

FERNALD CLEANUP PROGRESS BRIEFING

February 11, 2003

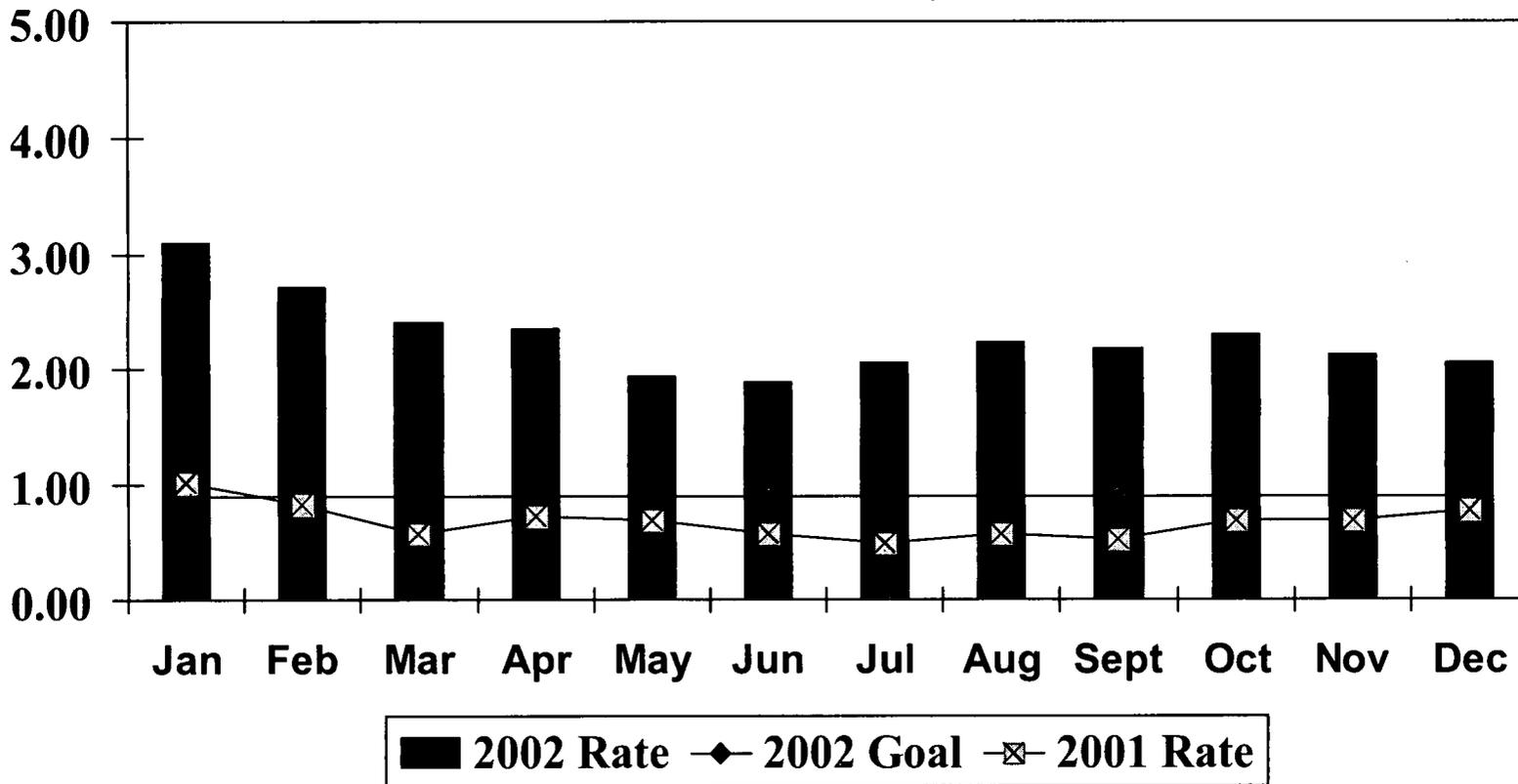
**Project Update:
Silos 1 and 2 Treatment Facility**

**Presenter:
Ray Corradi**



FERNALD
Closure Project

2001 - 2002 OSHA RECORDABLE INCIDENCE RATE

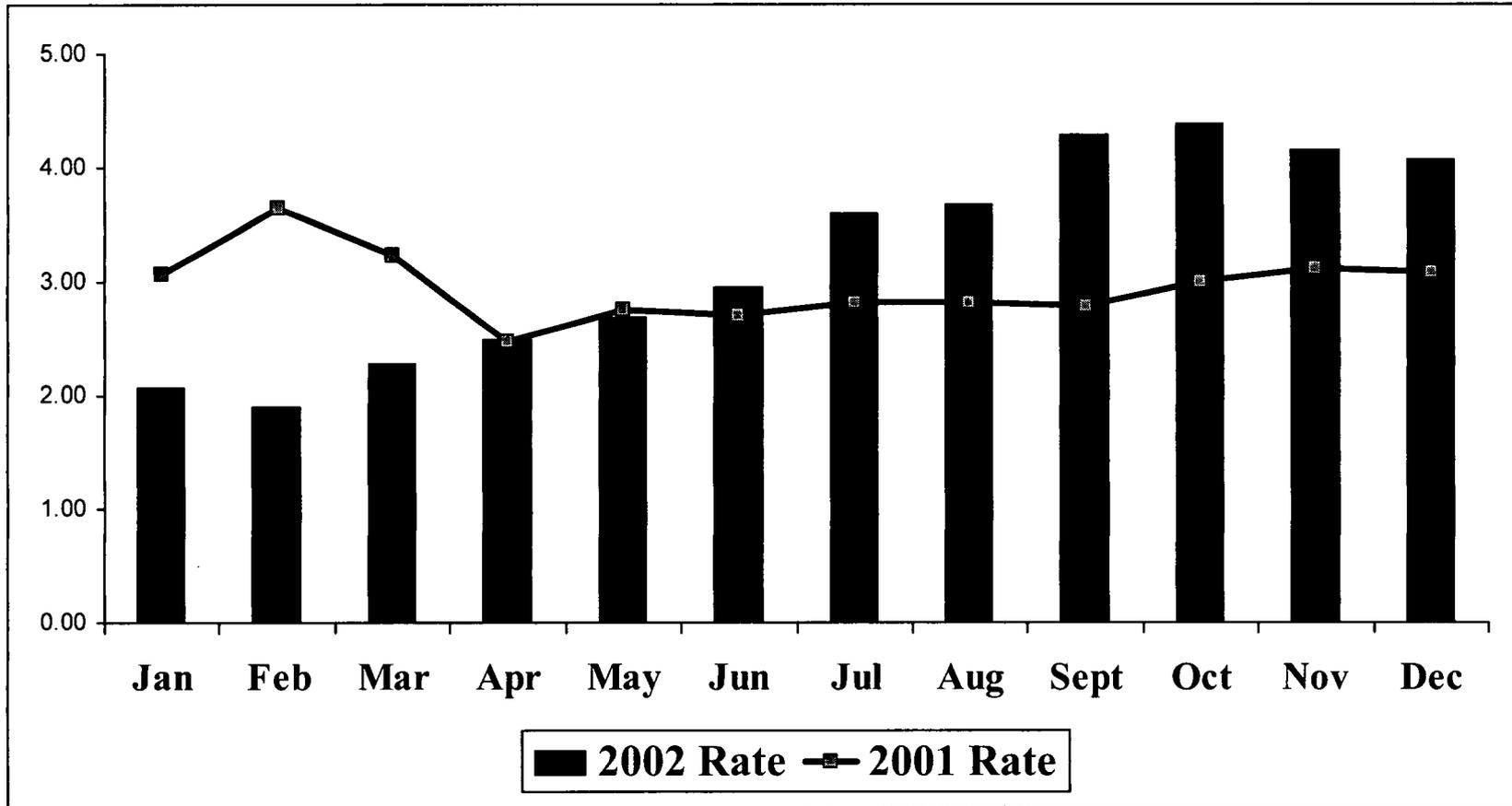


Graphics 7783-01.A

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VAD



2001-2002 FIRST AID INCIDENCE RATE



SILOS PROJECT

Scope

- **Accelerated Waste Retrieval (AWR) Project**
 - **Retrieve 8,900 cubic yards of radium-bearing wastes and place into 4 transfer tanks**

- **Silos 1 and 2 Final Remedial Action**
 - **Stabilize the wastes with cement and flyash, place into steel shipping containers and ship off site for disposal**

Graphic 7783-01

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SILOS PROJECT

Cleanup Remedy

- **Record of Decision signed in December 1994**
- **Record of Decision Amendment for Operable Unit 4 Silos 1 and 2 Remedial Action approved in July 2000**
- **Remove waste using sluice and pump process**
- **Stabilize waste to reduce leachability and decrease moisture content**

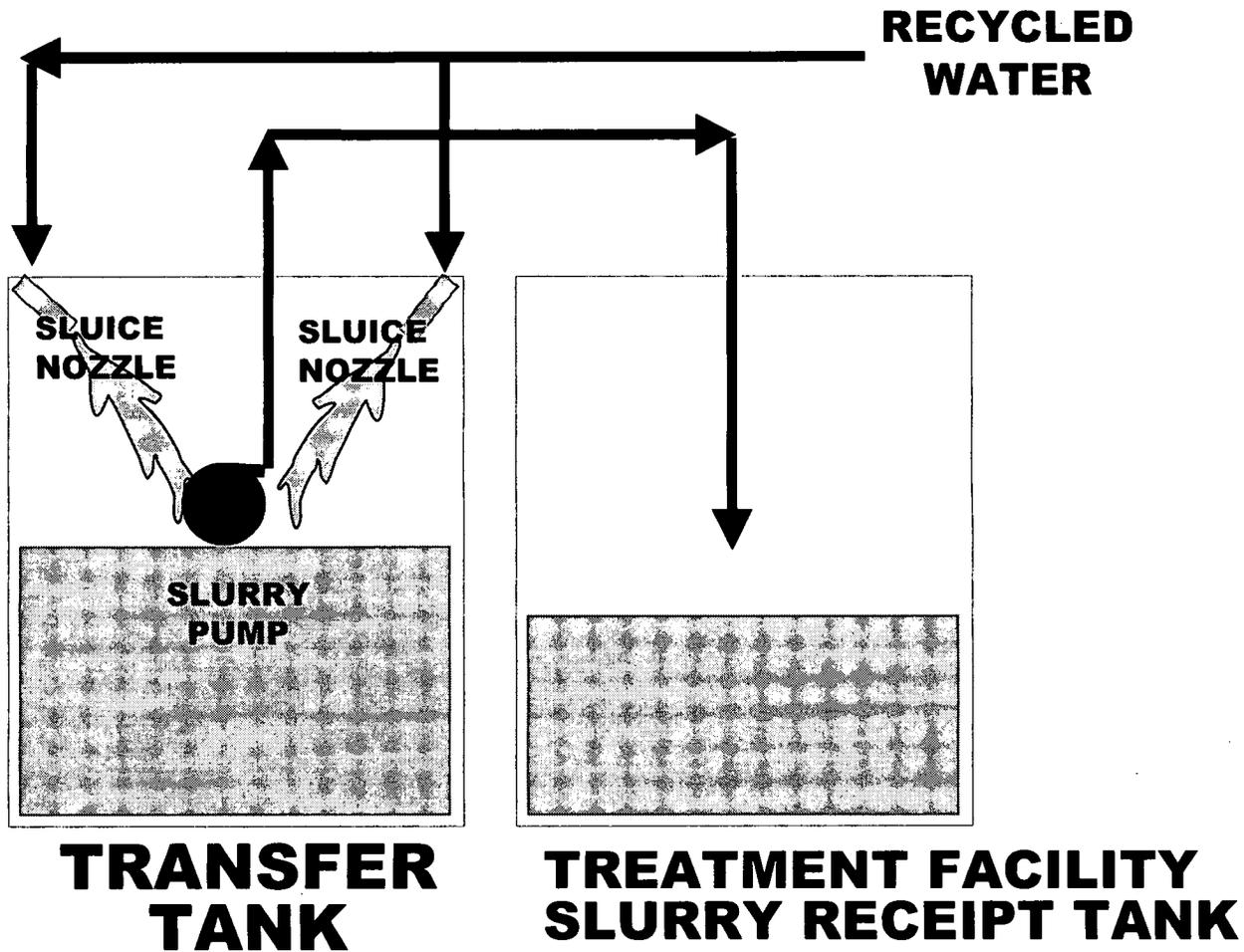
SILOS 1 AND 2

Conceptual Design

- **Sluice material from transfer tanks as a thin slurry**
- **Pipes will carry to remediation facility**
- **Remove water**
 - **Using standard vendor design clarifier**
 - **Treatability study to determine dewatering aids**
- **Stabilization to immobilize lead**
 - **Flowable grout**
 - **Treatability study to verify reagent requirements**
- **Load grout into suitable package for shipment and off-site disposal**

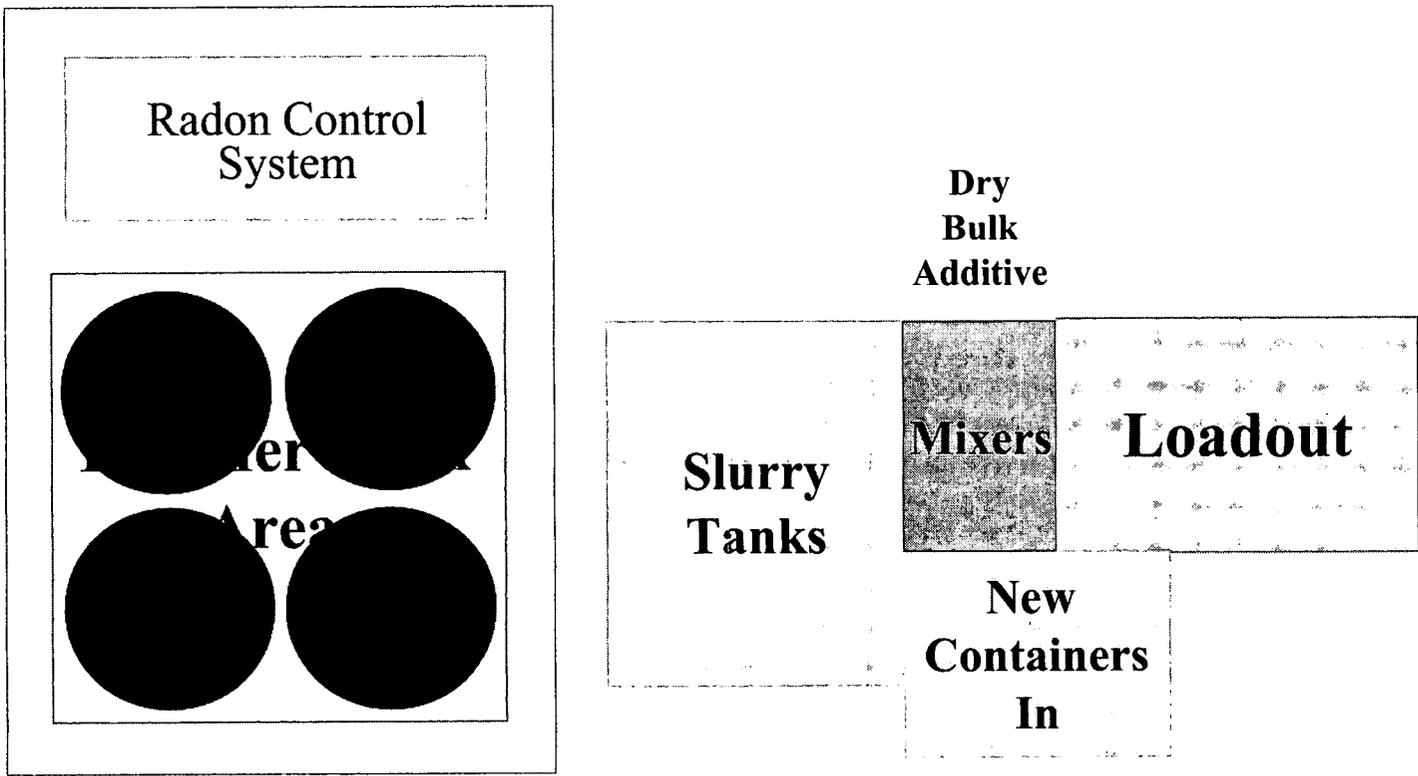
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AWR INTERFACE WITH TREATMENT



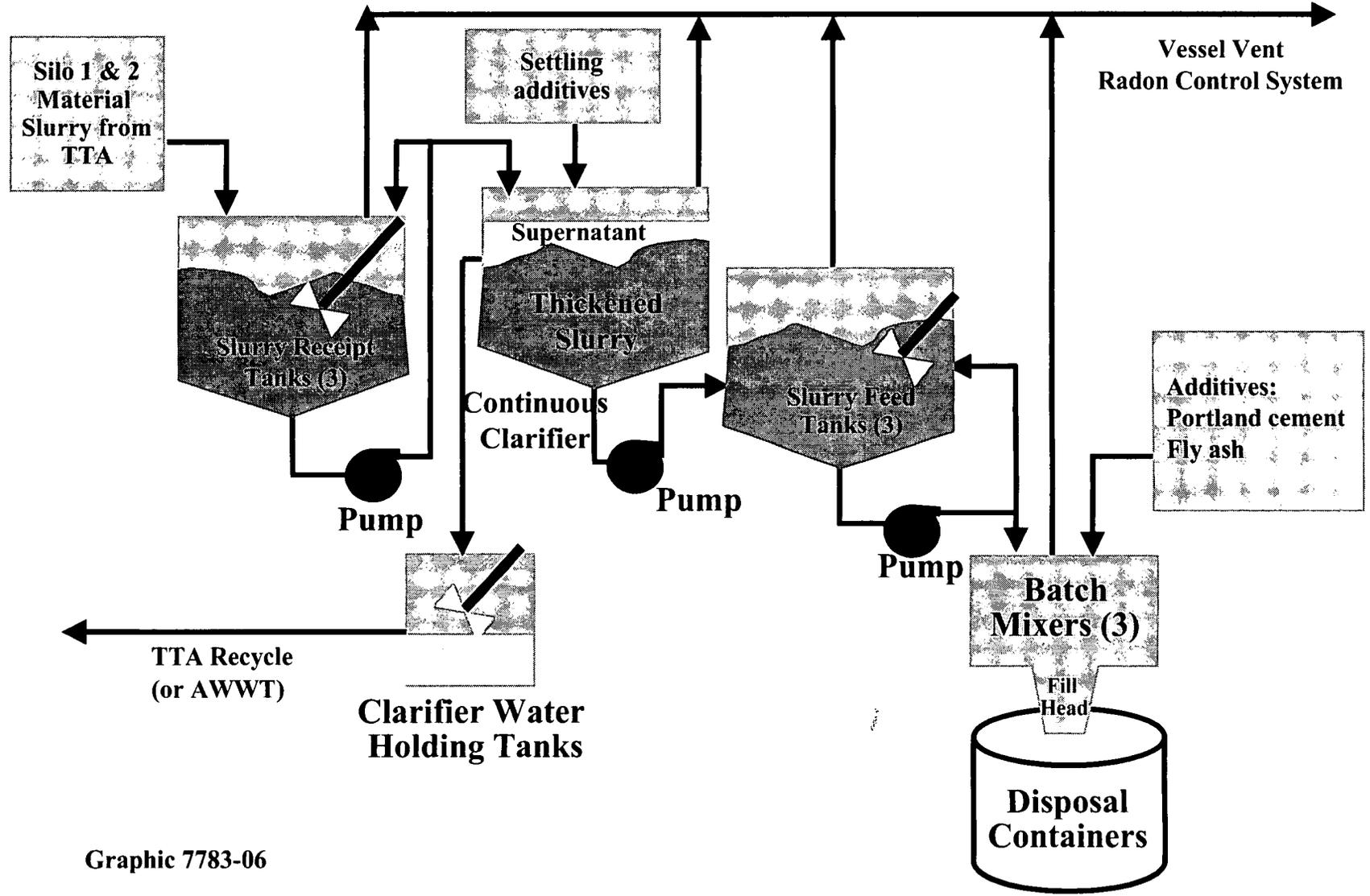
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SILOS 1 AND 2 KEY PLAN



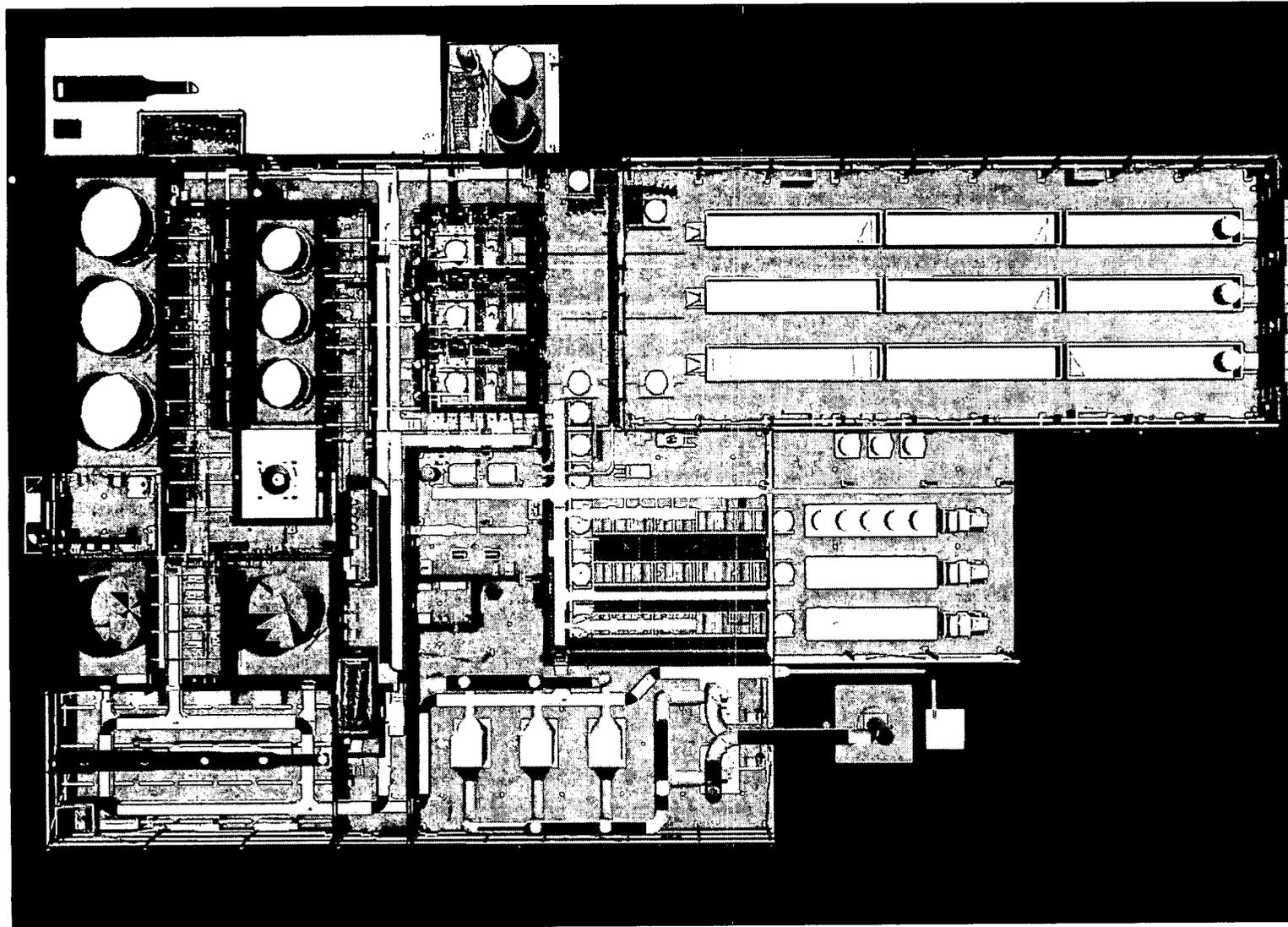
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SILOS 1 AND 2 REMEDIATION PROCESS DIAGRAM



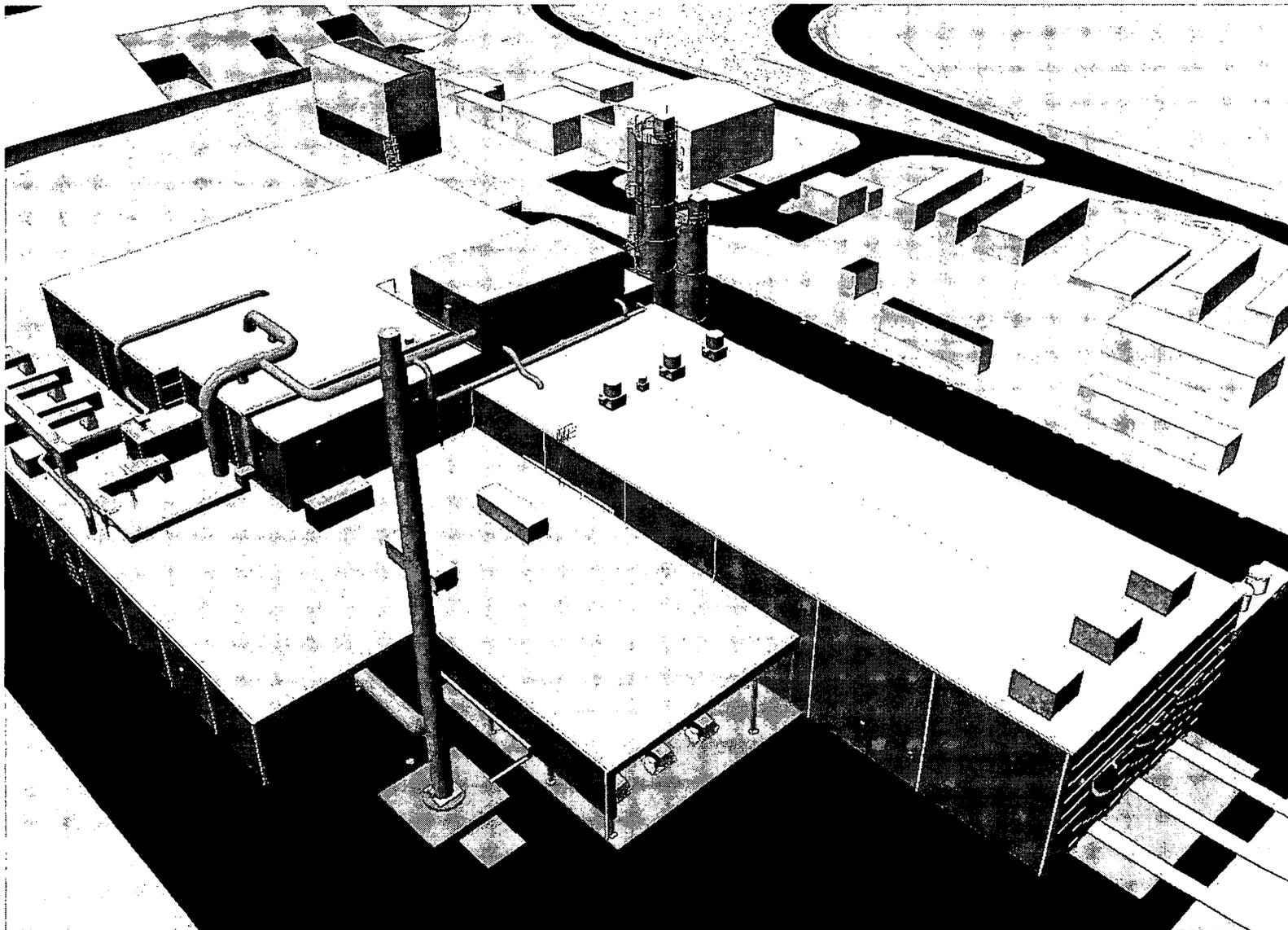
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TREATMENT FACILITY - FIRST FLOOR



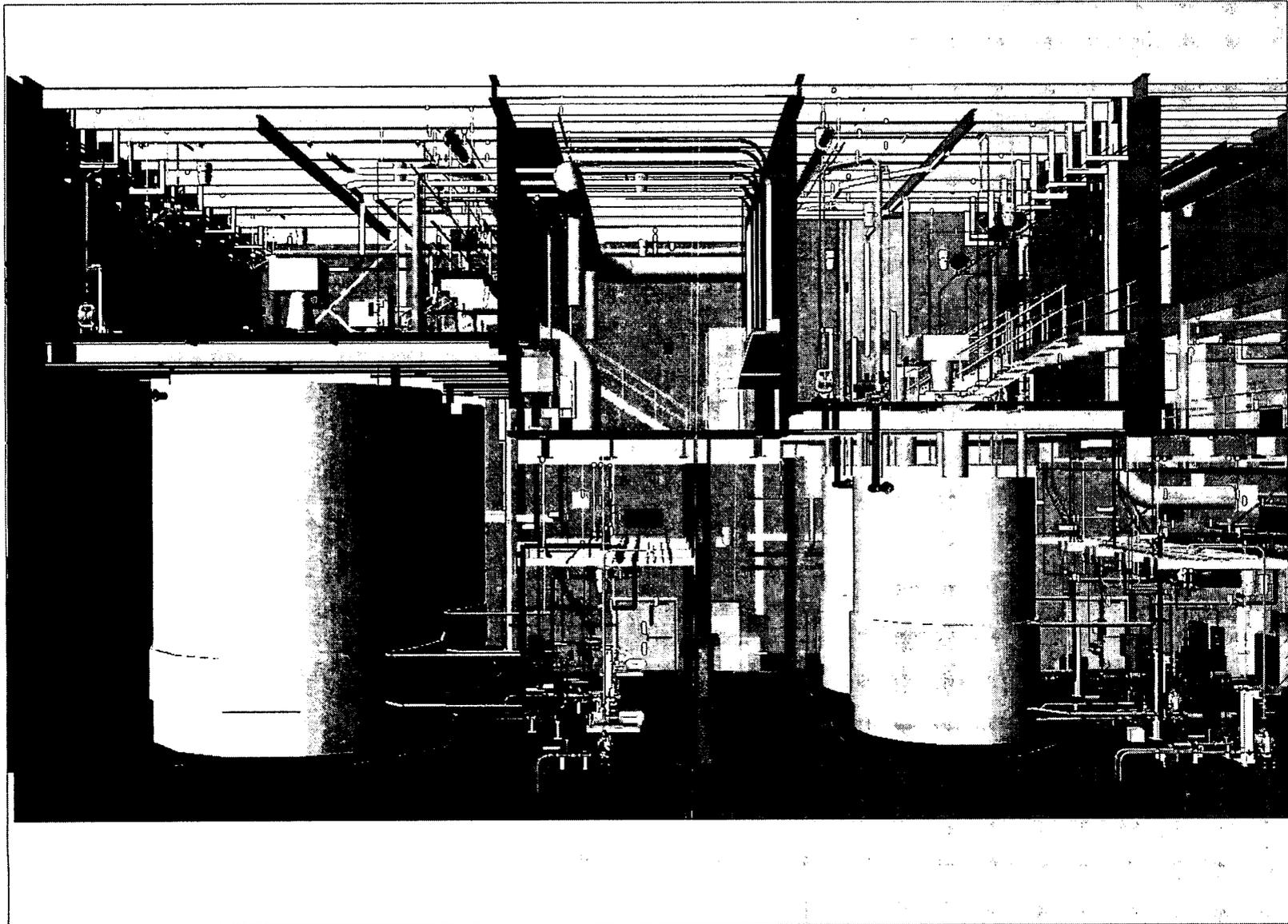
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SILOS 1 AND 2 TREATMENT FACILITY



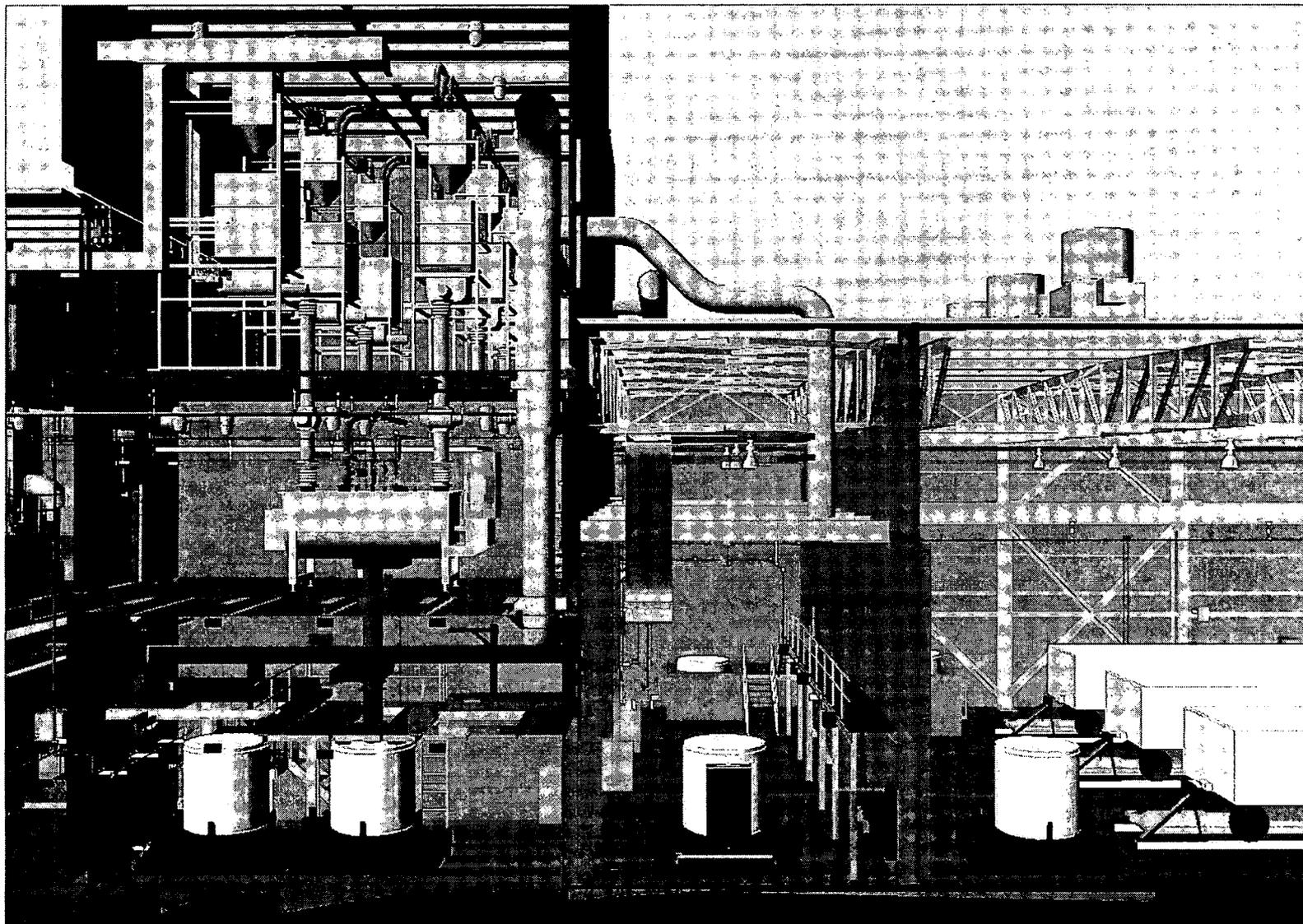
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SLURRY RECEIPT AND FEED TANKS



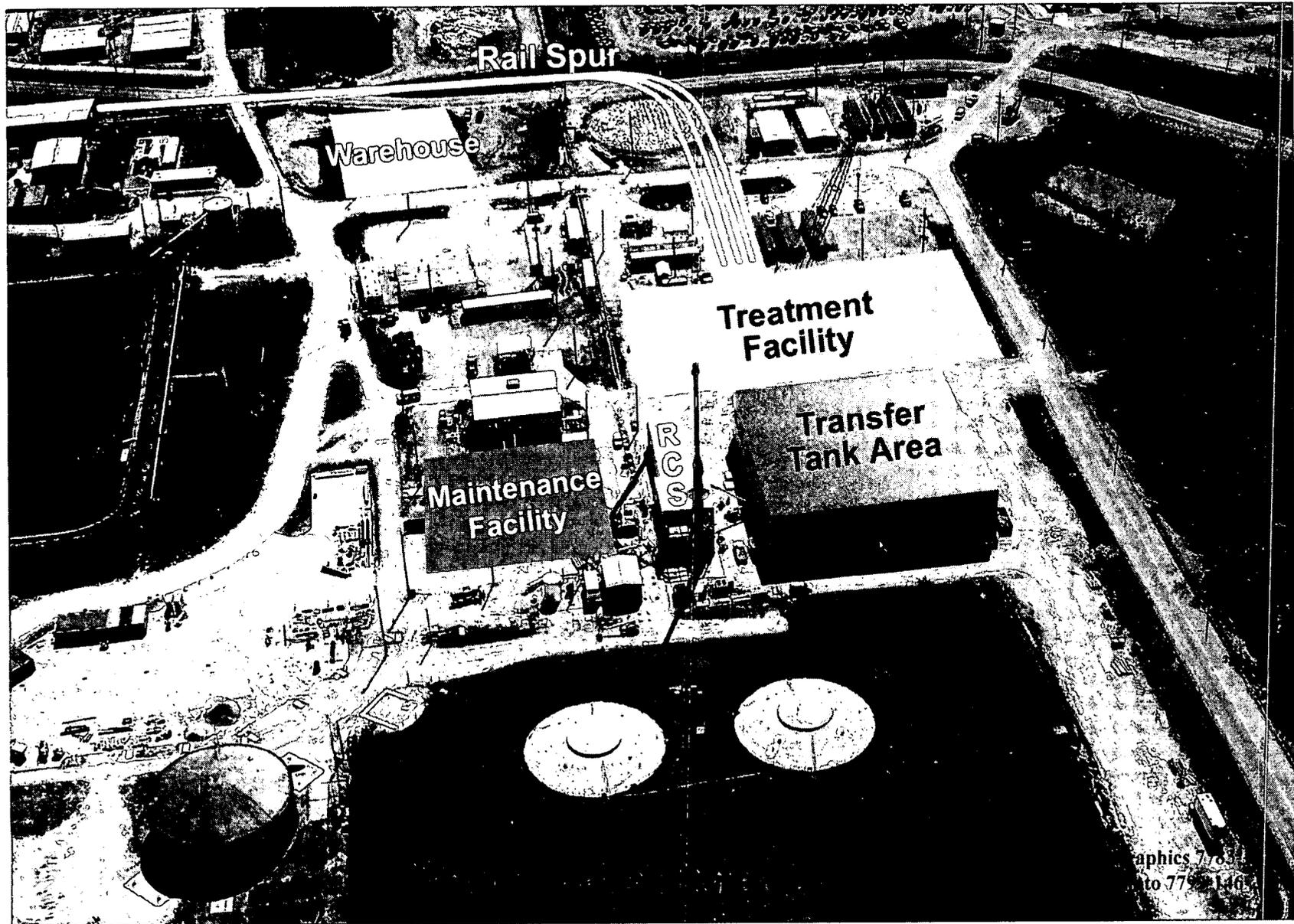
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MIX TOWER AND LOADING AREA



Graphic 7783-10

SILOS 1 AND 2 FACILITIES AND RAIL SPUR



Graphics 7/63
to 77-146

SILOS 1 AND 2

Container Design

- **Integrated container design with handling, filling and lidding system designs**
- **Integrated container and transportation systems designs for maximum flexibility**
 - **Rail**
 - **Truck**
- **Remote grapple operation**
 - **Minimize worker exposures**

SILOS 1 AND 2

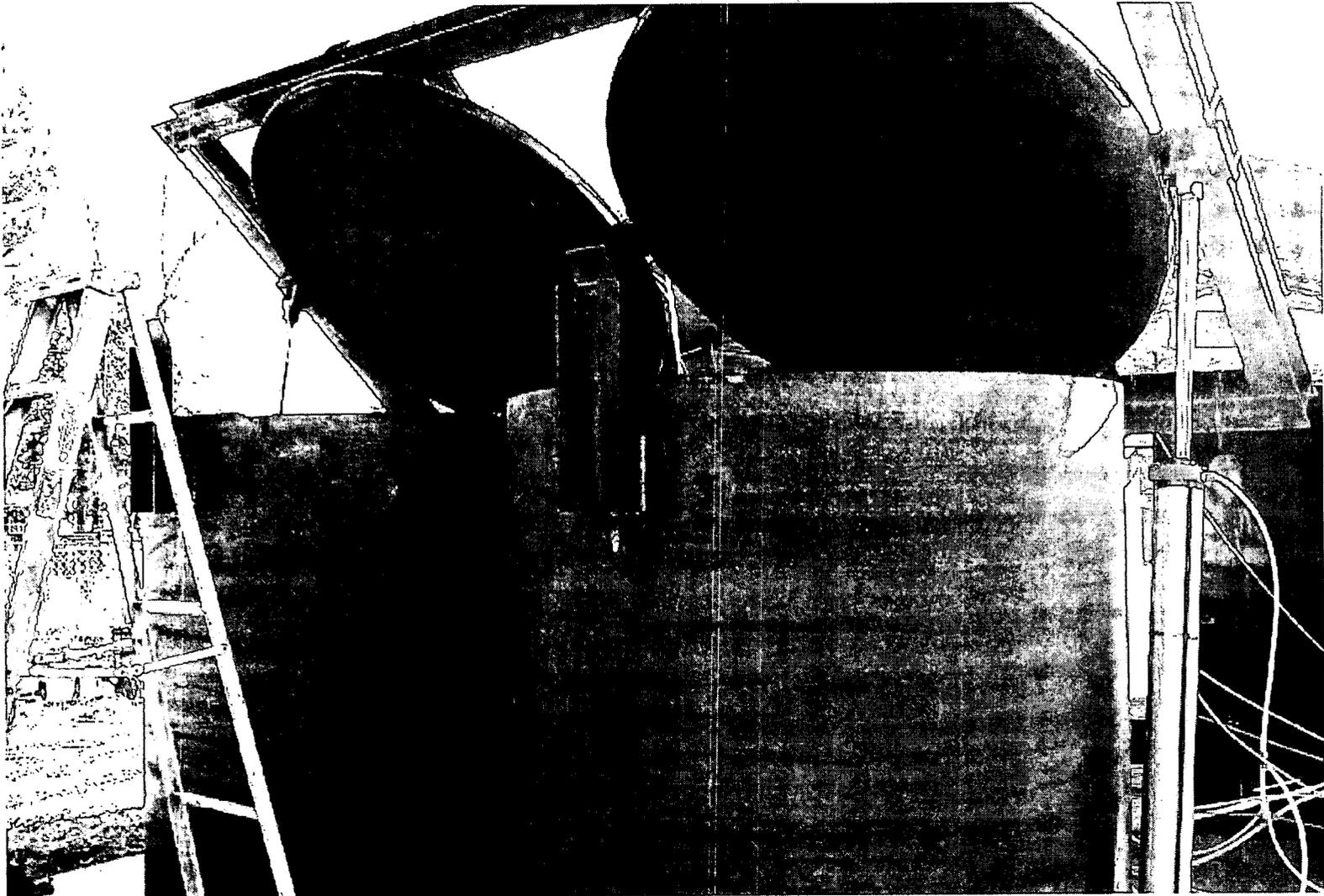
Testing Status

- **Prototype container, handling and transportation systems constructed and tested at various sites in South Carolina, Illinois and Tennessee**
 - **Twelve prototype containers: IP-2 designation including drop tests**
 - **One prototype grapple**
 - **One prototype railcar insert that holds seven containers in place: AAR testing**
 - **January – May 2003**

CONTAINER TOP WITH FILL OPENING AND GRAPPLE RING



PROTOTYPE OF GONDOLA RAILCAR LID MECHANISM



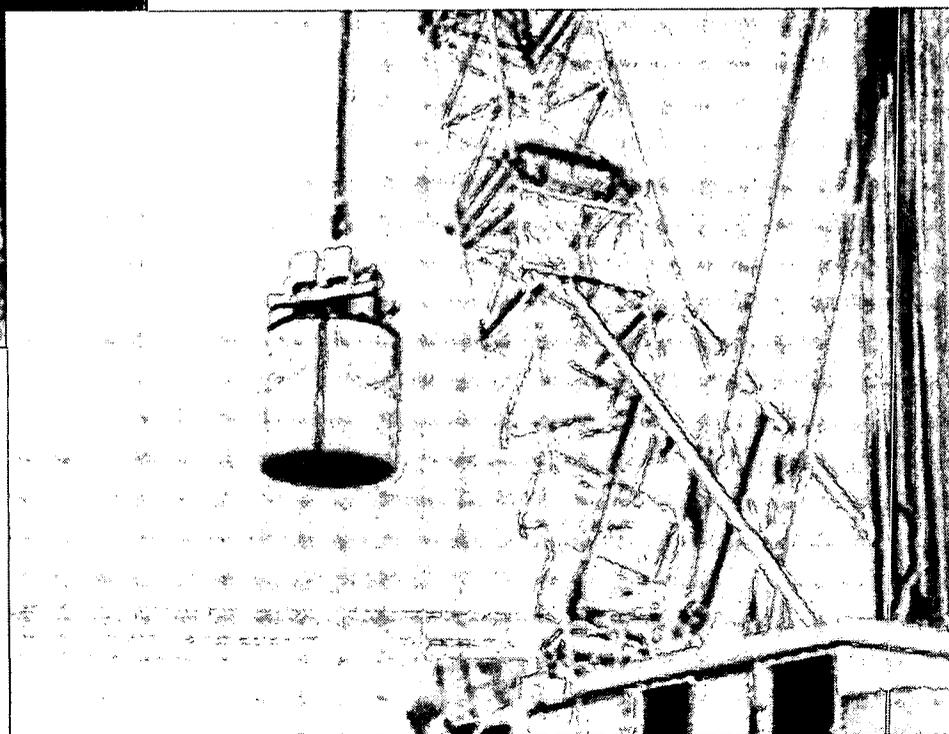
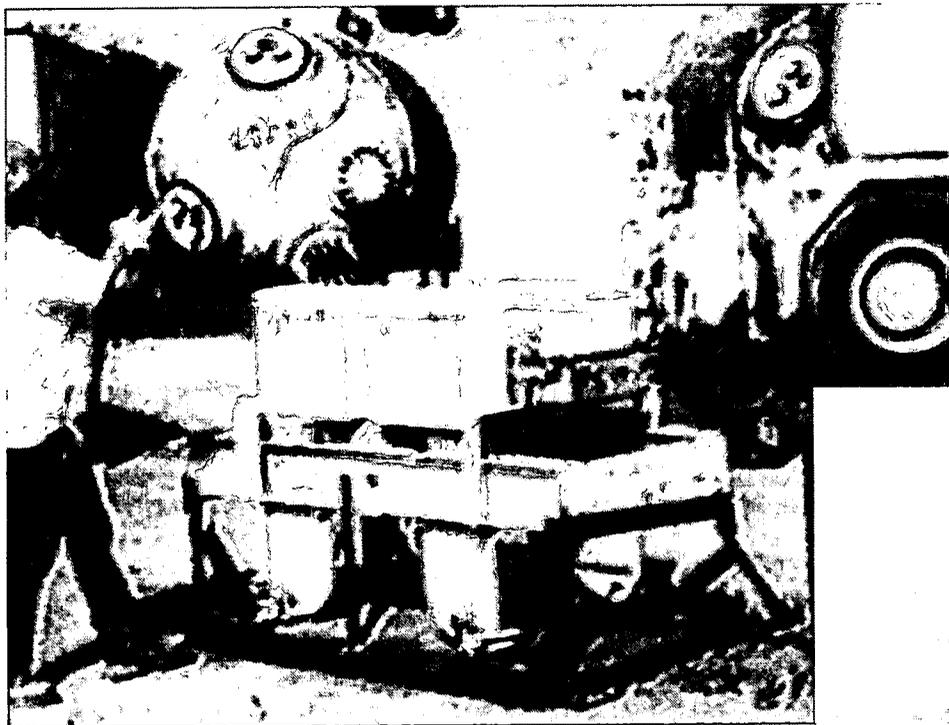
Graphic 7783-15 Photo 7931-D01

PROTOTYPE CONTAINERS



Graphic 7783-16
Photo 7931-D08

GRAPPLER AND GRAPPLER LIFT



Graphics 7783-17
Photos 7774-D1 & 7774-D2 Video Grabs

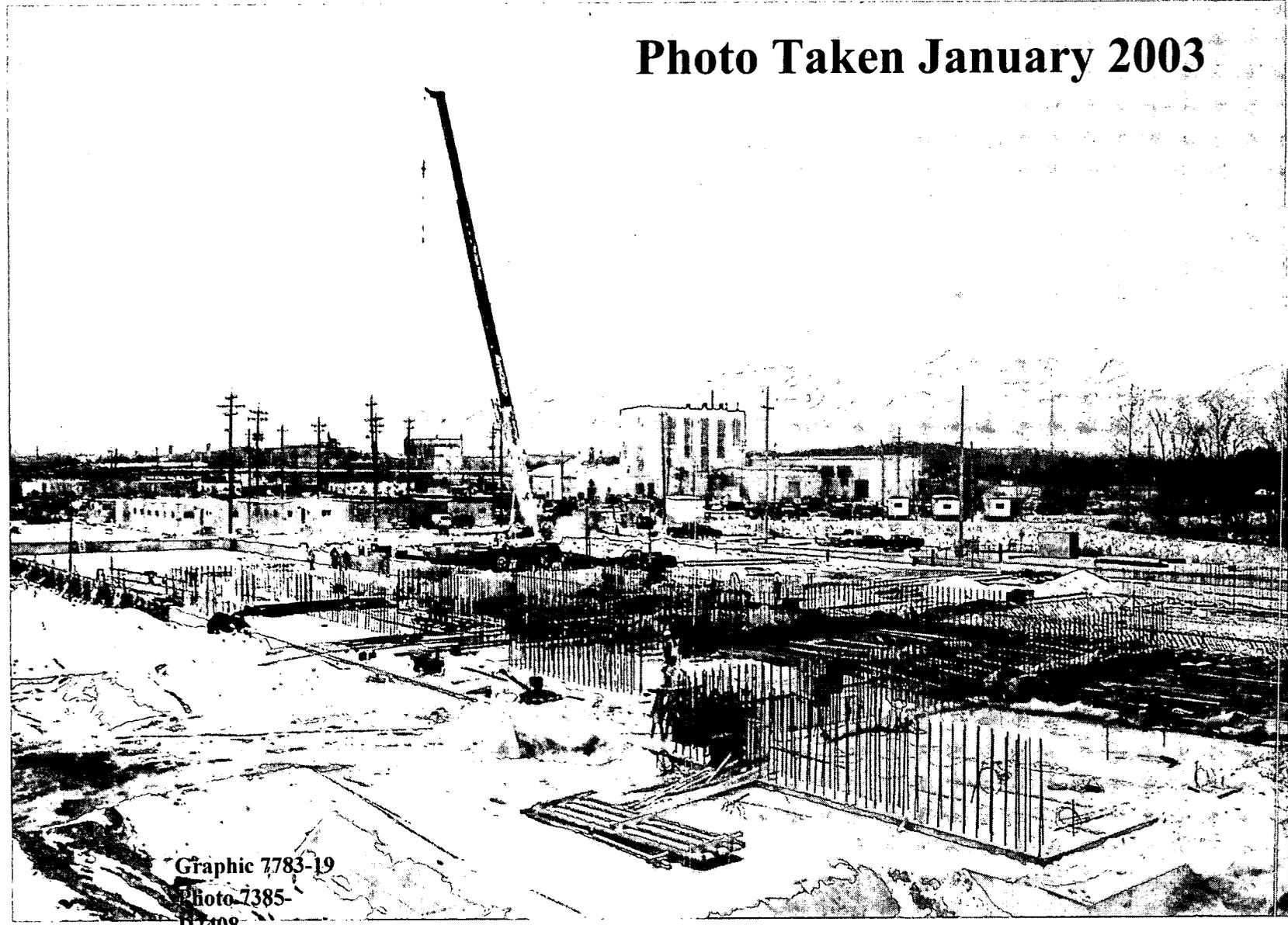
SILOS 1 AND 2

Final Design

- **Incorporated treatability results and vendor input**
- **Many diverse groups reviewed design**
- **Integrated treatment facility design with AWR design**
- **Final design will be complete by the end of February 2003**

SILOS 1 AND 2 FACILITIES CONSTRUCTION

Photo Taken January 2003



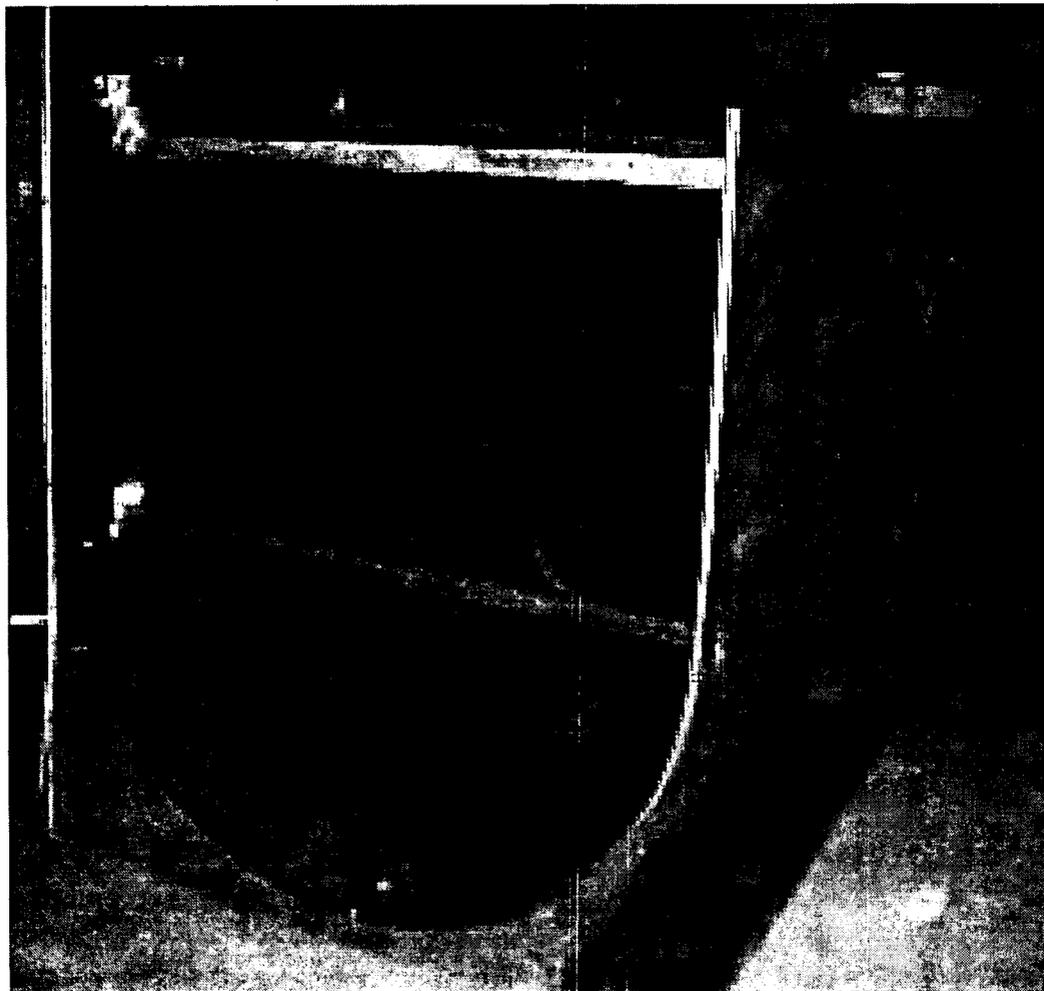
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D2408

SILOS 1 AND 2

Equipment Procurement Status

- **Vendors will deliver clarifier, tank agitators, product mixers, cement/flyash systems to Fernald in time to support construction**
- **Vendors will complete container transfer car, fill chute, and gantry manipulator prototypes in time for the fill room full-scale mockup**

SHELL OF GROUT MIXER



Graphic 7783-20.A

Photo 7932-06

SILOS 1 AND 2

Testing Status

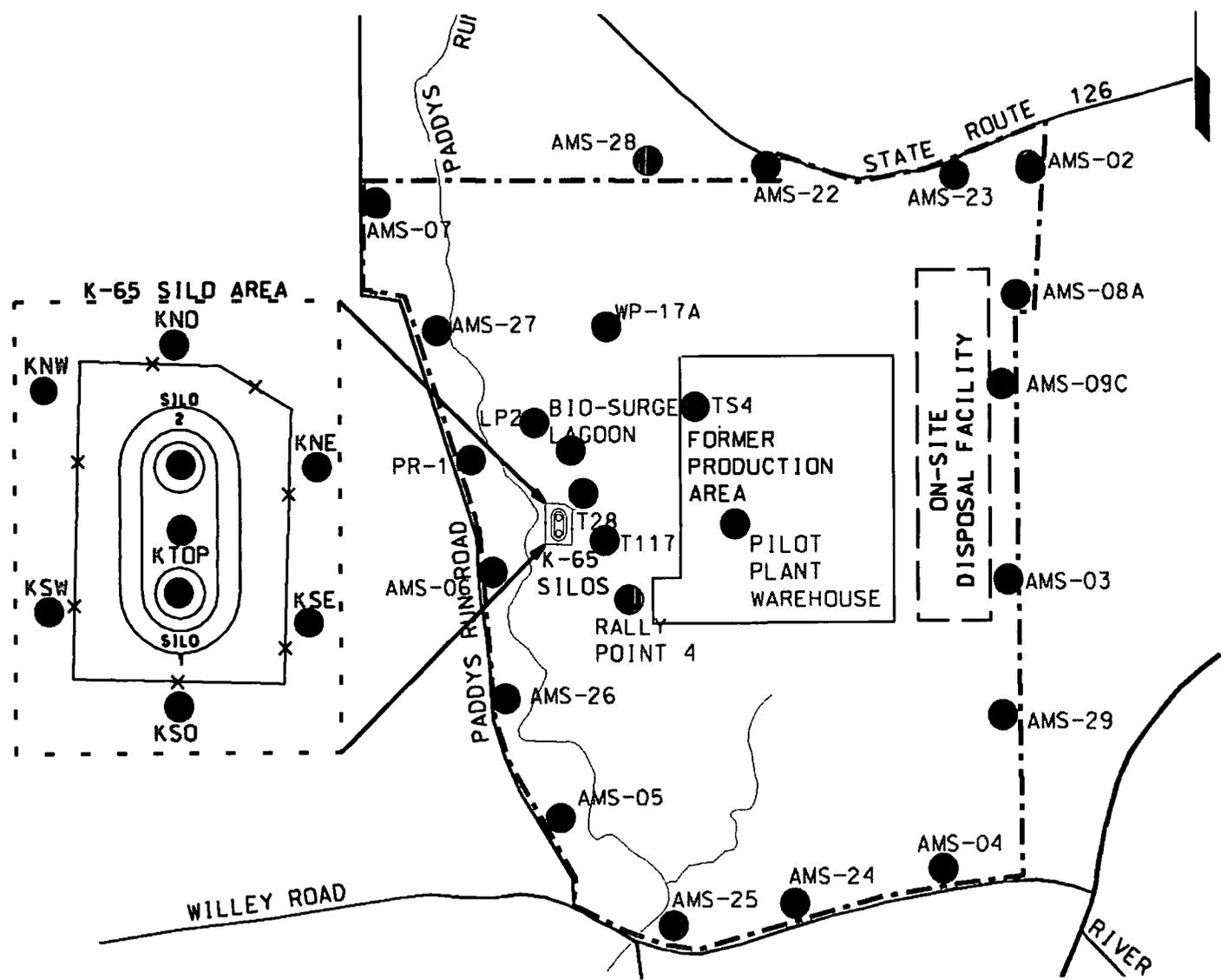
- **Cold Loop Tests: surrogate material**
 - **Evaluate pumps, pipes and instrumentation**
 - **January – April 2003: ORNL**
 - **February – May 2003: Mississippi State University**

- **Hot Loop Tests: K-65 material**
 - **Evaluate pumps, pipes and instrumentation**
 - **Late April 2003: Mississippi State University**

- **Integrated Testing Program**
 - **Full-scale mockup of fill room**
 - **Mockup will also be used for operations and maintenance training**
 - **June 2003: Oak Ridge**

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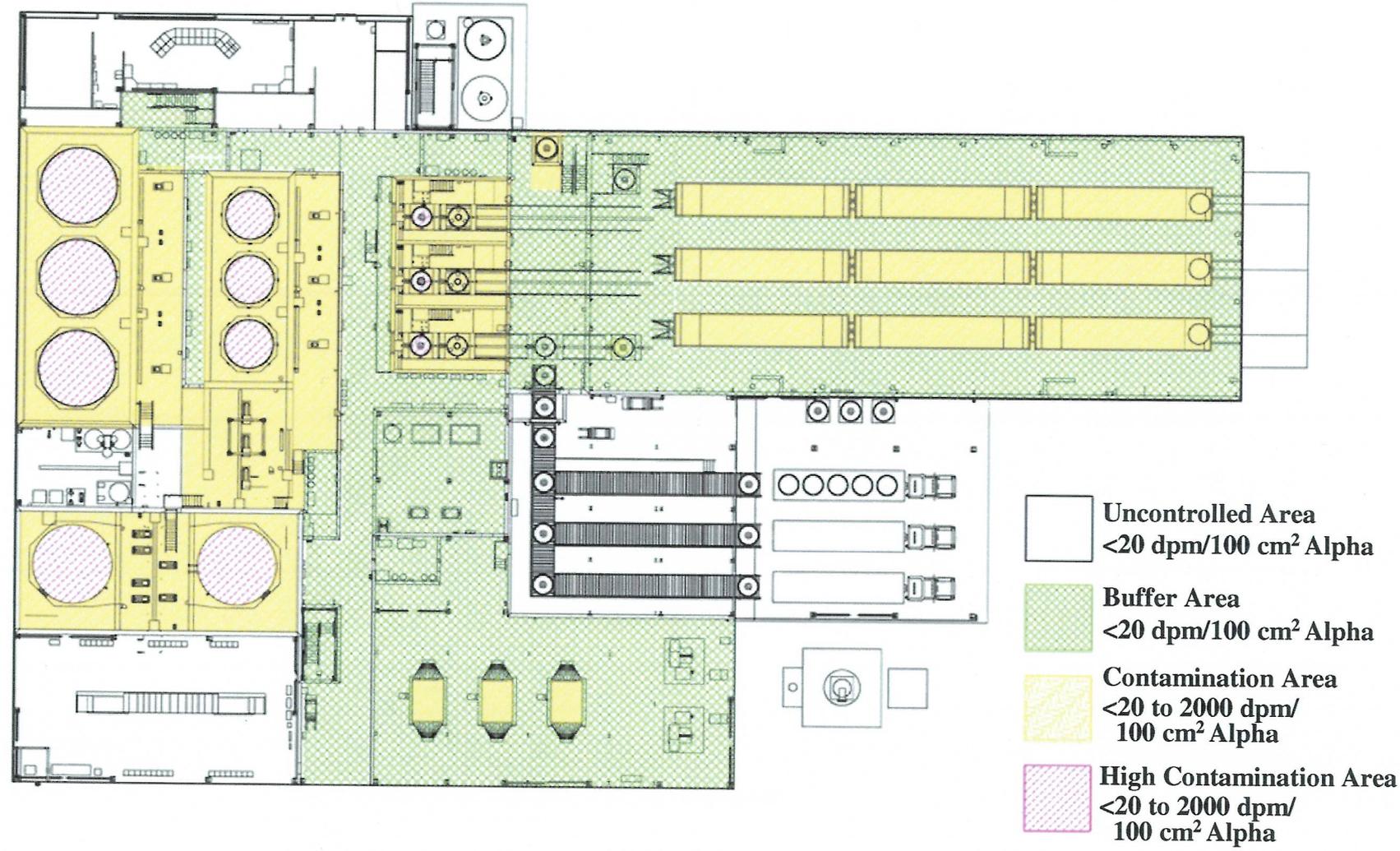
RADON MONITORING



Graphic 7783-24 / 7770-28

SILOS 1 AND 2 TREATMENT FACILITY

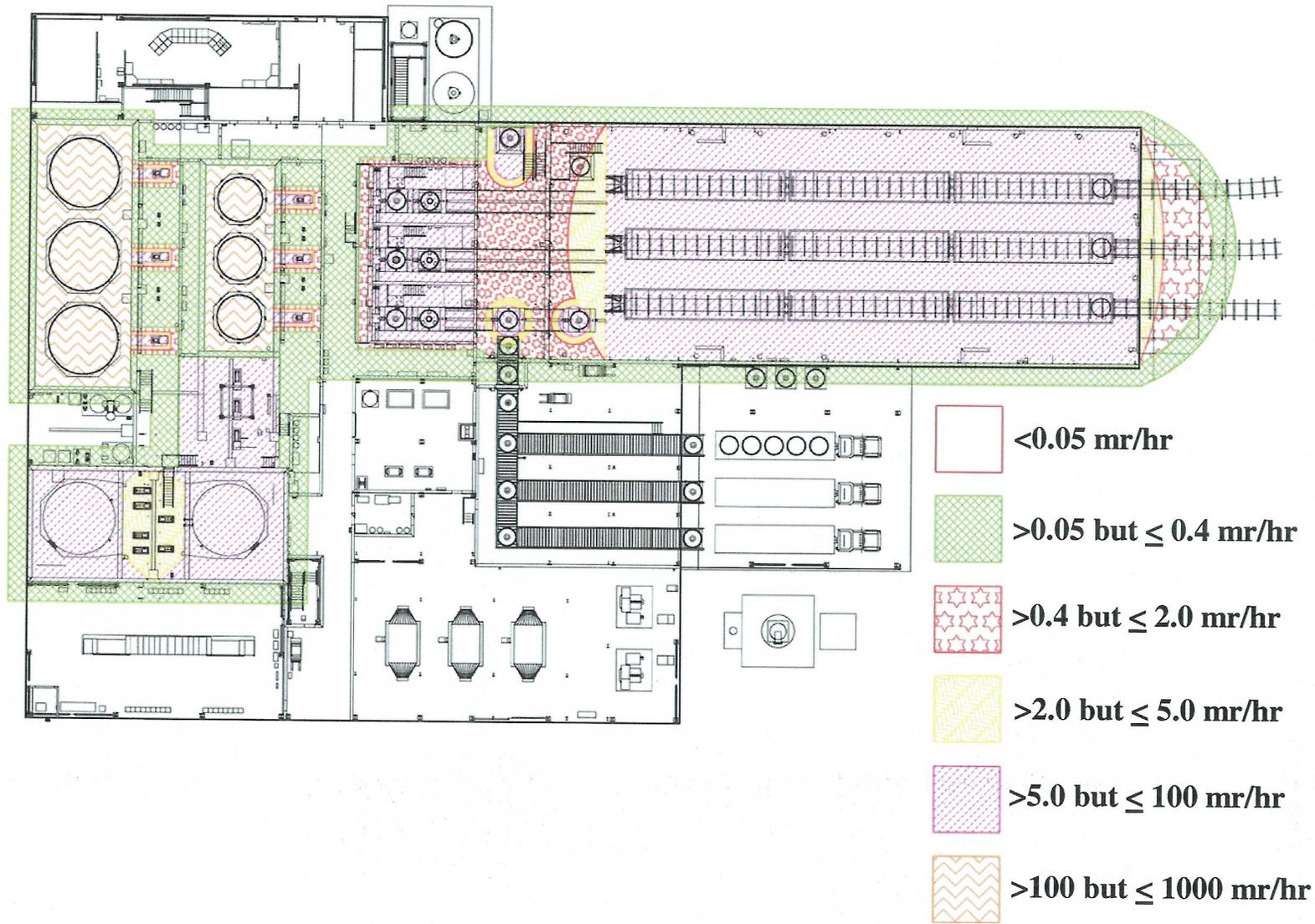
Contamination Levels



Graphic 7783-22

SILOS 1 AND 2 TREATMENT FACILITY

Exposure Rates



Graphic 7783-23

SILOS PROJECT

Schedule

- **Initiate slurry transfer on or before** **May 26, 2004**
- **Initiate Silos 1 and 2 final treatment operations** **February 2005**
- **Complete slurry operations, clean out system, turn over to D&D** **February 14, 2006**
- **Complete Silo 1 and 2 operations** **April 28, 2006**

Graphic 7783-25

ACCELERATED WASTE RETRIEVAL (AWR) PROJECT OVERVIEW

Objectives

- **Remove K-65 waste from Silos 1 & 2 and transfer it to secure, temporary storage**
- **Remove radon gas from Silos 1 & 2 headspace**
- **Transfer stored waste to final treatment**
- **Safely shut down AWR facilities**

ACCELERATED WASTE RETRIEVAL (AWR) PROJECT OVERVIEW

Components

- **Radon Control System (RCS)**
- **Transfer Tank Area (TTA)**
- **Silo bridge and waste removal system**
- **Tank waste retrieval system**

AWR PROJECT

Sequence of Events

- **Completed Radon Control System and TTA tanks and containment walls**
- **RCS Phase I – remove radon gas from silo headspace**
- **Build bridges over both silos**
- **Install deck and building on top of TTA to house pumps and sluicing modules**

AWR PROJECT

Sequence of Events

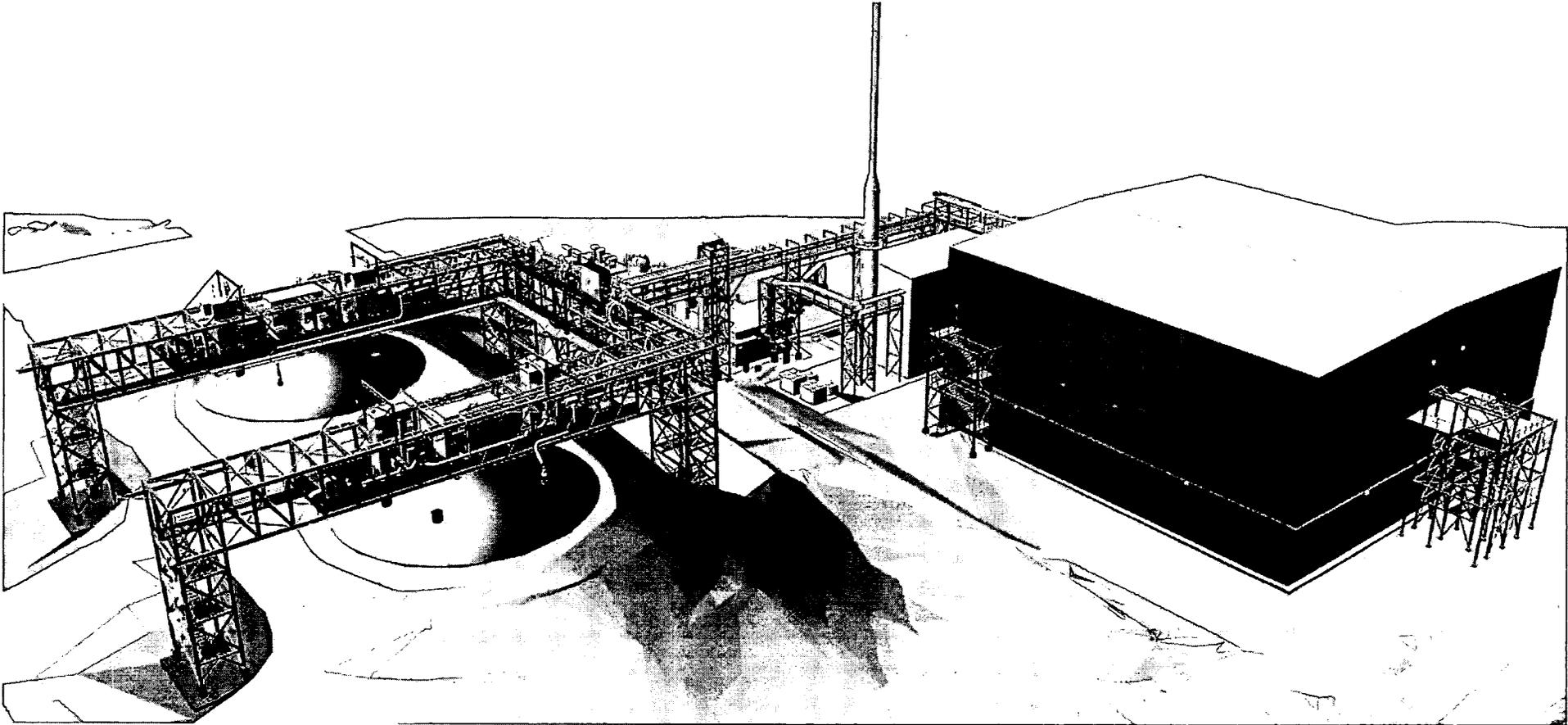
- **Install pump and sluice modules, piping, and wiring on bridges**
- **RCS Phase II – remove radon gas from both silos and TTA tanks**
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- **Sluice material into one TTA tank at a time and reuse settled water from other tanks**

AWR PROJECT

Sequence of Events

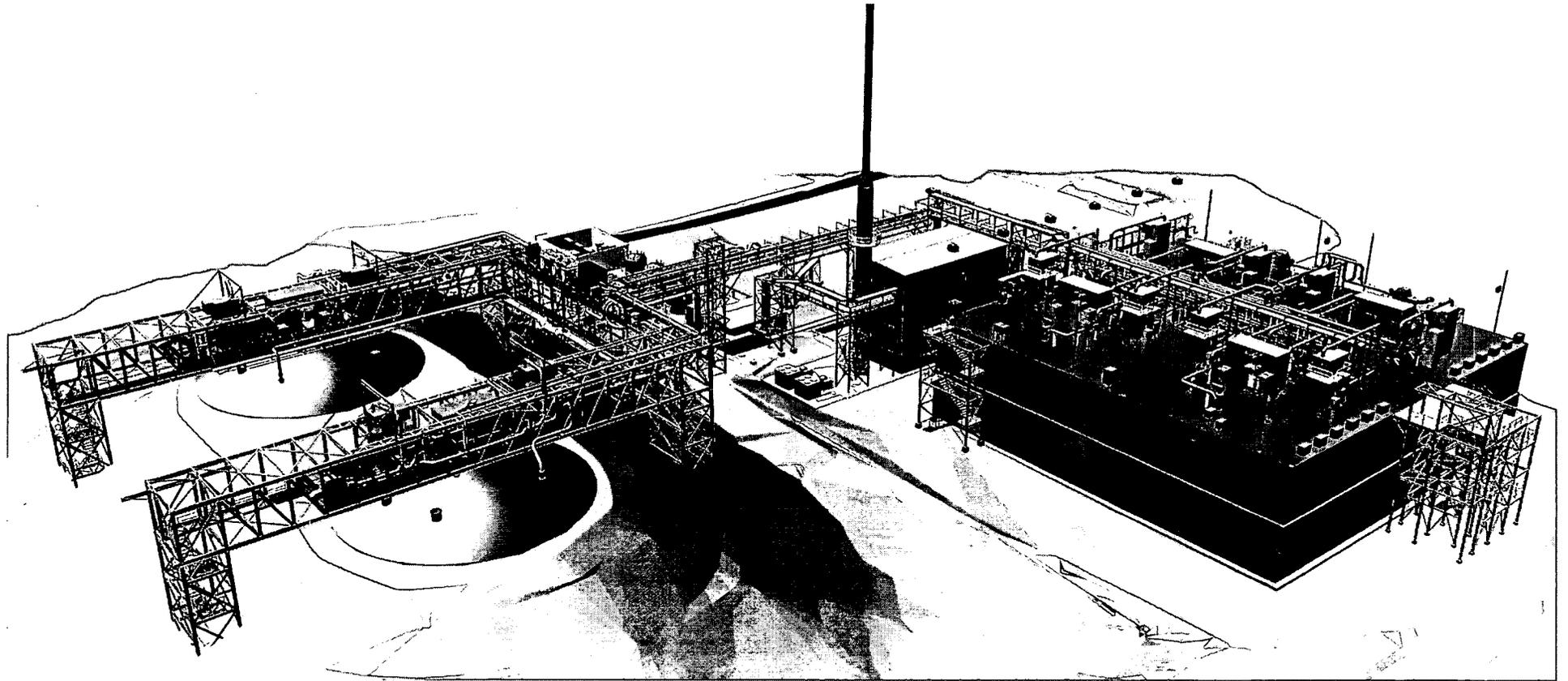
- **RCS Phase III – remove radon gas from silos, tanks and treatment facilities**
- **Transfer waste to treatment**

AWR PROJECT FACILITIES



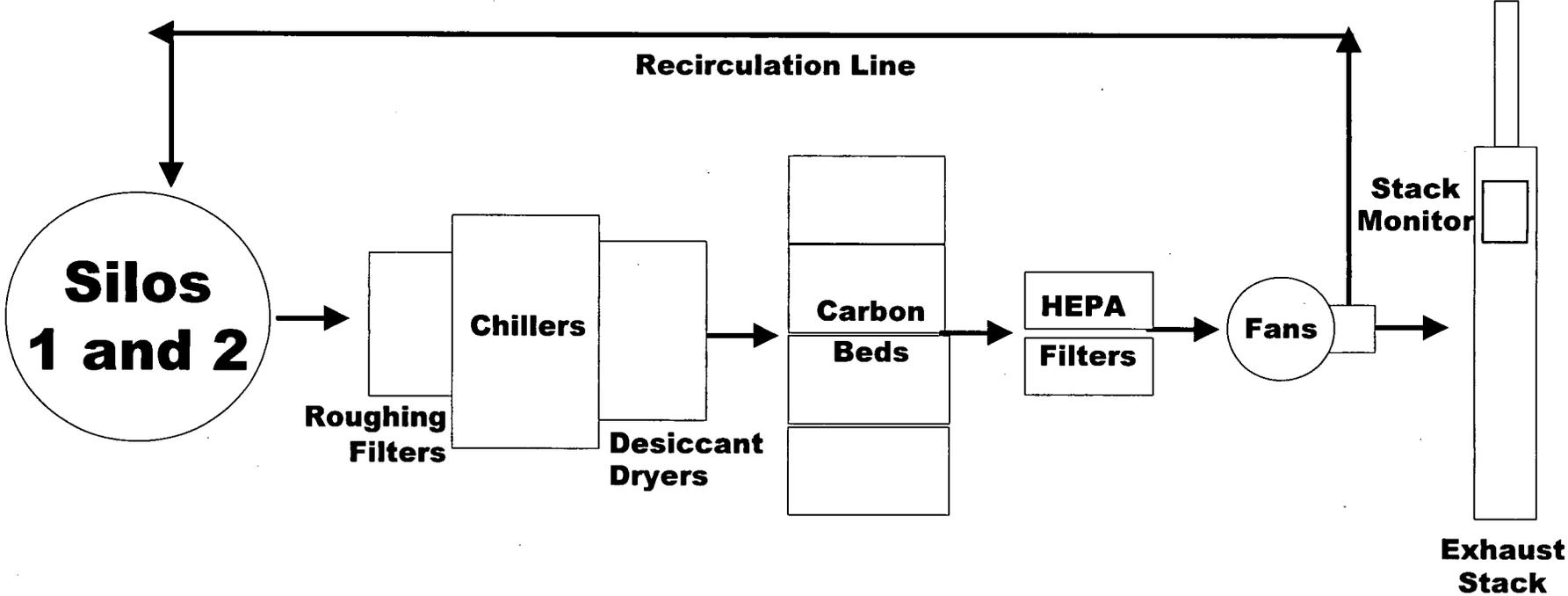
Graphic 7770-06

AWR PROJECT EQUIPMENT



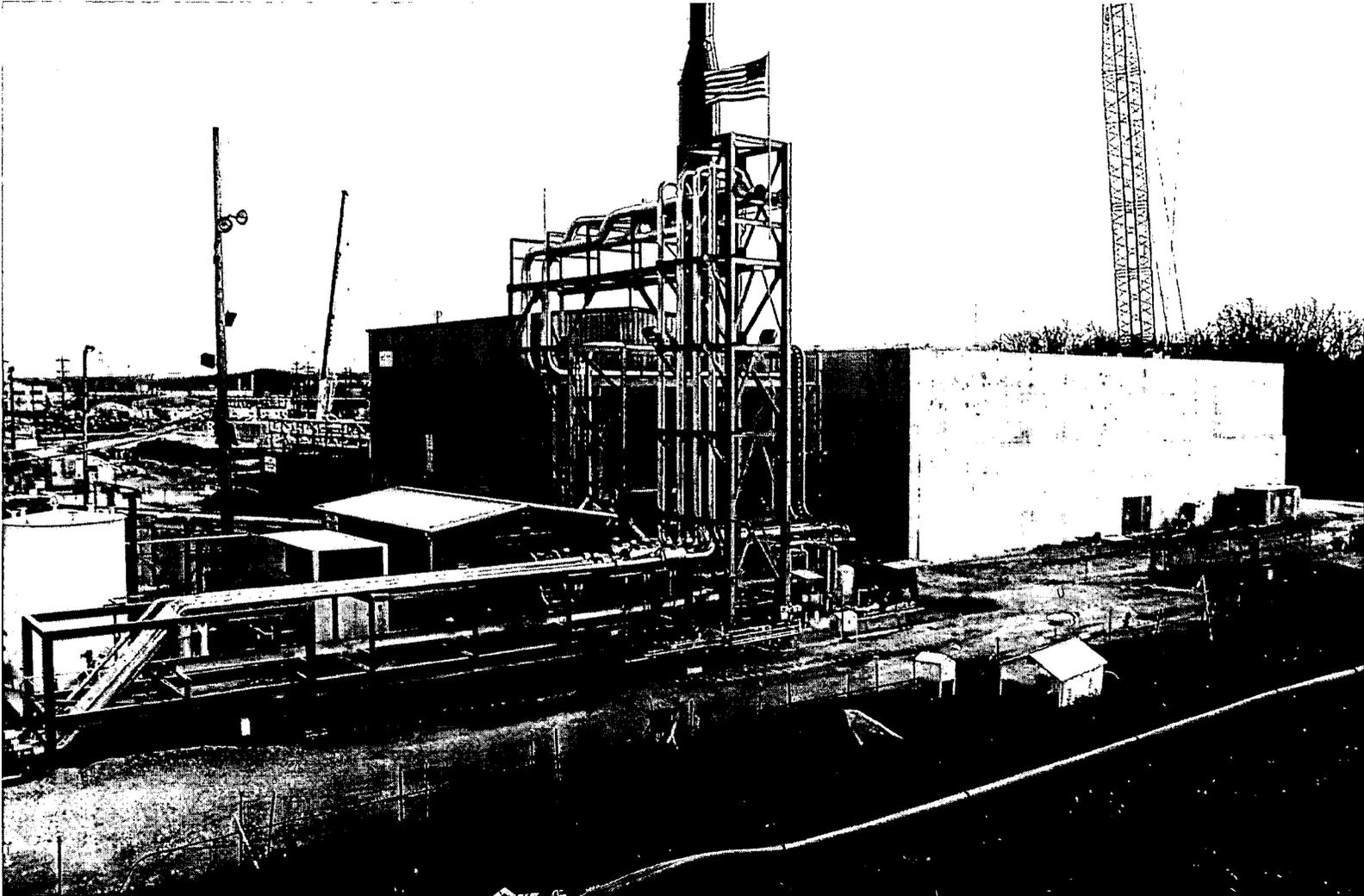
Graphic 7770-07

RADON CONTROL SYSTEM



Graphic 7770-08

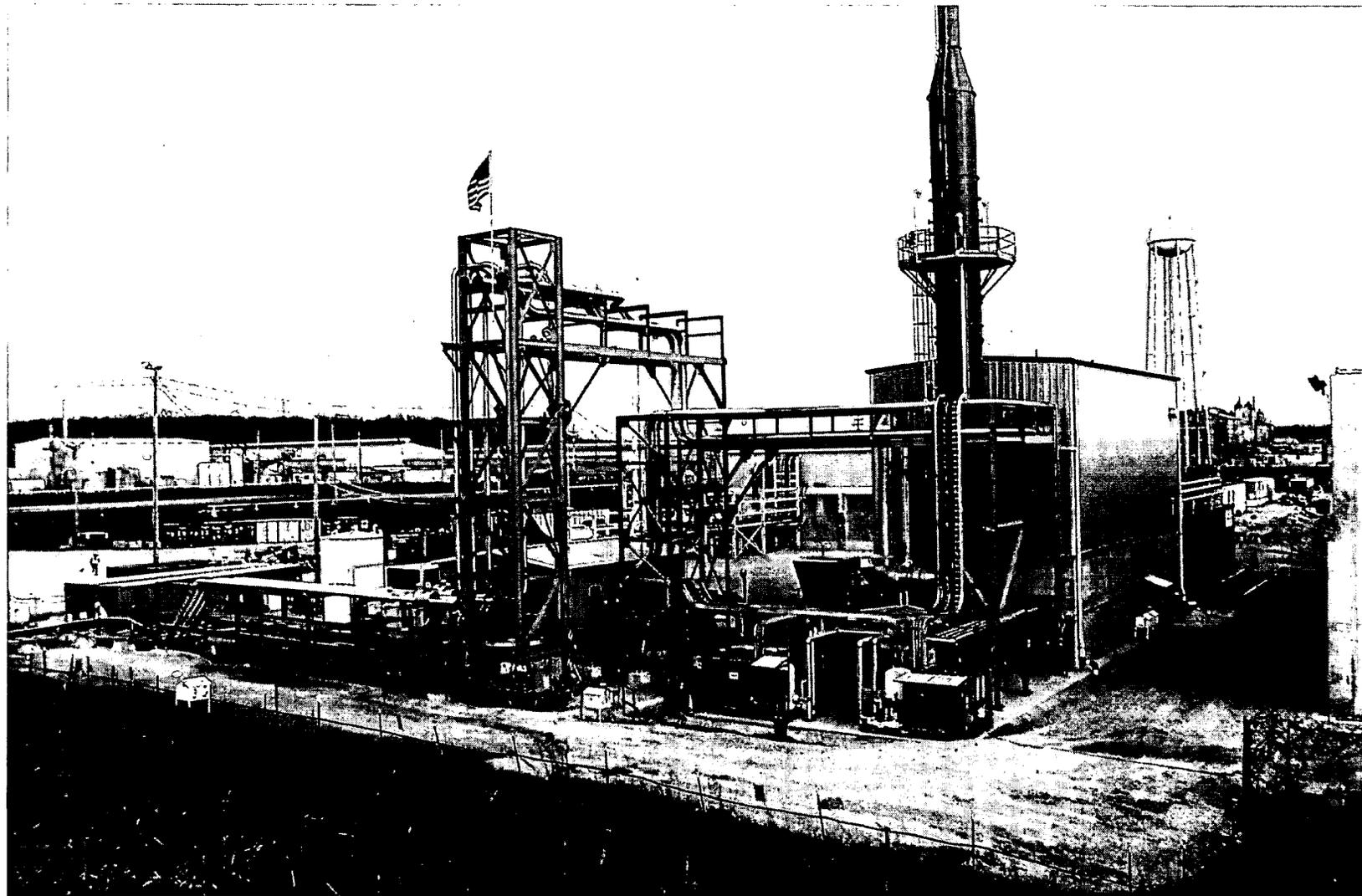
RADON CONTROL SYSTEM



December 2002

Graphic 7770-09
Photo #7385-D2276

RADON CONTROL SYSTEM



Graphic 7770-10
Photo # 7385-D2281

December 2002

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RADON CONTROL SYSTEM (RCS)

- **Hot Test: first operation to draw down radon in Silos 1 & 2 headspace and test equipment**
- **Phase I: supports construction by reducing radiation field on top of silos**
- **Phase II: operation during waste removal from silos and transfer to tanks**
- **Phase III: operation during waste retrieval from tanks and transfer to treatment**

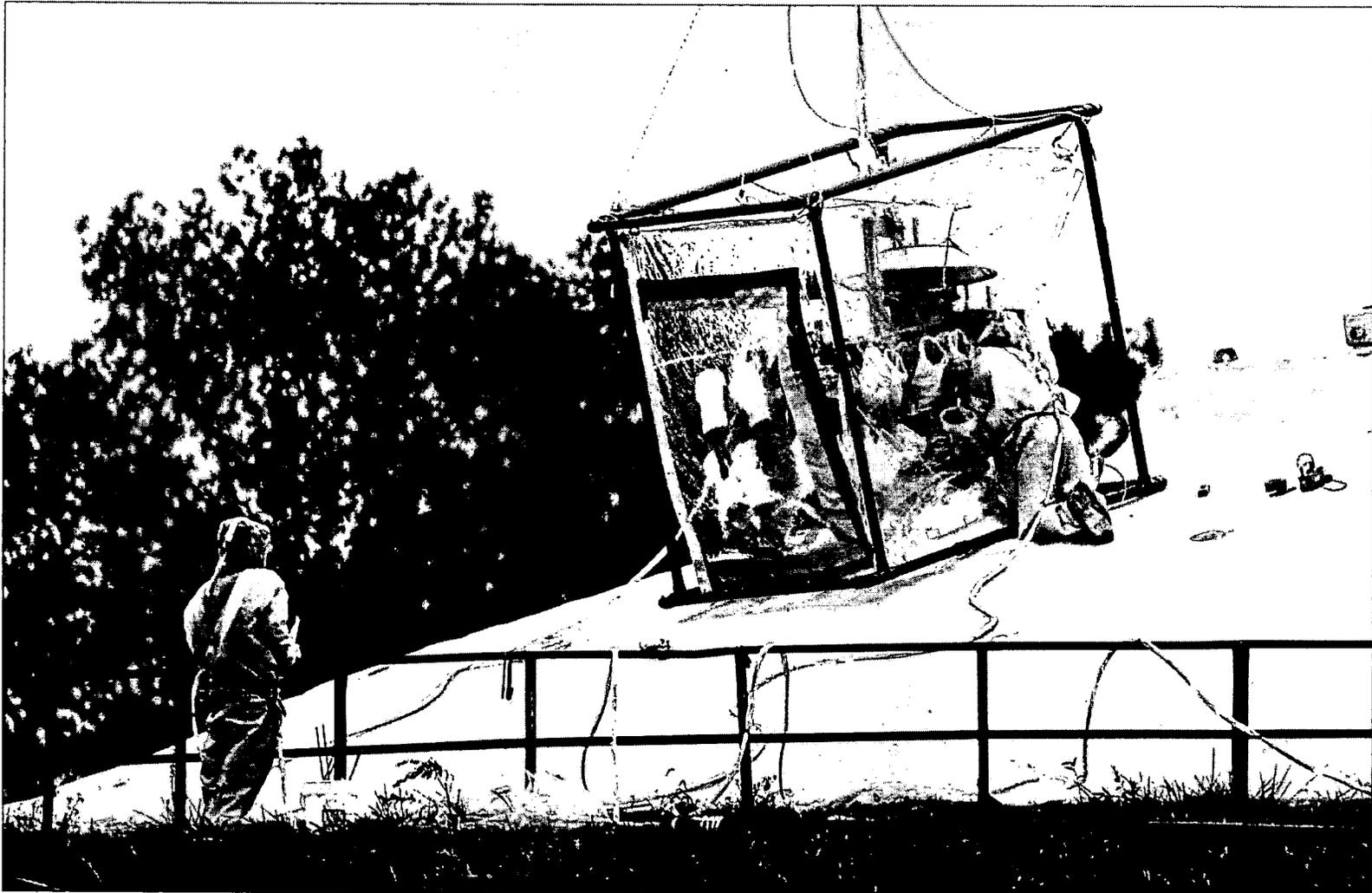
RCS HOT TEST READINESS

- **Fluor Fernald and DOE, with oversight from the Defense Nuclear Facility Safety Board, begin structured review of project readiness.**
- **Project performs self assessments, surveillances, senior management assessments and corrects deficiencies**
- **Independent Fluor Fernald group conducts Standard Startup Review (SSR) and identifies pre- and post-starts**
- **Independent DOE group conducts Readiness Assessment (RA) and identifies pre- and post-starts**

RCS HOT TEST READINESS

- **Project fixes pre-starts; schedules post-start corrective actions**
- **SSR Team and RA Team concurs with all corrective actions**
- **Fluor Fernald and DOE authorize the Silos Project to begin RCS Hot Test**

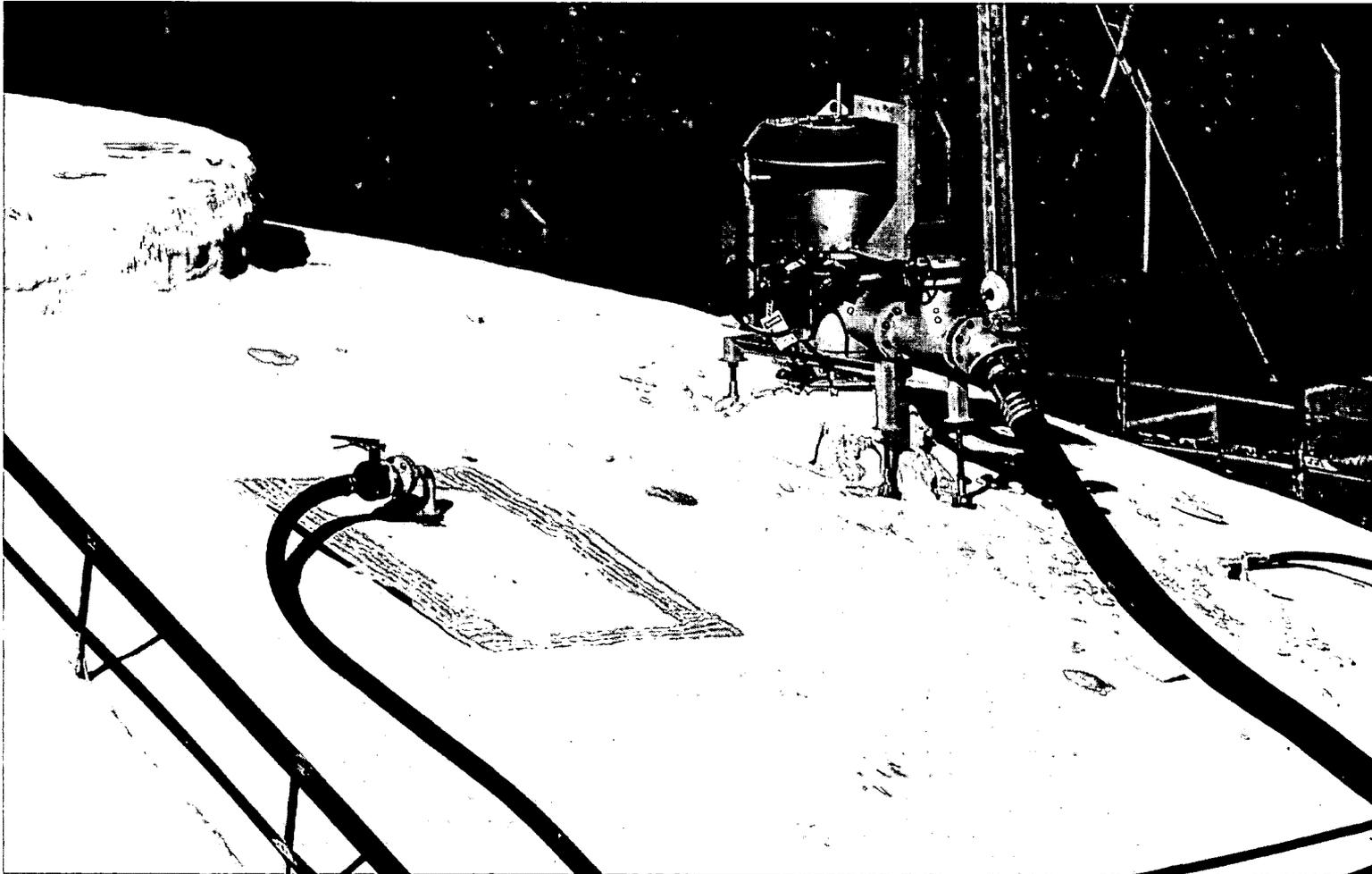
RADON CONTROL SYSTEM VALVE INSTALLATION



Graphic 7770-14
Photo #7385-D2144

October 2002

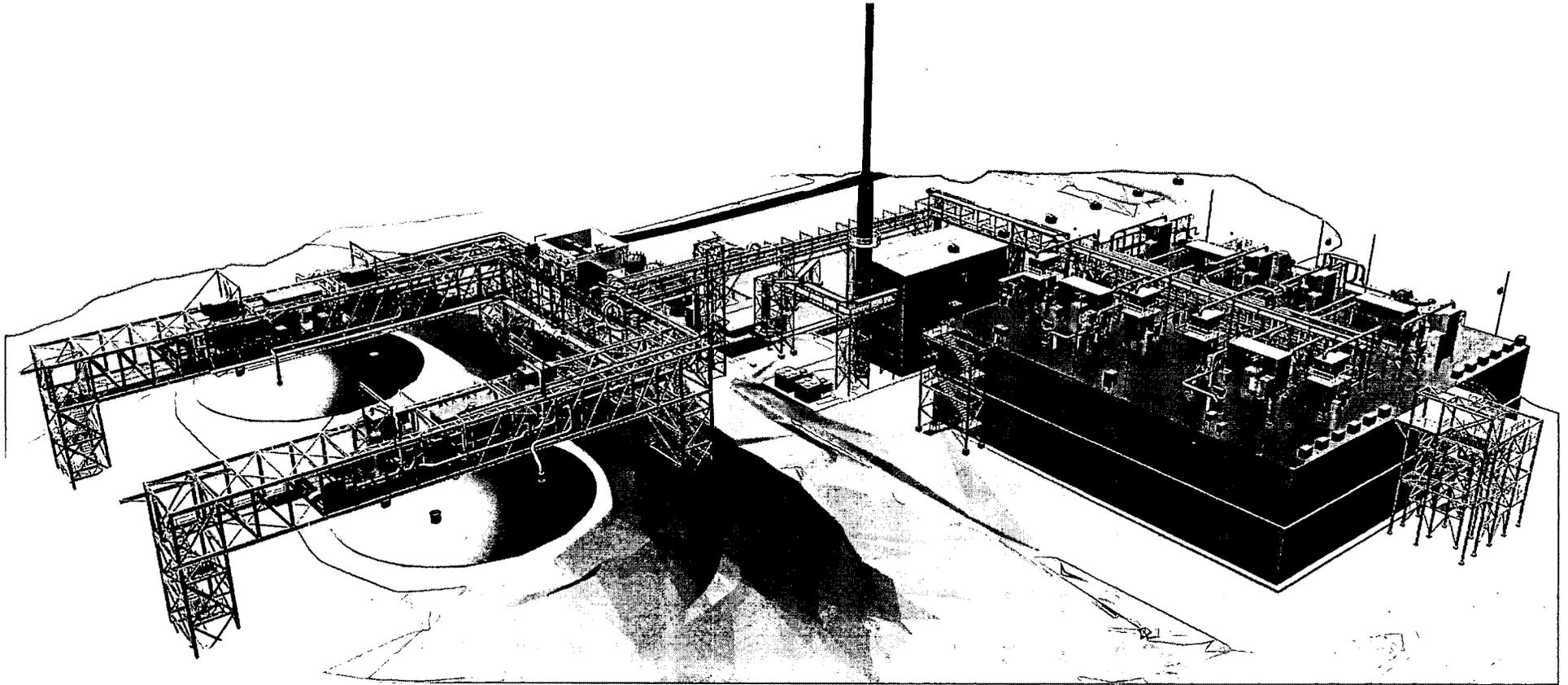
RADON CONTROL SYSTEM VALVE INSTALLATION



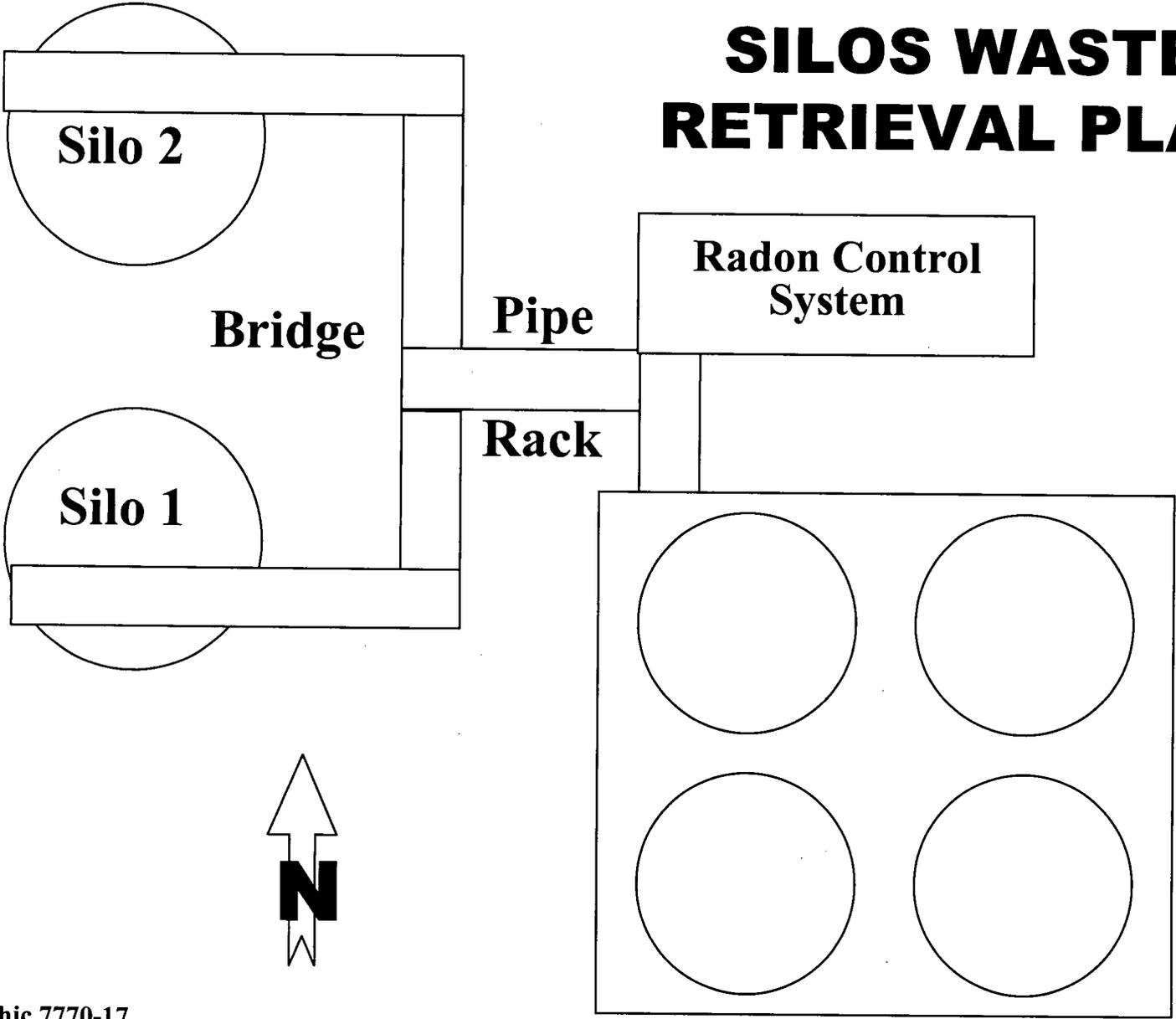
Graphic 7770-15
Photo # 7385-D2198

October 2002

SILOS WASTE RETRIEVAL SYSTEM



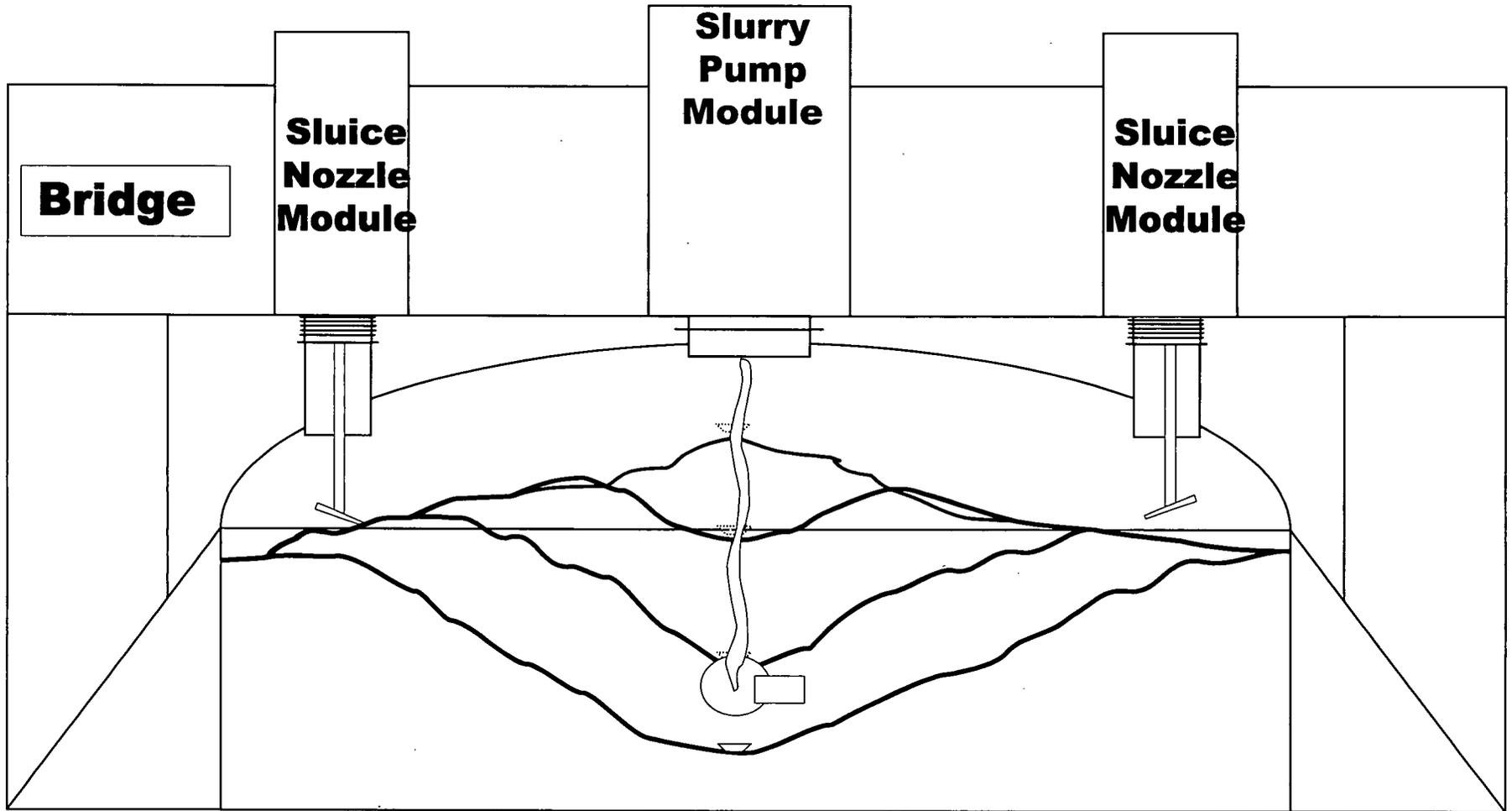
SILOS WASTE RETRIEVAL PLAN



Graphic 7770-17

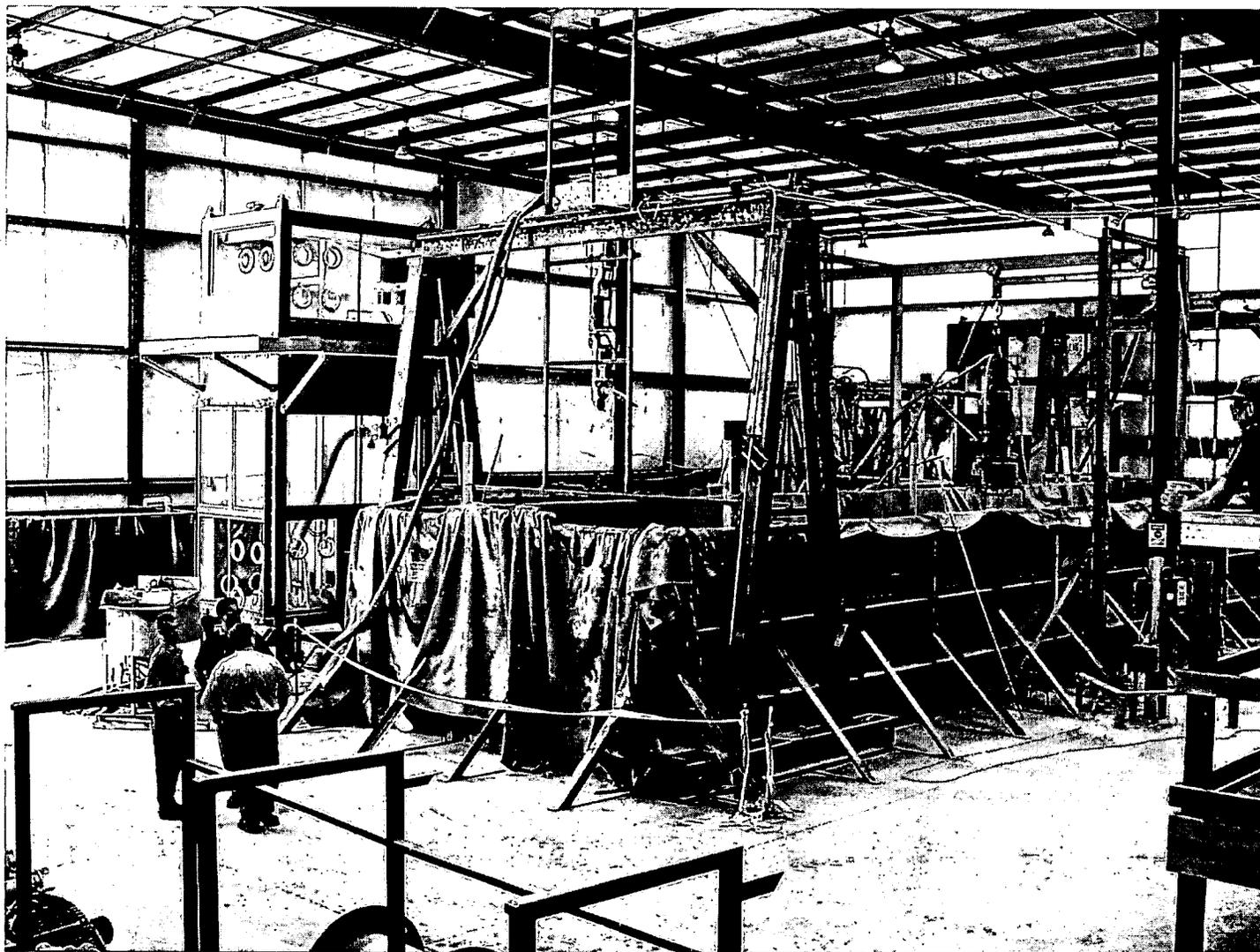
Transfer Tank Area

WASTE REMOVAL



Graphic 7770-18

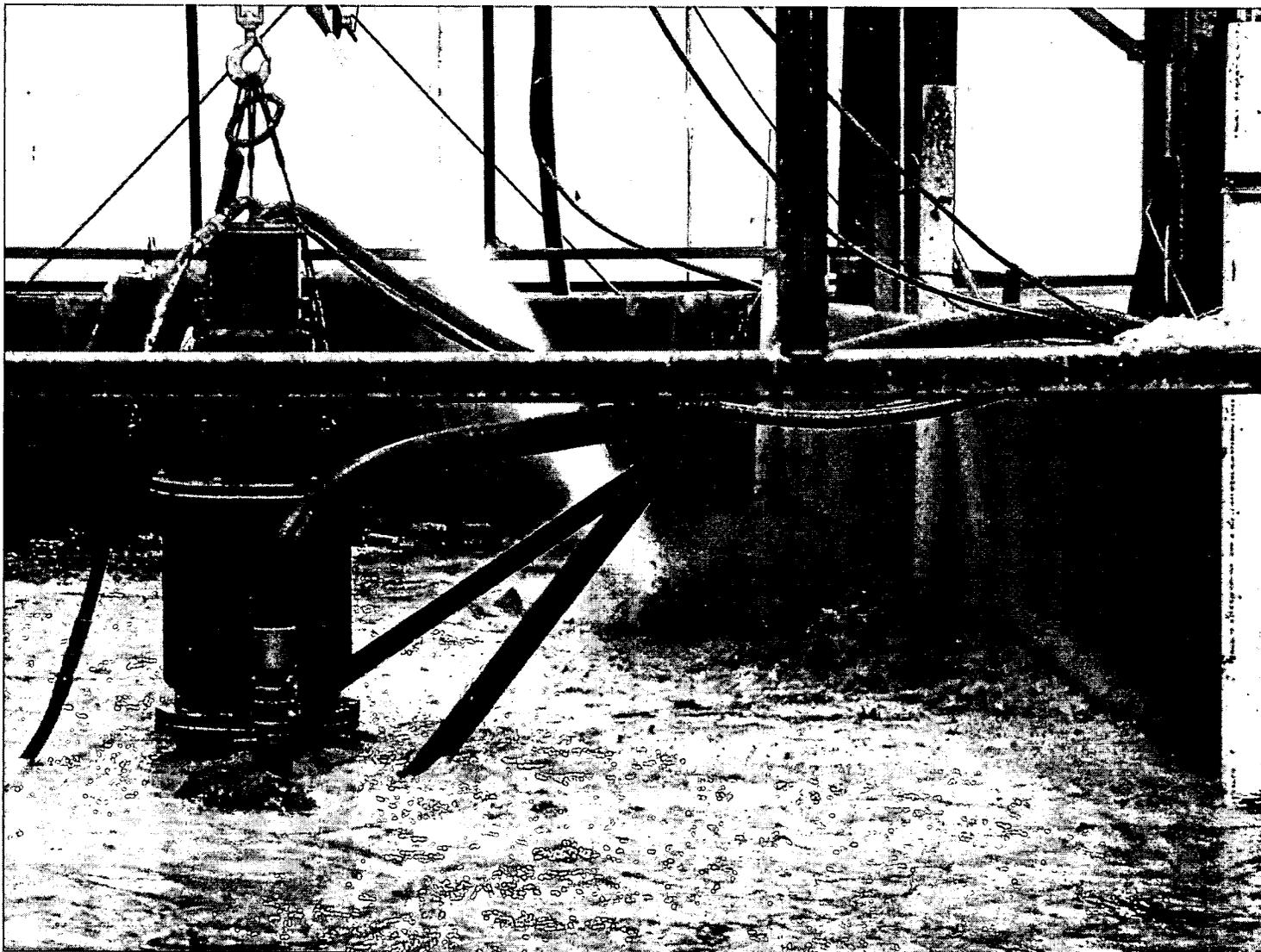
COLD LOOP TEST



Graphic 7770-19
Photo #7862-D08

August 2002

COLD LOOP TEST



Graphic 7770-20
Photo #7862-D018

August 2002

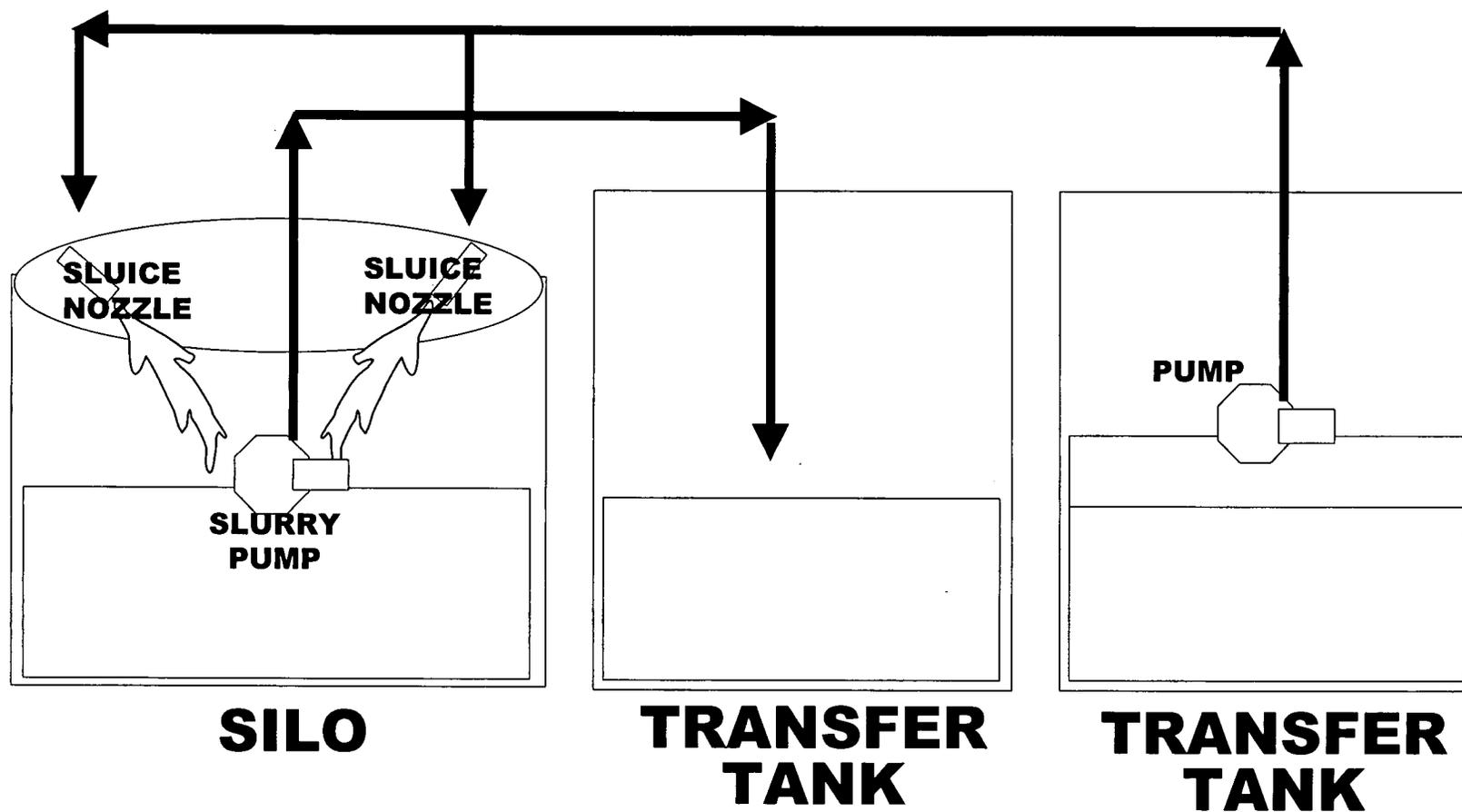
COLD LOOP TEST



Graphic 7770-21
Photo #7862-D013

August 2002

SLURRY OPERATIONS



HEEL REMOVAL

- **Silos team collecting technical information**
- **Workshop and brainstorming sessions will begin in January 2003**
- **Workshop will include Fluor Fernald, Jacobs, Batelle and other EM-50 experts**
- **Team plans to have design complete by April 2004**
- **Possible removal alternatives:**
 - ◆ **Smaller pump in silo sump**
 - ◆ **Mechanical device to push material to pump**
 - ◆ **Screw conveyor**
 - ◆ **External flushing**

BERM EXCAVATION

- **Recent engineering work concluded that silo walls can withstand pressure from berm**
- **Project will not need to constantly coordinate berm excavation with waste removal**
- **Crews will excavate part of the berm on the south side to make room for an equipment laydown area**
- **Project will dispose of berm soil in either On-Site Disposal Facility or offsite, depending upon sampling results**

SILO CAP REMOVAL

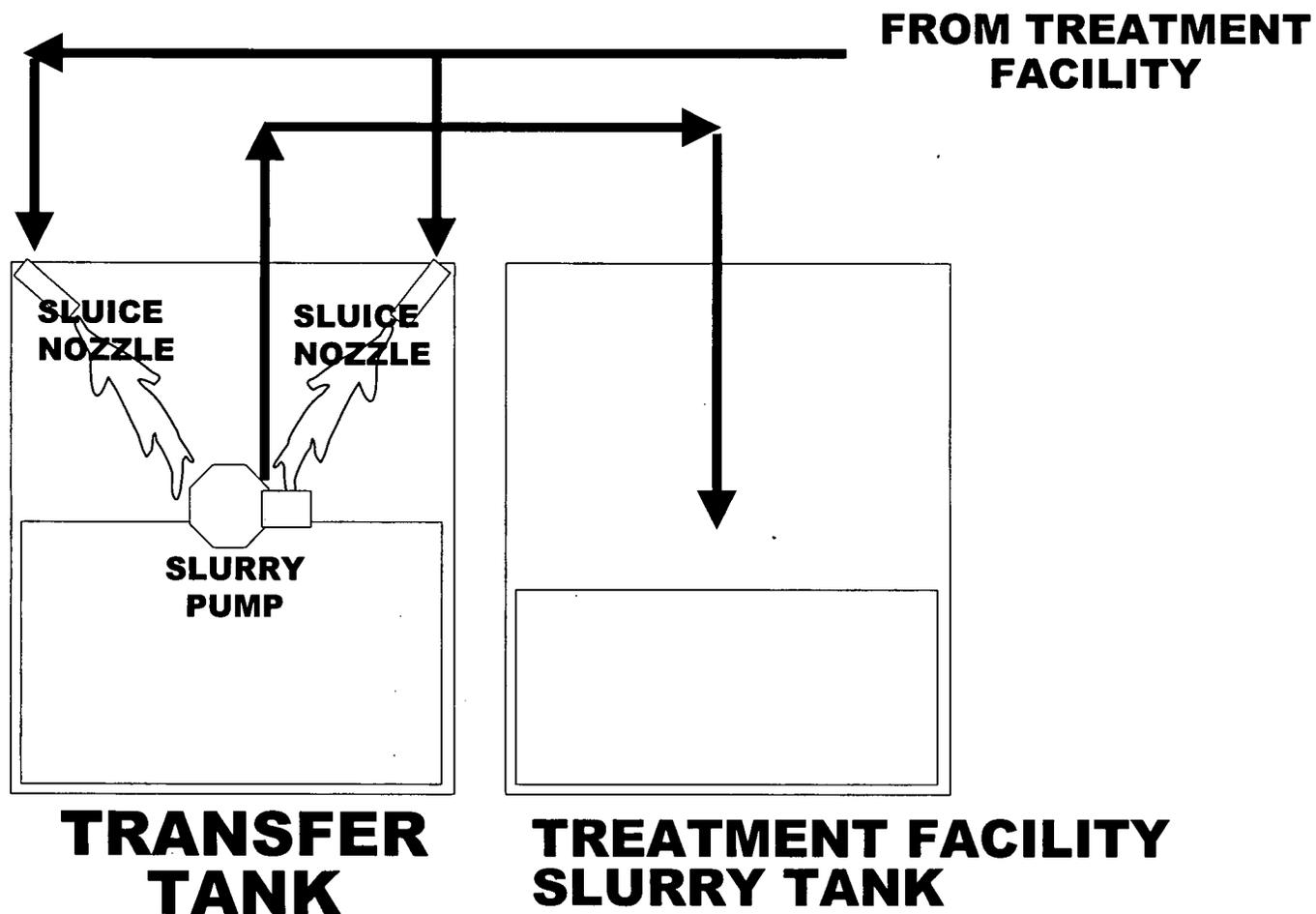


May 2002

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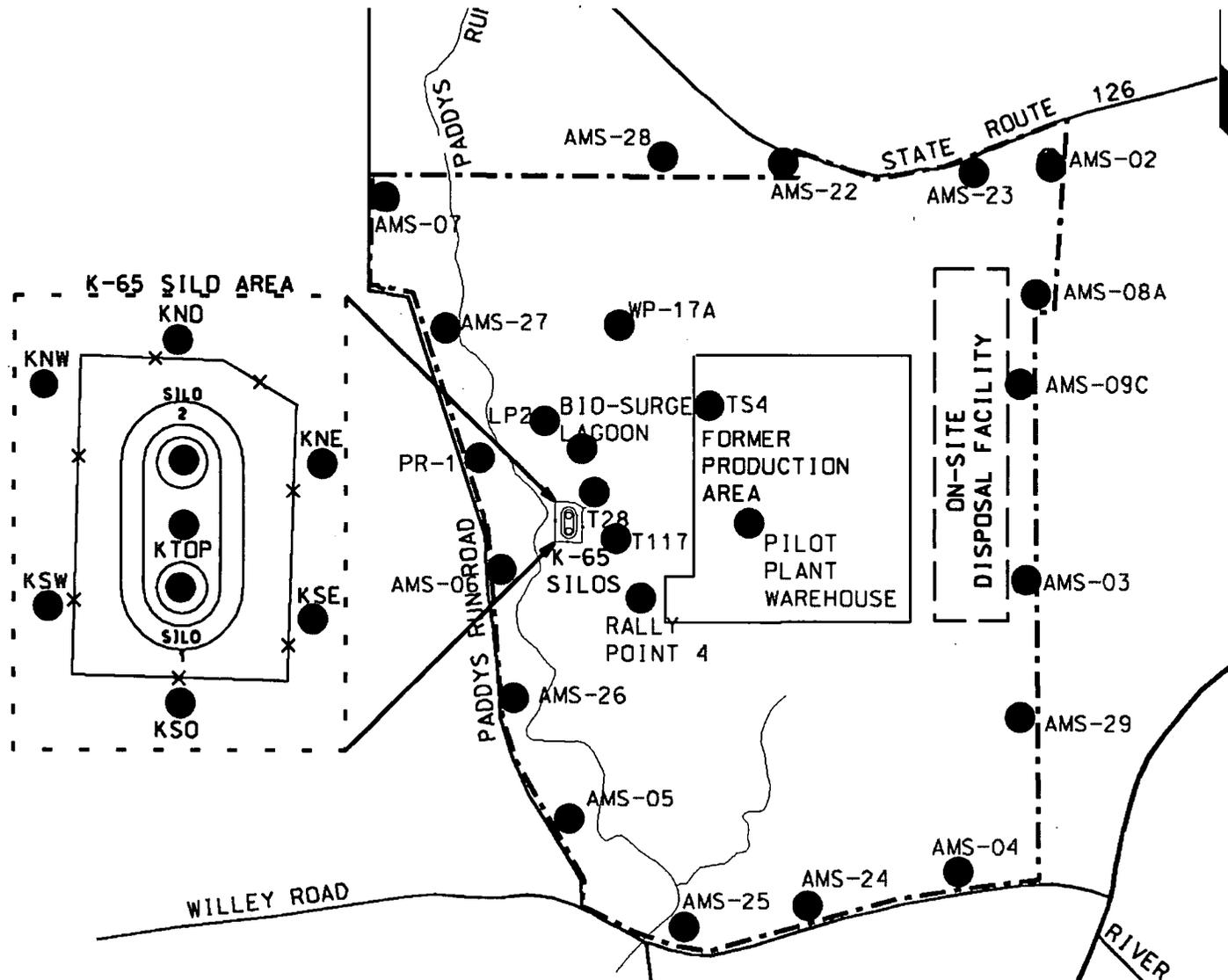
AWR INTERFACE WITH TREATMENT



MONITORING

- **Environmental Monitoring**
 - ◆ **At the site boundary**
 - ◆ **Within the silos boundary**
- **Stack Monitoring**
 - ◆ **Radon**
 - ◆ **Particulate**
- **Process Monitoring**
 - ◆ **Pressure control**
 - ◆ **Temperature and relative humidity**
 - ◆ **Slurry density**
 - ◆ **Mass flow indicators**
 - ◆ **Decant sump tank level**
- **Personnel monitoring**

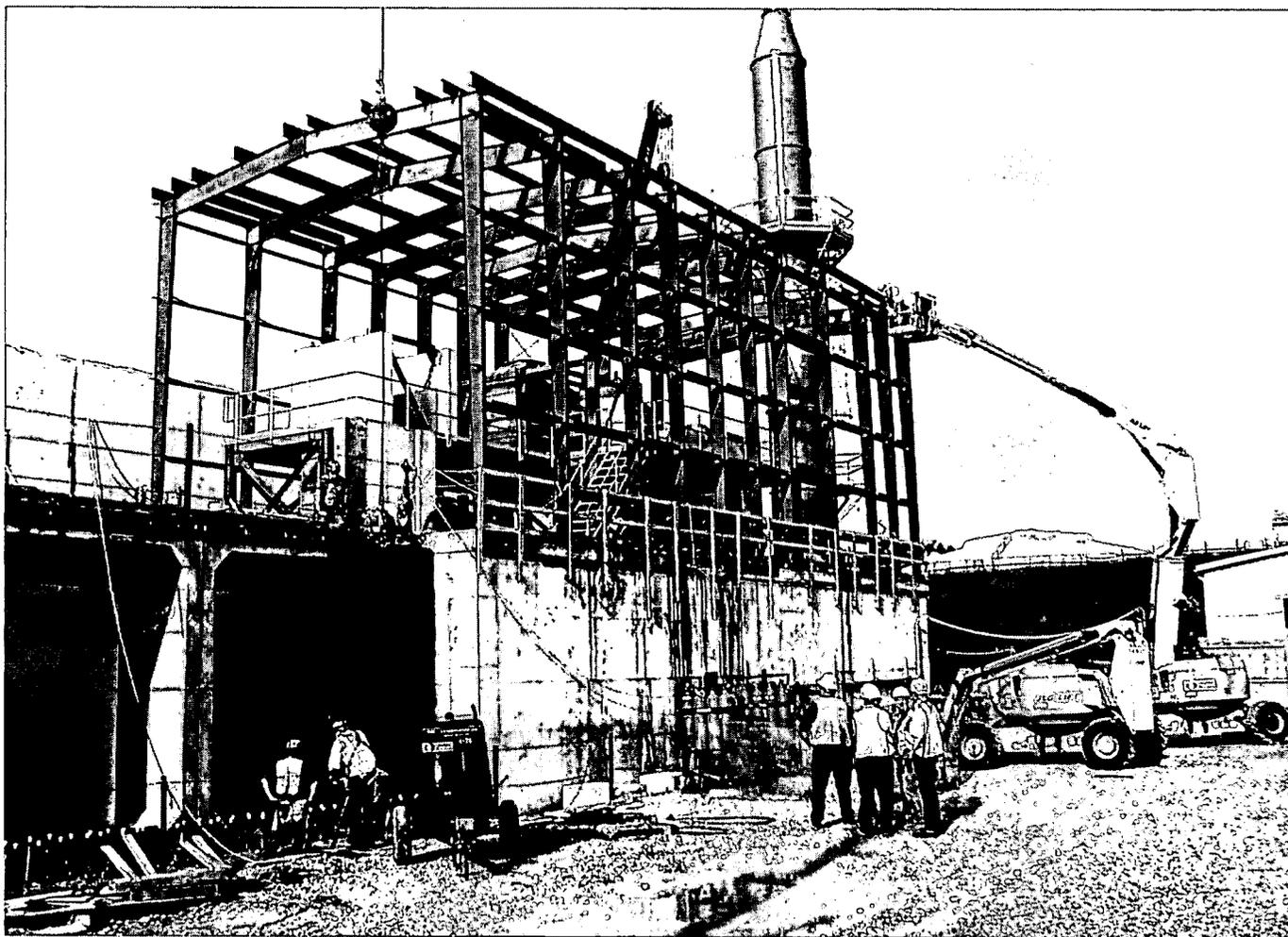
RADON MONITORING



Graphic 7770-28

CONSTRUCTION PROGRESS

Radon Control System

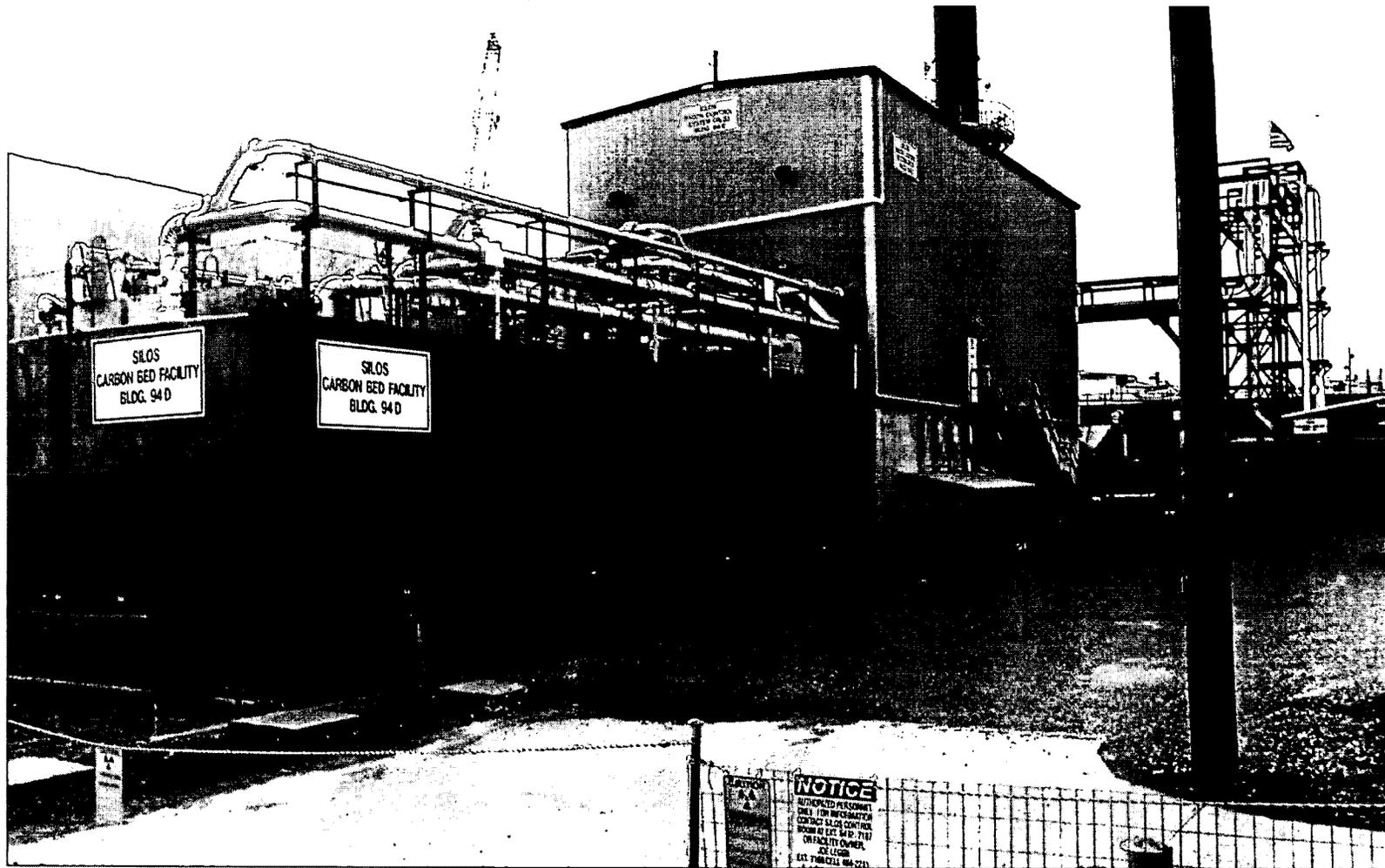


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Photo #7385-D1750

June 2002

CONSTRUCTION PROGRESS

Radon Control System



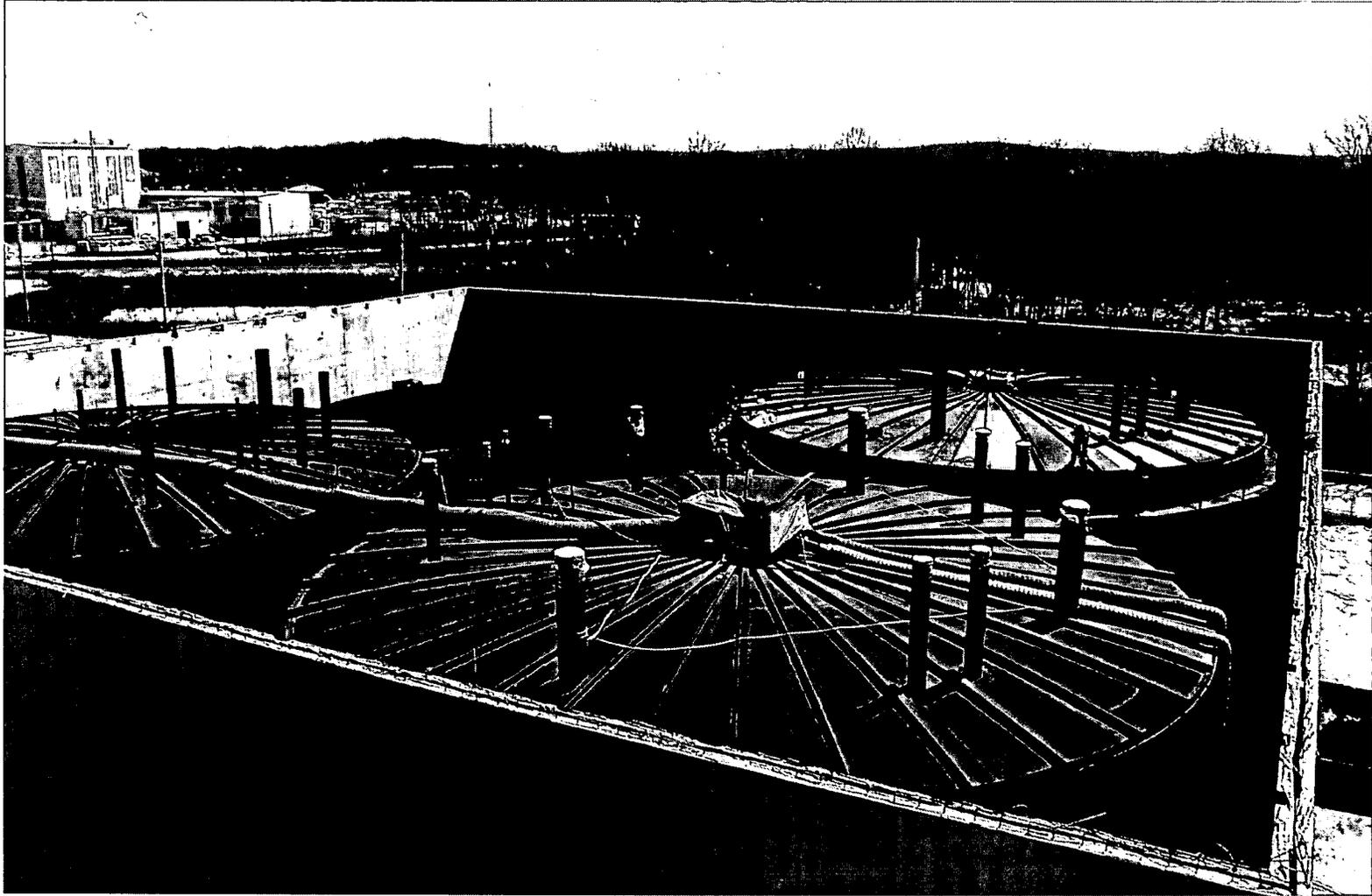
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December 2002

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CONSTRUCTION PROGRESS

Transfer Tank Area

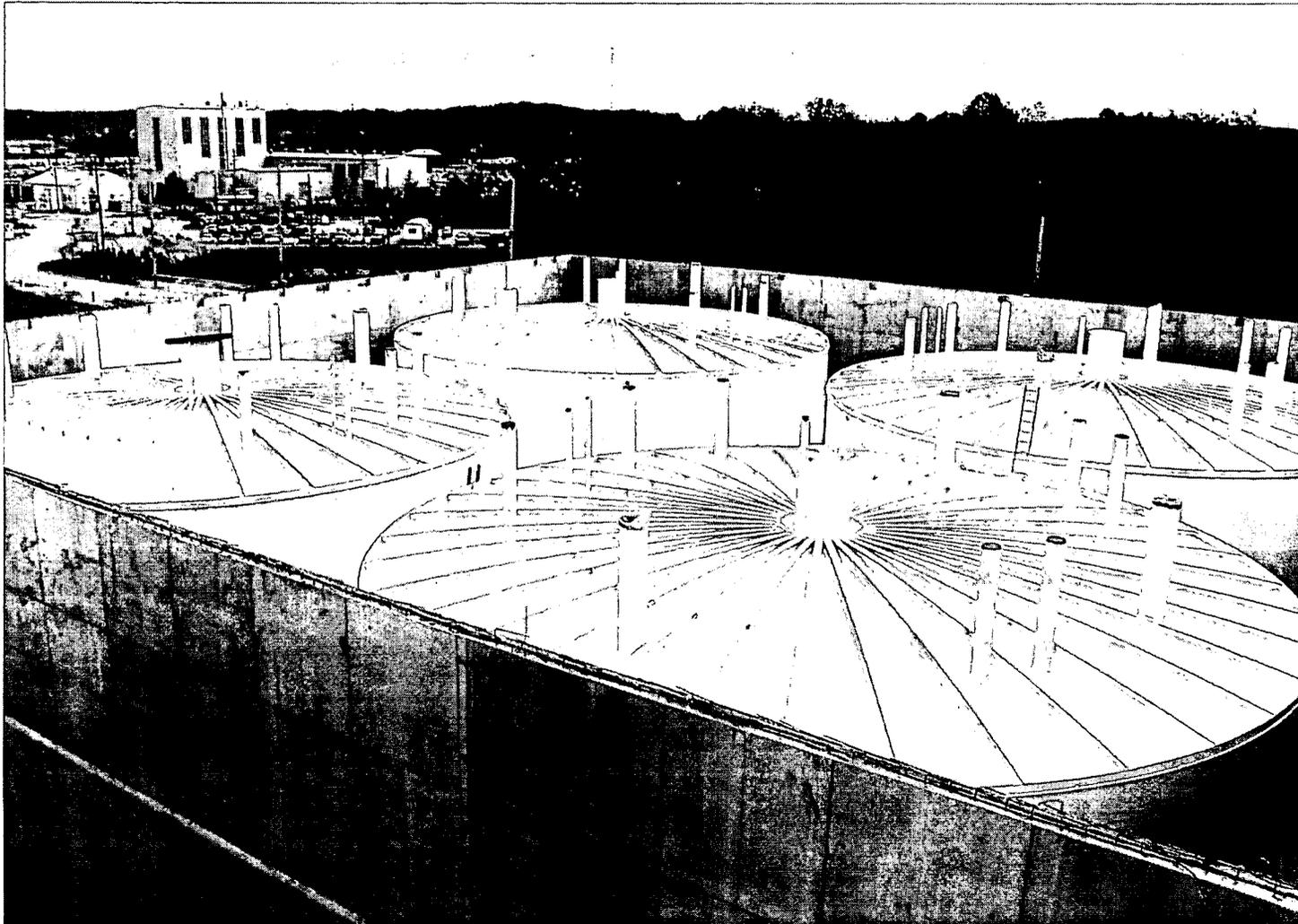


Graphic 7770-31
Photo #7385-D1569

April 2002

CONSTRUCTION PROGRESS

Transfer Tank Area



Graphic 7770-32
Photo #7385-D2069

December 2002

TIMELINE

- December 2002:** Complete RCS Hot Test
- February 2003:** Silo 4 dome penetration mockup
- March 2003:** Phase I RCS operation
- April 2003:** Silo 1 and 2 cap removal
- June 2003:** Erect bridge over silos
- July 2003:** Penetrate silo domes to install risers
- November 2003:** Complete AWR construction

TIMELINE

- November 2003:** Start slurry operations readiness and testing
- May 2004:** Begin waste extraction
- February 2005:** Begin slurry transfer to treatment
- May 2005:** Complete silo waste extraction
- January 2006:** Complete heel removal
- February 2006:** Complete slurry transfer to treatment
- February 2006:** Complete safe shutdown of AWR facilities

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AWR PROJECT

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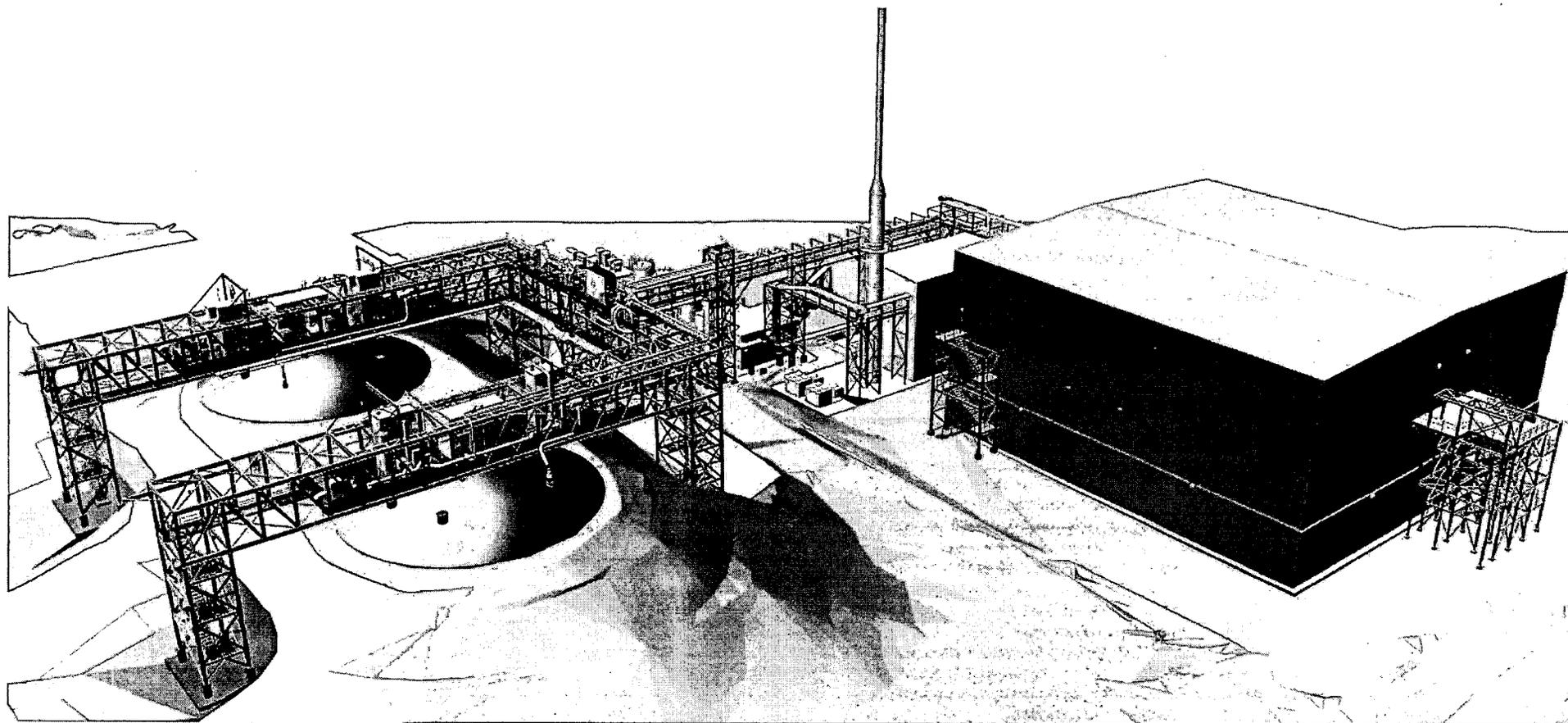
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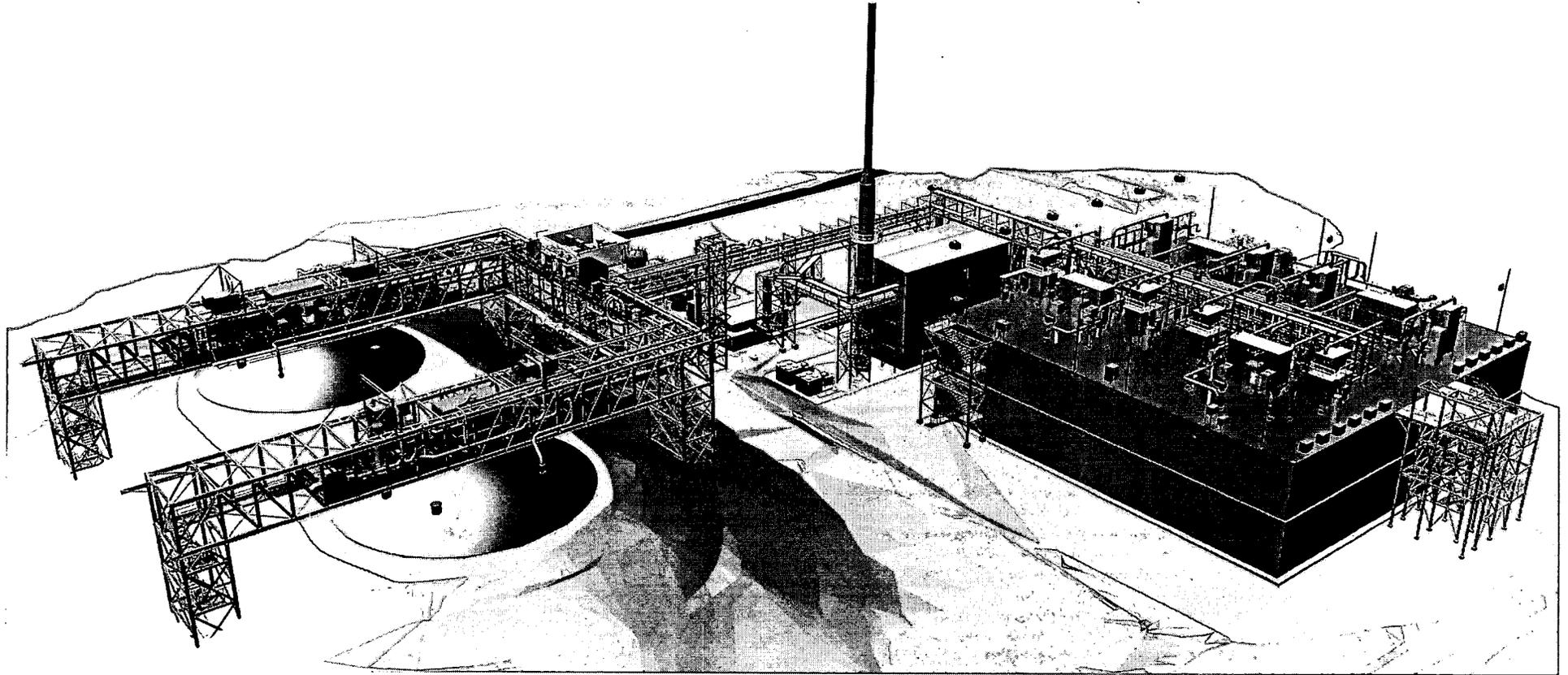
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AWR PROJECT FACILITIES



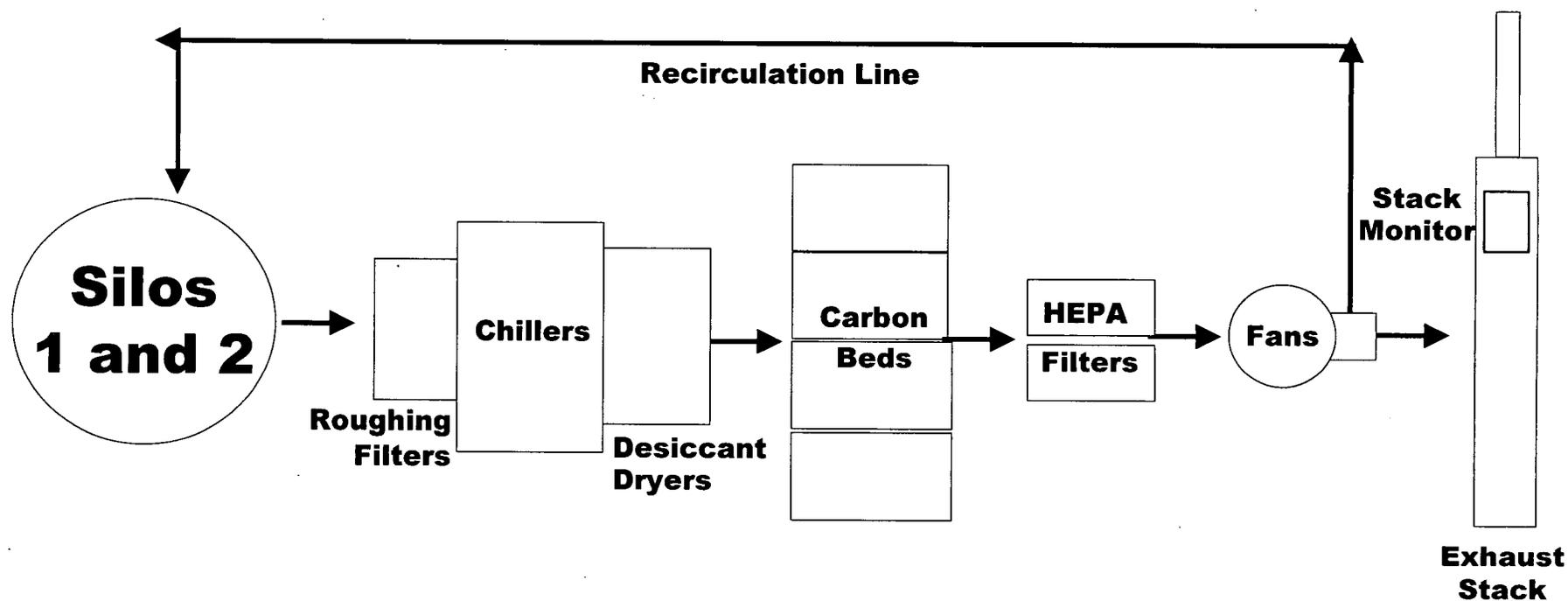
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AWR PROJECT EQUIPMENT



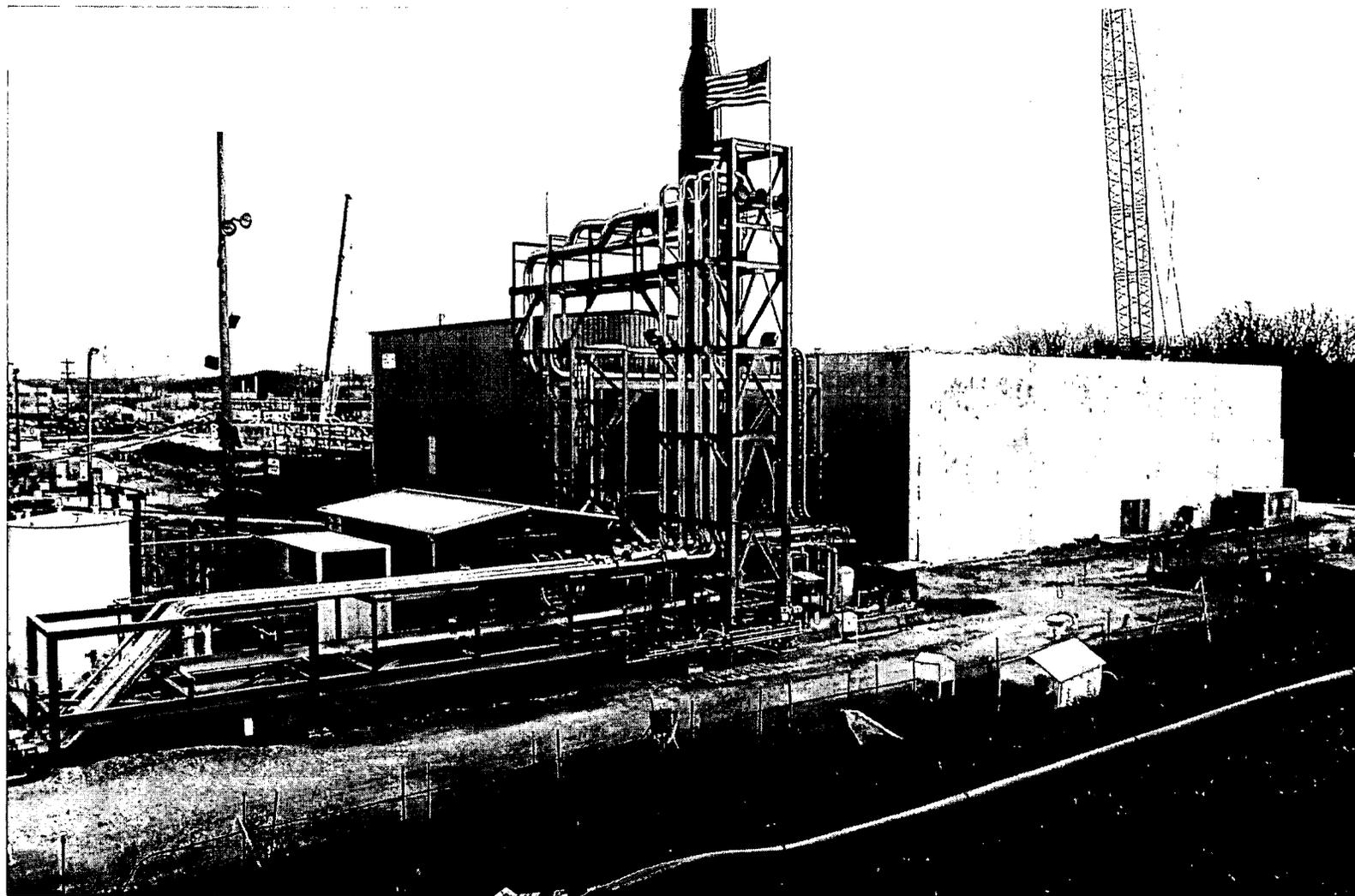
Graphic 7770-07

RADON CONTROL SYSTEM



Graphic 7770-08

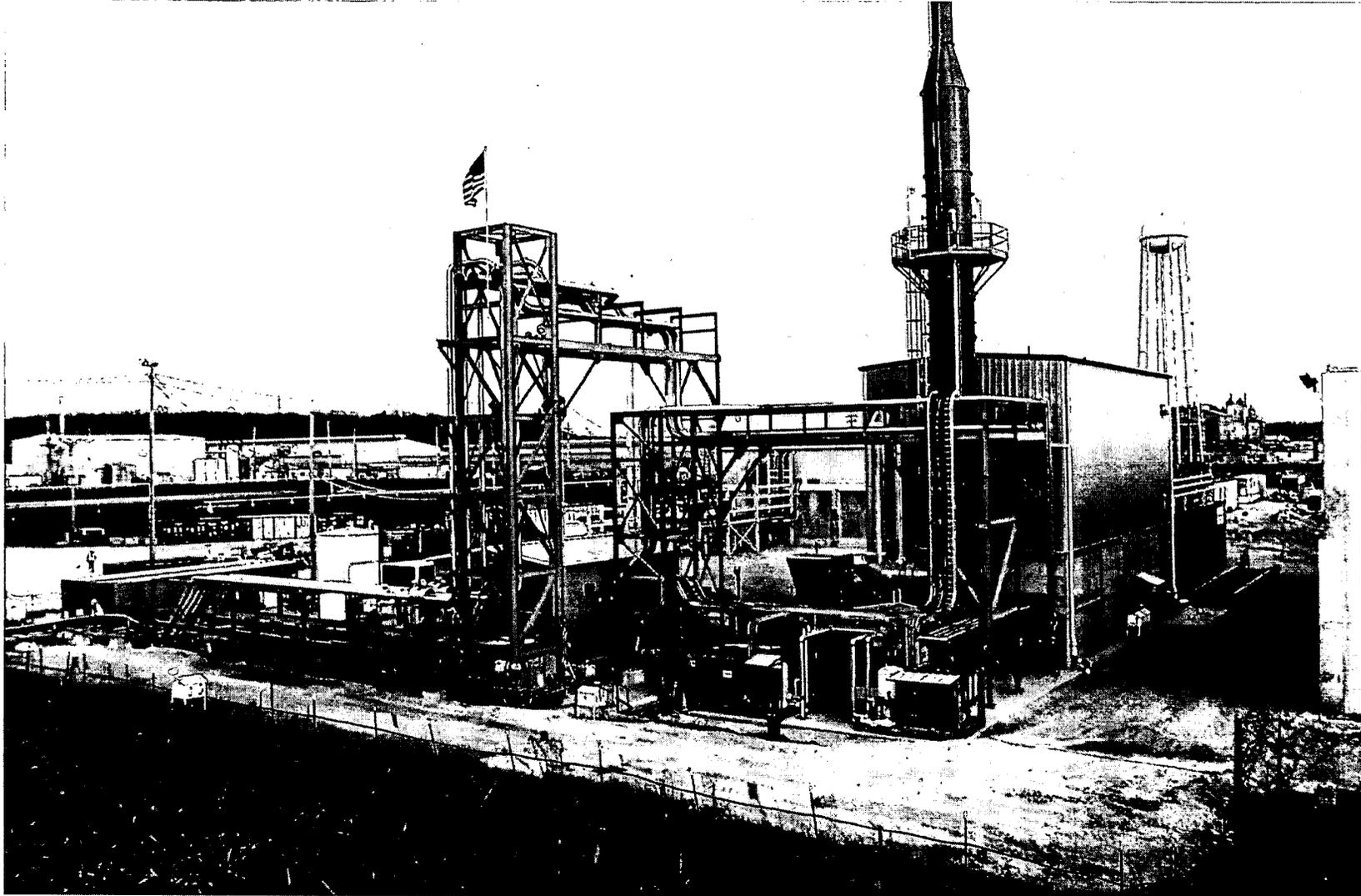
RADON CONTROL SYSTEM



December 2002

Graphic 7770-09
Photo #7385-D2276

RADON CONTROL SYSTEM



Graphic 7770-10
Photo # 7385-D2281

December 2002

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RADON CONTROL SYSTEM (RCS)

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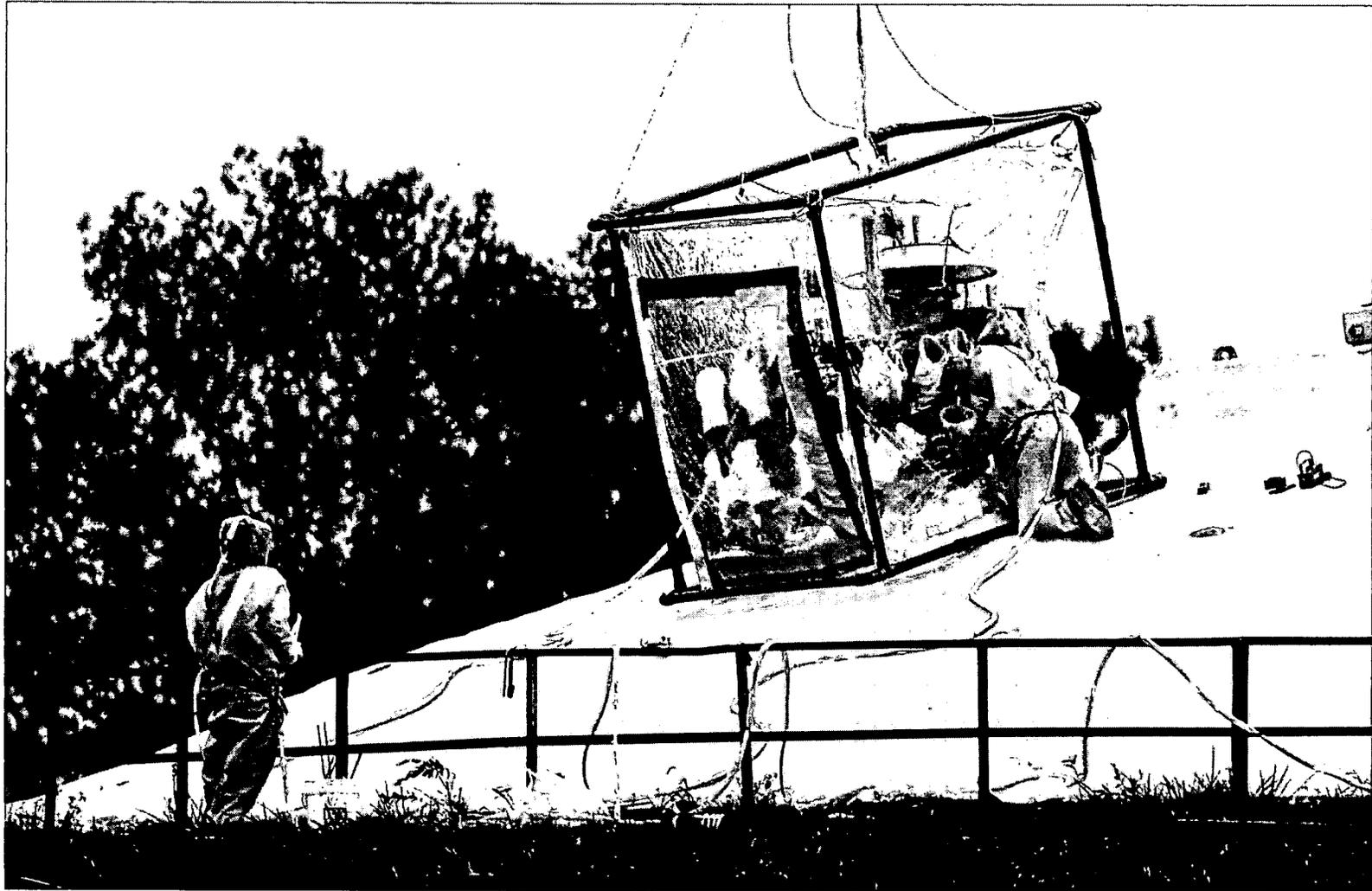
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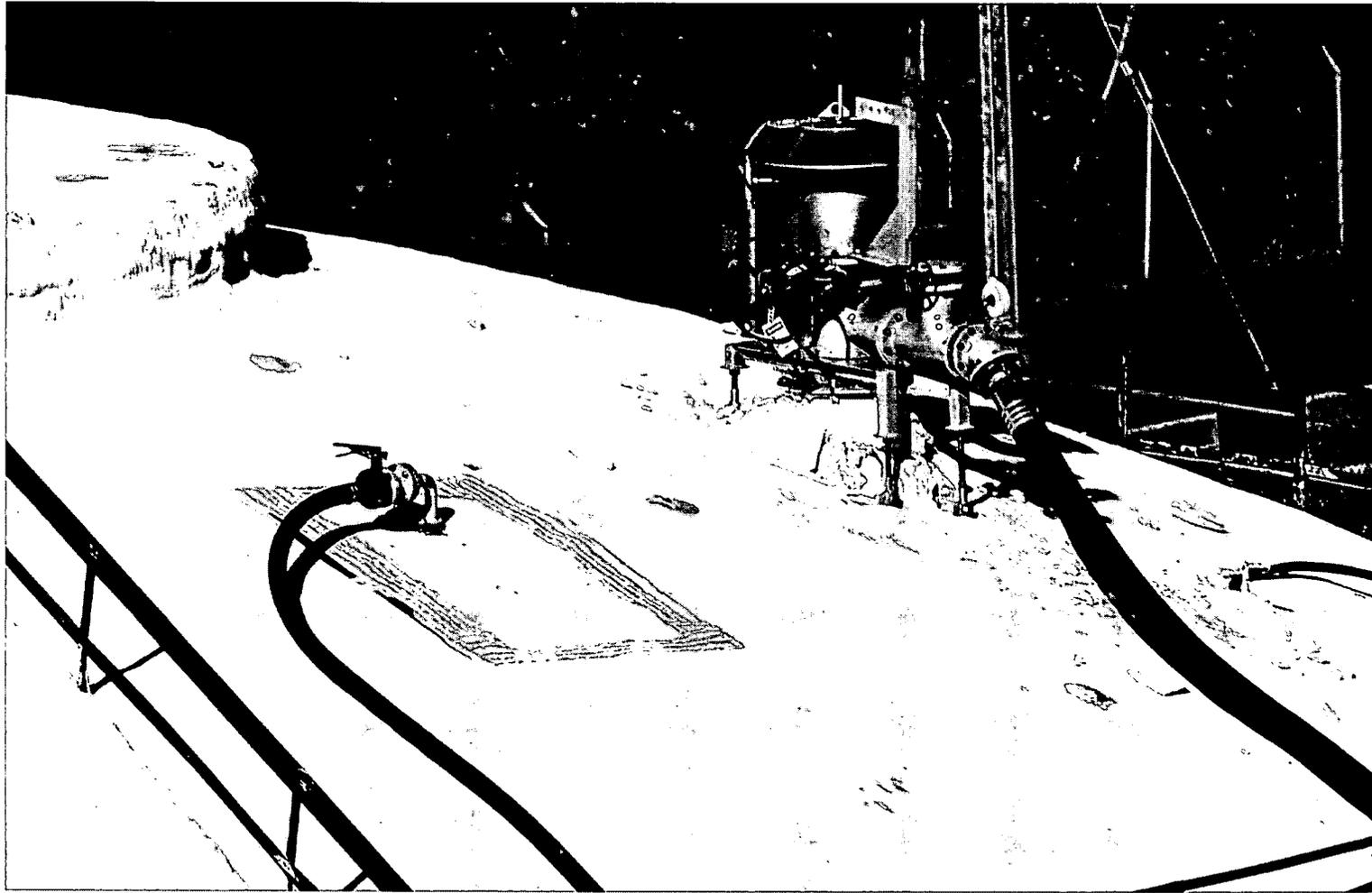
RADON CONTROL SYSTEM VALVE INSTALLATION



Graphic 7770-14
Photo #7385-D2144

October 2002

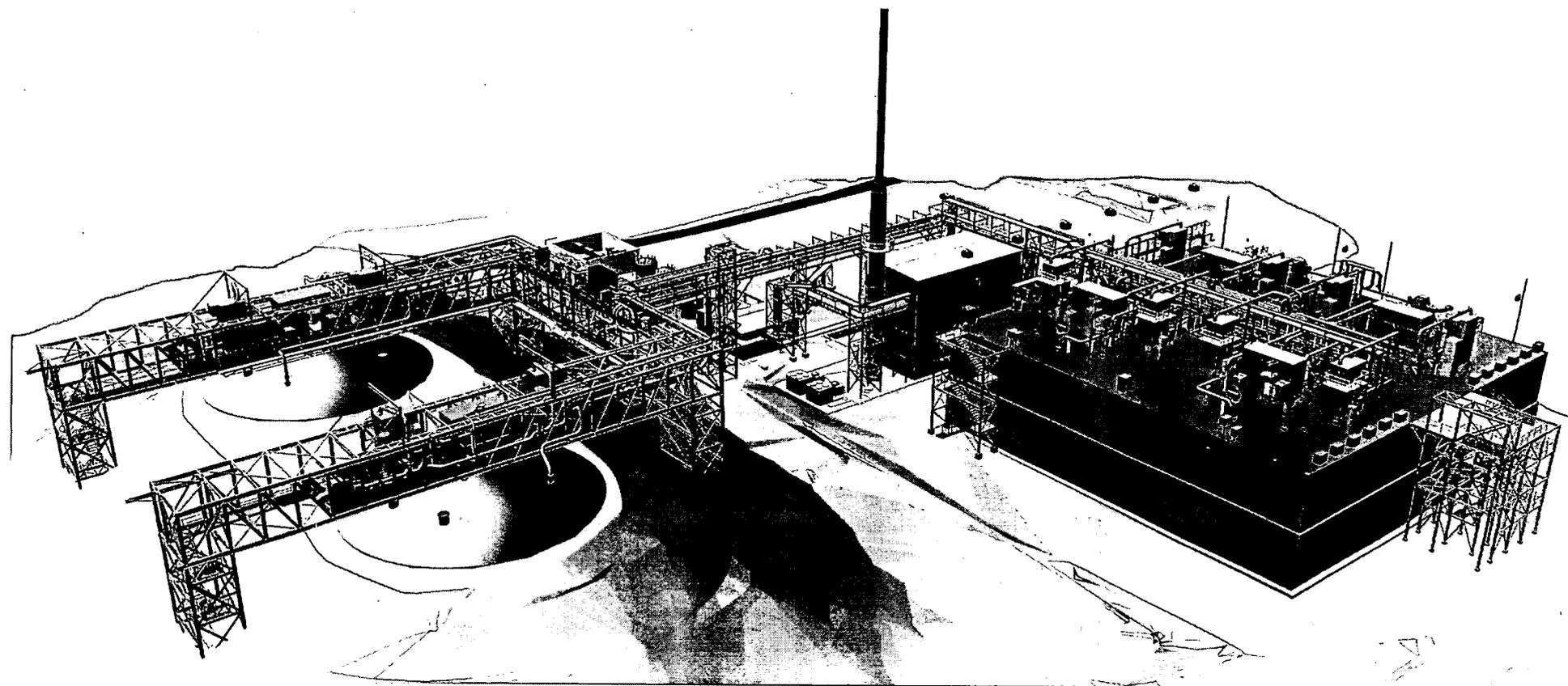
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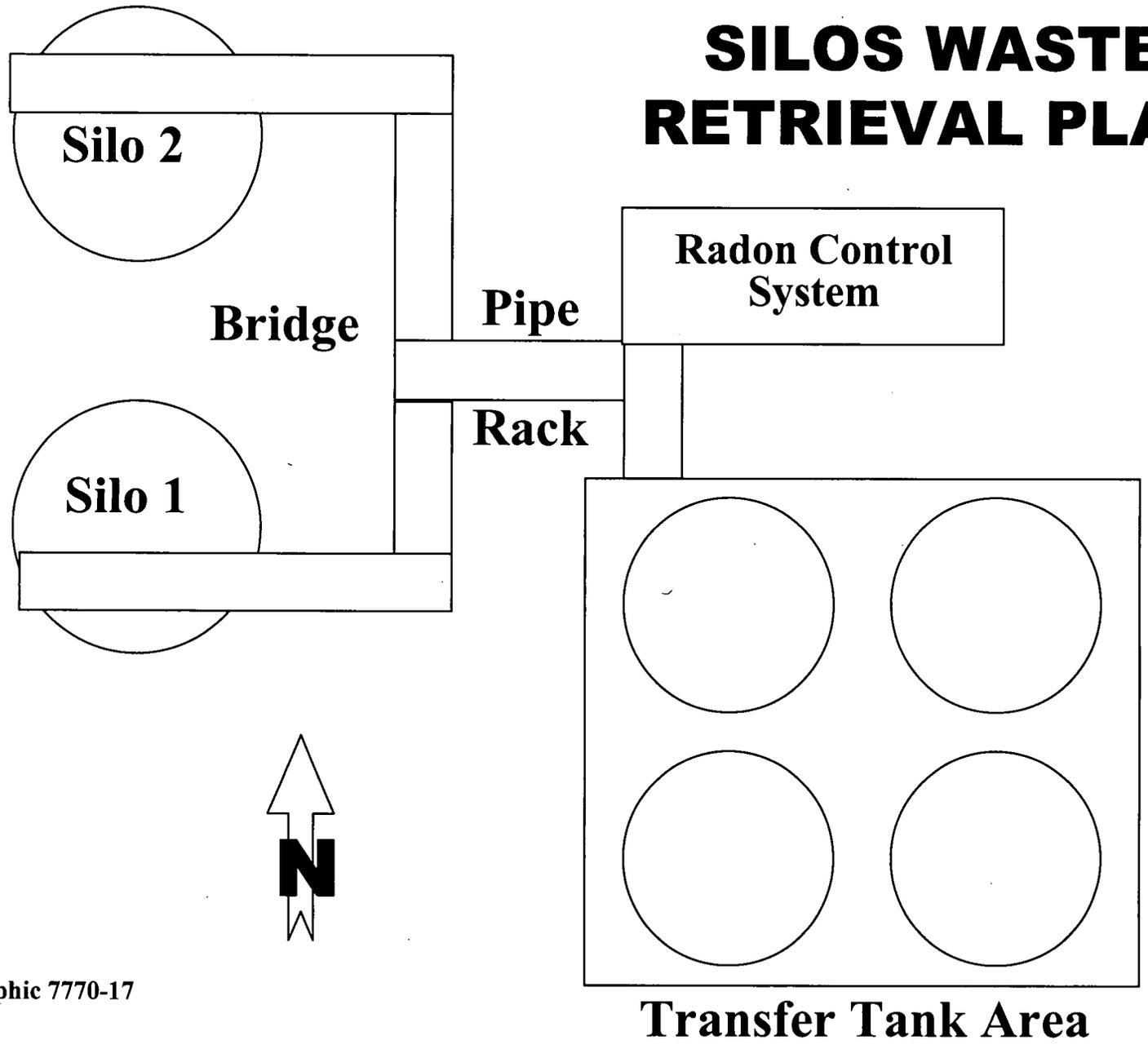
**Graphic 7770-15
Photo # 7385-D2198**

October 2002

SILOS WASTE RETRIEVAL SYSTEM

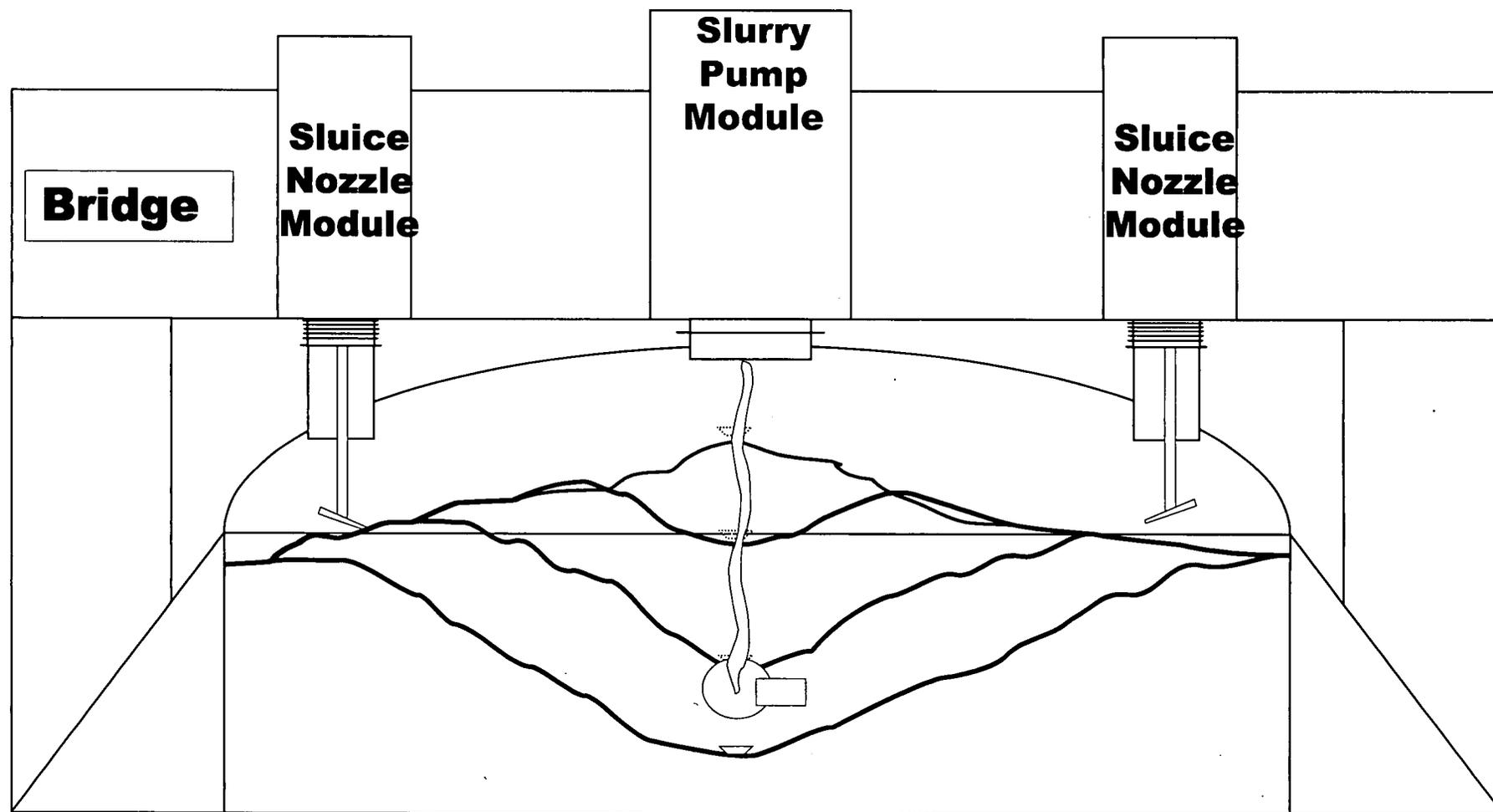


SILOS WASTE RETRIEVAL PLAN

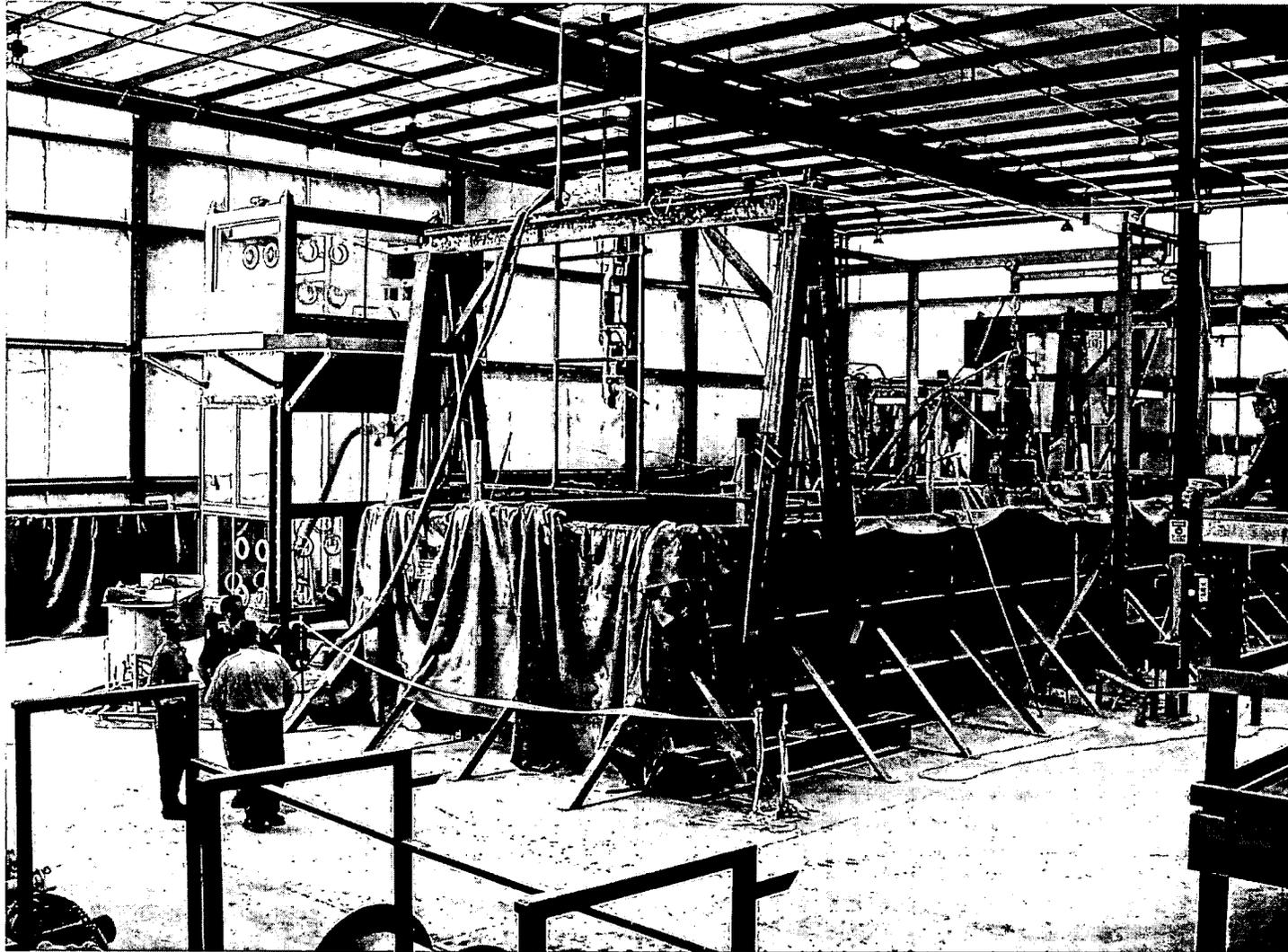


Graphic 7770-17

WASTE REMOVAL



COLD LOOP TEST

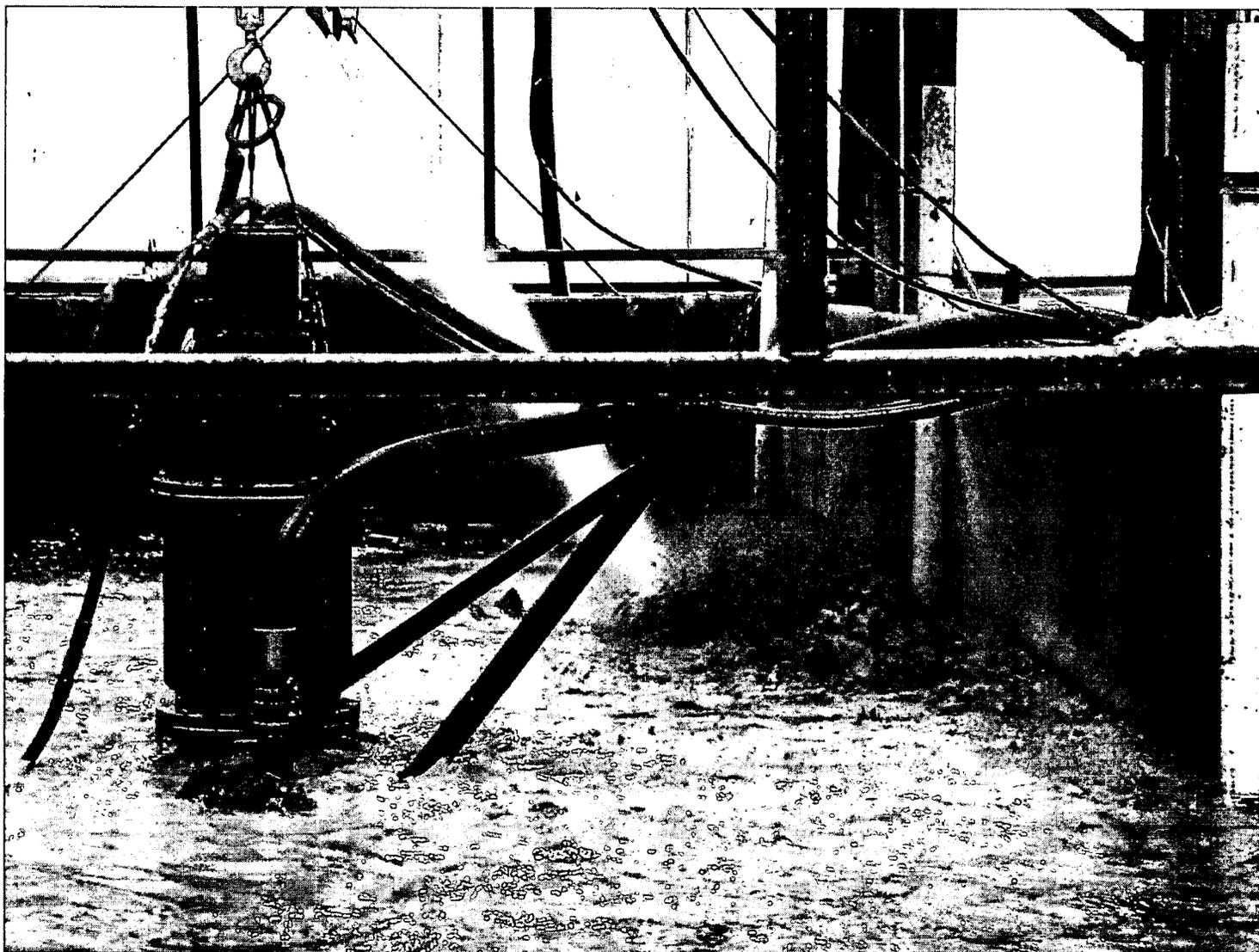


Graphic 7770-19
Photo #7862-D08

August 2002

4709

COLD LOOP TEST



Graphic 7770-20
Photo #7862-D018

August 2002

000085

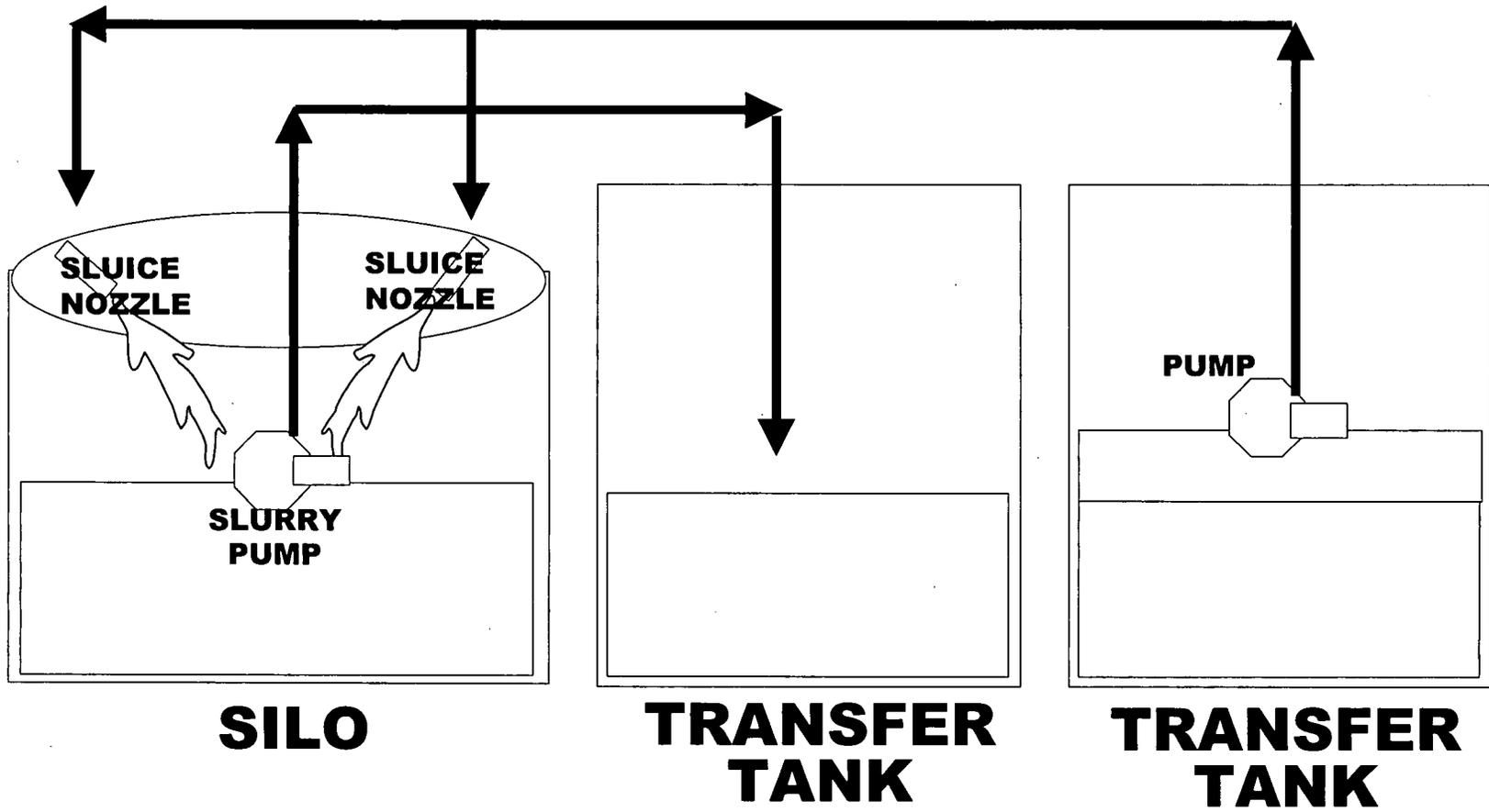
COLD LOOP TEST



Graphic 7770-21
Photo #7862-D013

August 2002

SLURRY OPERATIONS



HEEL REMOVAL

- **Silos team collecting technical information**
- **Workshop and brainstorming sessions will begin in January 2003**
- **Workshop will include Fluor Fernald, Jacobs, Batelle and other EM-50 experts**
- **Team plans to have design complete by April 2004**
- **Possible removal alternatives:**
 - ◆ **Smaller pump in silo sump**
 - ◆ **Mechanical device to push material to pump**
 - ◆ **Screw conveyor**
 - ◆ **External flushing**

BERM EXCAVATION

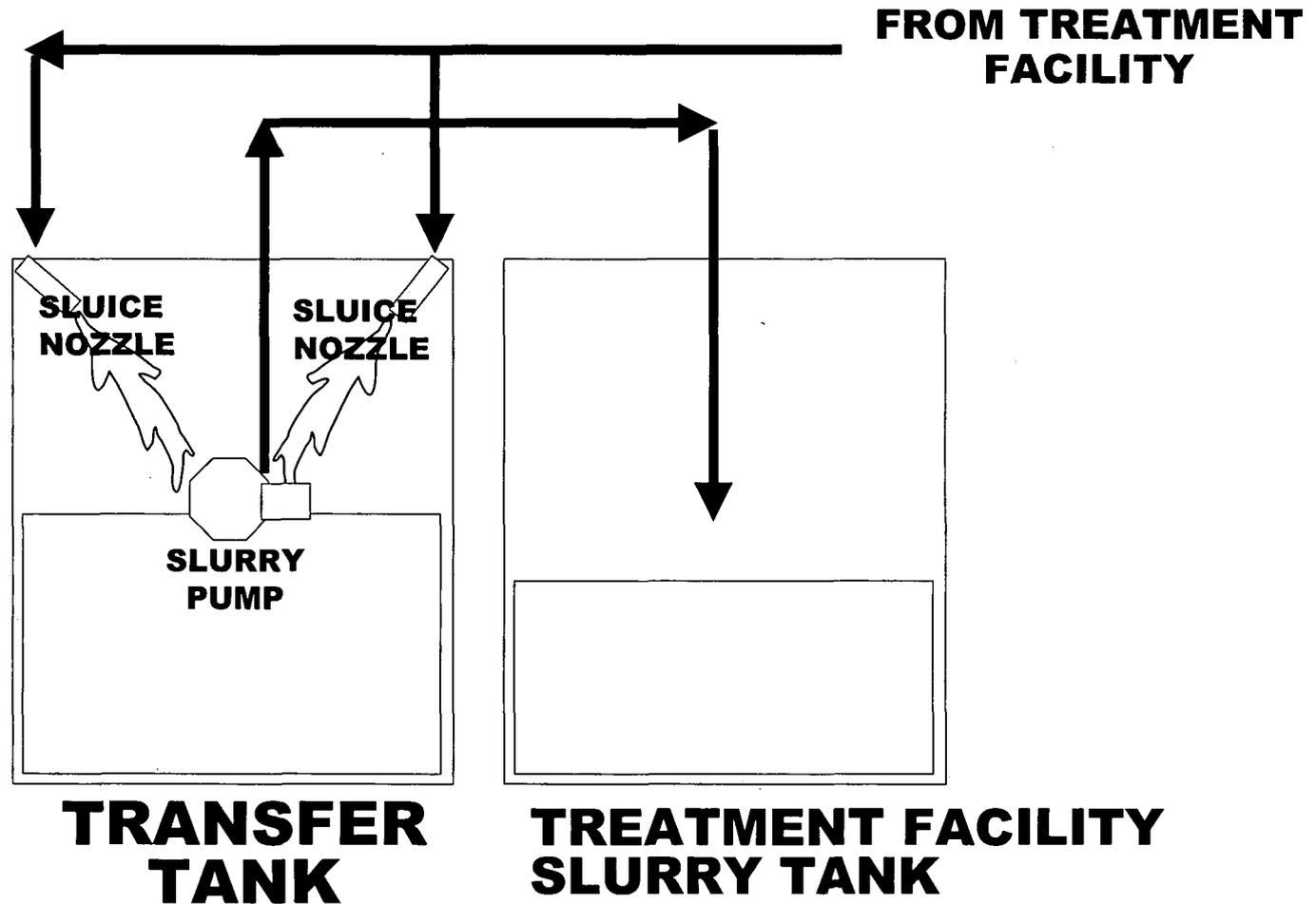
- **Recent engineering work concluded that silo walls can withstand pressure from berm**
- **Project will not need to constantly coordinate berm excavation with waste removal**
- **Crews will excavate part of the berm on the south side to make room for an equipment laydown area**
- **Project will dispose of berm soil in either On-Site Disposal Facility or offsite, depending upon sampling results**

SILO CAP REMOVAL



May 2002

AWR INTERFACE WITH TREATMENT

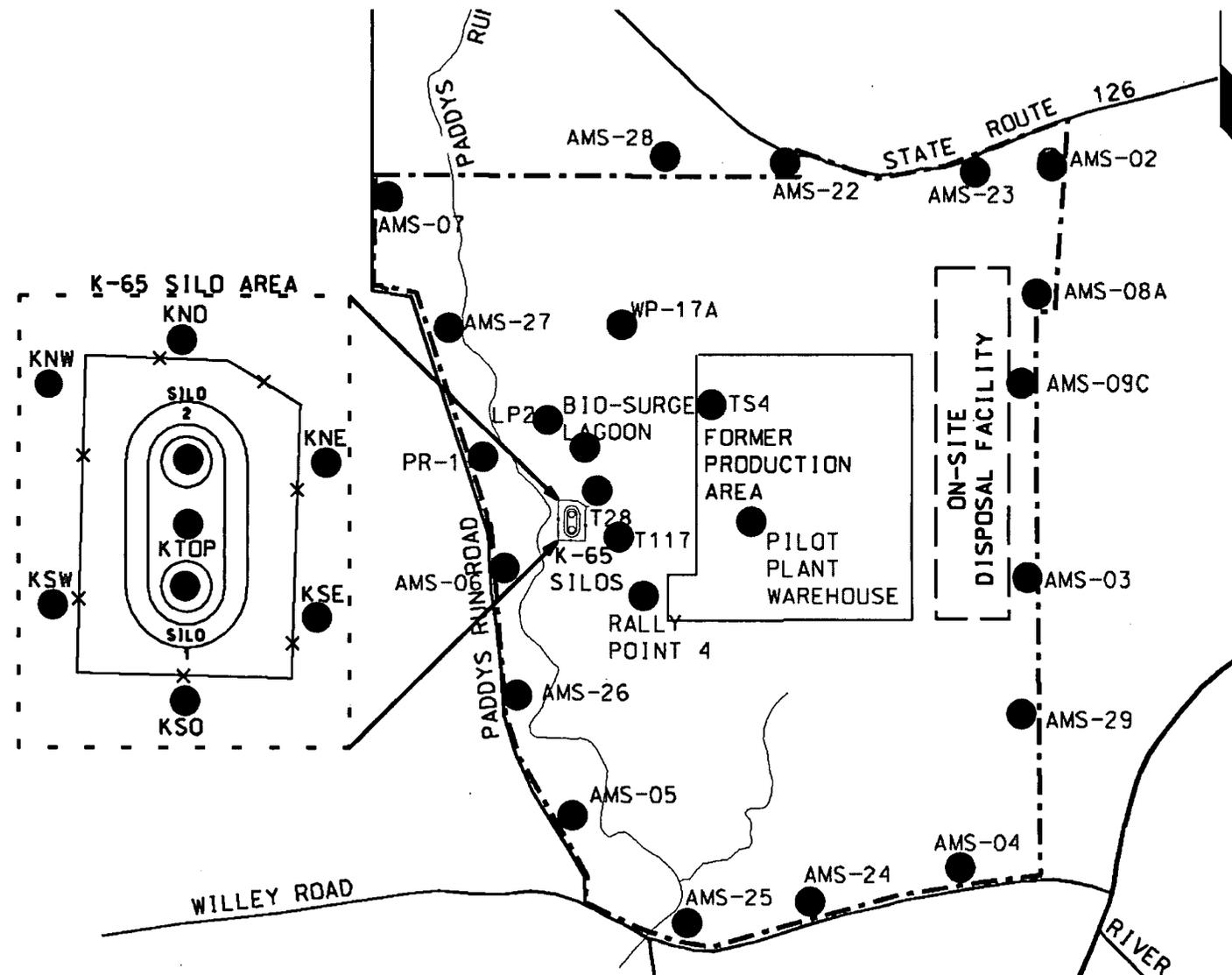


Graphic 7770-26

MONITORING

- **Environmental Monitoring**
 - ◆ **At the site boundary**
 - ◆ **Within the silos boundary**
- **Stack Monitoring**
 - ◆ **Radon**
 - ◆ **Particulate**
- **Process Monitoring**
 - ◆ **Pressure control**
 - ◆ **Temperature and relative humidity**
 - ◆ **Slurry density**
 - ◆ **Mass flow indicators**
 - ◆ **Decant sump tank level**
- **Personnel monitoring**

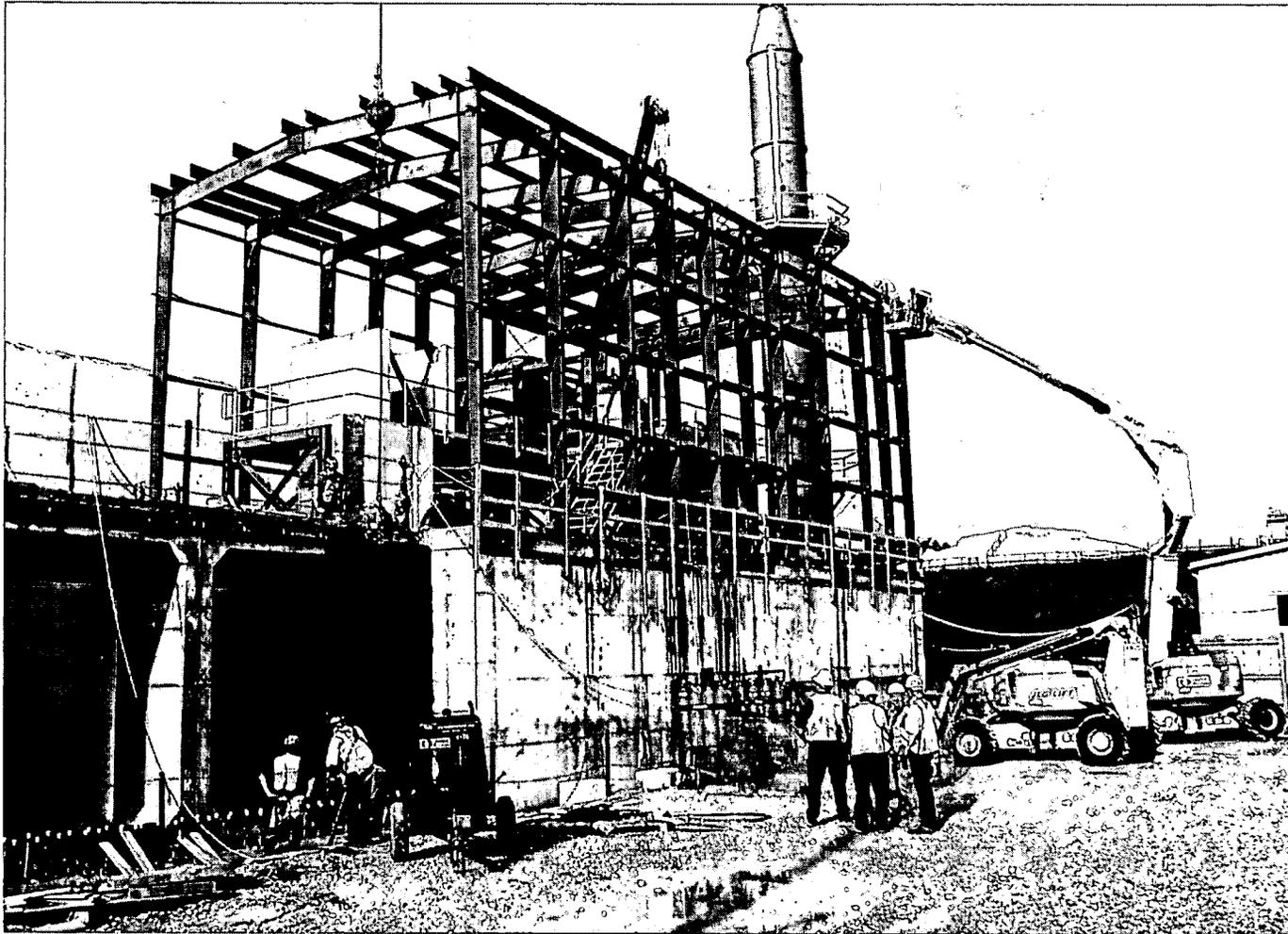
RADON MONITORING



Graphic 7770-28

CONSTRUCTION PROGRESS

Radon Control System



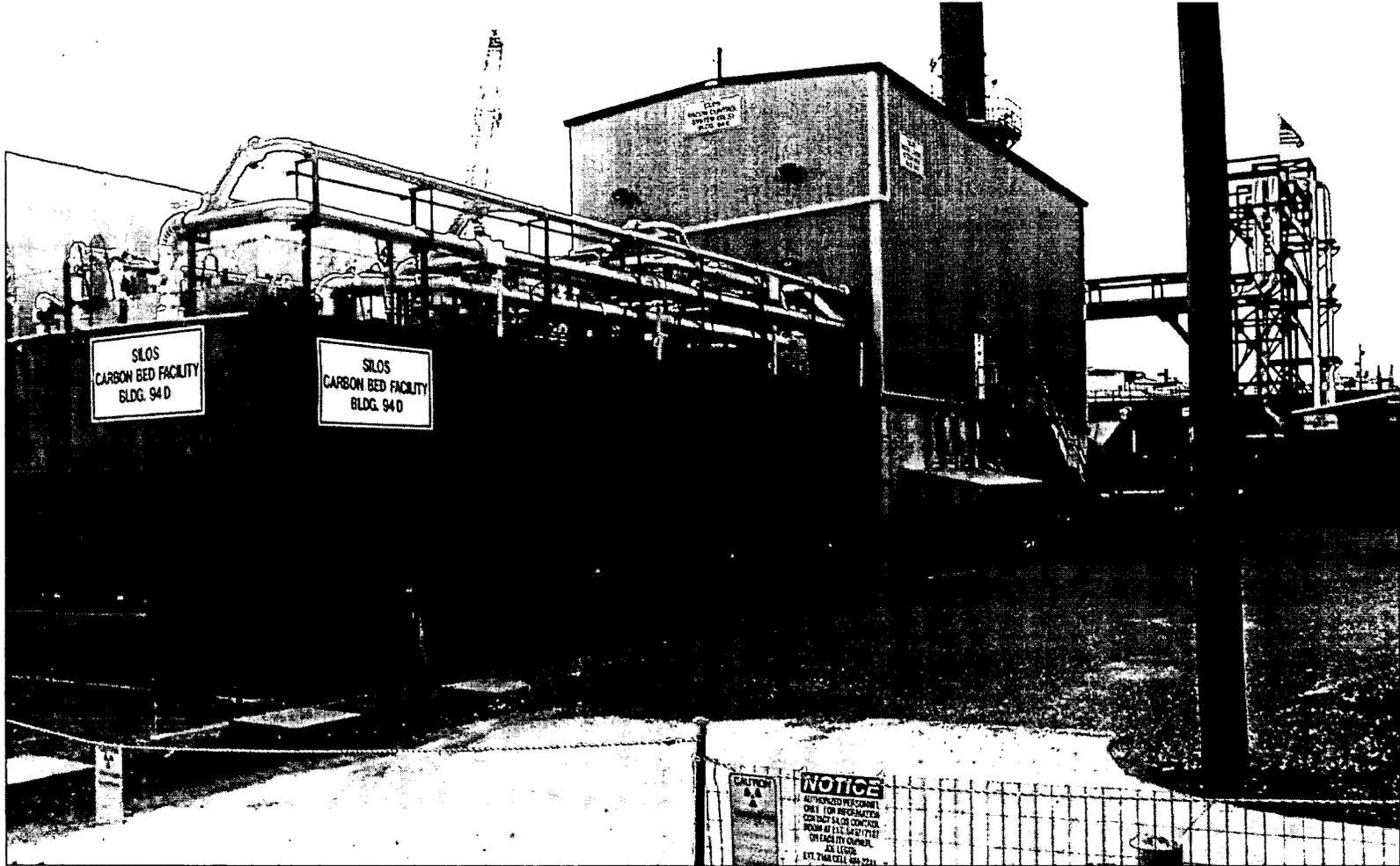
Graphic 7770-29
Photo #7385-D1750

June 2002

000094

CONSTRUCTION PROGRESS

Radon Control System

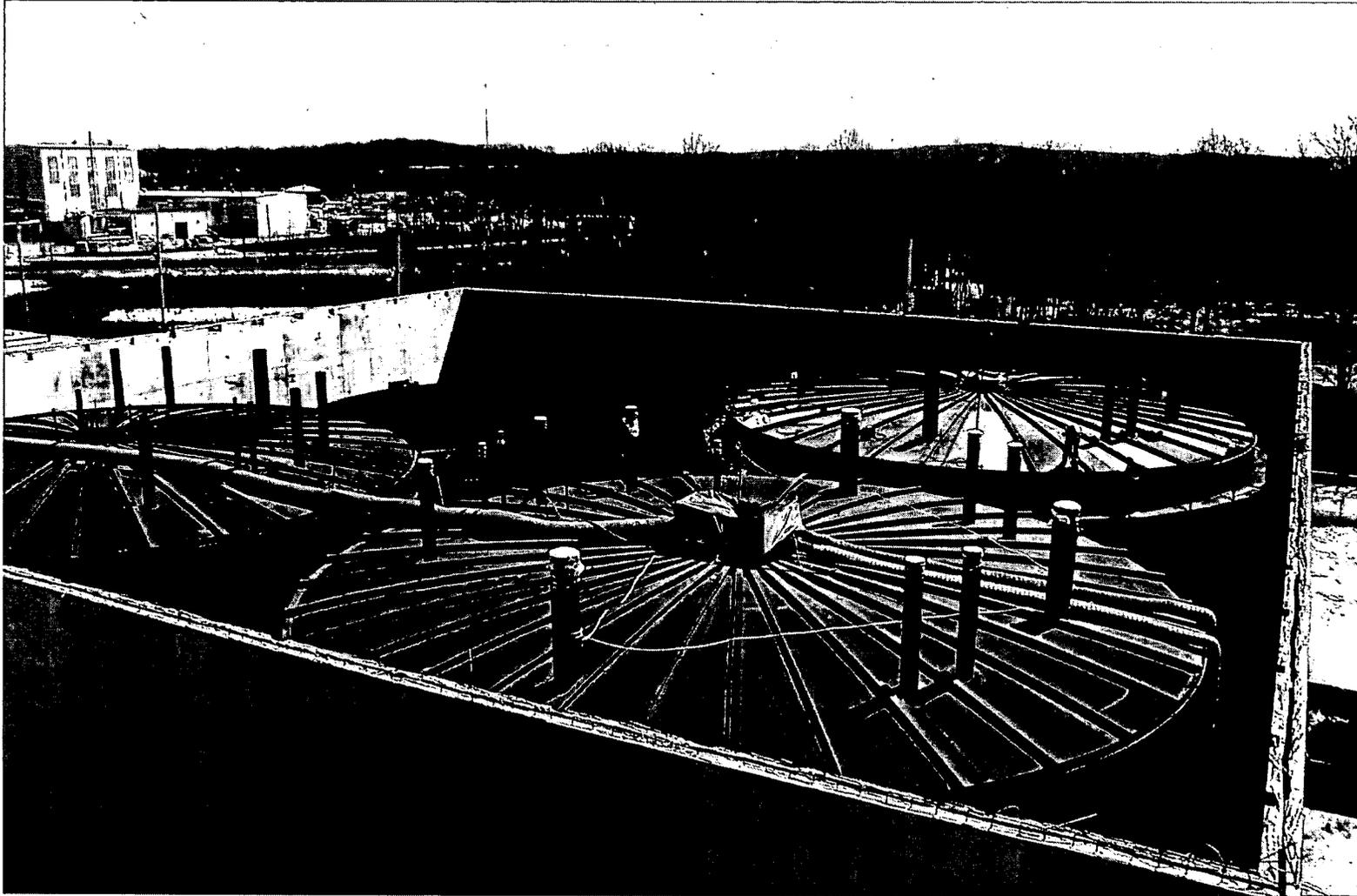


Graphic 7770-30
Photo #7385-D2294

December 2002

CONSTRUCTION PROGRESS

Transfer Tank Area

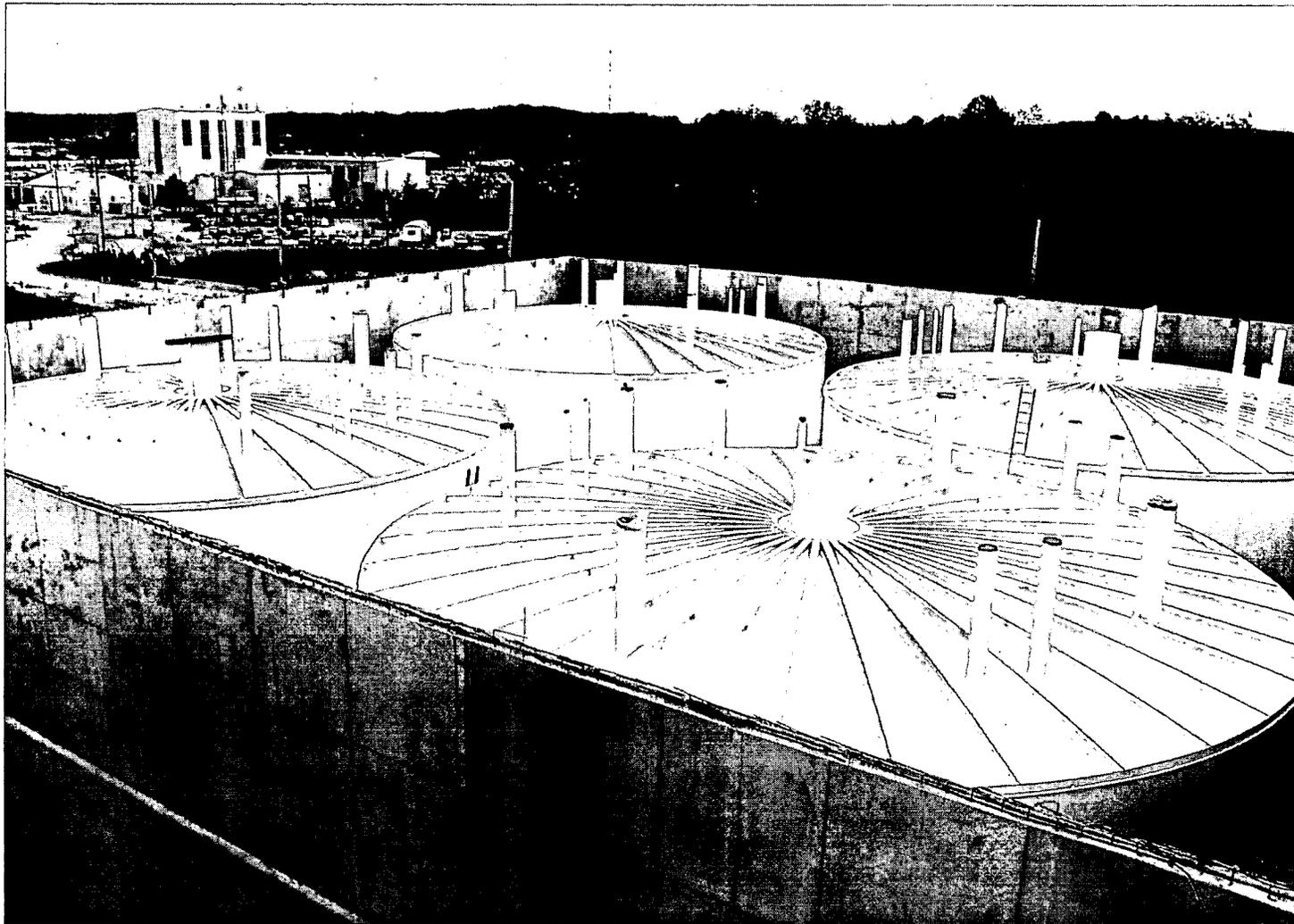


Graphic 7770-31
Photo #7385-D1569

April 2002

CONSTRUCTION PROGRESS

Transfer Tank Area



Graphic 7770-32
Photo #7385-D2069

December 2002

TIMELINE

- December 2002:** Complete RCS Hot Test
- February 2003:** Silo 4 dome penetration mockup
- March 2003:** Phase I RCS operation
- April 2003:** Silo 1 and 2 cap removal
- June 2003:** Erect bridge over silos
- July 2003:** Penetrate silo domes to install risers
- November 2003:** Complete AWR construction

TIMELINE

- November 2003:** Start slurry operations readiness and testing
- May 2004:** Begin waste extraction
- February 2005:** Begin slurry transfer to treatment
- May 2005:** Complete silo waste extraction
- January 2006:** Complete heel removal
- February 2006:** Complete slurry transfer to treatment
- February 2006:** Complete safe shutdown of AWR facilities