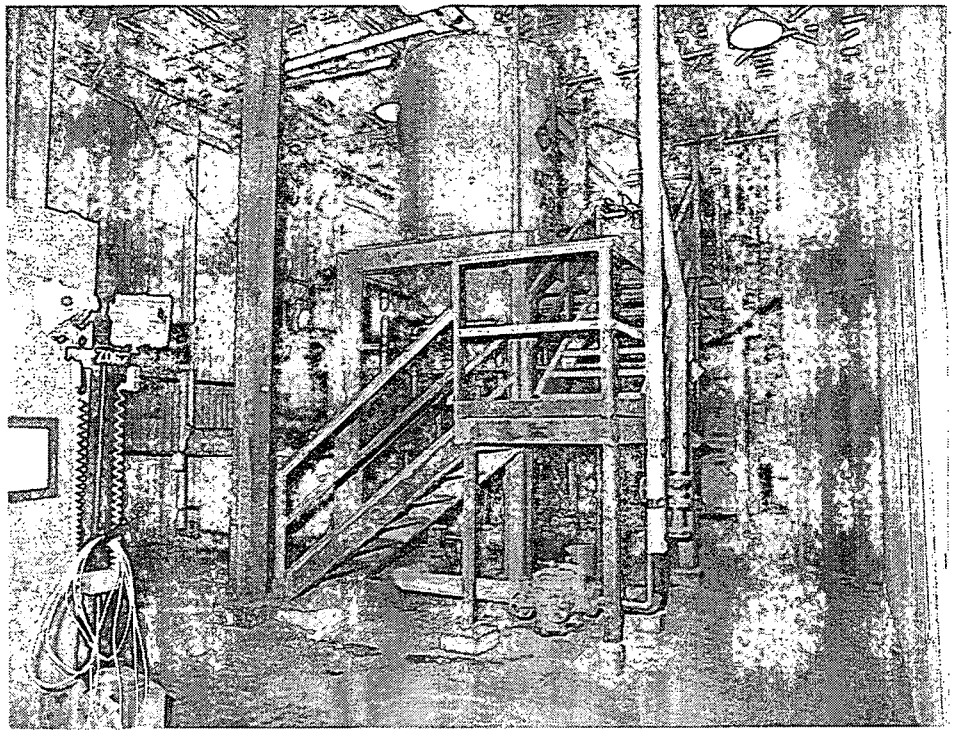

FIGURE E-9 Building 9A - Zirnlo Decladding Area, Acid Tank

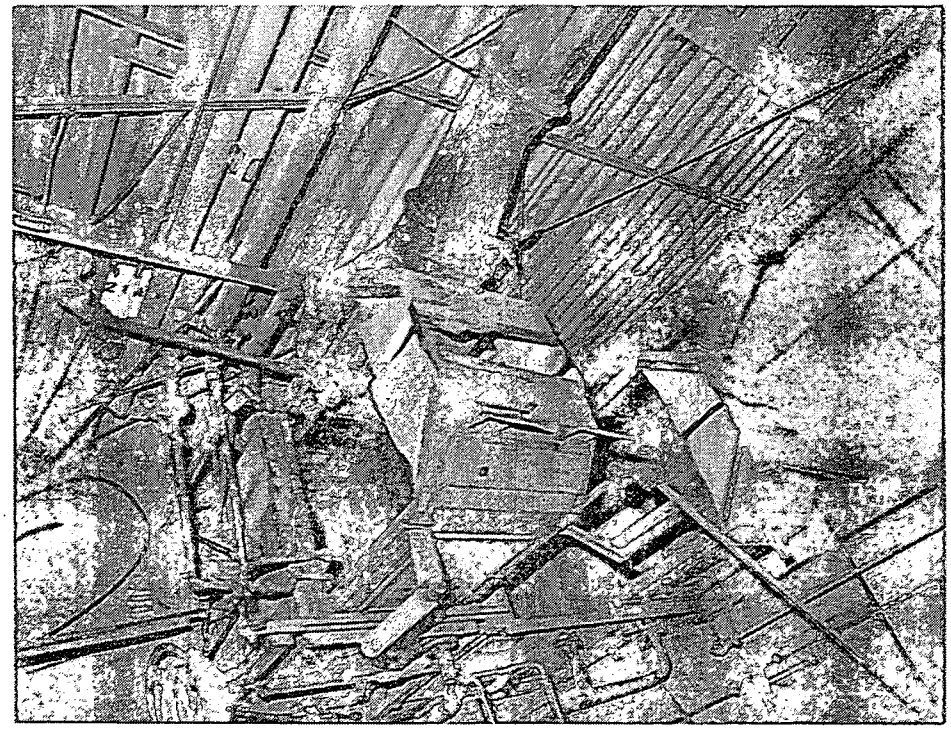

FIGURE E-10 Building 9A - Zirnlo Decladding, Dezirc and Pickle Rinse Tanks

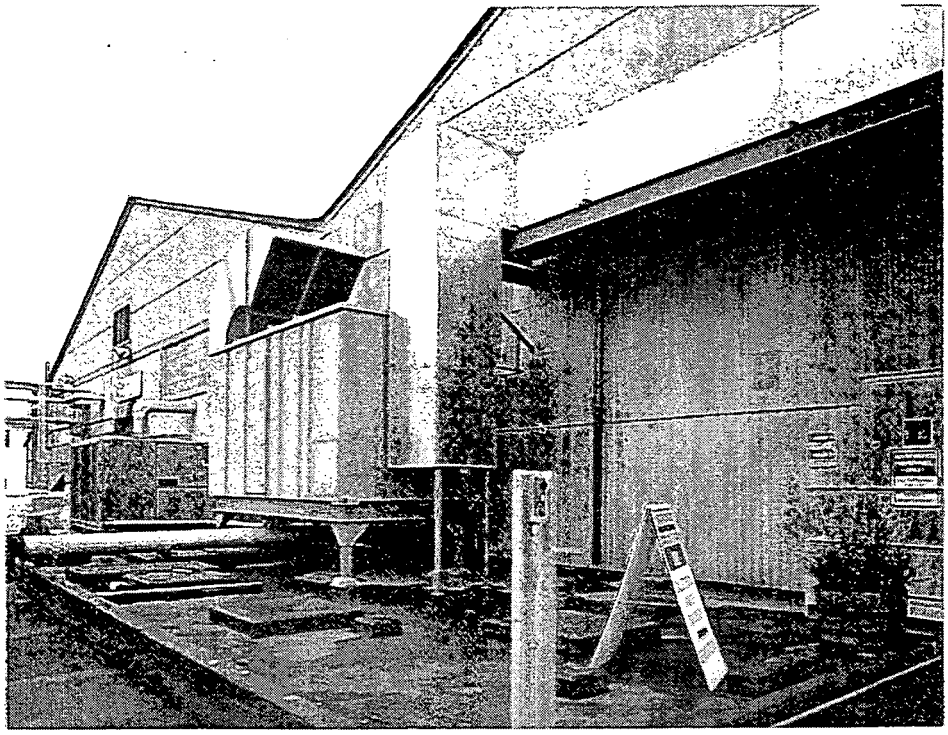

FIGURE E-11 Building 9A - South Elevation, Dust Collector

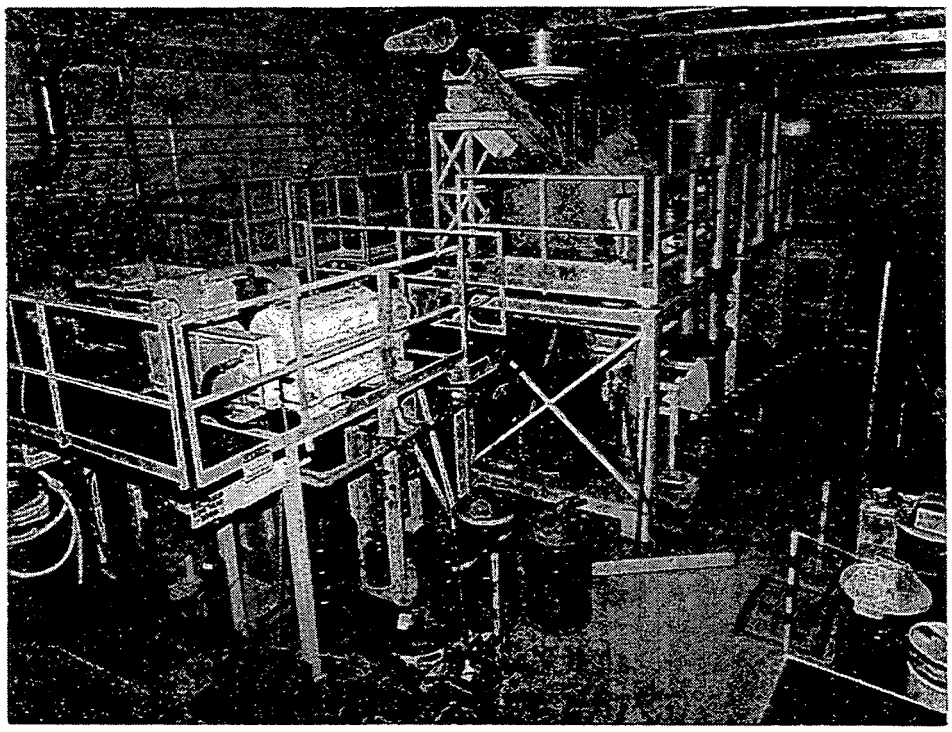

FIGURE E-12 Building 9A - MAWS Process Equipment

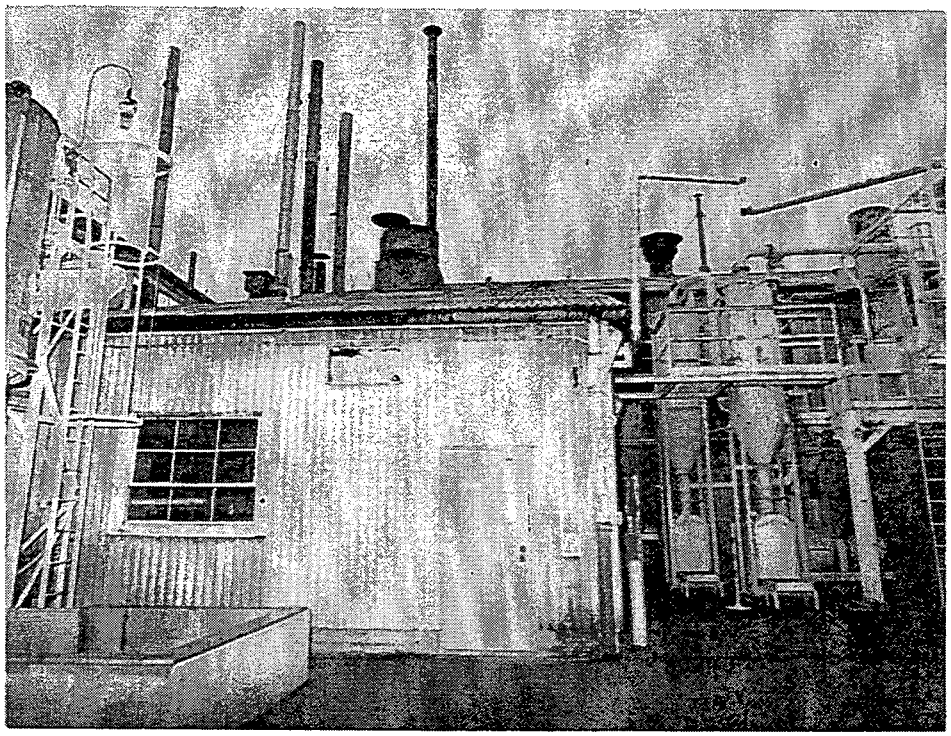

FIGURE E-13 Building 9B - West Elevation, Sump Treatment Facility

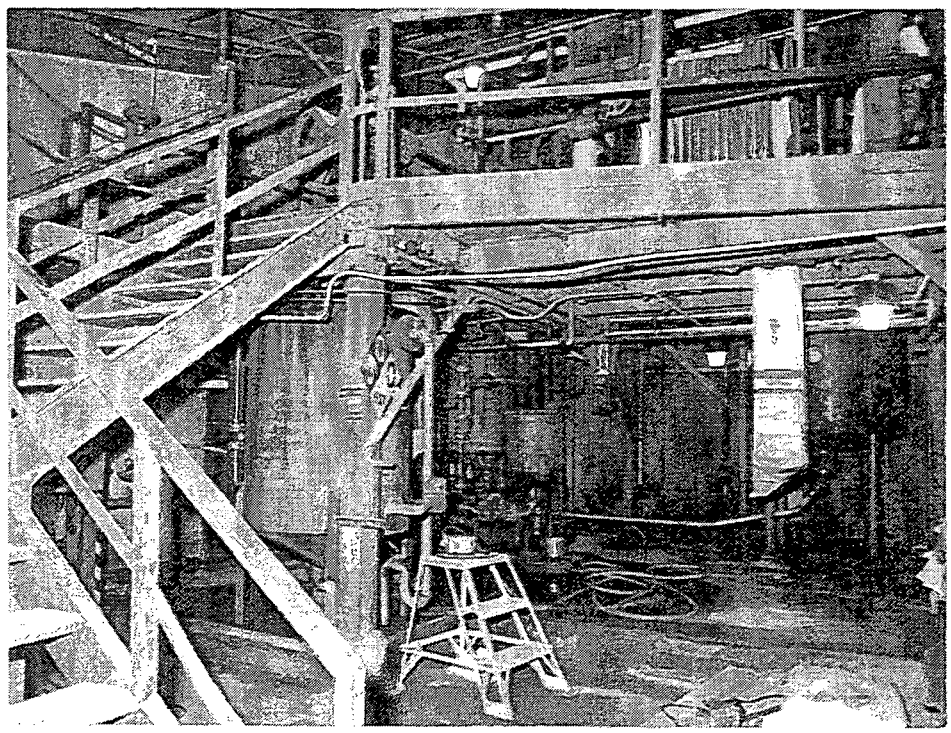

FIGURE E-14 Building 9B - Sump Treatment Tanks and Filter Press

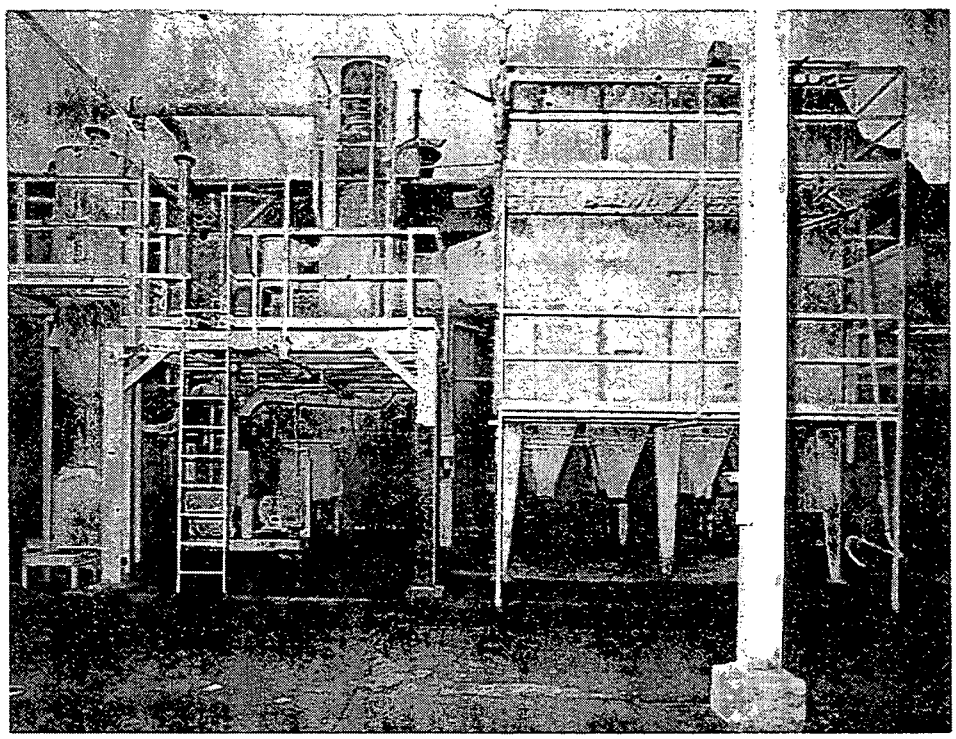

FIGURE E-15 Building 9C - Dust Collector, West Elevation

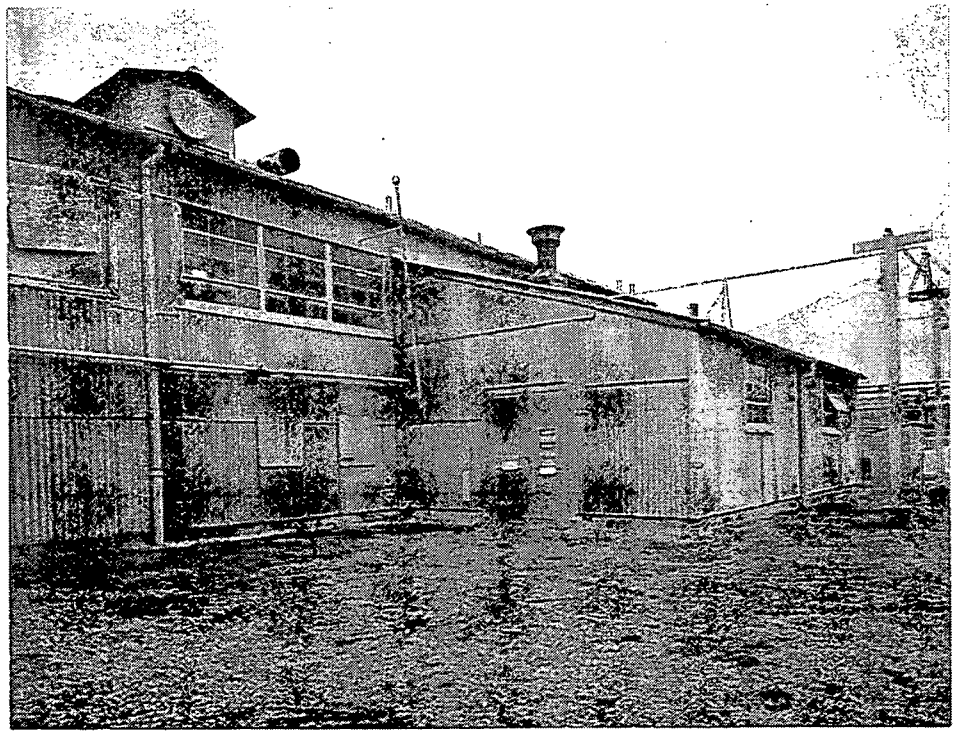

FIGURE E-16 Building 9D - Electrical Substation, Northwest Elevation

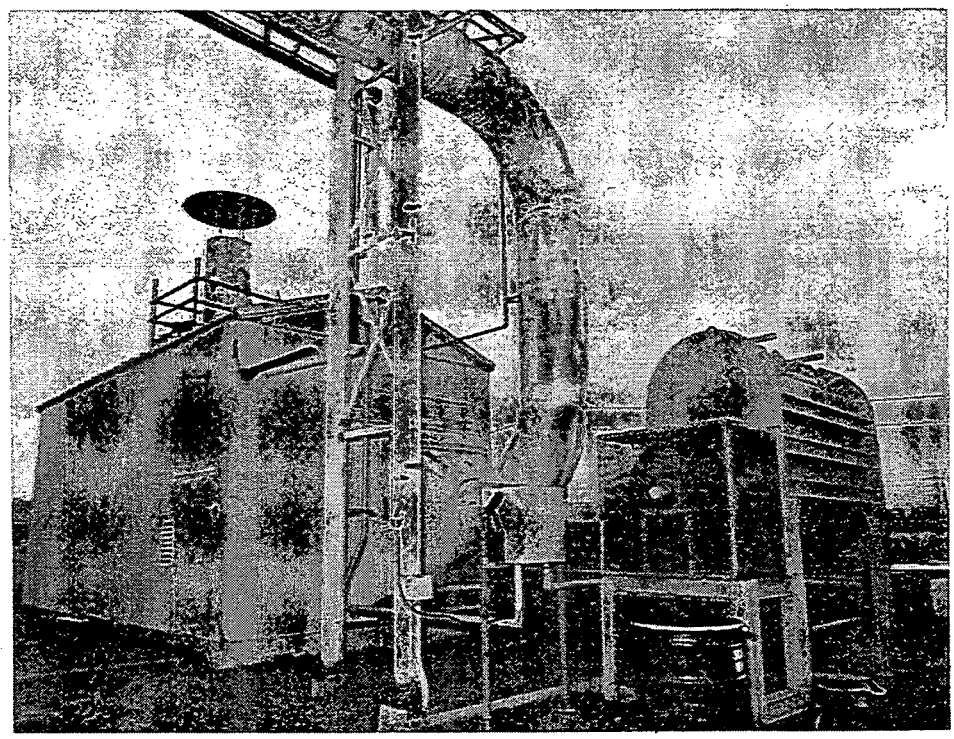

FIGURE E-17 Building 9F - Electrostatic Precipitator, Southwest Elevation

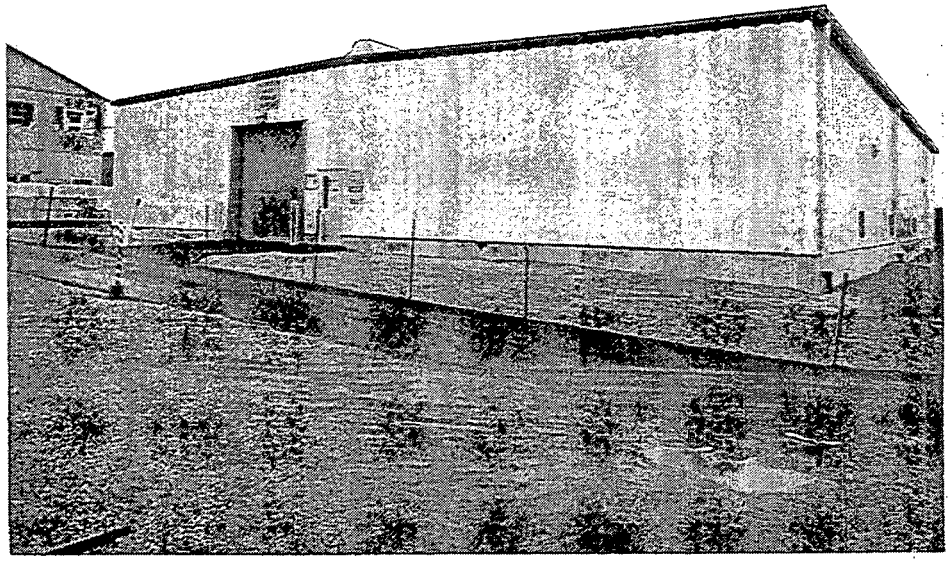

FIGURE E-18 Building 81 - West Elevation

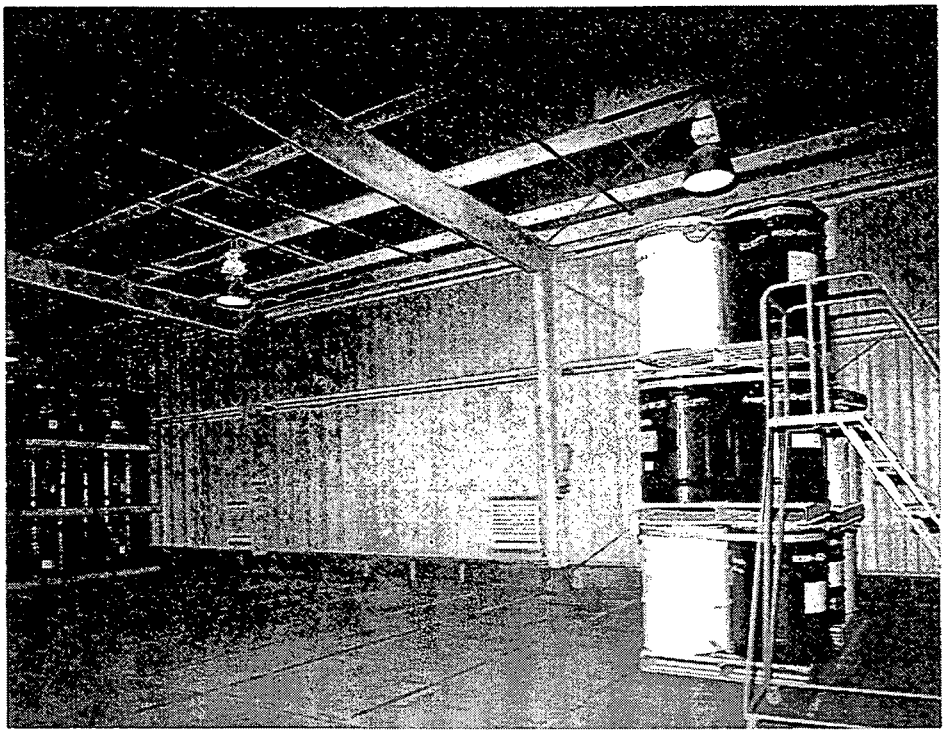

FIGURE E-19 Building 81 - Interior, North Wall

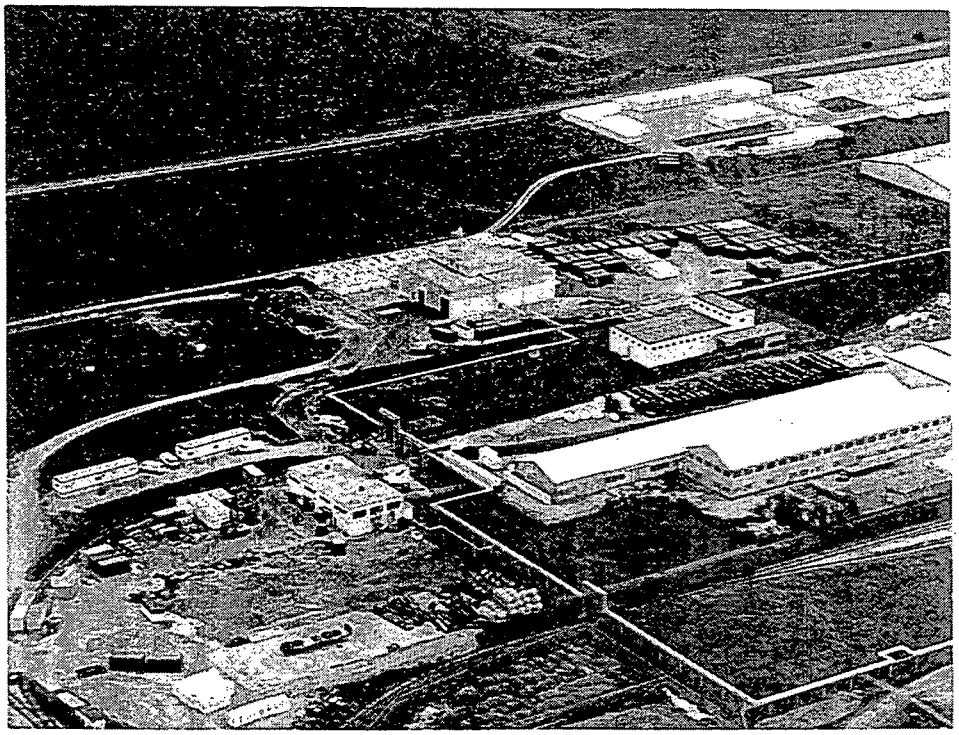

FIGURE E-20 Aerial View of Thorium Complex

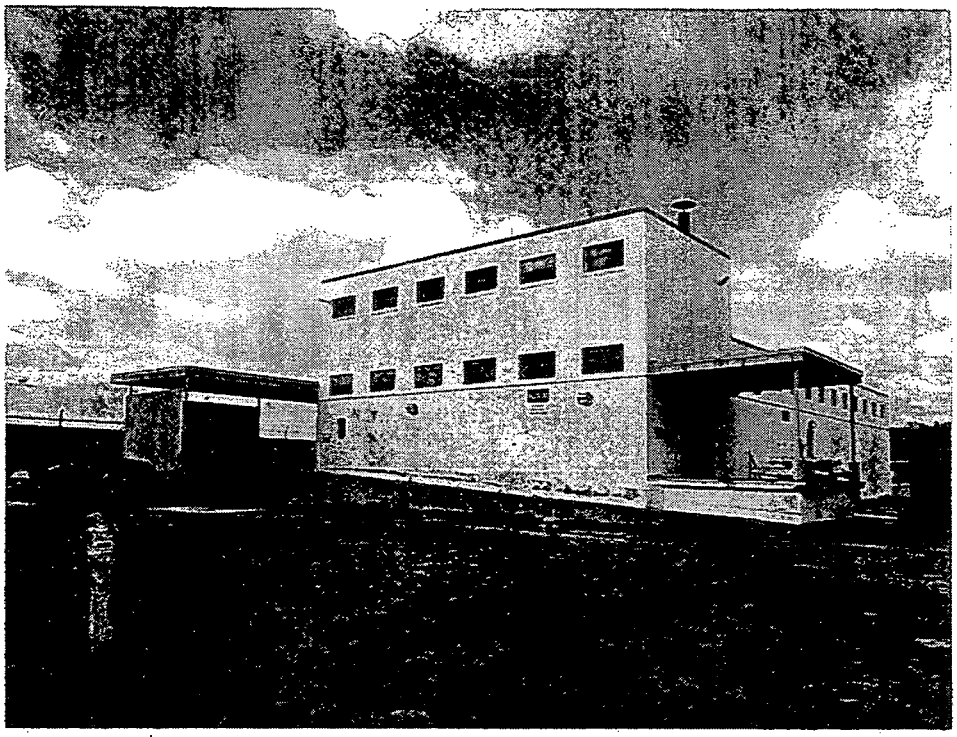

FIGURE E-21 Building 32A and 32B - Southeast Elevation

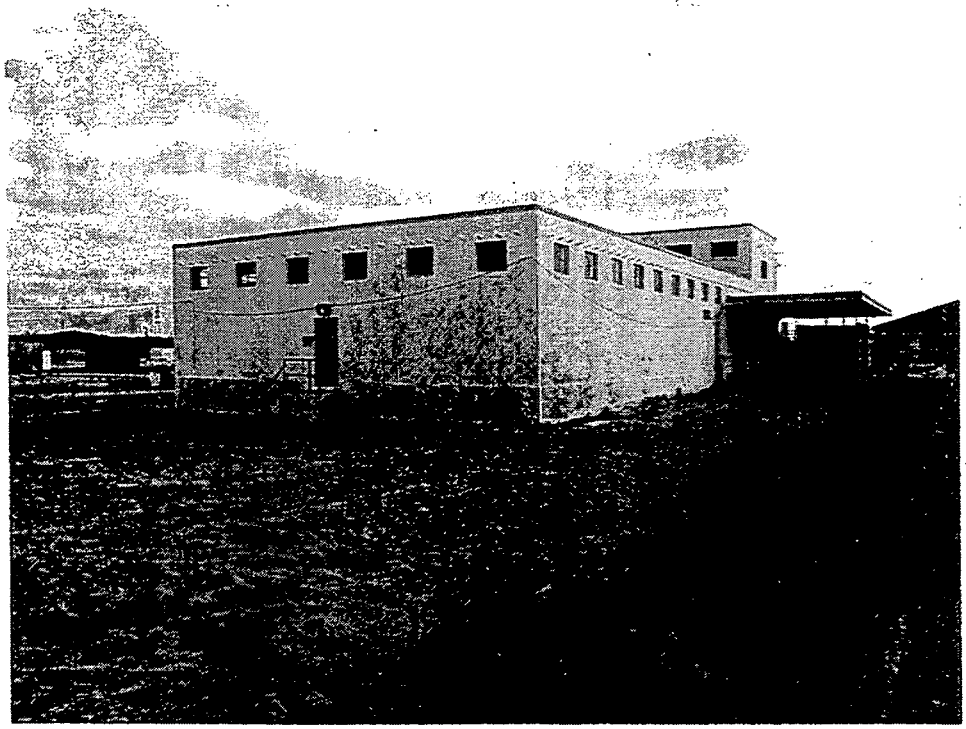

FIGURE E-22 Building 32A and 32B - Northwest Elevation

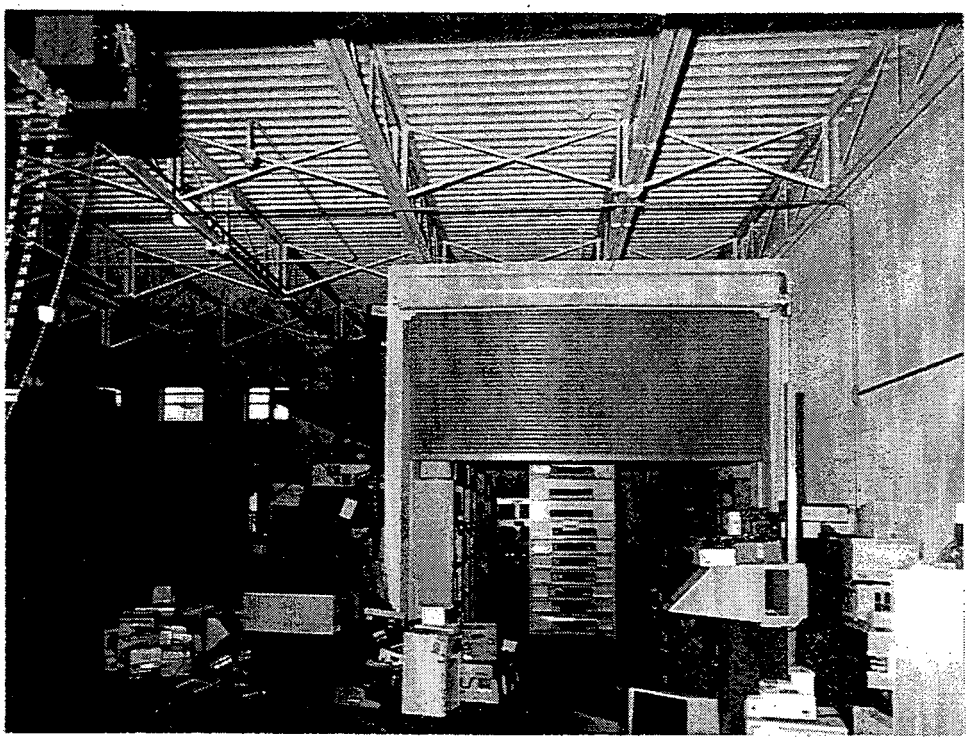

FIGURE E-23 Building 32A - Structural Steel, Overhead Door, Masonry Block

FIGURE E-24 Building 32A - Structural Steel and Corrugated Roofing

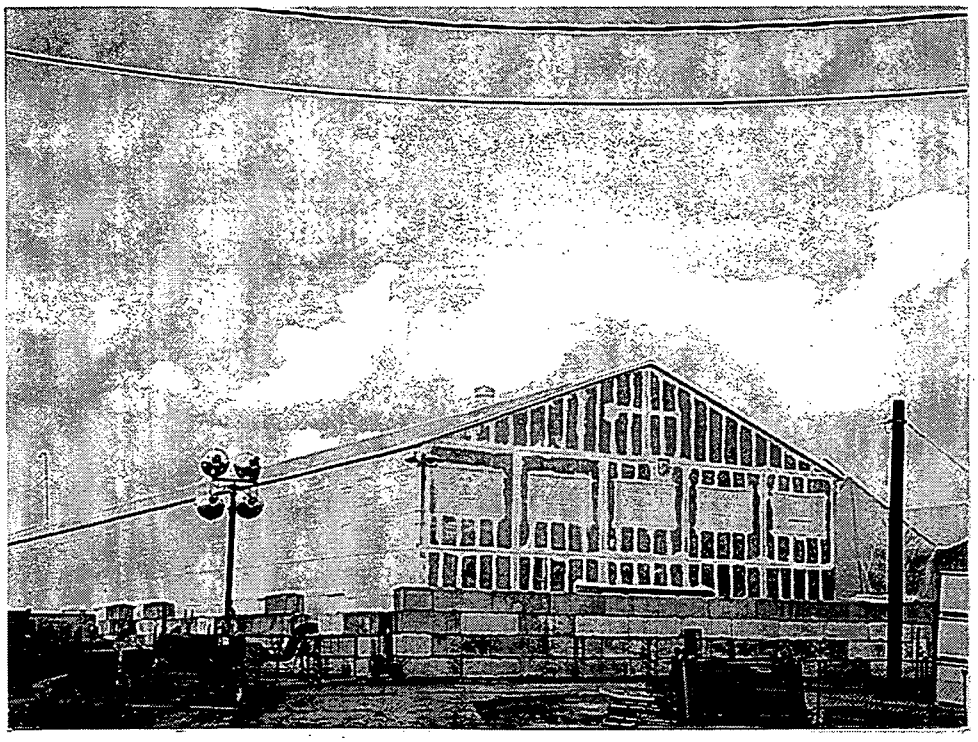

FIGURE E-25 Building 65 - South Elevation

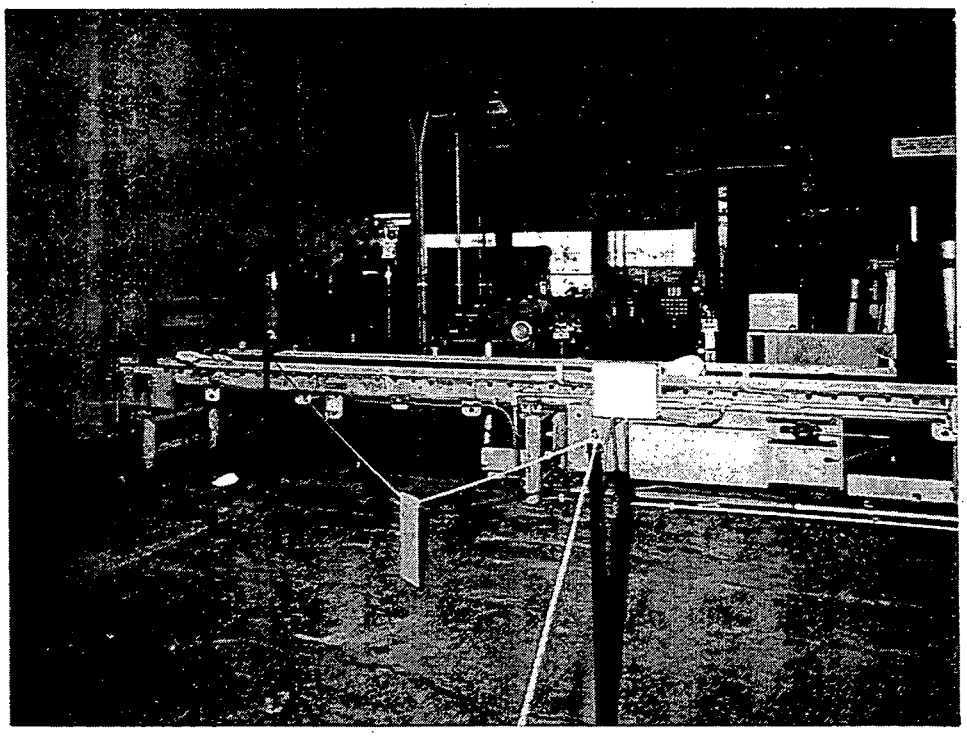

FIGURE E-26 Building 64 - Process Machines and Conveyor

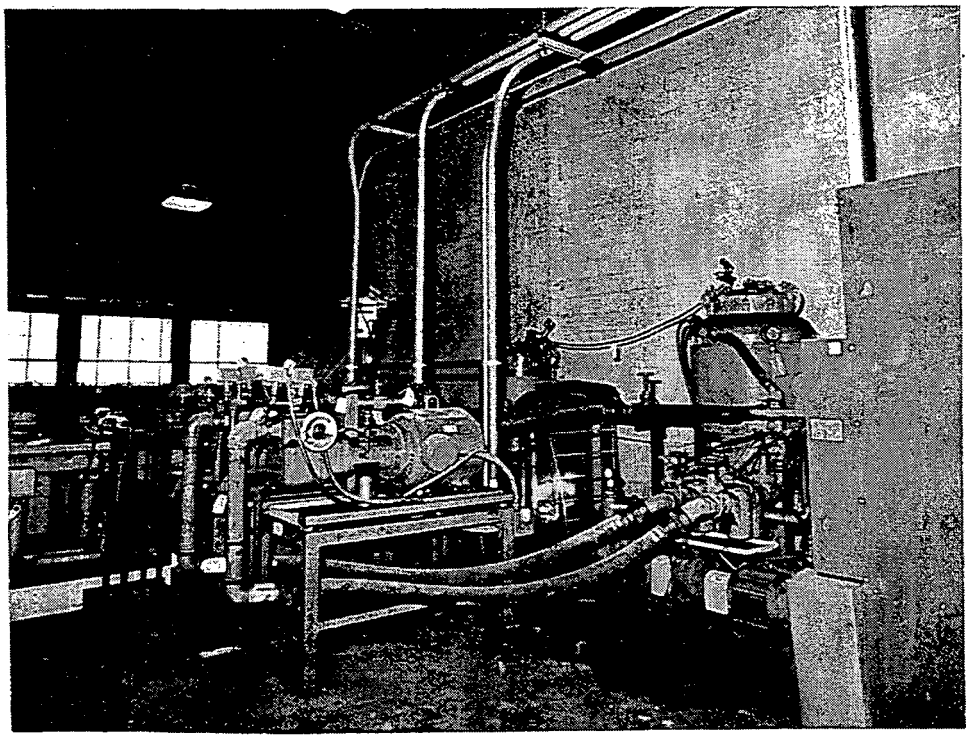

FIGURE E-27 Building 64 - Machine Units and Masonry Block

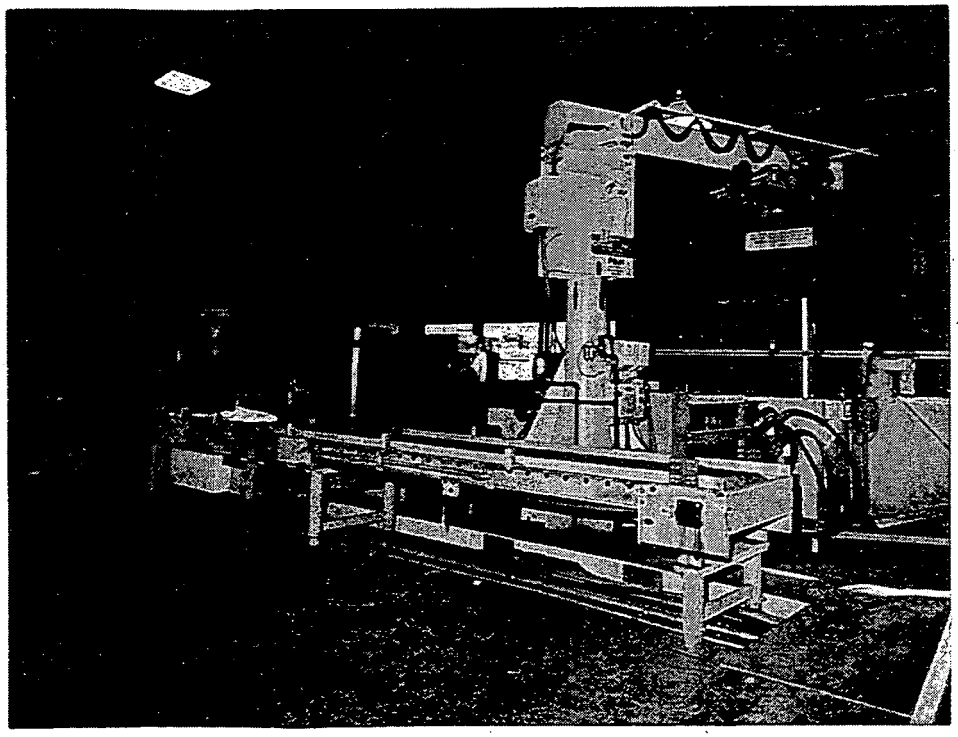

FIGURE E-28 Building 64 - Structural Crane and Conveyor

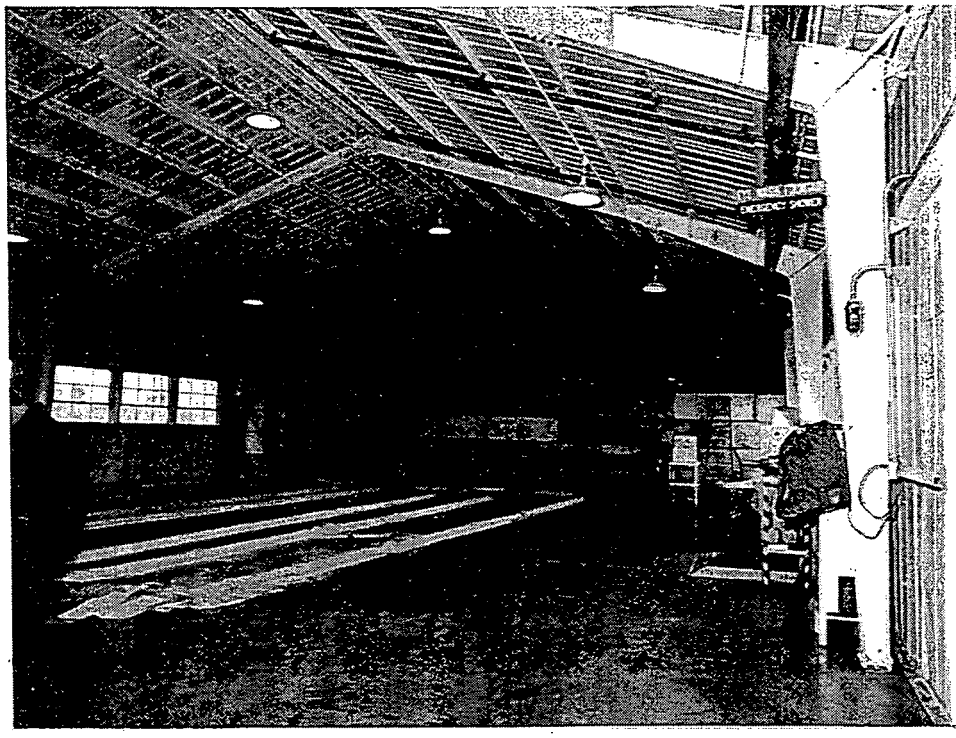

FIGURE E-29 Building 64 - Interior Structural Steel

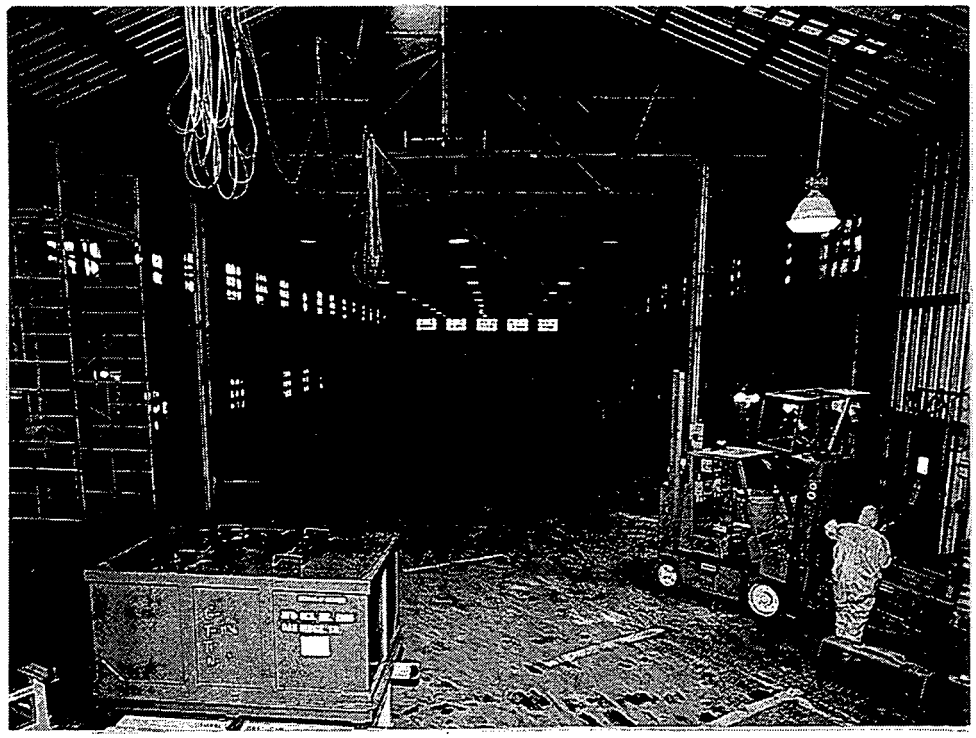

FIGURE E-30 Building 65 - Interior Structural Steel

FIGURE E-31 Building 78 - Southwest Elevation

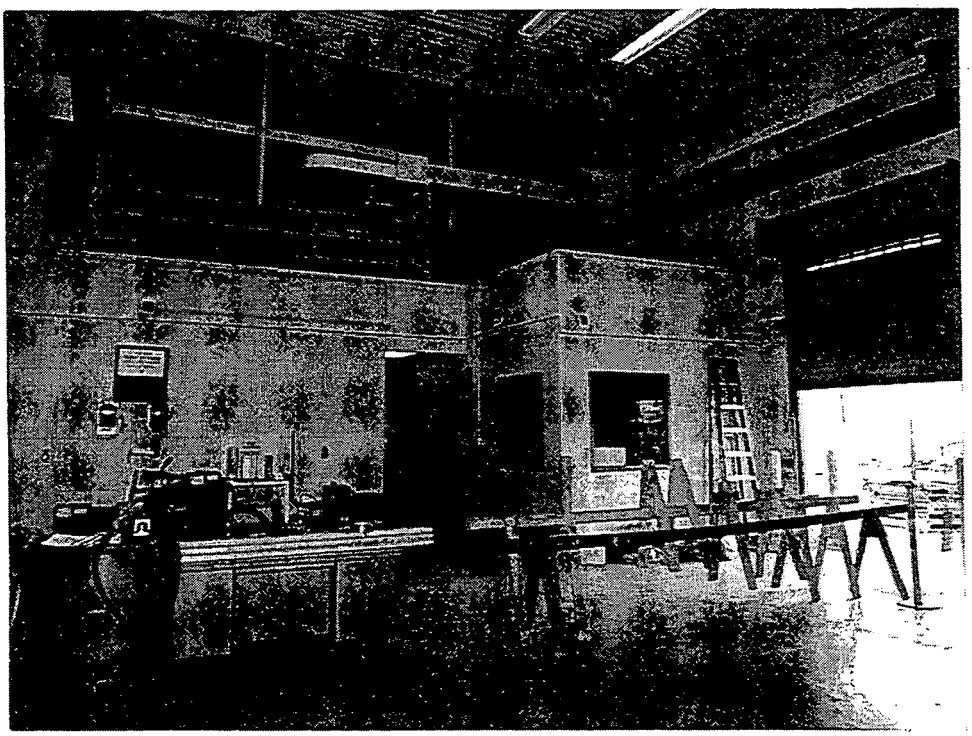

FIGURE E-32 Building 78 - First Floor, Office

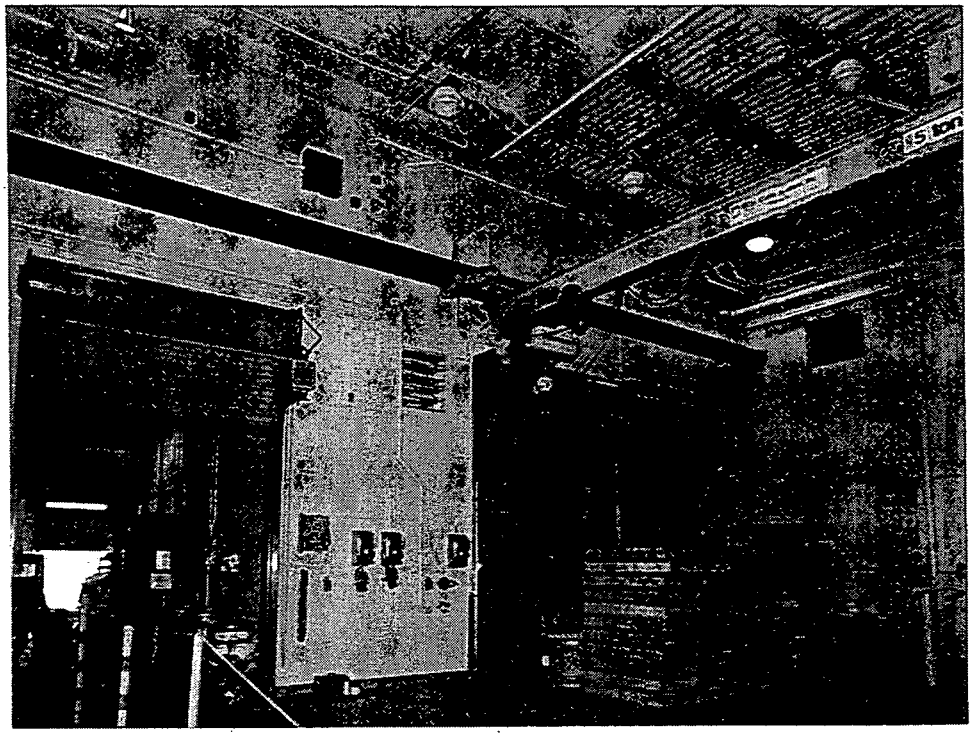

FIGURE E-33 Building 78 - First Floor, 5-Ton Crane and Roll-up Door

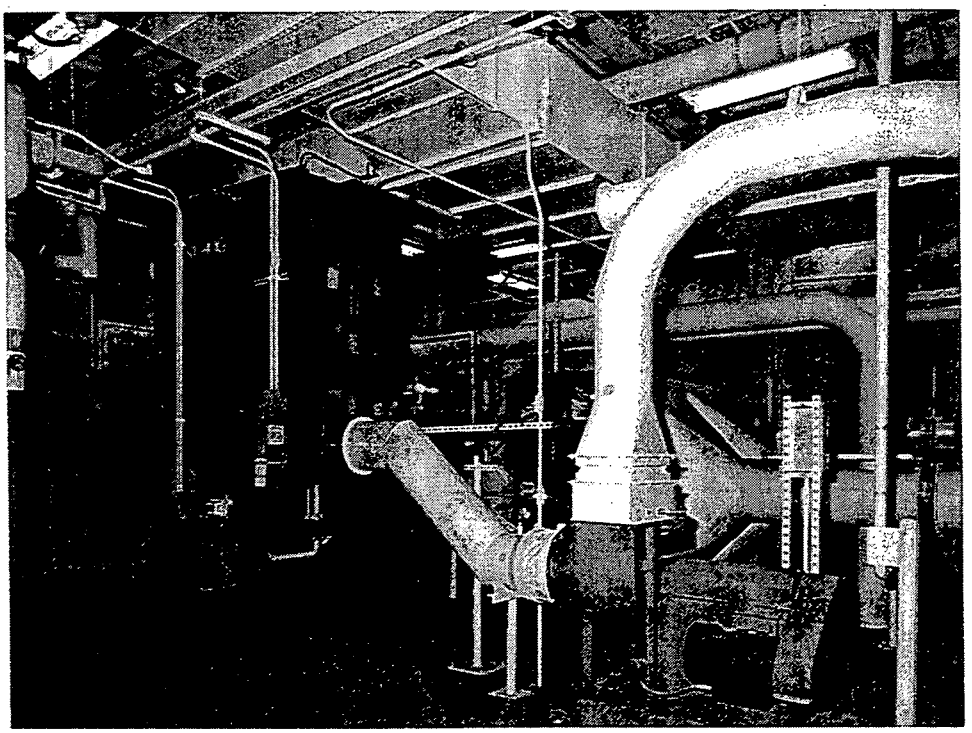

FIGURE E-34 Building 78 - Second Floor, Process Equipment

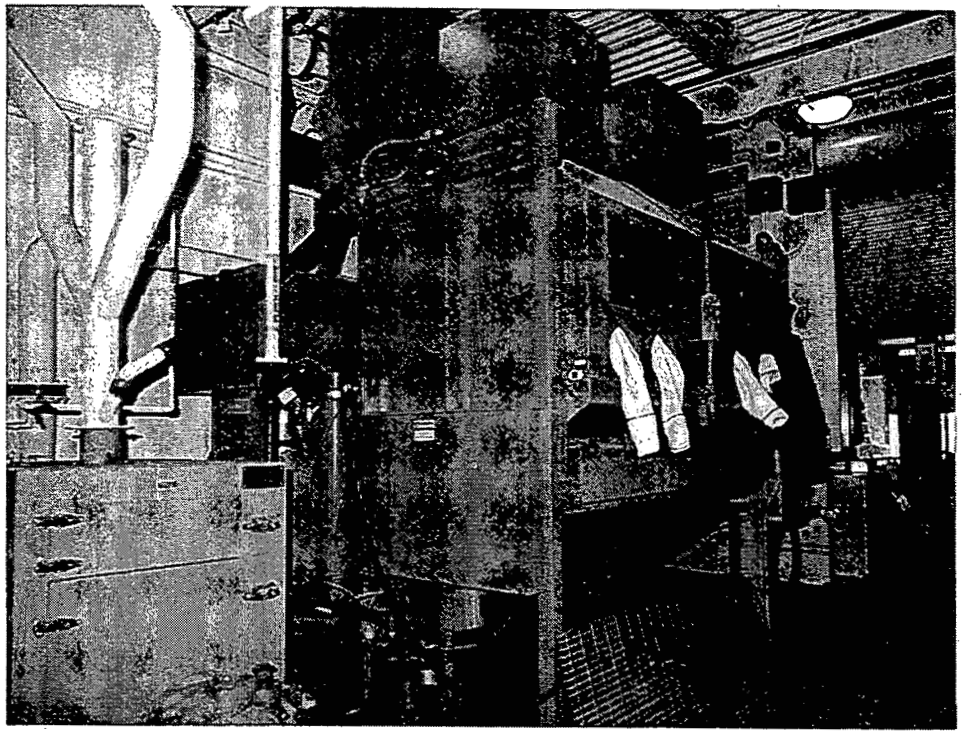
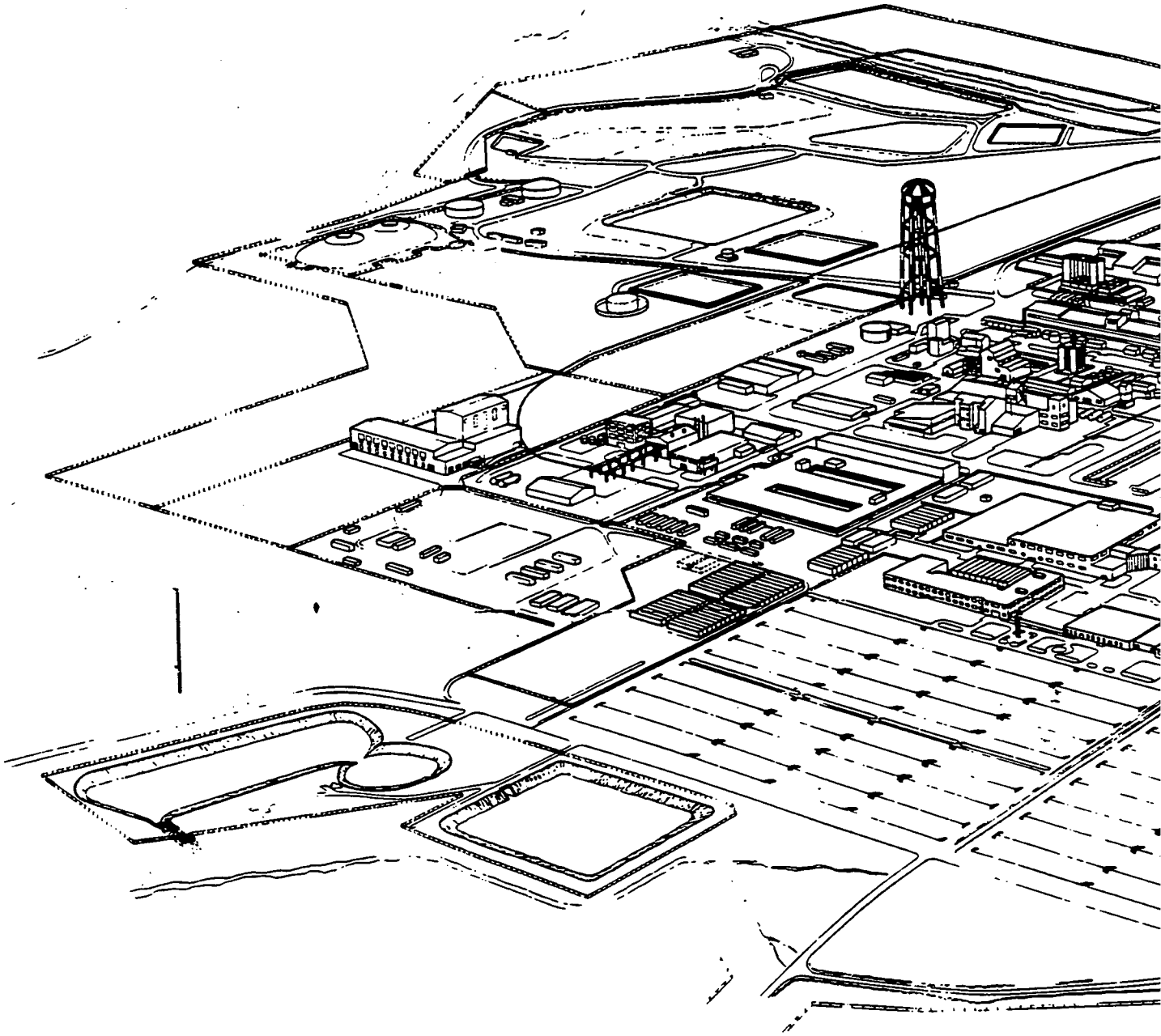
FIGURE E-35 Building 78 - Second Floor, Glove Bag Unit