

**FISCAL YEARS 1993 AND 1994
DECONTAMINATION AND DECOMMISSIONING
ACTIVITIES PHOTOBRIEFING BOOK**



**FOR THE
ARGONNE NATIONAL LABORATORY-EAST SITE
TECHNOLOGY DEVELOPMENT DIVISION
DECONTAMINATION AND DECOMMISSIONING PROJECTS DEPARTMENT**

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COVER PHOTO:

**METAL MELT BOX BEING LOADED FOR TRANSPORT TO SCIENTIFIC ECOLOGY GROUP (SEG) SMELTING FACILITY IN
OAK RIDGE, TENNESSEE (Neg 16017K #13A)**

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ACRONYMS AND INITIALISMS

ANL	Argonne National Laboratory
ANL-East	Argonne National Laboratory-East Site
ATSR	Argonne Thermal Source Reactor
CP-5	Chicago Pile-5
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
EBWR	Experimental Boiling Water Reactor
FNG	Fast Neutron Generator
FY	Fiscal Year
HEPA	High-Efficiency Particulate Air
ORISE	Oak Ridge Institute for Science and Education
POB	Proof-of-Breeding
Rn-220	Radon-220
SEG	Scientific Ecology Group
TD	Technology Development
Th-232	Thorium-232
TRU	Transuranic
U-233	Uranium-233
U-235	Uranium-235
ZPR	Zero Power Reactor

INTRODUCTION

INTRODUCTION

PURPOSE

This photobriefing book describes the ongoing decontamination and decommissioning projects at the Argonne National Laboratory (ANL)-East Site near Lemont, Illinois. The book is broken down into three sections: introduction, project descriptions, and summary. The introduction relates the history and mission of the Decontamination and Decommissioning (D&D) Projects Department at ANL-East. The second section describes the active ANL-East D&D projects, giving a project history and detailing fiscal year (FY) 1993 and FY 1994 accomplishments and FY 1995 goals. The final section summarizes the goals of the D&D Projects Department and the current program status.

MISSION OF THE ANL-EAST D&D PROGRAM

In September 1991, ANL-East established the Environment and Waste Management Program (now Environmental Management Operations) under the Chief Operations Officer of the Laboratory. Initially, the D&D Projects Department was one of five departments within that program. In March 1994, the D&D Projects Department was moved to the Technology Development (TD) Division, under the Associate Laboratory Director of Engineering Research. The D&D Projects Department serves as the single point of contact at ANL-East for coordination of the responsibilities and interrelationships among the various Laboratory organizational units with essential roles in the overall D&D program. Within the TD Division, the D&D Projects Department interfaces with D&D technology developers and provides ways to improve the conduct of D&D operations across the DOE complex.

INTRODUCTION (continued)

The TD/D&D Projects Department proactively supports the U.S. Department of Energy (DOE) and ANL-East mission by conducting D&D activities that promote compliance with applicable DOE, ANL, federal, and state regulations and procedures. This includes planning, scheduling, and directing all D&D program activities at ANL-East; interfacing with DOE on the status of these activities; planning and scheduling future D&D at ANL-East; and investigating new and innovative approaches to accomplishing D&D project work in a more timely and cost-effective manner. The D&D program at ANL-East is conducted with the utmost regard for public safety and health, worker safety and health, and the environment.

The roles and responsibilities of the D&D Projects Department include:

- ▶ Serving as a focus for D&D activities at ANL-East,
- ▶ Directing and planning all ongoing ANL-East D&D activities,
- ▶ Maintaining an inventory of ANL-East facilities currently undergoing D&D or requiring D&D in the future,
- ▶ Planning and scheduling all out-year D&D activities at ANL-East,
- ▶ Reporting to DOE on the progress of ANL-East D&D activities, and
- ▶ Investigating new and innovative approaches to D&D.

INTRODUCTION (continued)

ANL-East has been formally conducting D&D activities during most of the operations at the site. The final structural D&D projects have been most identifiable over the past 15 years. The D&D projects completed to date include:

- ▶ Plutonium Fuel Fabrication Facility (Building 350)
- ▶ East Area Surplus Facilities (Buildings 16, 17, 22, 34, 37, 38, 41, and 55)
- ▶ Surplus plutonium gloveboxes (seven gloveboxes in Building 212)
- ▶ Many other small-scale D&D jobs

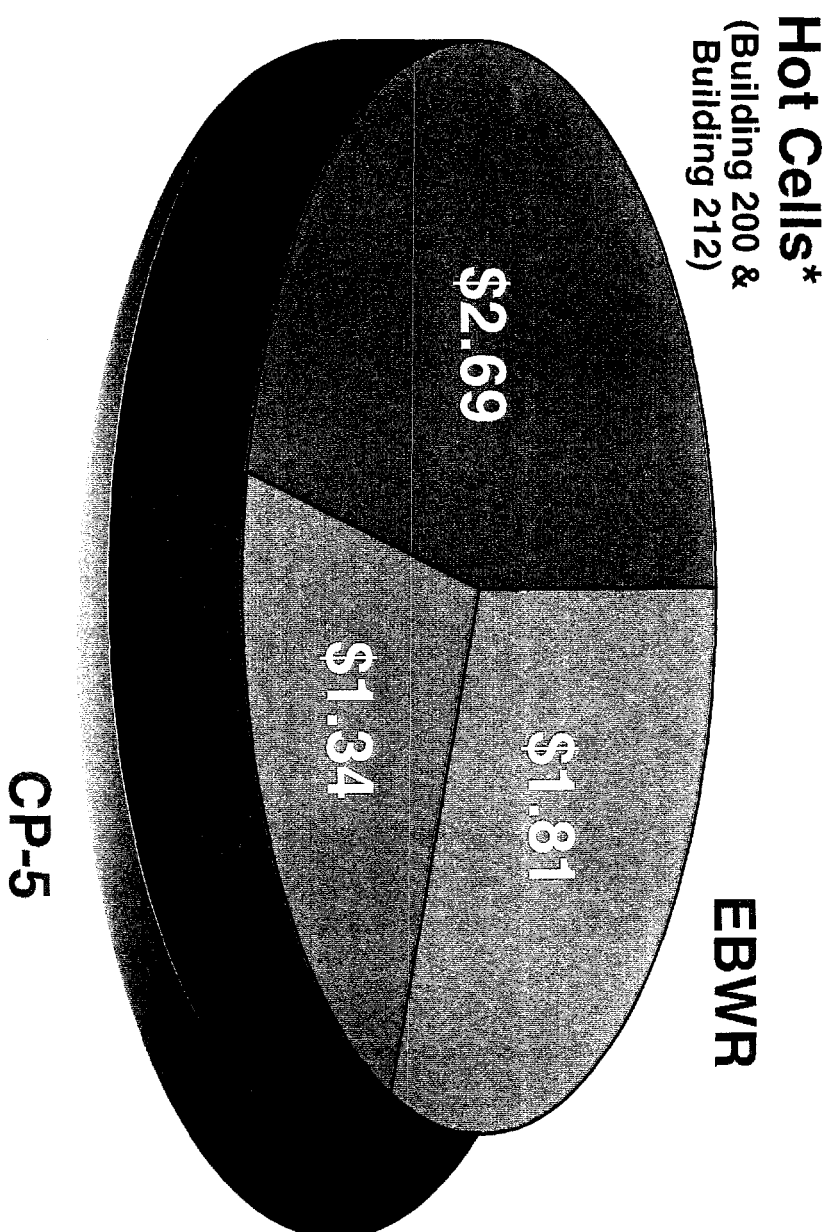
Like other DOE sites throughout the complex, ANL-East makes D&D an ongoing priority. The D&D process is initiated in a timely fashion on each facility that is shut down or identified as surplus. This helps to minimize costly surveillance and maintenance of surplus facilities. In addition, the Laboratory directs the funding it receives to those facilities with relatively higher risks to worker/public health and safety and/or the environment.

Four active D&D projects at ANL-East include:

- ▶ Experimental Boiling Water Reactor (EBWR)
- ▶ Chicago Pile-5 (CP-5) Reactor
- ▶ Building 200 M-Wing Proof-of-Breeding (POB) Program Hot Cells
- ▶ Building 212 Plutonium Gloveboxes

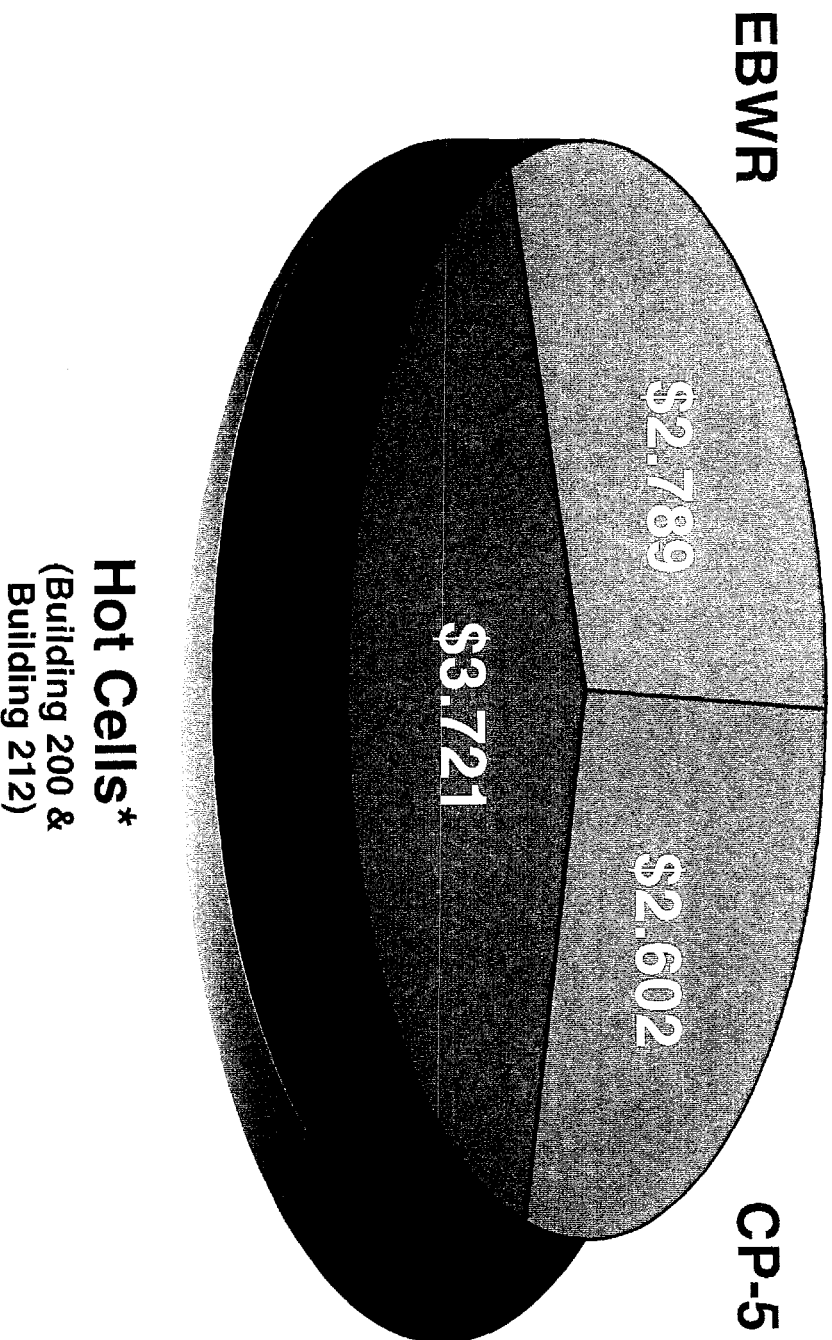
The total costs incurred by each of these ongoing projects in FY 1993 and FY 1994 are presented in Figures 1 and 2, respectively.

FIGURE 1
TOTAL COSTS (IN MILLIONS) INCURRED BY PROJECT IN FY 1993



*Also includes some program planning/technical support costs

FIGURE 2
TOTAL COSTS (IN MILLIONS) INCURRED BY PROJECT IN FY 1994



*Also includes some program planning/technical support costs

INTRODUCTION (continued)

The following projects at ANL-East have been identified as requiring D&D. Work on these projects is in the early planning stage and will be initiated in the out-years. Other projects will be added as they are identified, or as research activities are shut down in individual facilities.

▶ Zero Power Reactor (ZPR) Facilities	Building 315
▶ Argonne Thermal Source Reactor (ATSR)	Building 316
▶ Juggernaut Reactor	Building 335
▶ 60" Cyclotron	Building 211
▶ Waste Ion Exchange Facility	Building 579
▶ Fast Neutron Generator (FNG)	Building 314
▶ JANUS Reactor	Building 302
▶ Surplus Retention Tanks	Building 310

Figure 3 is a site map of ANL-East; Figure 4, an aerial photograph of the site, shows active and future D&D projects.

FIGURE 3
ARGONNE NATIONAL LABORATORY-EAST SITE MAP

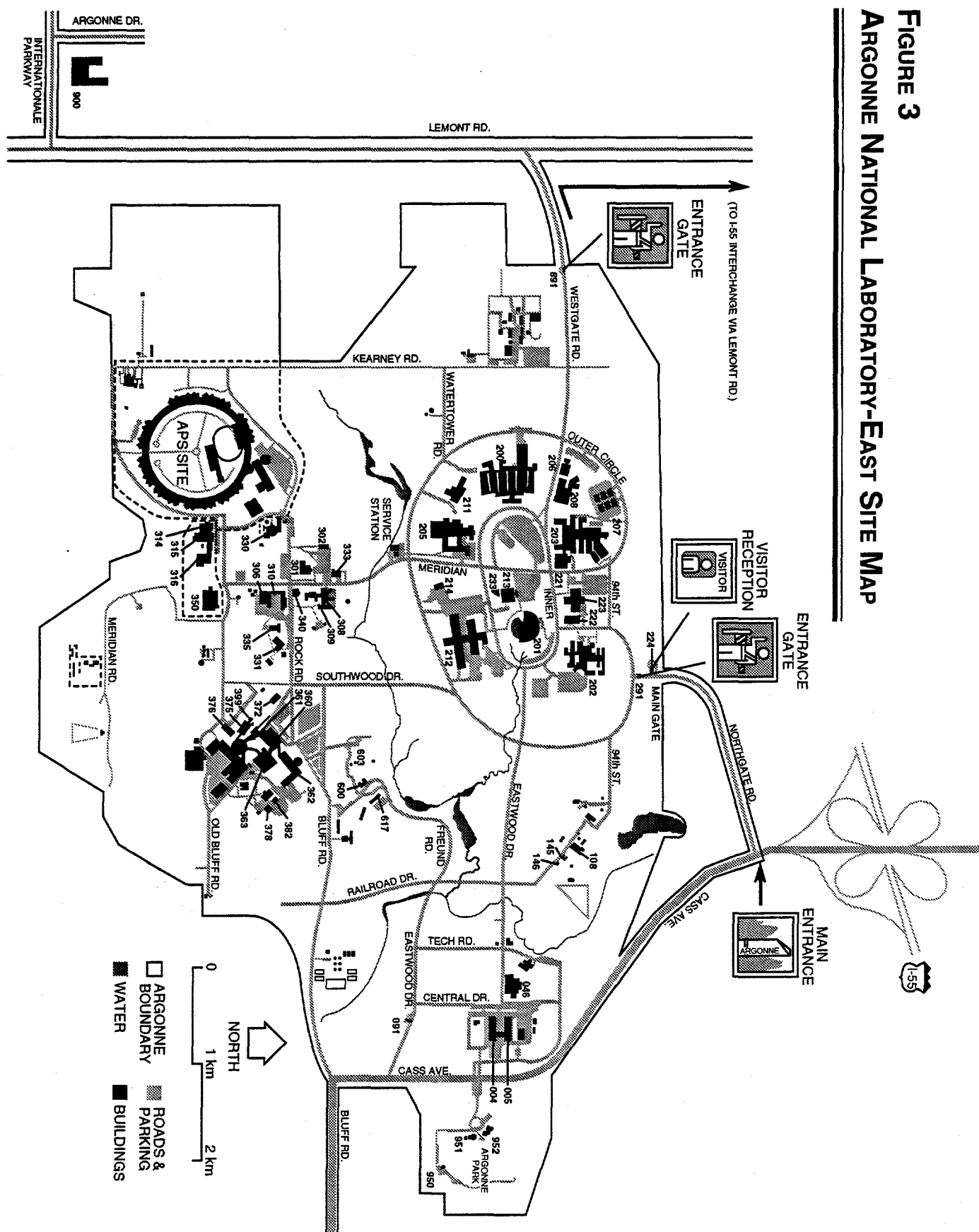






FIGURE 4
D&D PROJECTS LOCATOR

- 1 EBWR Facility
- 2 CP-5 Reactor Facilities
- 3 Hot Cells Project Consists Of:
 - 3A Building 200 POB M-Wing
 - Hot Cells Decontamination (5 Cells)
 - 3B Building 212 Plutonium Gloveboxes
 - 3C Building 301 Hot Cells
- 4 Juggernaut Reactor
- 5 Zero Power Reactors 6 & 9 Facilities
- 6 Argonne Thermal Source Reactor
- 7 60-Inch Cyclotron
- 8 Building 579 Waste Ion Exchange Facility
- 9 Fast Neutron Generator
- 10 JANUS Reactor
- 11 Building 310 Surplus Retention Tanks

EXPERIMENTAL BOILING WATER REACTOR (EBWR) D&D PROJECT

FIGURE 5
EBWR FACILITY (Neg 17553K #20)

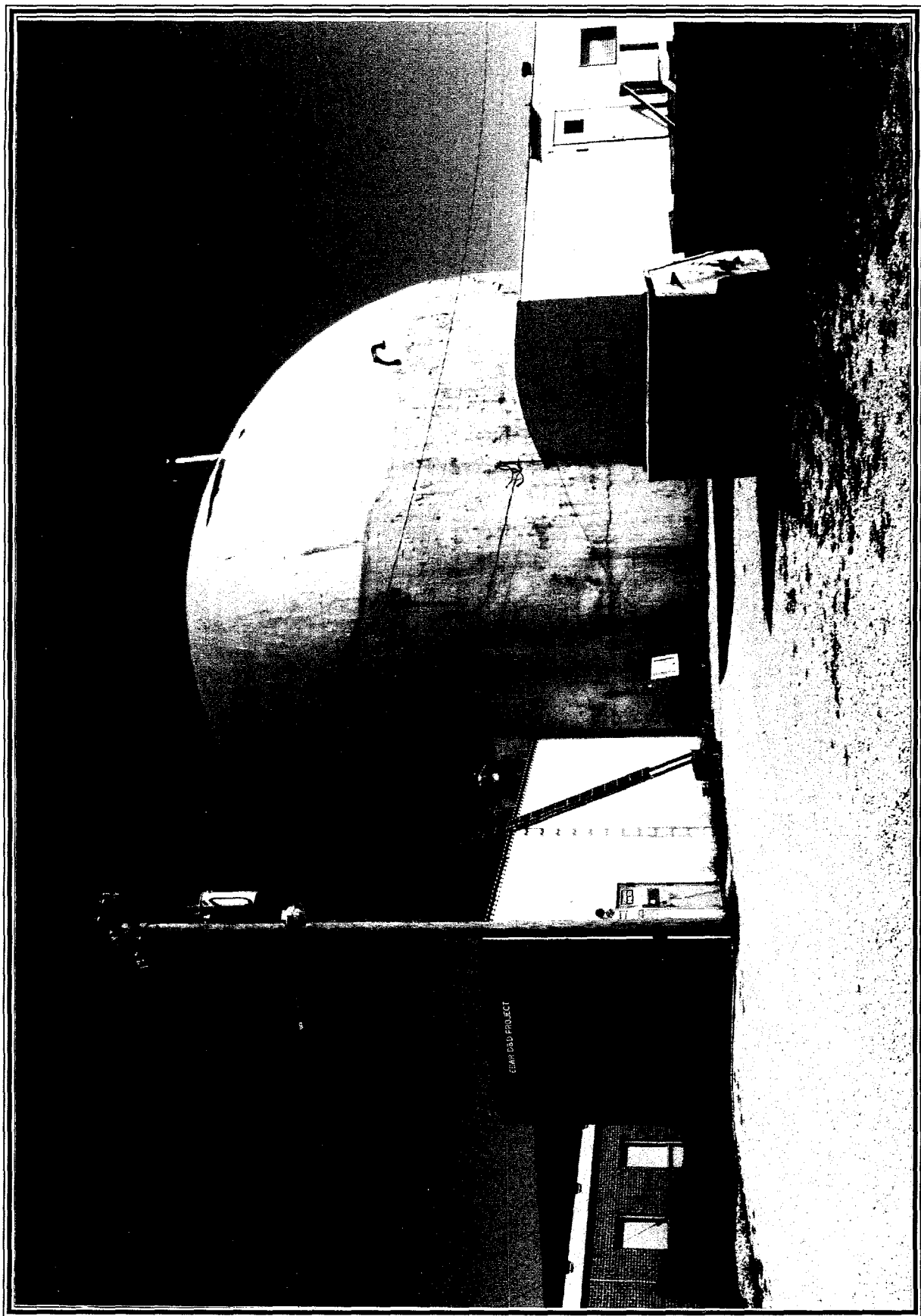
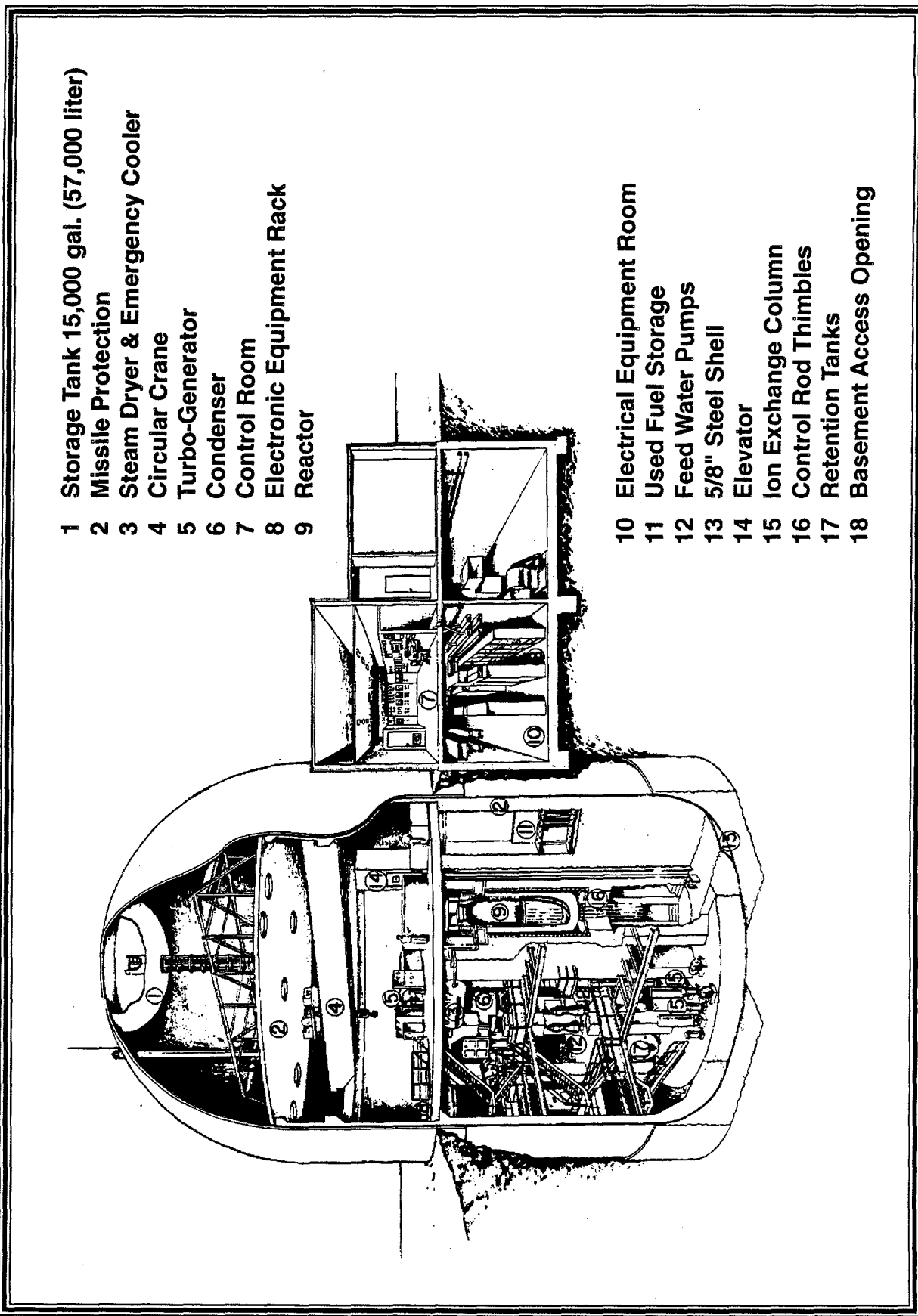


FIGURE 6

EBWR PLANT PERSPECTIVE BEFORE D&D (Neg 700-88)





EXPERIMENTAL BOILING WATER REACTOR (EBWR)

D&D PROJECT

DESCRIPTION

The EBWR facility (Figures 5 and 6) was operated from 1956 to 1967 at levels of 20 and 100 megawatts (thermal) to demonstrate the use of a boiling water reactor as a heat source to generate electricity for distribution to the commercial sector. The reactor operated at 5 megawatts (thermal) and was a fully integrated, operating power plant. The facility was shut down and placed in a dry lay-up condition in 1967. As part of the dry lay-up, all reactor fuel was removed and shipped to the DOE Savannah River Plant for reprocessing. All reactor systems were flushed and drained, and the water treated for disposal.

The primary areas of concern associated with the facility are the induced radioactivity of the reactor internals and the reactor vessel itself. In its current condition, the EBWR facility could present a significant radiological safety concern due to the potential for inadvertent exposure to personnel. Once D&D is completed, this potential exposure risk will be eliminated and the EBWR facility will be converted and used for storage of transuranic (TRU) waste packages prior to off-site shipment for storage/disposal.

The EBWR D&D is one of the projects participating in the DOE International Technology Transfer Exchange Program. Visitors often tour the EBWR, and technical information and data are compiled in the course of the project to exchange with other countries' representatives and international organizations.

DESCRIPTION (continued)

Several of EBWR's outbuildings were either demolished or converted for reuse prior to 1980. This work was funded from a Laboratory-wide general demolition fund. Surveillance and maintenance of the facility have been under way since the time of shutdown. In 1986, the EBWR D&D project was initiated with general facility preparations (Phase I D&D). This phase also included removing asbestos insulation throughout the facility. Phase II D&D began in 1988 and continued through 1989. This work consisted of removing all reactor system piping, components, and associated equipment (radioactive and nonradioactive contaminated). This phase of the D&D was completed in 1990. Phase III of the D&D is currently under way.

Phase III includes preparations for, and removal of, the reactor vessel internals and the reactor vessel itself. The original schedule had been delayed due to other Laboratory priorities that delayed staff availability. In FY 1992, however, major strides were made to establish a reasonable schedule for full D&D.

FY 1993 ACCOMPLISHMENTS

Accomplishments of this project in FY 1993 (Figures 7-16):

- ▶ Completion of EBWR water filtration/transfer system and the high efficiency particulate air ventilation system installations
- ▶ Completion of a Project Readiness Review for removal of reactor complex work
- ▶ Conditional approval by DOE of the EBWR subcontract for completion of D&D work
- ▶ Training on the removal of control rods from the mock-up reactor vessel

FY 1993 ACCOMPLISHMENTS (continued)

- ▶ Calculation, for disposal purposes, of the curie content of each reactor component
- ▶ Preparation of the final safety bounding document for the project
- ▶ Development of procedures for removal, size reduction, and packaging of the reactor vessel internals
- ▶ Analysis, for isotopic content, of samples from a control rod
- ▶ Assignment of a new project engineer and field engineer to project management staff
- ▶ Fabrication of shielded transfer equipment and completion of engineering operational inspections
- ▶ Calibration of radiation systems monitoring equipment

FIGURE 7
VIEW LOOKING UP AT EBWR CONTROL ROD LIFTING EXTENSIONS AND RESTRAINING DEVICE -- EACH ROD WAS "PUSHED"
TO AN ELEVATION THAT ALLOWED ENGAGEMENT OF THE TRANSFER SHIELD. (Neg 17554K #2)

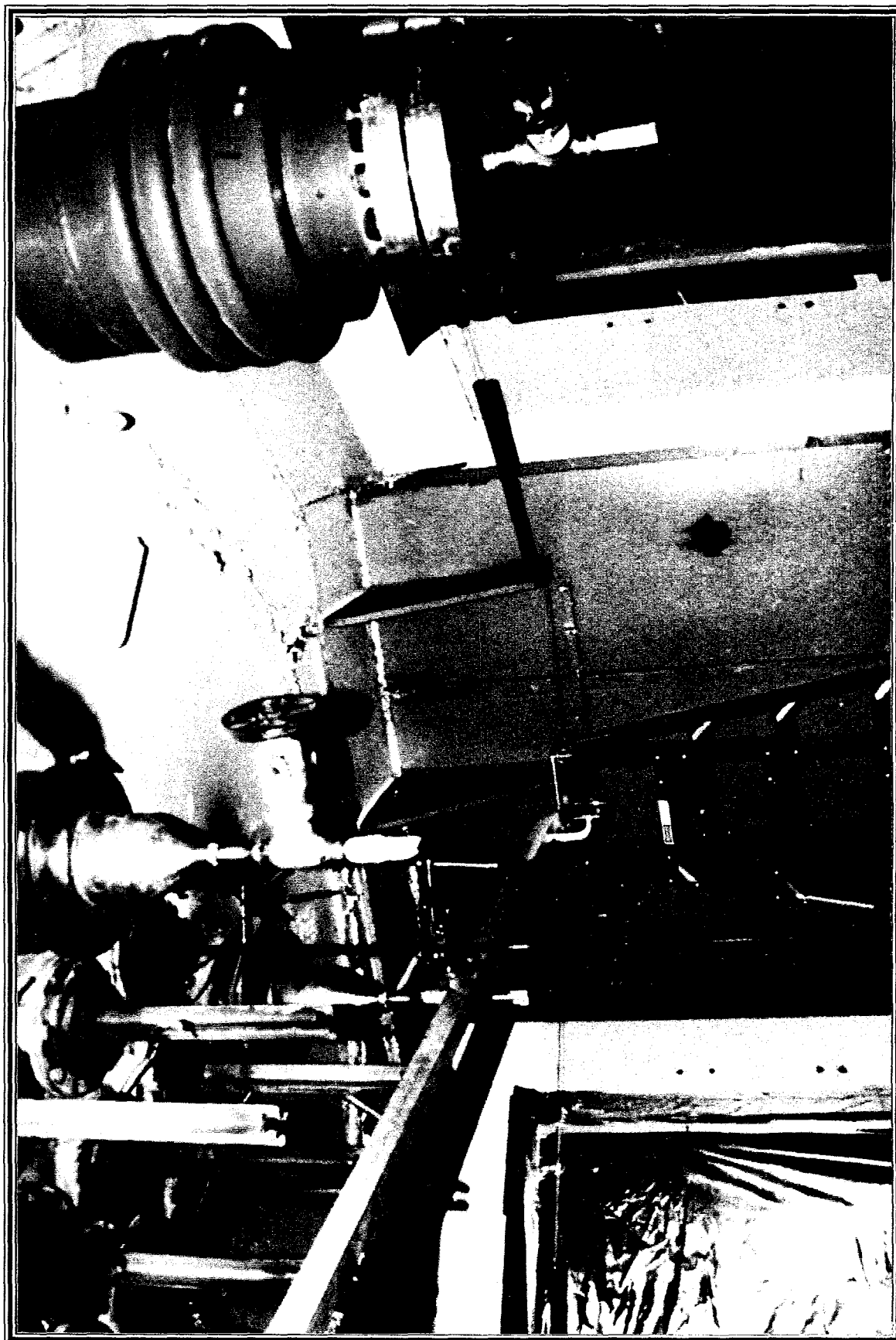


FIGURE 8

RECIRCULATION AND FILTRATION PORTION OF THE EBWR WATER FILTRATION AND TRANSFER SYSTEM (Neg 17554K #3)

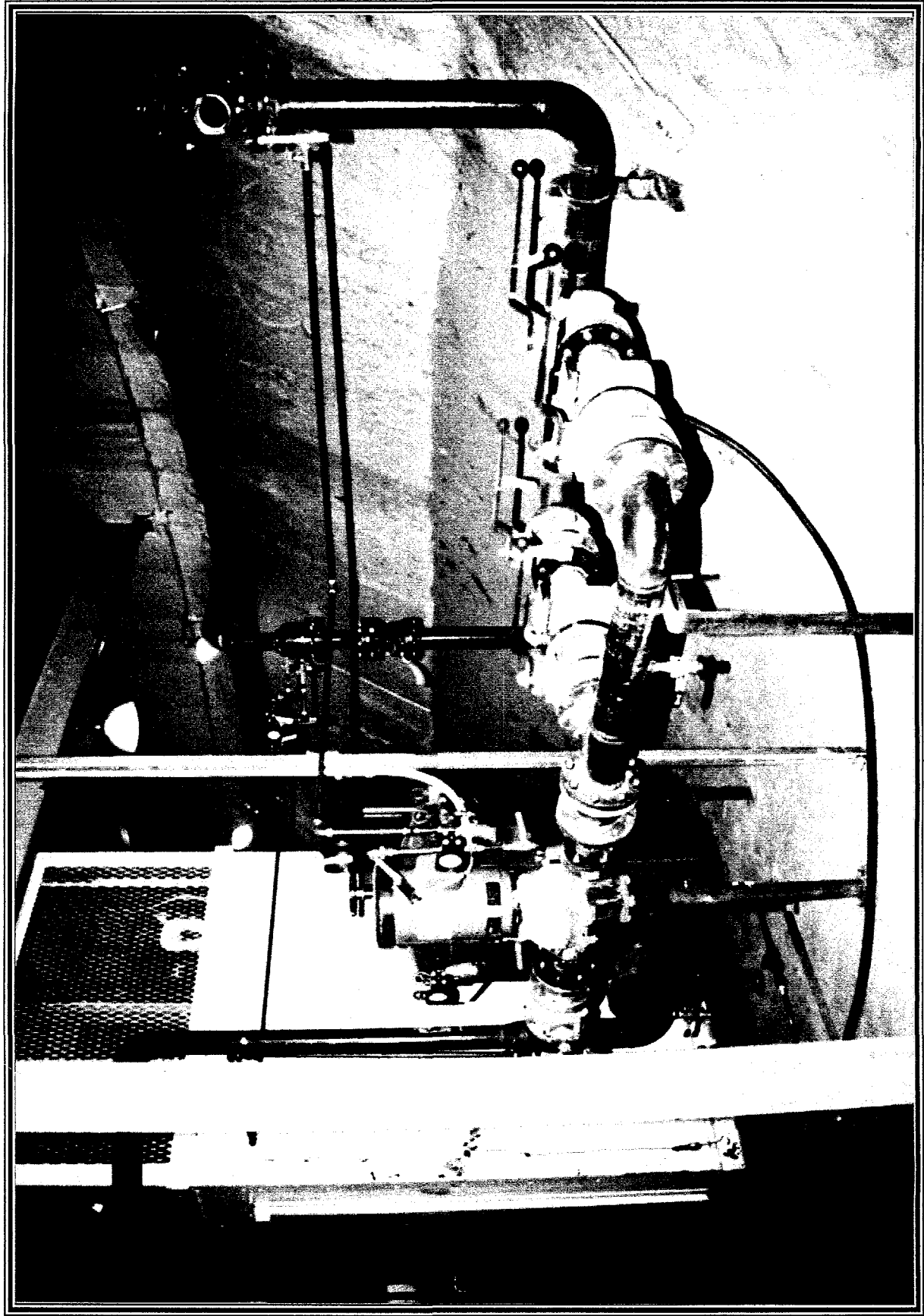


FIGURE 9

ANL TECHNICIAN WORKING ON THE EBWR WATER FILTRATION AND TRANSFER SYSTEM (Neg 17554K #4)

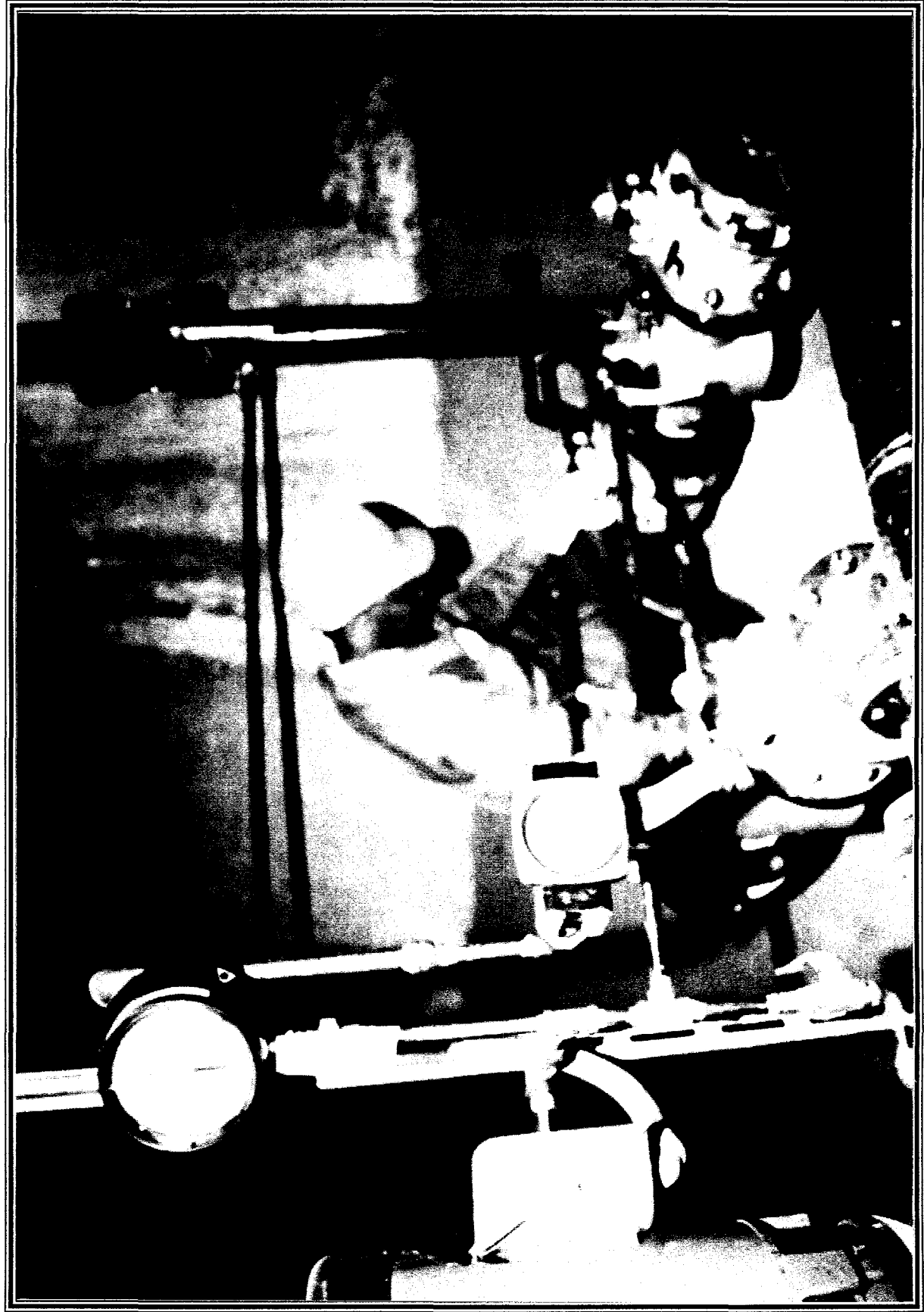


FIGURE 10

ANL TECHNICIAN RIGGING THE EBWR CONTROL ROD TRANSFER SHIELD — ACCESS PLUGS FOR THE REACTOR HEAD INDEXING PLATE ARE IN THE FOREGROUND. (Neg 17554K #5)



FIGURE 11

**ANL HEALTH PHYSICS TECHNICIAN CONDUCTING RADIOLOGICAL SURVEYS OVER THE EBWR REACTOR VESSEL INDEXING
PLATE PRIOR TO CONTROL ROD SAMPLING (Neg 17554K #10)**

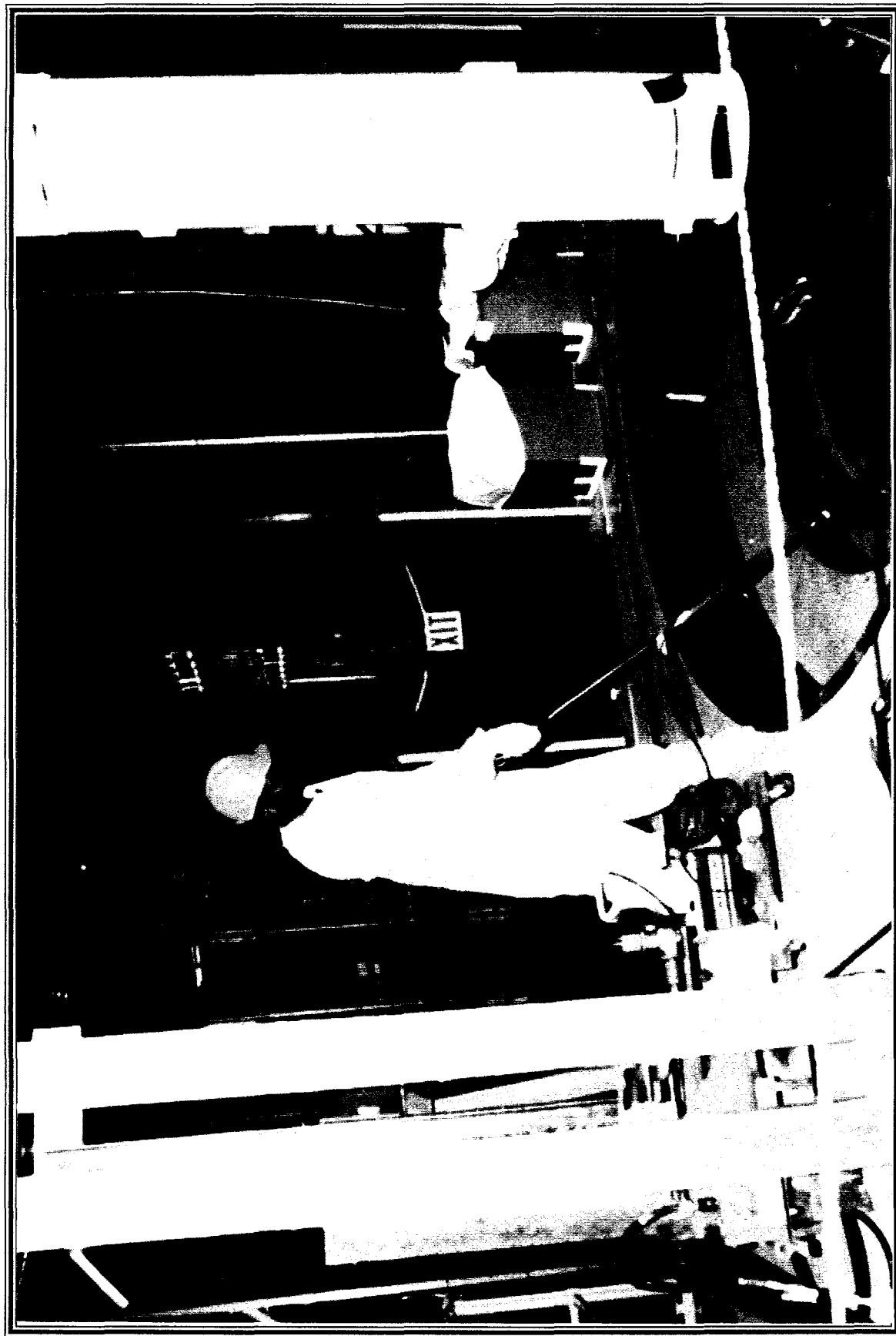


FIGURE 12
VIEW LOOKING DOWN FROM THE EBWR SHELL MEZZANINE INTO THE FUEL STORAGE POOL AND
PORTABLE GANTRY CRANE (Neg 17554K #7)

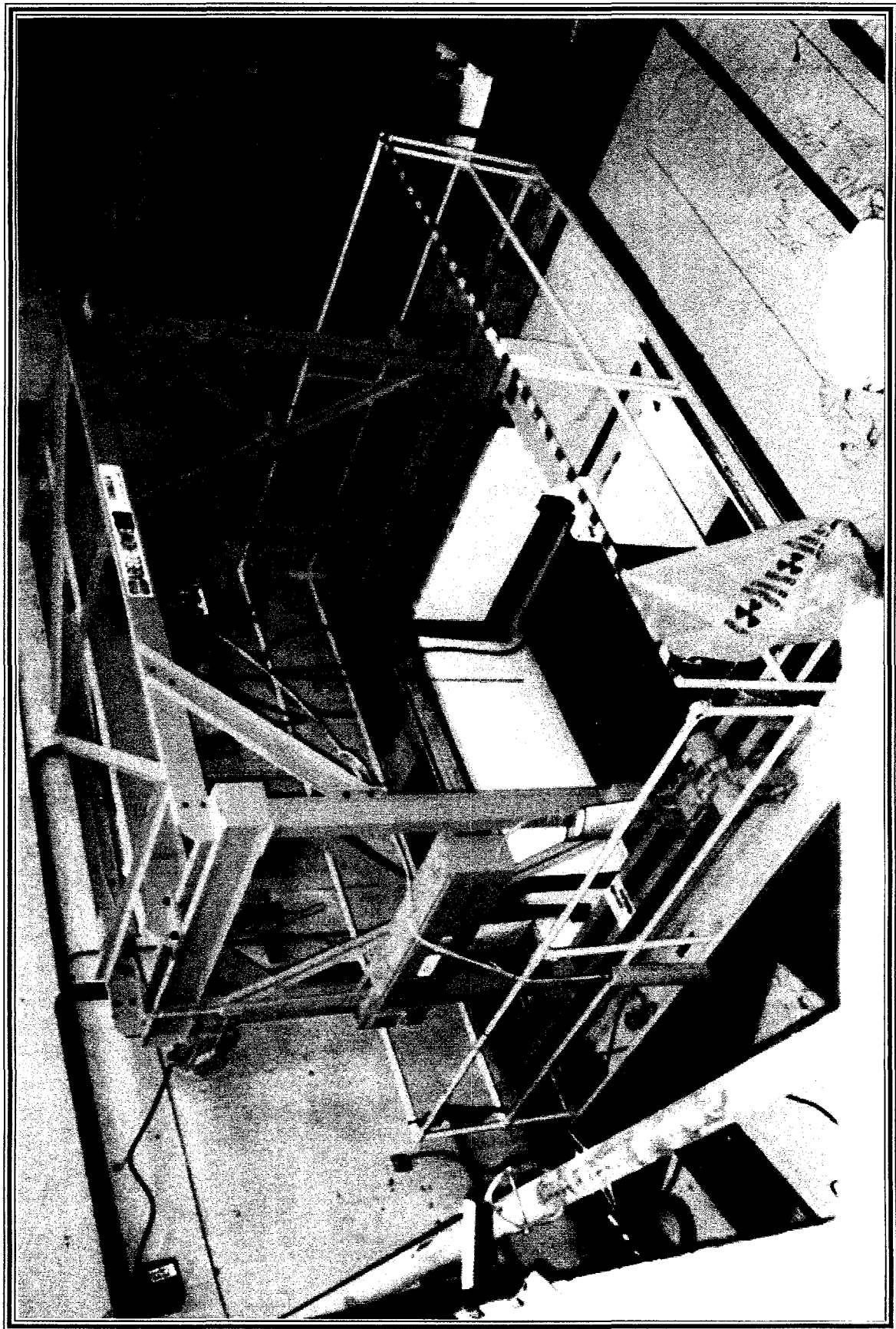


FIGURE 13
VIEW OF THE EBWR SHELL'S MAIN FLOOR SHOWING THE TOP OF THE MOCK-UP REACTOR VESSEL AND
TWO OF THE TRANSFER SHIELDS (PART OF THE HIGH-EFFICIENCY PARTICULATE AIR [HEPA] VENTILATION SYSTEM
IS PICTURED ON THE FAR LEFT.) (Neg 17554K #8)

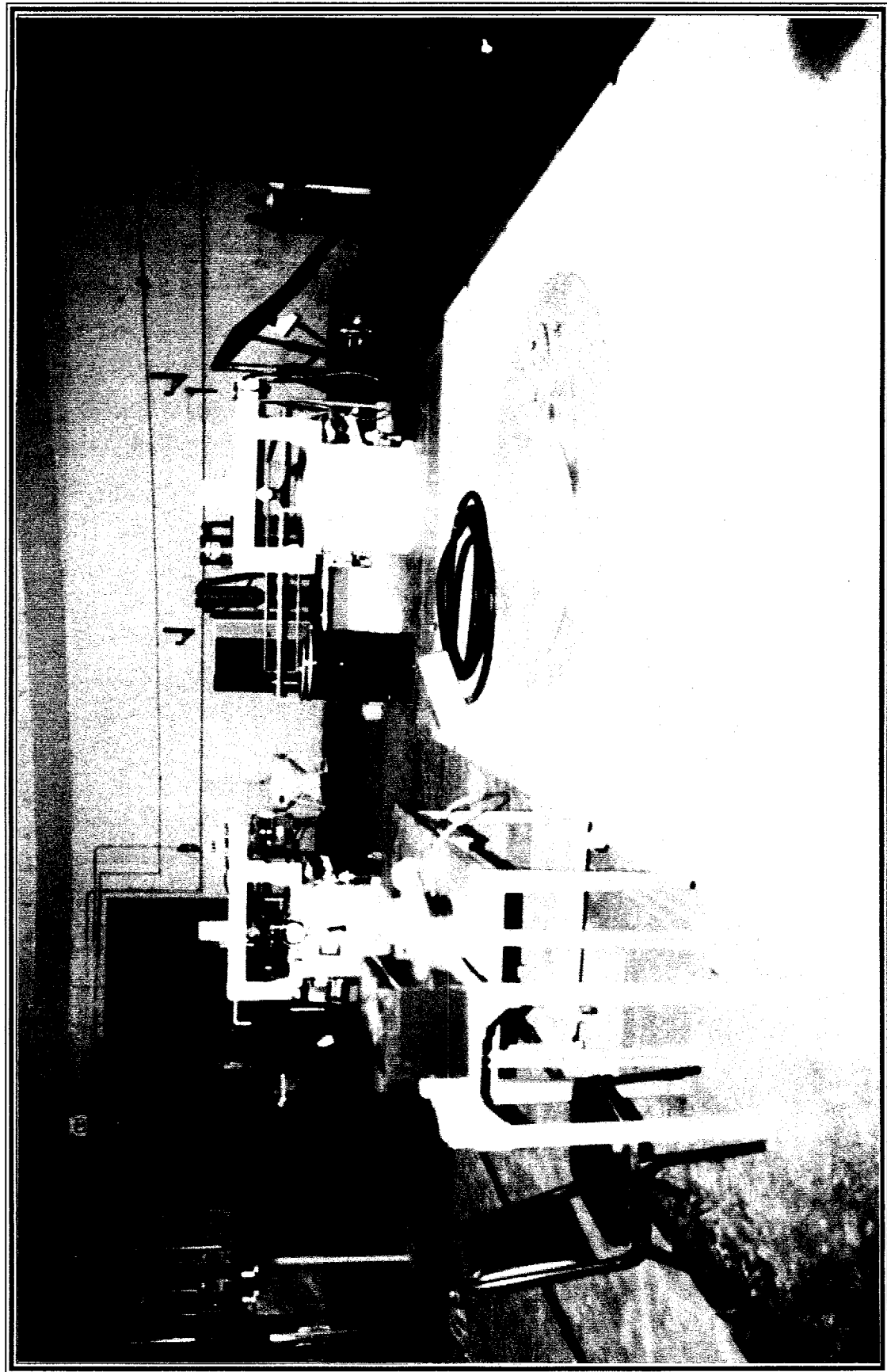


FIGURE 14

VIEW SHOWING THE EBWR CONTROL ROD "PUSHING" ASSEMBLY AND EXTENSION RESTRAINING DEVICE (Neg 17554K #6)

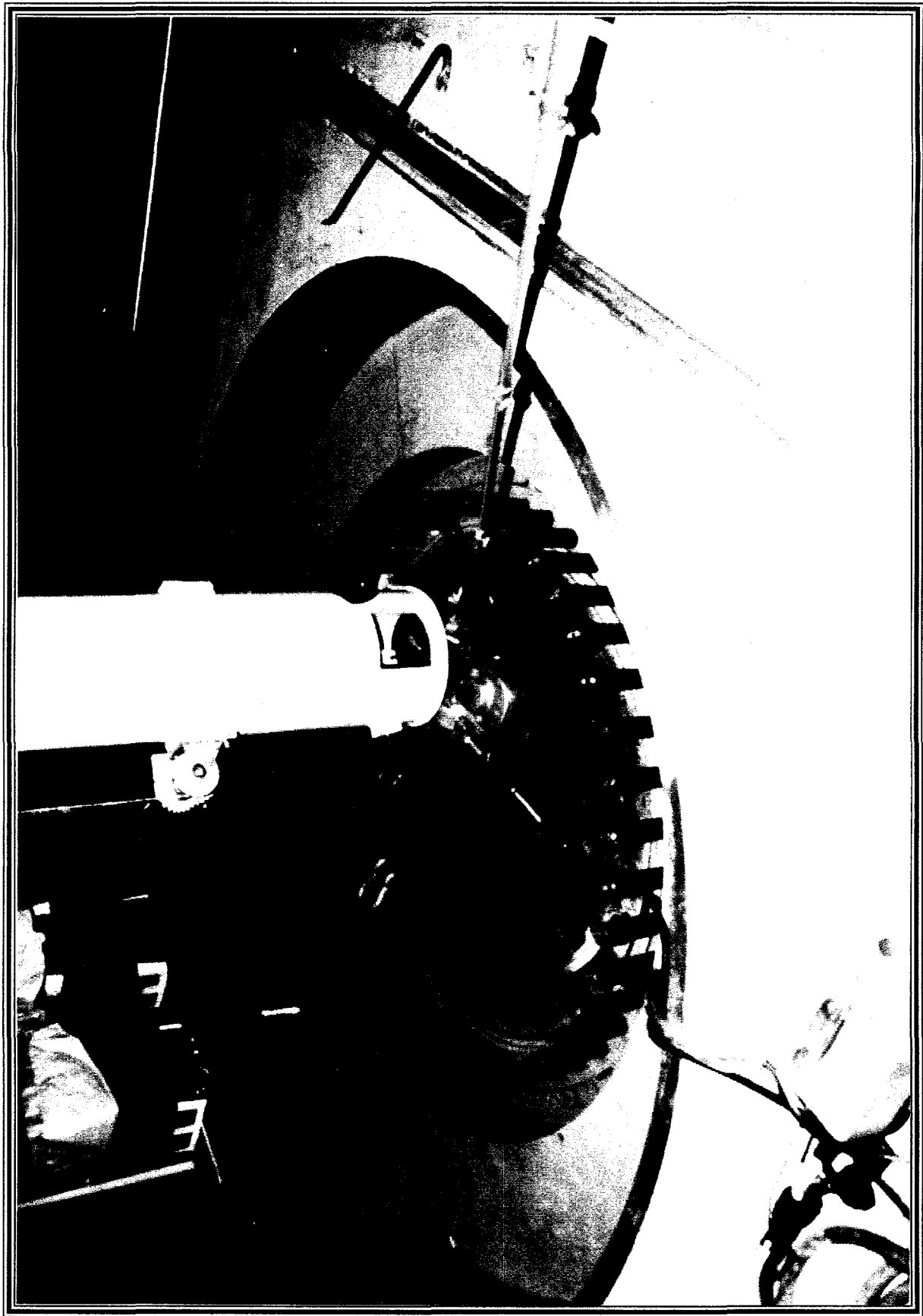


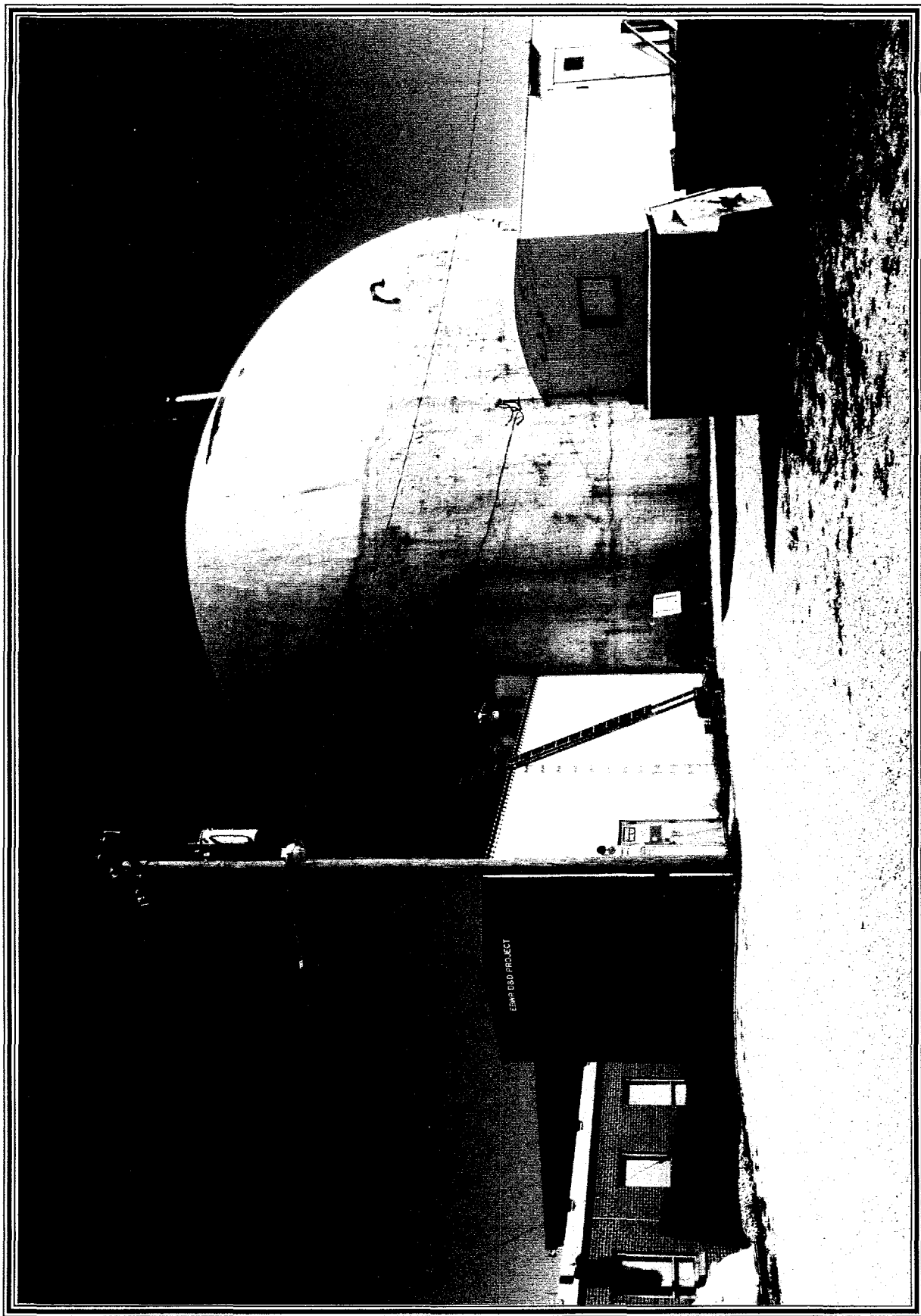
FIGURE 15

ANL TECHNICIAN OBTAINING EBWR CONTROL ROD SAMPLE PUNCH – THE CONTROL ROD TRANSFER SHIELD IS BEING USED TO RAISE THE CONTROL ROD TO AN ACCESSIBLE POSITION.

(Neg 17554K #9)



FIGURE 16
FULL VIEW OF THE EBWR FROM THE SOUTHWEST CORNER (Neg 17553K #20)



FY 1994 ACCOMPLISHMENTS

Accomplishments of this project in FY 1994 (Figures 17-27):

- ▶ Closed out all Project Readiness Review findings
- ▶ Completed reactor internals removal from reactor vessel to pool
- ▶ Completed Phase IIIB, removal of reactor vessel
- ▶ Initiated Phase IV, removal of biological shield
- ▶ Completed size reduction and packaging of all low-level radioactive waste generated during Phase IIIB
- ▶ Began size reduction and packaging of reactor internals in the fuel pool
- ▶ Removed all tools and equipment not required for D&D from the EBWR shell to the Building 330 K-Wing storage area
- ▶ Surveyed and free-released for recycle 134,050 pounds of lead from the biological shield (the lead was smelted and reused for shielding stands at ANL-East's Advanced Photon Source)

FY 1994 ACCOMPLISHMENTS (continued)

- ▶ Transferred 2,000 cubic feet of low-level radioactive waste to ANL-East Waste Management Operations for shipment to the DOE Westinghouse Hanford Company disposal site
- ▶ Released 37,900 pounds of steel and 35,000 pounds of concrete as clean material
- ▶ Completed scheduled surveillance and maintenance activities

FIGURE 17

**TRANSFER OF AN EBWR CONTROL ROD FROM THE REACTOR VESSEL TO THE
FUEL POOL (Neg 18652K #18)**

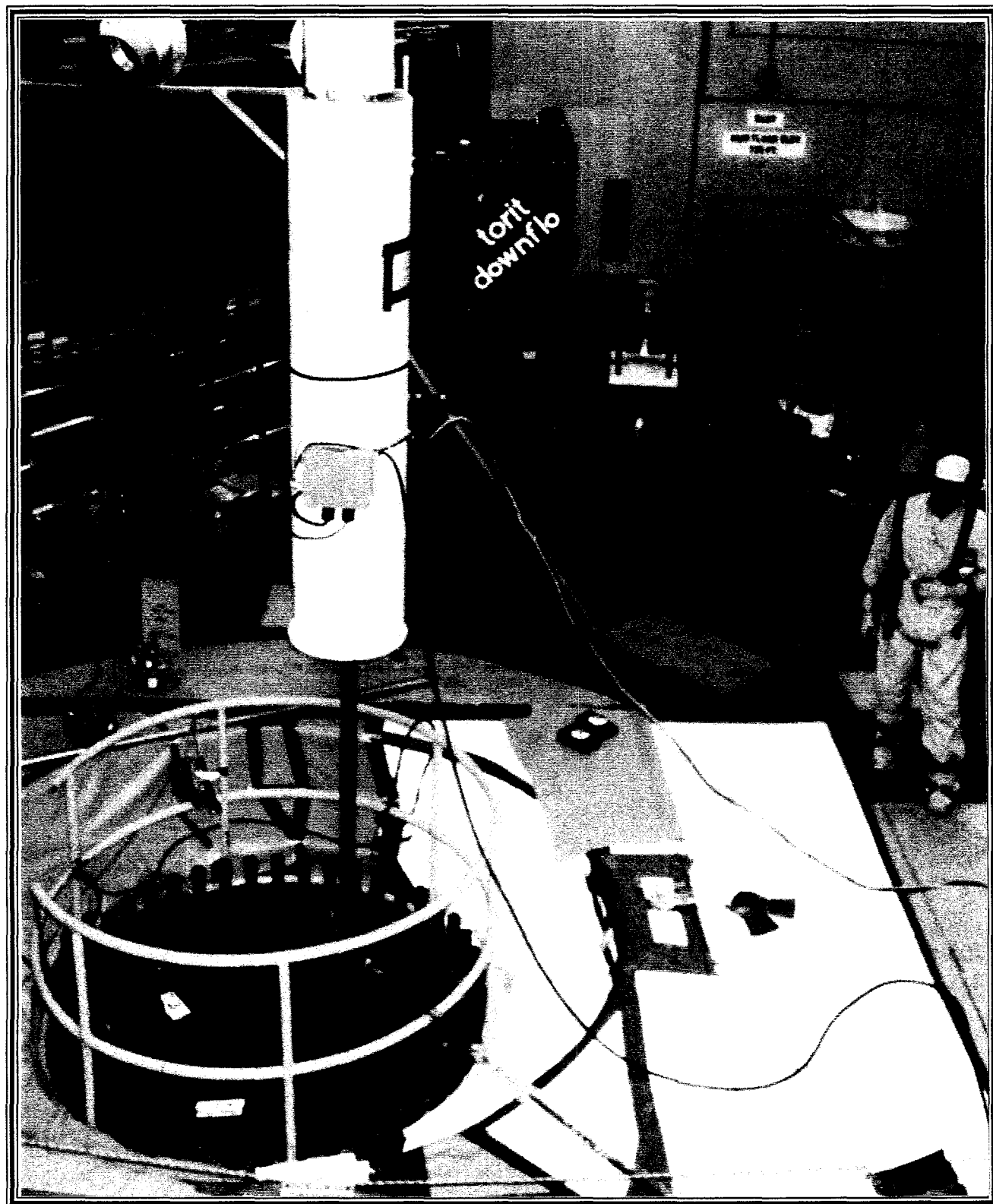


FIGURE 18

TRANSFER OF THE 200 ROENTGEN/HOUR CORE ASSEMBLY FROM THE REACTOR VESSEL TO THE FUEL POOL

(Neg 18652K #14)

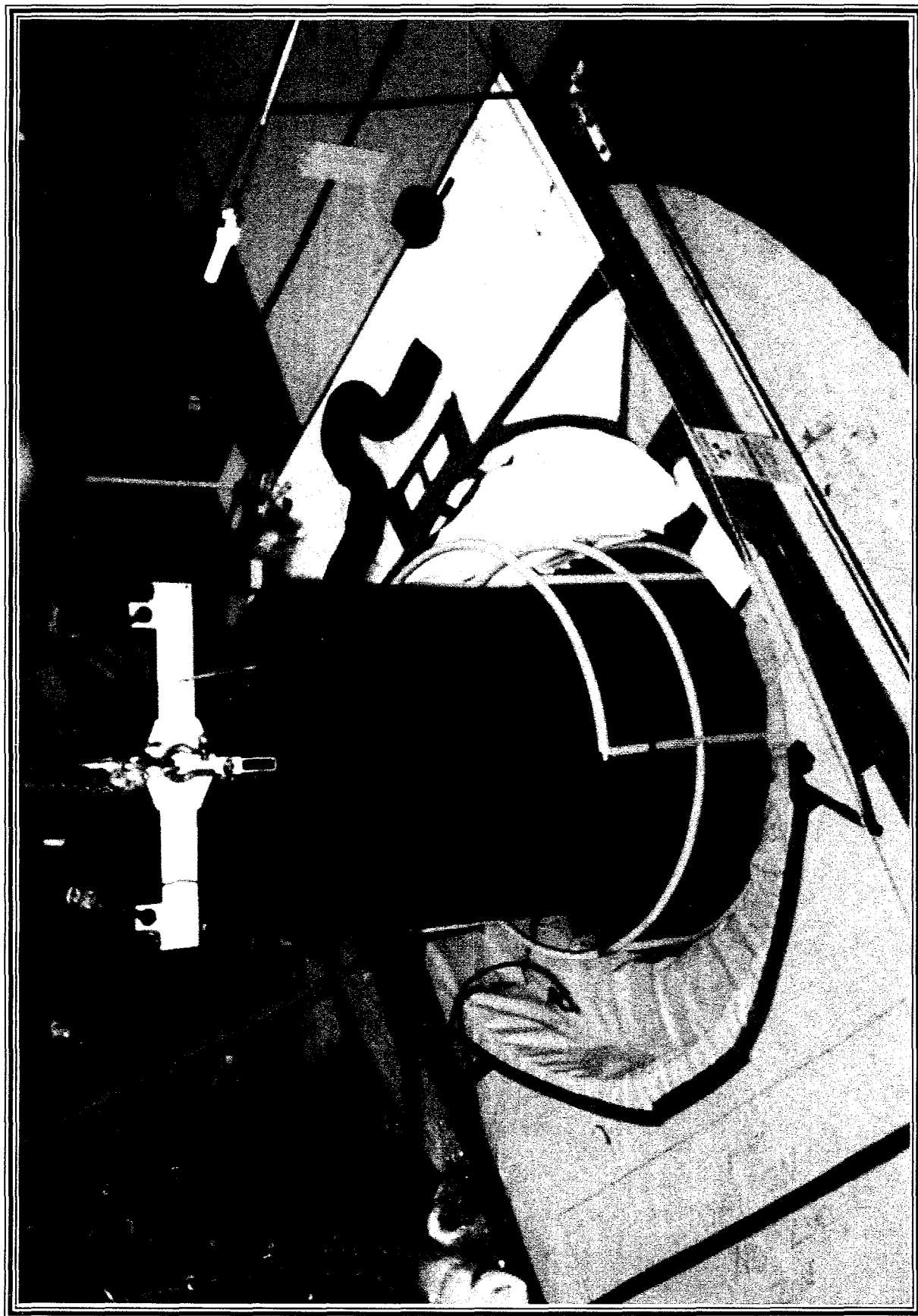


FIGURE 19

TRANSFER OF A SECTION OF THERMAL SHIELD FROM THE REACTOR VESSEL TO THE FUEL POOL FOR FURTHER SIZE REDUCTION (Neg 18652K #9)

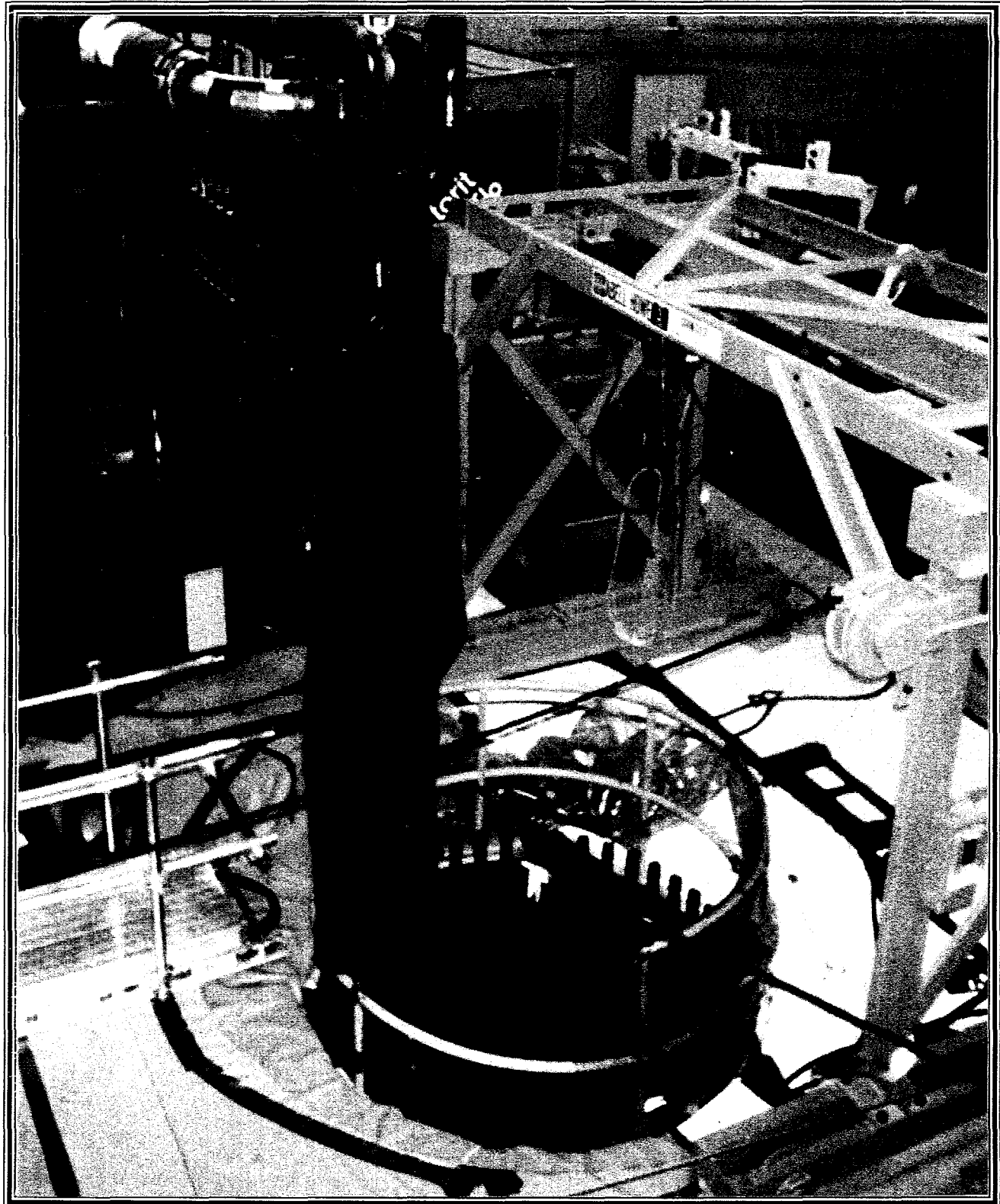


FIGURE 20
HEPA-VENTILATED CUTTING TENT USED TO SIZE-REDUCE PIECES OF REACTOR INTERNALS AND THE
REACTOR VESSEL RING SEGMENTS (Neg 18652K #15)

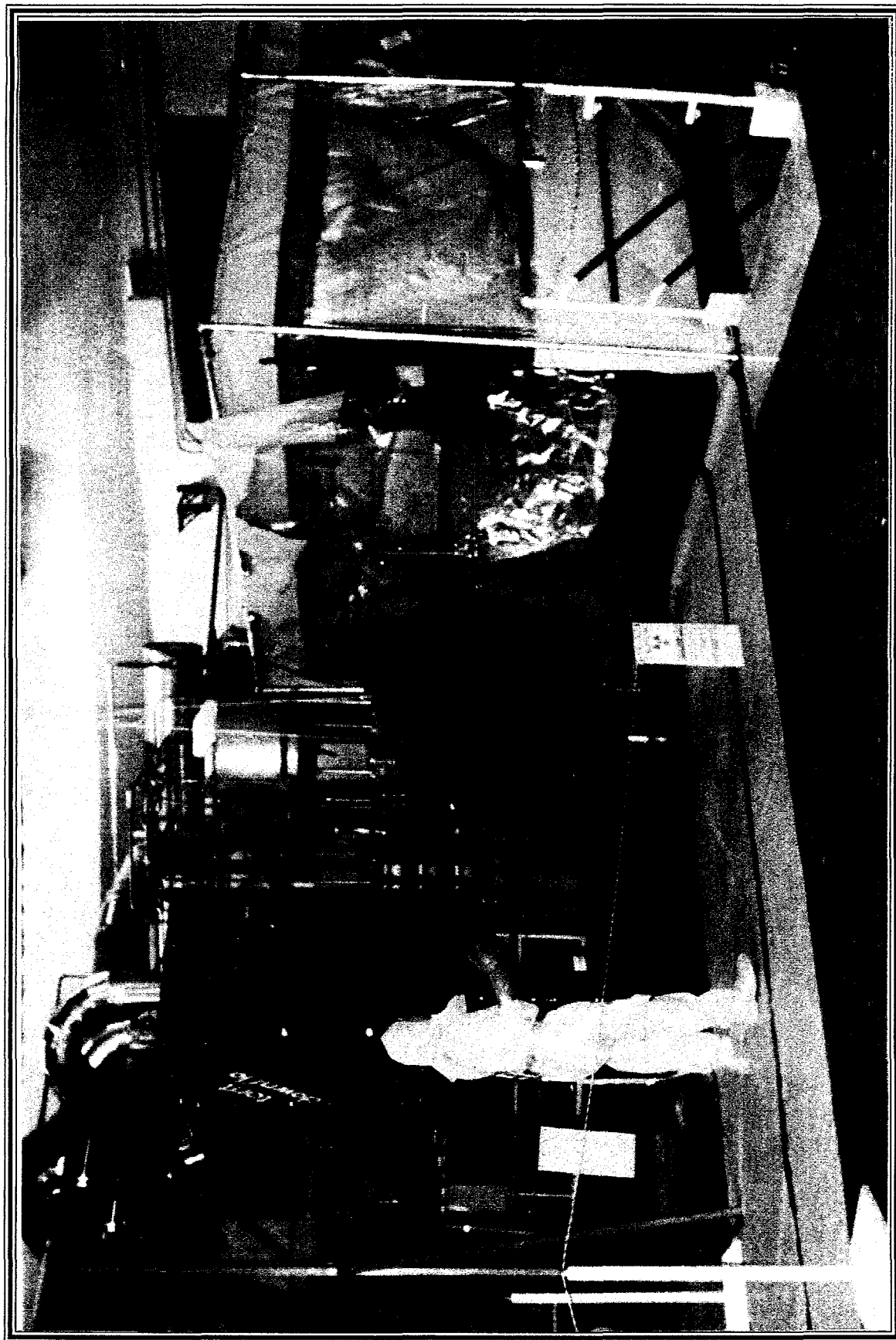


FIGURE 21
CORE ASSEMBLY DURING THE PLASMA ARC SIZE-REDUCTION PROCESS (Neg 17557K #18)

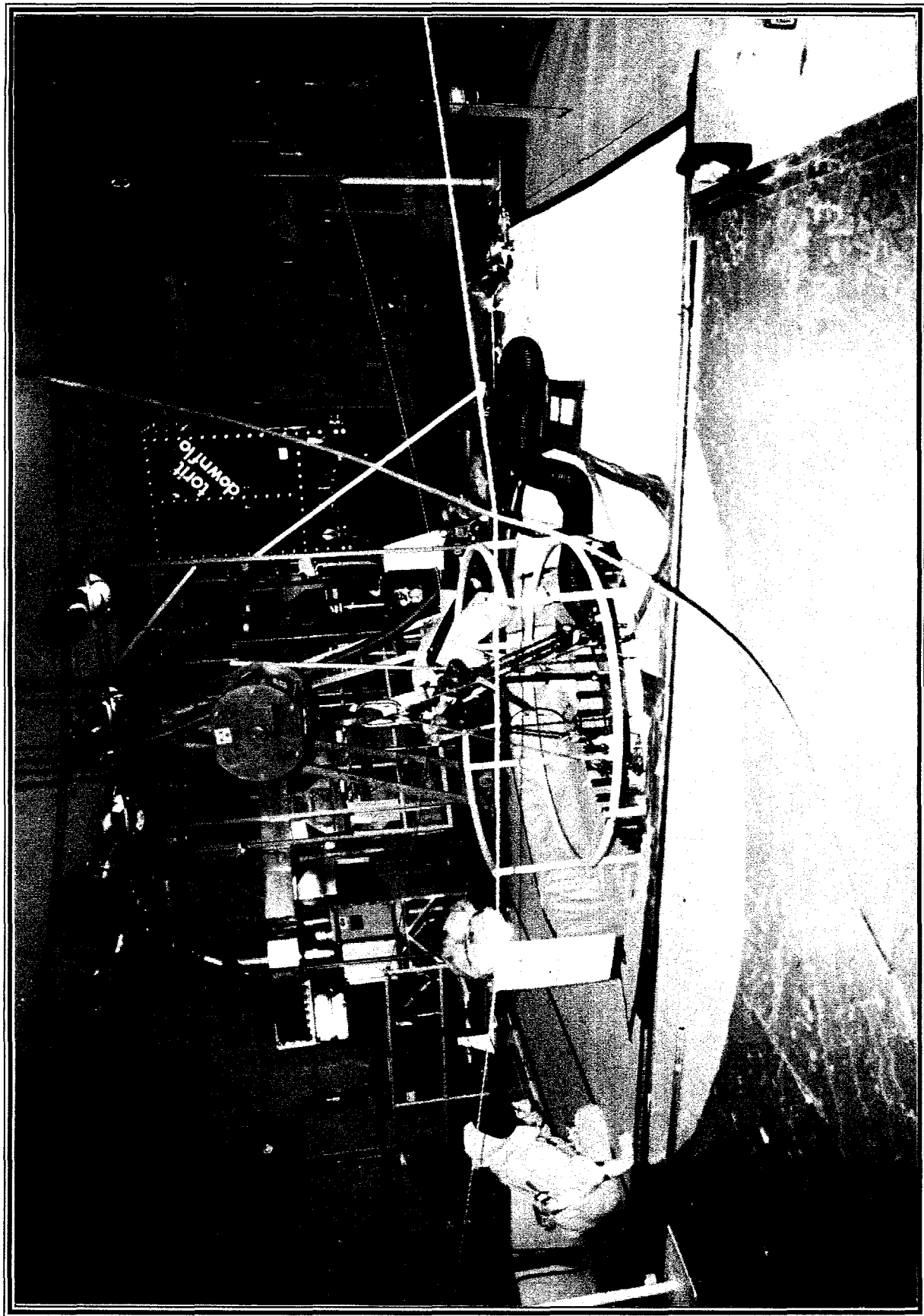


FIGURE 22

REMOVAL OF THE FIRST REACTOR VESSEL SEGMENT (Neg 18652K #11)

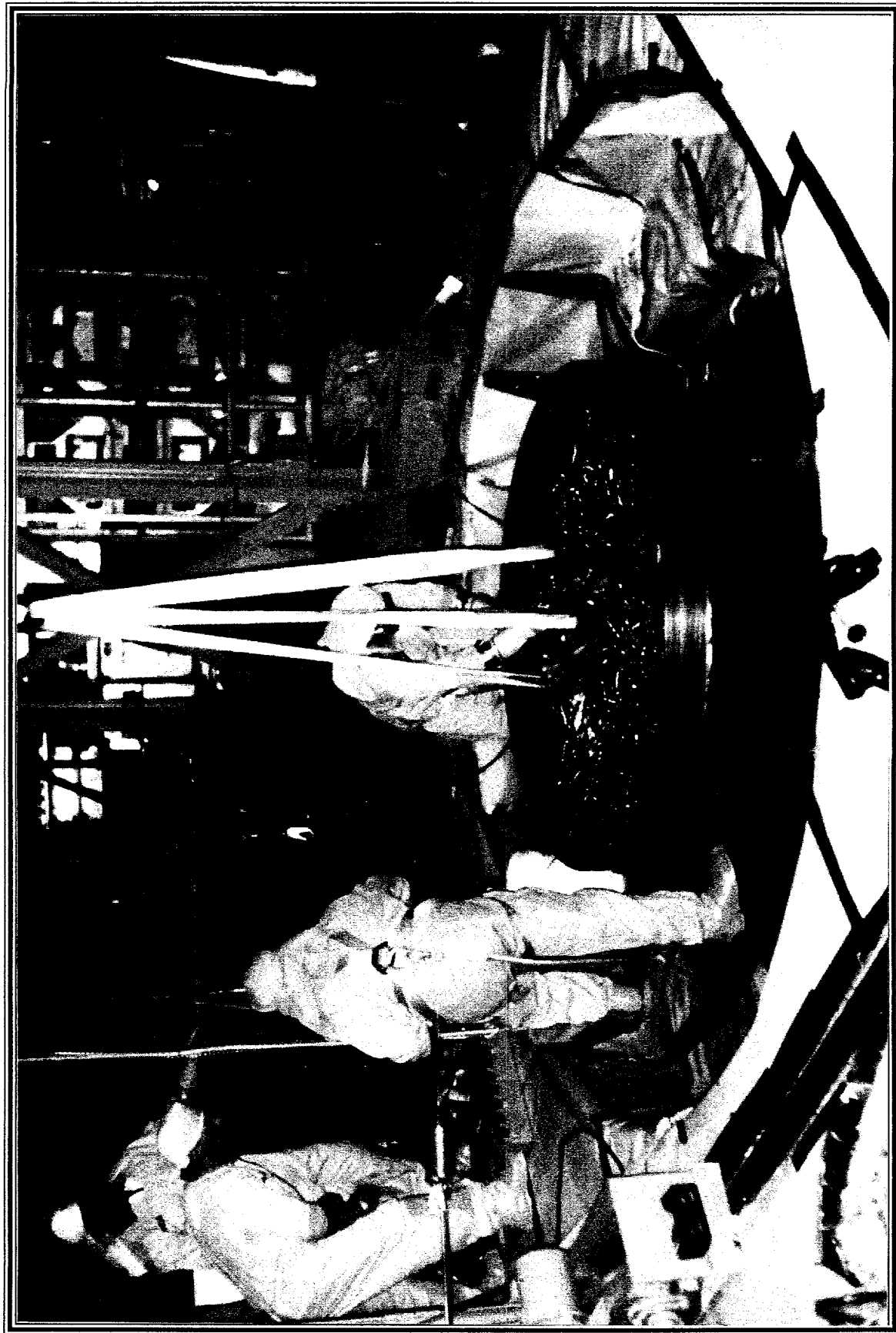


FIGURE 23

REMOVAL OF THE UPPER SEGMENT OF THE REACTOR VESSEL (Neg 18652K #5)

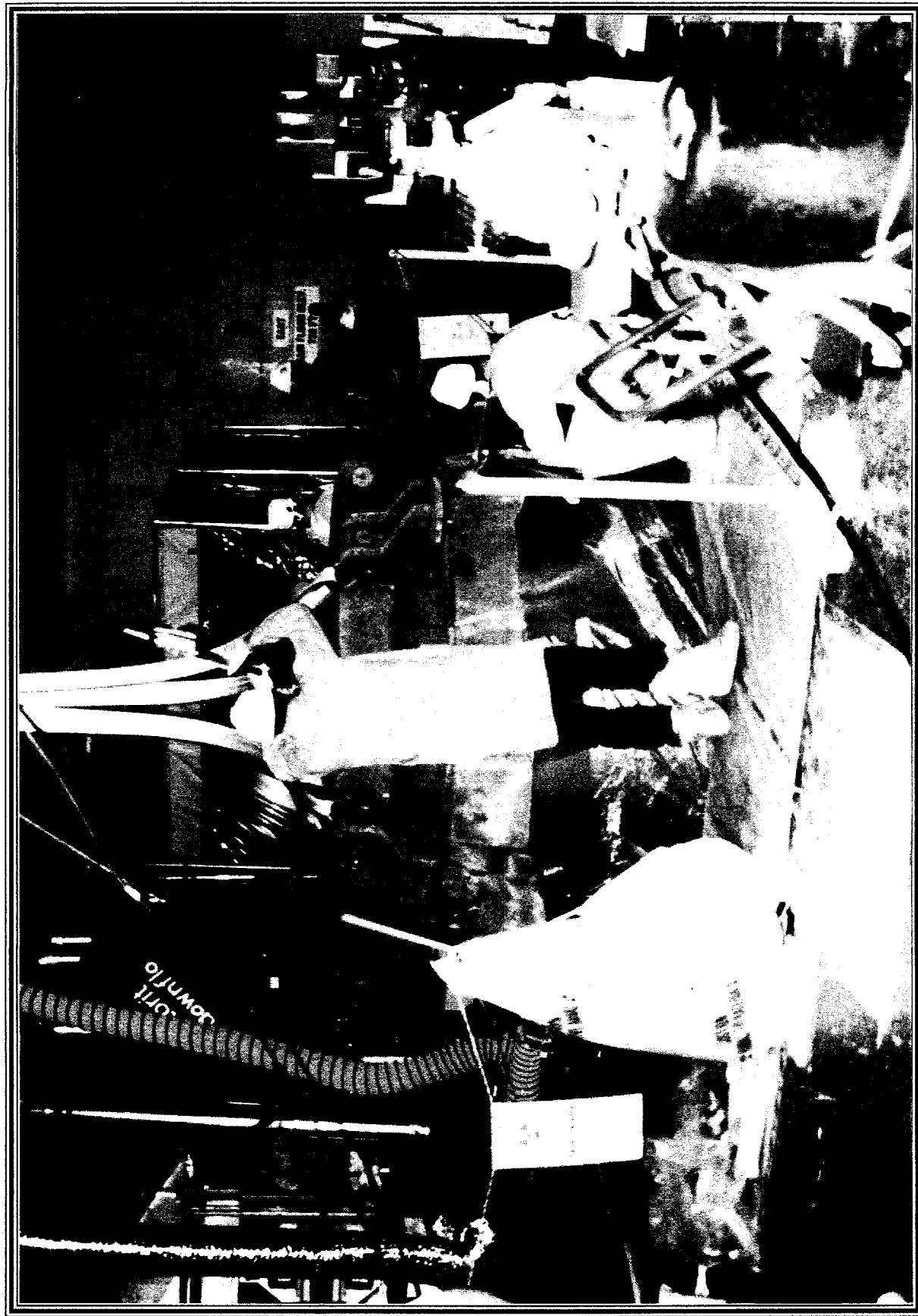


FIGURE 24

REMOVAL OF THE LOWER BOWL SECTION OF THE REACTOR VESSEL (Neg 18652K #7)

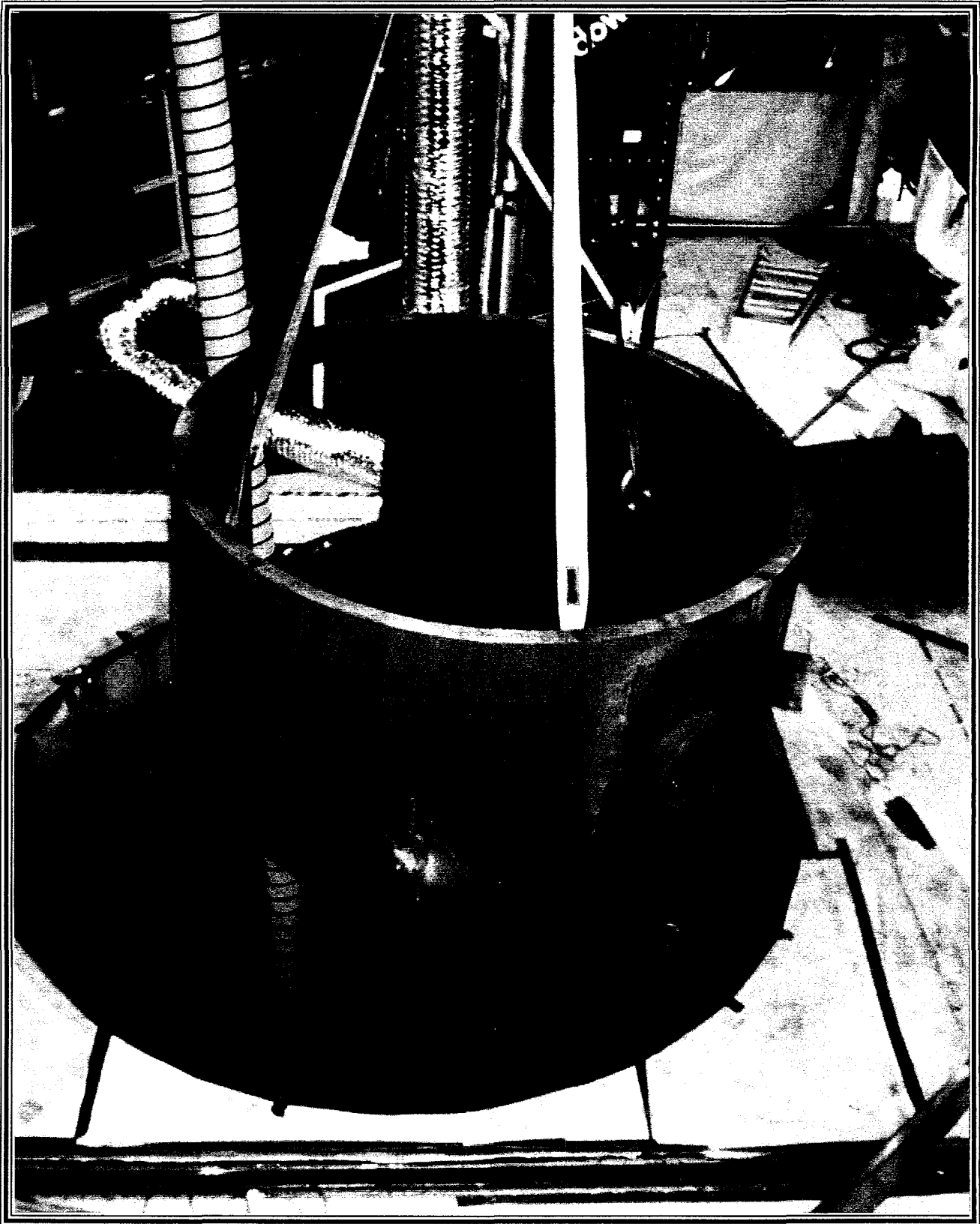


FIGURE 25

WACHS REACTOR VESSEL CUTTING MACHINE SECTIONING THE REACTOR CAVITY LINER (Neg 18652K #3)



FIGURE 26

ANL TECHNICIANS REMOVING LEAD BRICKS FROM THE BIOSHIELD — OVER 3,000 INDIVIDUAL BRICKS WERE REMOVED.

(Neg 17678K #3)

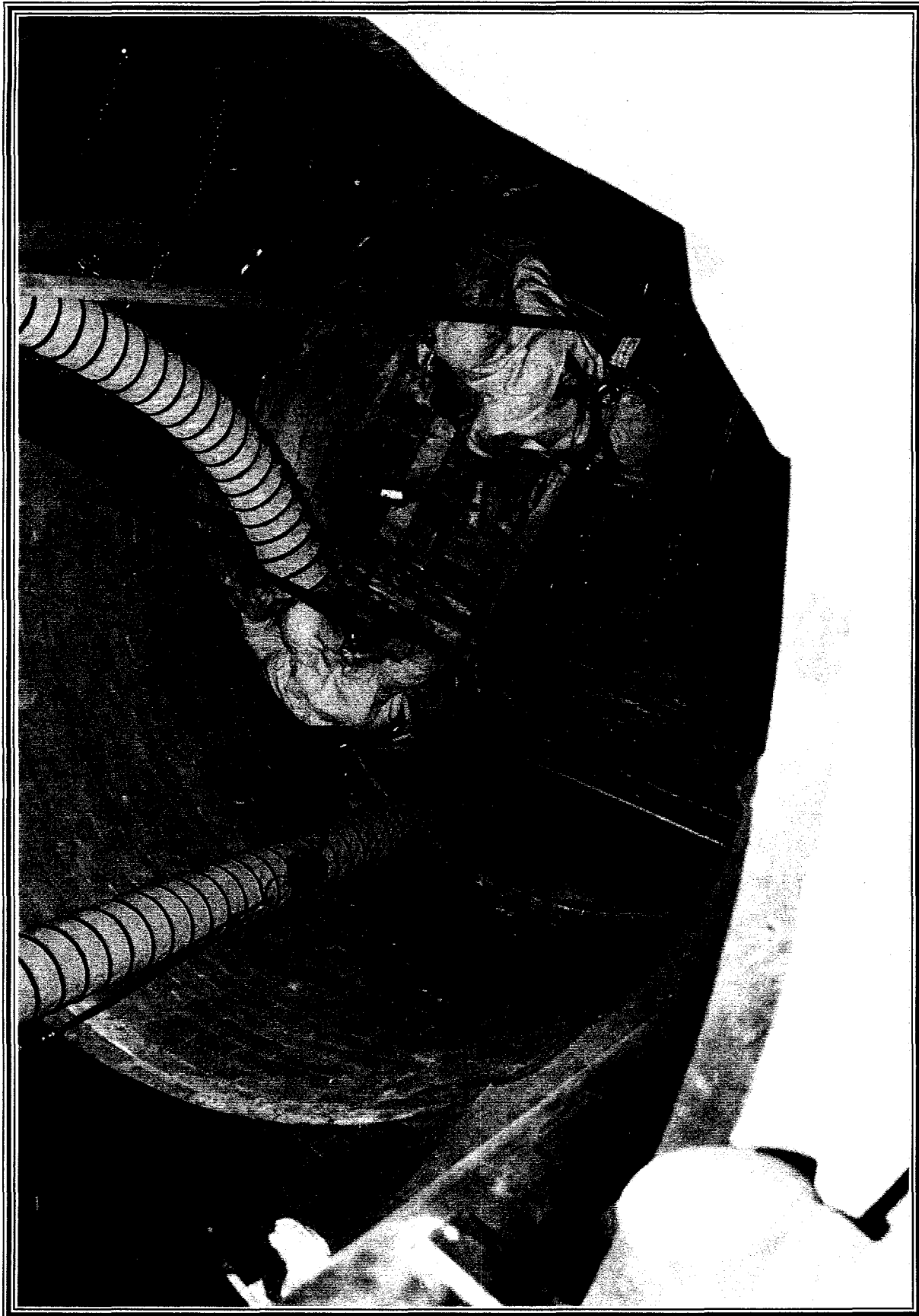
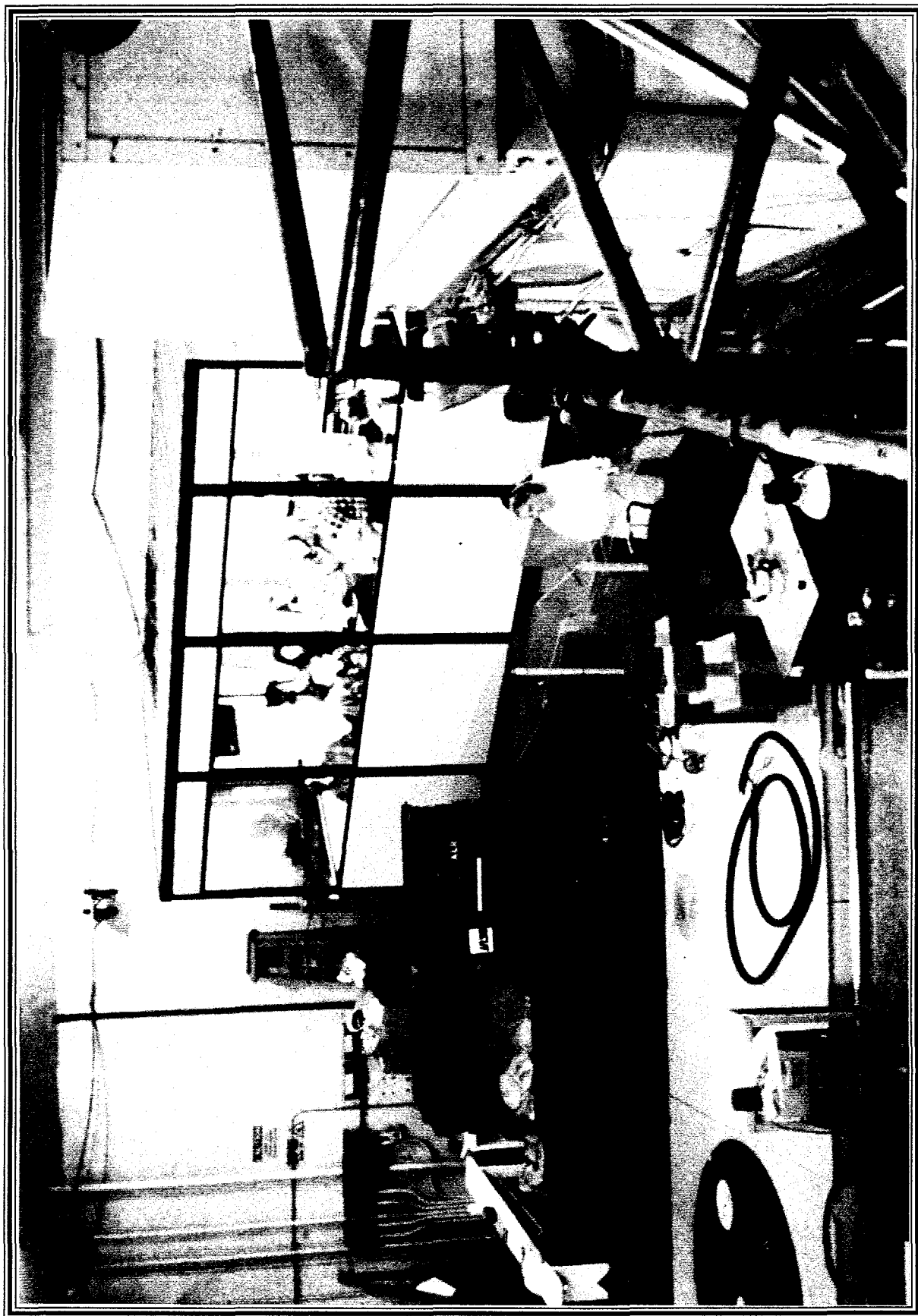


FIGURE 27
TOUR GROUP OF STAKEHOLDERS LEARNING ABOUT THE ONGOING D&D WORK AT EBWR (Neg 18652K #1)



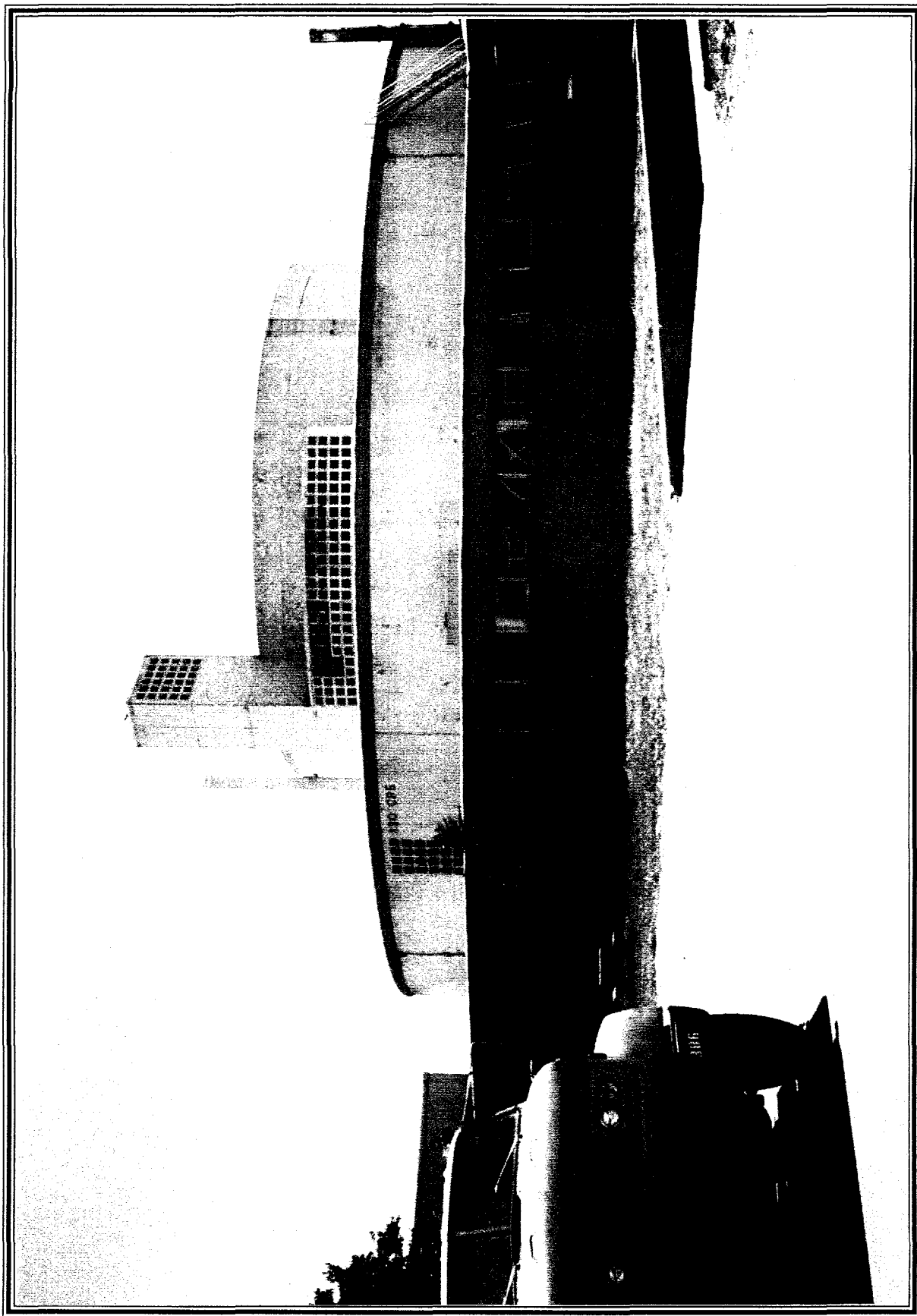
FY 1995 GOALS

In FY 1995, all EBWR D&D project activities are expected to be completed. All remote-handled low-level radioactive waste will be shipped to the DOE Westinghouse Hanford Company for disposal. Surveillance and maintenance activities will continue through final project completion. Specific objectives for FY 1995:

- ▶ Completion of size reduction and packaging of reactor internals
- ▶ Completion of removal and packaging of neutron-activated bioshield concrete
- ▶ Completion of removal of D&D support systems (water filtration system, HEPA system, cutting tents)
- ▶ Decontamination of fuel pool and general decontamination of the EBWR building
- ▶ Completion of final release survey by project and DOE Headquarters Independent Verification Contractor from Oak Ridge Institute for Science and Education (ORISE)
- ▶ Transfer of the EBWR shell to ANL Waste Management Operations for conversion and reuse as a TRU waste storage facility

CHICAGO PILE-5 (CP-5) REACTOR D&D PROJECT

FIGURE 28
CHICAGO PILE-5 (CP-5) REACTOR FACILITY BEFORE D&D (Neg 17551K #0A)





CHICAGO PILE-5 (CP-5) REACTOR D&D PROJECT

DESCRIPTION

The CP-5 Research Reactor (Figure 28) was the principal reactor used for the production of neutrons for scientific research at ANL-East from 1954 to 1979. It was a heavy-water-moderated, enriched-uranium-fueled reactor that operated for 19 years of its 25-year history at a thermal power of 5 megawatts, which produced a maximum flux of 10^{14} neutrons per square centimeter per second. Over its operational life, the facility produced over 5.4×10^8 thermal kilowatt-hours and irradiated over 27,000 samples for research purposes.

The primary areas of concern associated with this facility include the storage of highly radioactive materials and components associated with reactor operations and the various experiments conducted at the facility over its lifetime. In its current condition, the CP-5 facility could present significant future environmental and safety concerns due to the potential for inadvertent exposure to personnel and to the migration of radioactive nuclides that could occur from groundwater leakage and the continuing deterioration of the facility. The continuous release of tritium from the biological shield, although within the allowable limits as defined by DOE Order 5400.5, presents a significant environmental concern and will be eliminated once the full reactor D&D is completed.

In September 1979, the reactor was shut down for the final time. In 1980, all the nuclear fuel and heavy water that could be drained from the process systems were shipped to the DOE Savannah River Plant. The CP-5 facility was placed in a lay-up condition pending funding for D&D activities. In 1990, funds were made available for the partial decontamination and medium-term protective storage of the facility in order to alleviate some of the safety and environmental concerns associated with the deterioration of the building and its support systems. In 1992, the decision was made to proceed with the complete D&D of CP-5, which includes removing the reactor structure and all radioactively contaminated support facilities, systems, and materials. When decontamination is completed, the remaining building will either be released for unrestricted use or fully demolished.

FY 1993 ACCOMPLISHMENTS

During FY 1993, efforts at the CP-5 D&D project were concentrated on removing radioactive materials from the outbuildings, releasing the buildings for demolition, removing materials stored in the yard area, removing reactor systems, shipping the fissile materials located in the storage holes of the rod storage area, performing sampling for characterization of the yard area, and performing surveillance and maintenance activities.

Accomplishments of this project in FY 1993 (Figures 29-38):

- ▶ Removal (with the exception of five highly radioactive items stored inside of shielding casks) of all lower-dose rate materials and equipment stored in the yard area
- ▶ Removal of radioactive materials from the outbuildings and radiological surveys and release of the outbuildings for demolition
- ▶ Shipment of the ATSR fuel stored at the facility and the JANUS fuel
- ▶ Completion of all field activities associated with characterizing the CP-5 yard area
- ▶ Removal of the various reactor secondary systems, including the system-cooling, pneumatic irradiation facility, and helium gas systems (up to the reactor biological shield)
- ▶ Rehabilitation of the hydraulically operated elevator for use in D&D operations
- ▶ Structural assessment of the concrete floors and walls of the reactor containment building

FY 1993 ACCOMPLISHMENTS (continued)

- ▶ Contract for removal, size reduction, and packaging of the remaining radioactive items in the yard area and the 76 storage holes in the rod storage area
- ▶ Packaging and shipping of 1,075 cubic feet of low-level radioactive waste and recycling of 695 cubic yards of noncontaminated metal scrap

FIGURE 29

ANL TECHNICIAN PACKAGING CP-5 RADIOACTIVE WASTE FOR SHIPMENT (Neg 17695K)

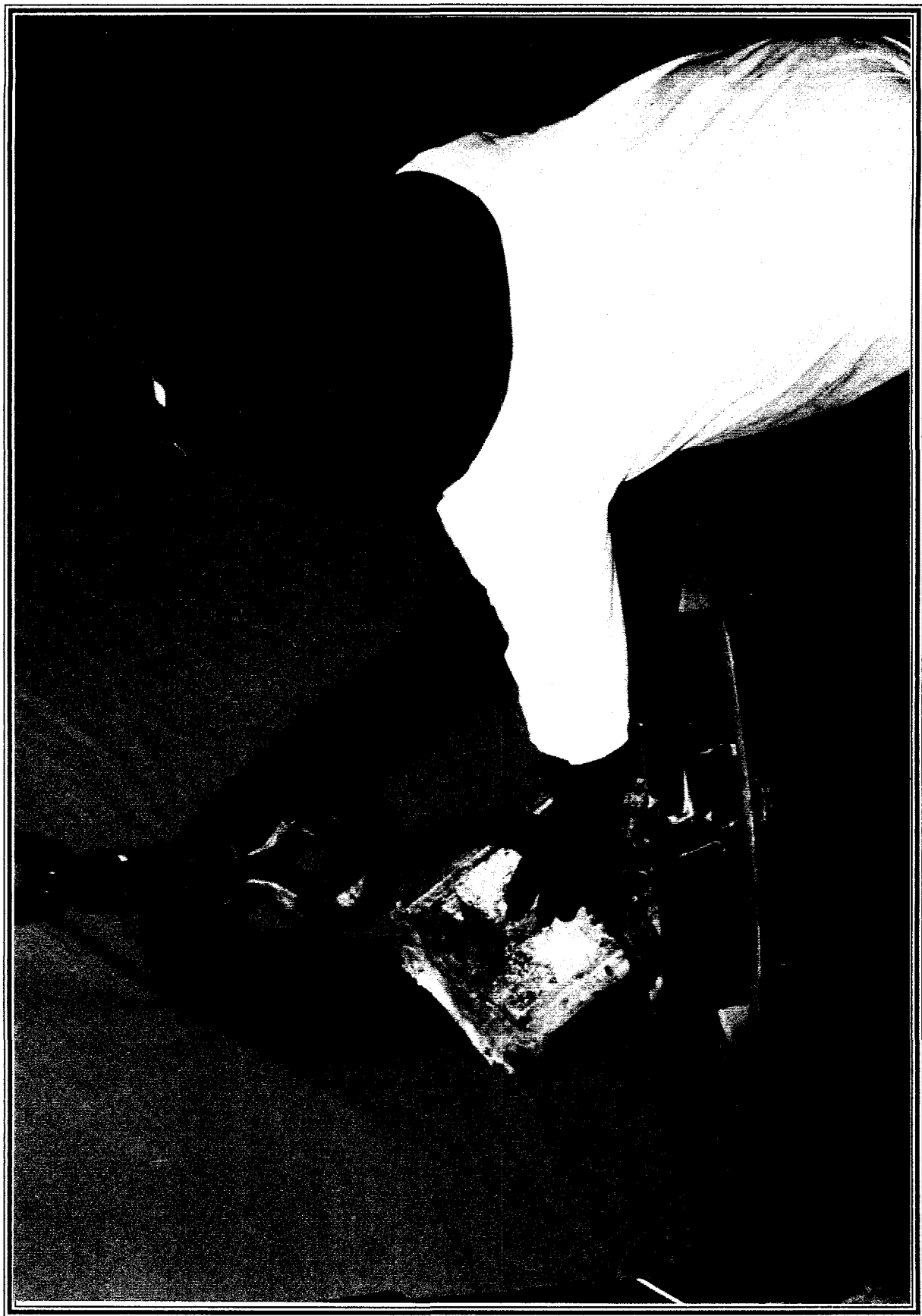
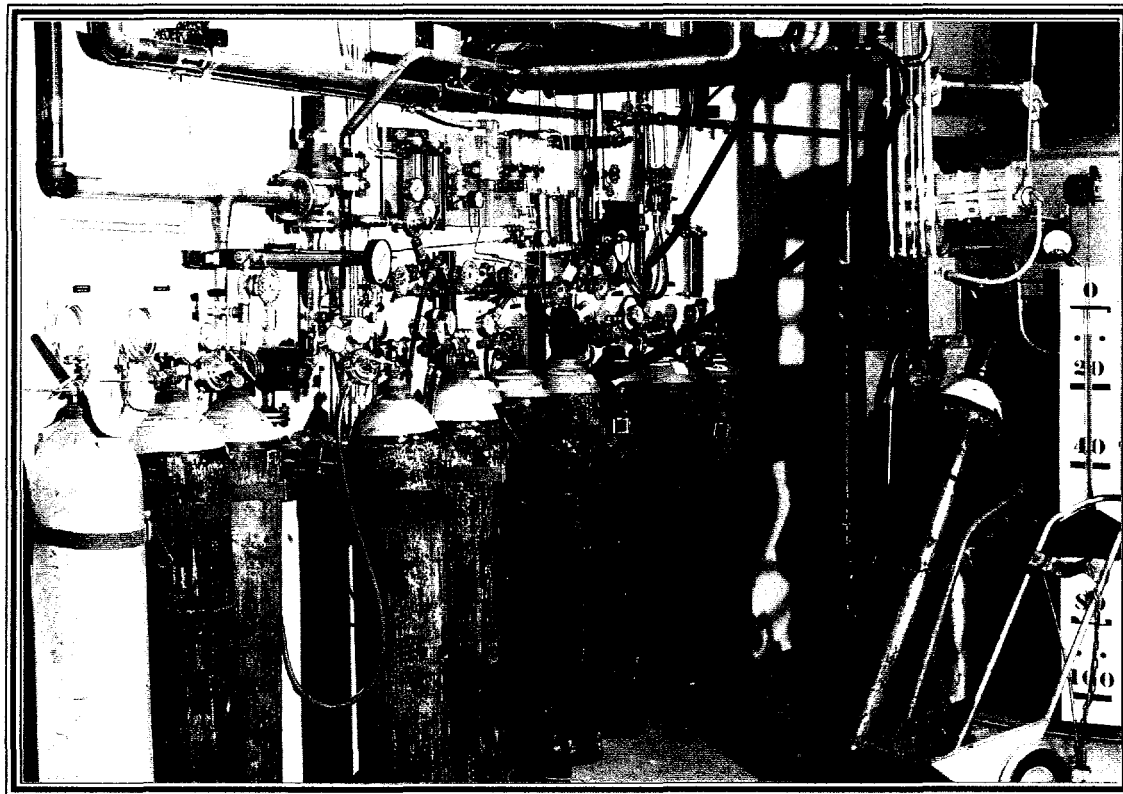


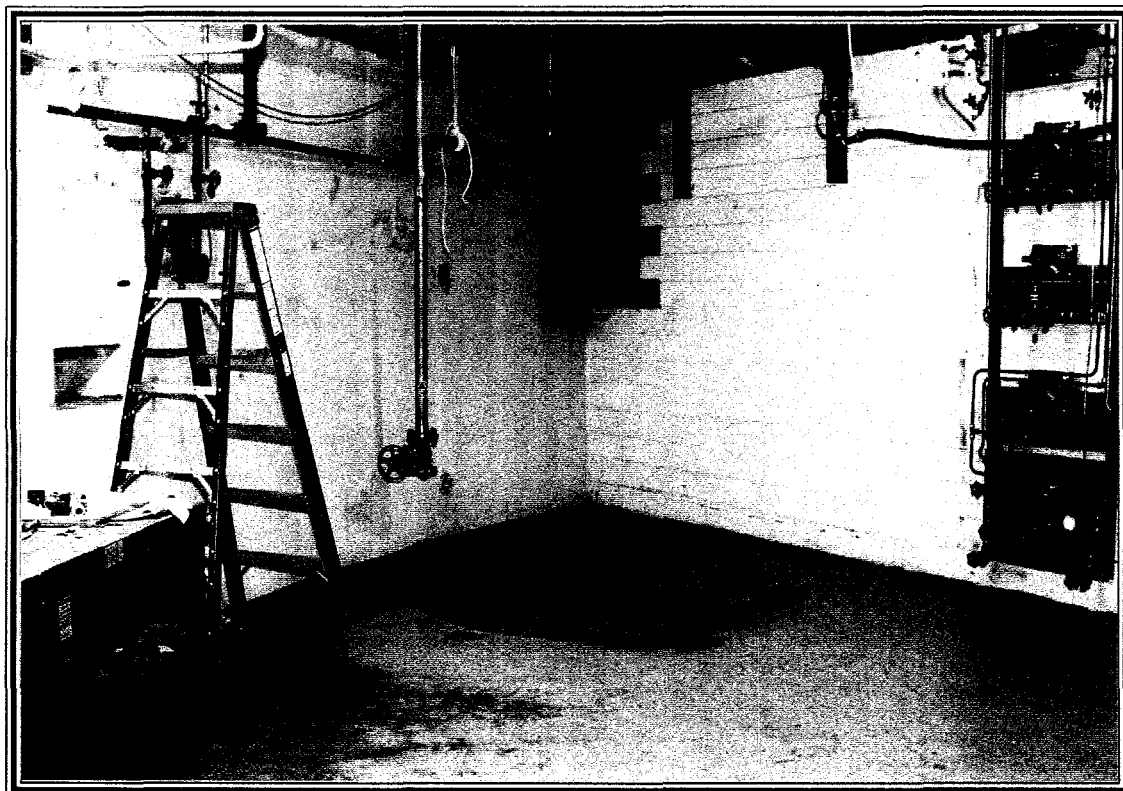
FIGURE 30

CP-5 SERVICE FLOOR LOOKING EAST – BEFORE AND AFTER D&D.



**BEFORE
D&D**

(Neg 144-1088)

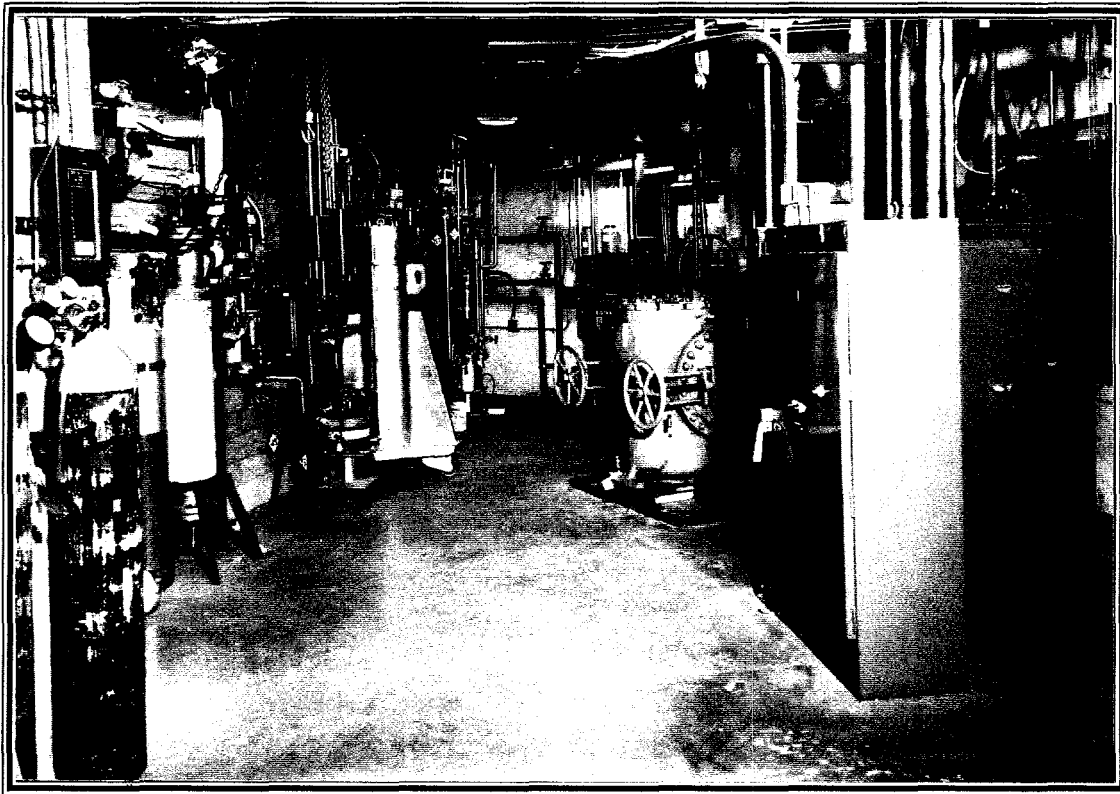


**AFTER
D&D**

(Neg 16173K #4)

FIGURE 31

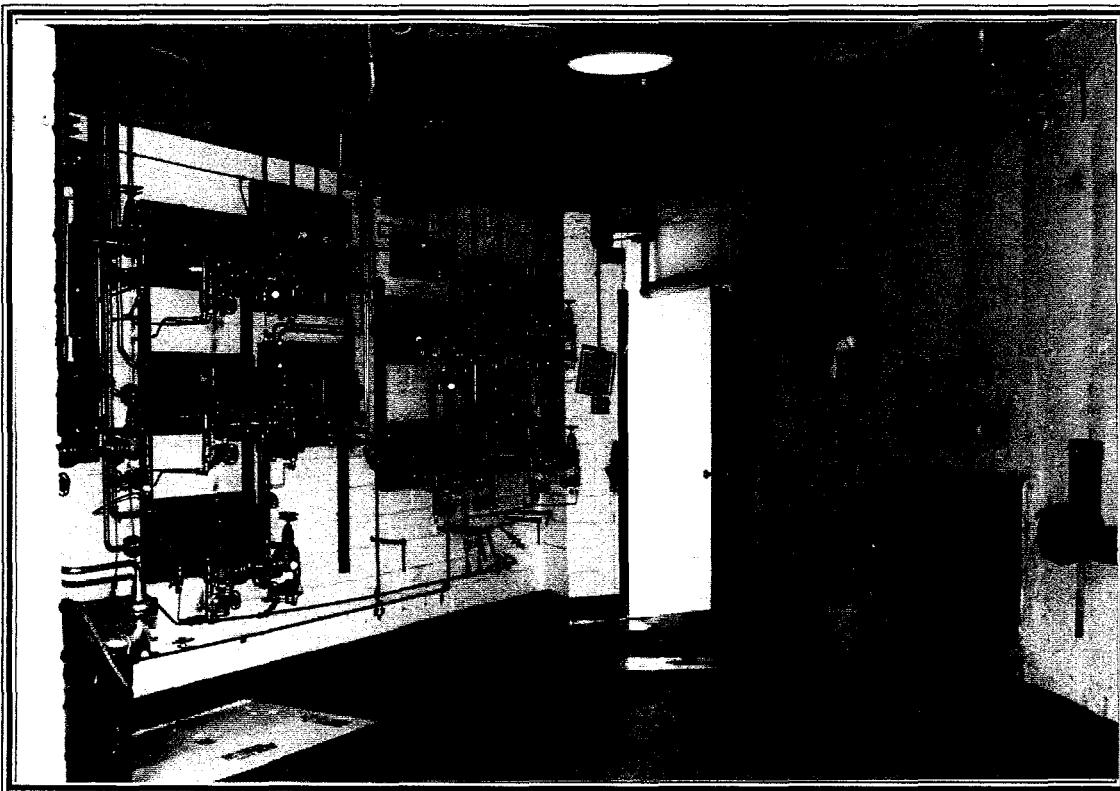
CP-5 SERVICE FLOOR PUMP ROOM – BEFORE AND AFTER D&D.



**BEFORE
D&D**

(Neg 235-1351)

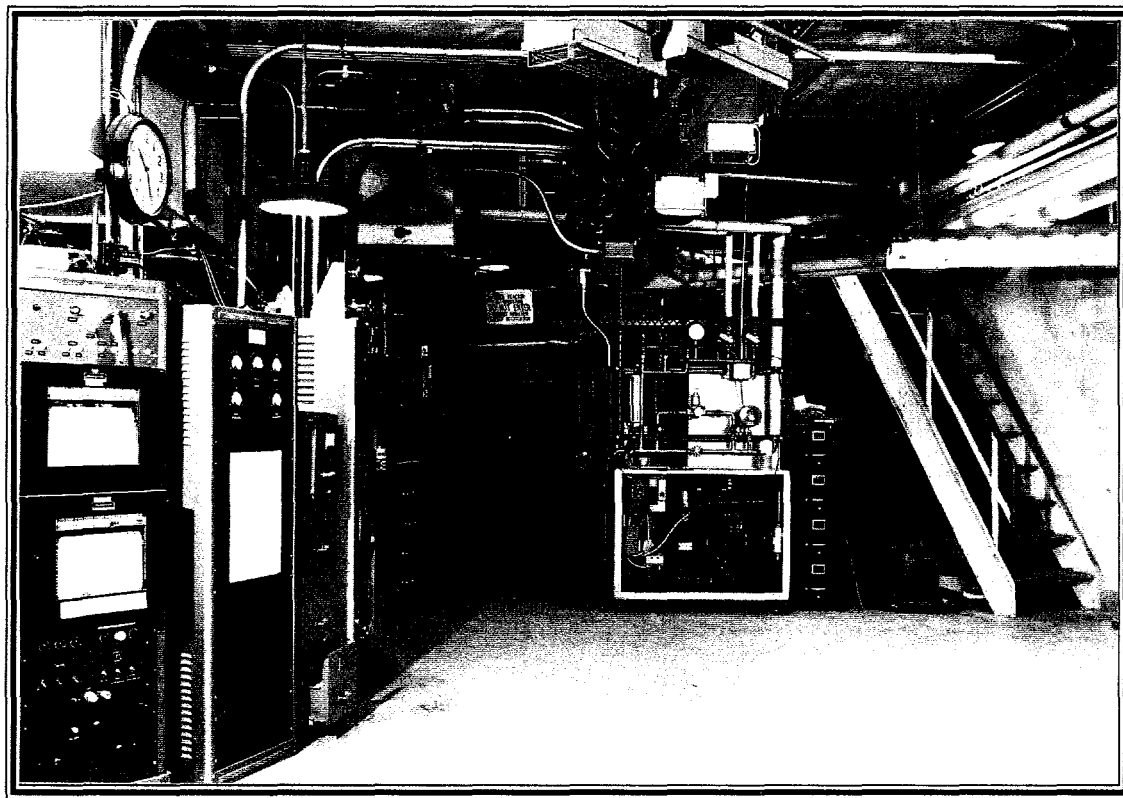
44



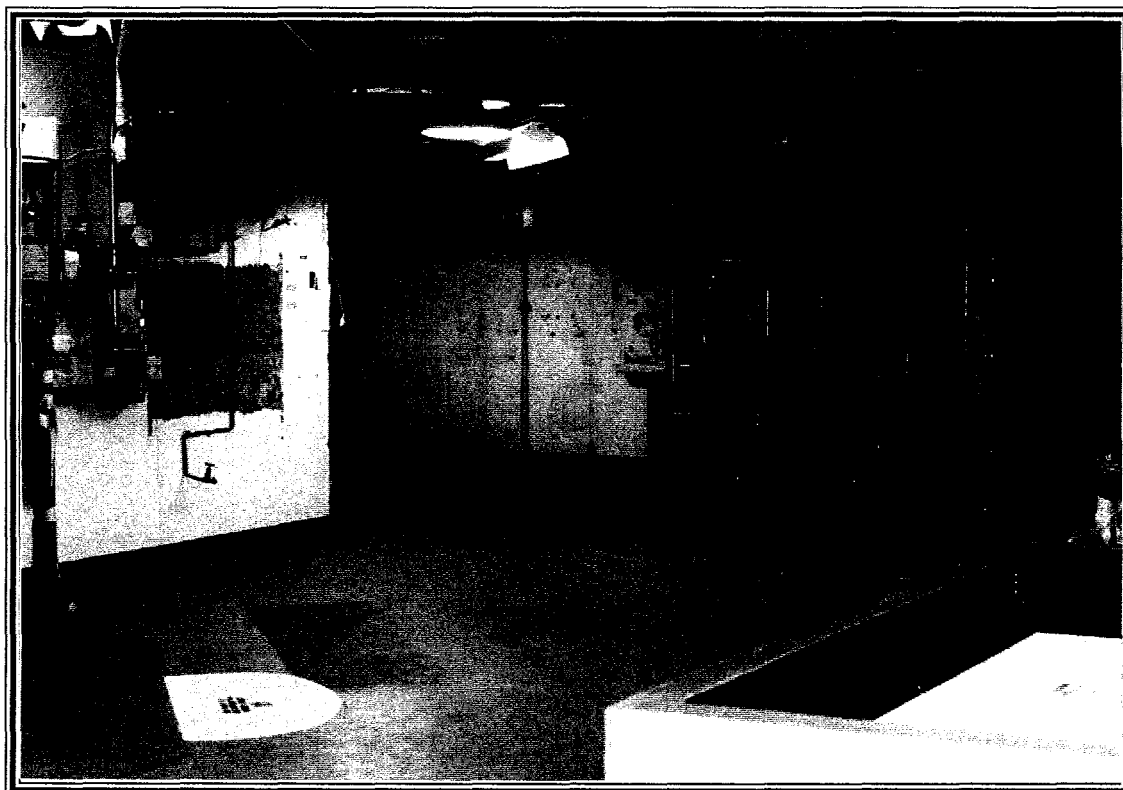
**AFTER
D&D**

(Neg 16173K #20)

FIGURE 32
CP-5 SERVICE FLOOR – BEFORE AND AFTER D&D.

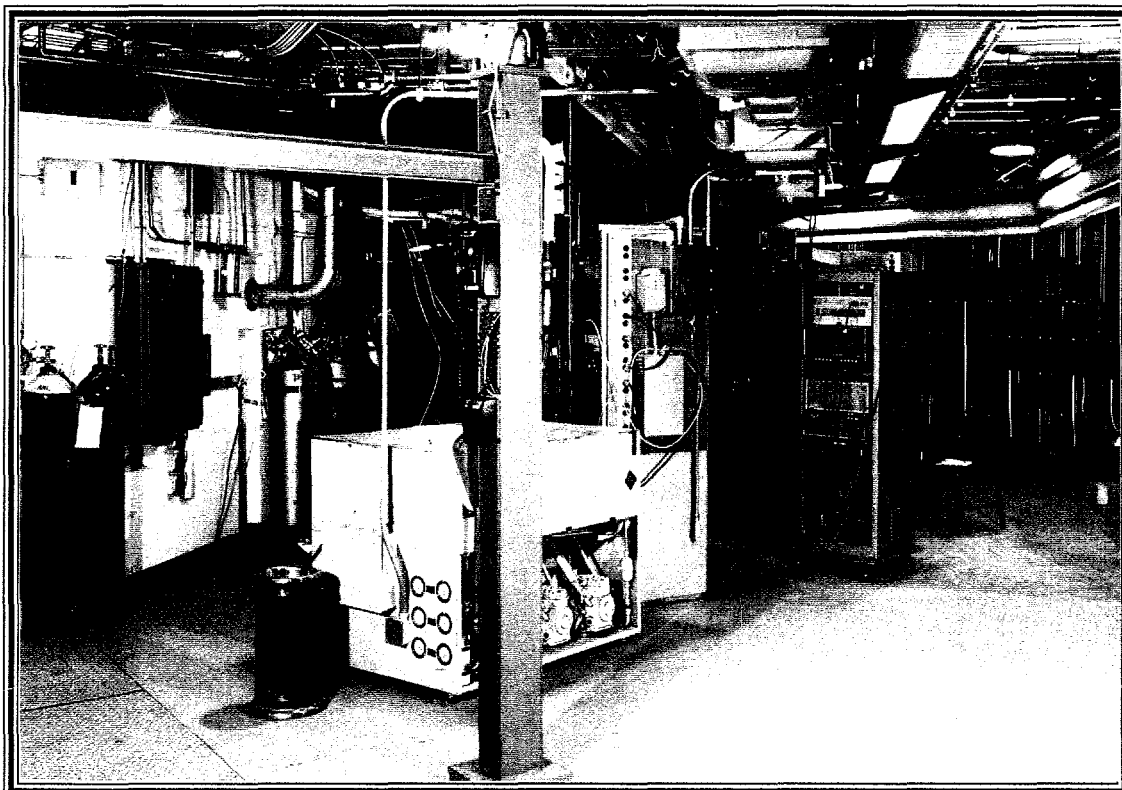


**BEFORE
D&D**
(Neg 144-522)

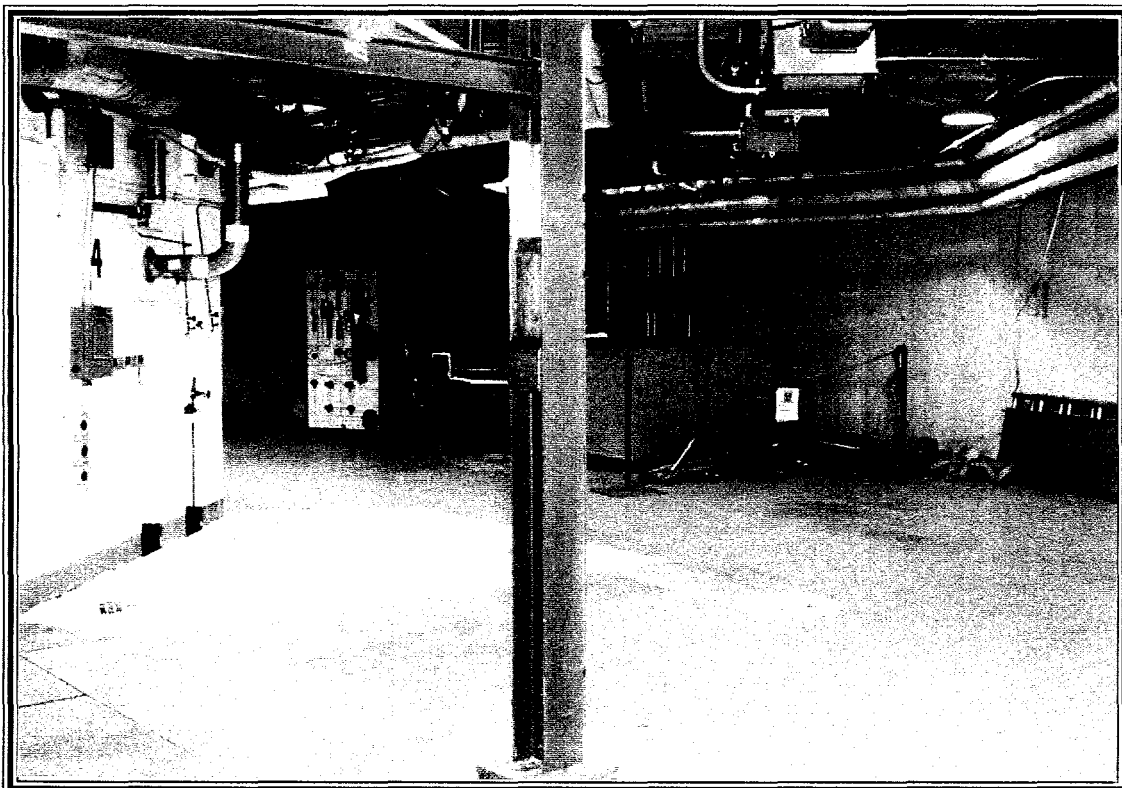


**AFTER
D&D**
(Neg 16173K #17)

FIGURE 33
CP-5 SERVICE FLOOR SHOWING PROCESS AND EXPERIMENTAL SUPPORT
EQUIPMENT – BEFORE AND AFTER D&D.

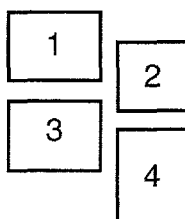
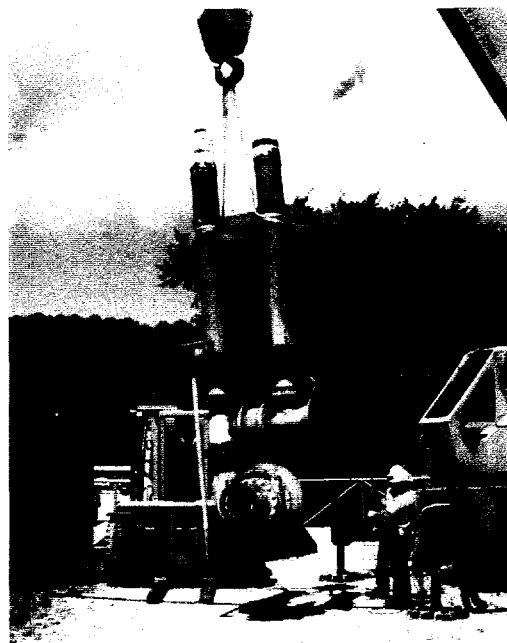
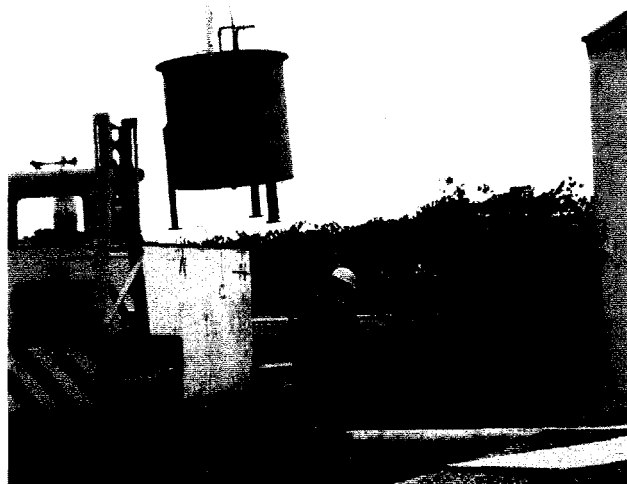
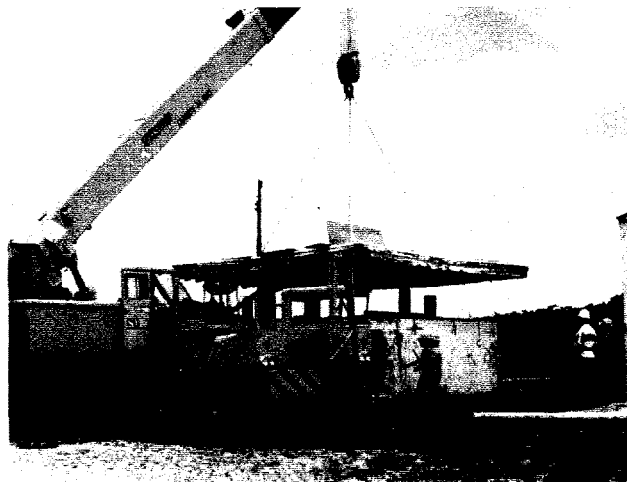


**BEFORE
D&D**
(Neg 235-1966)



**AFTER
D&D**
(Neg 16173K #2)

FIGURE 34
CP-5 VENTILATION ANNEX DEMOLITION



- 1) Removal of roof from ventilation annex (Neg 17696K)
- 2) Removal of piping from ventilation annex (Neg 17697K)
- 3) Removal of sodium hydroxide (NaOH) storage tank from ventilation annex (Neg 17698K)
- 4) Exhaust stack and blower after removal from ventilation annex (Neg 17699K)

FIGURE 35

CP-5 YARD AREA CHARACTERIZATION – DRILL RIG IN PREPARATION FOR GROUNDWATER MONITORING WELL INSTALLATION. (Neg 15898K #3)

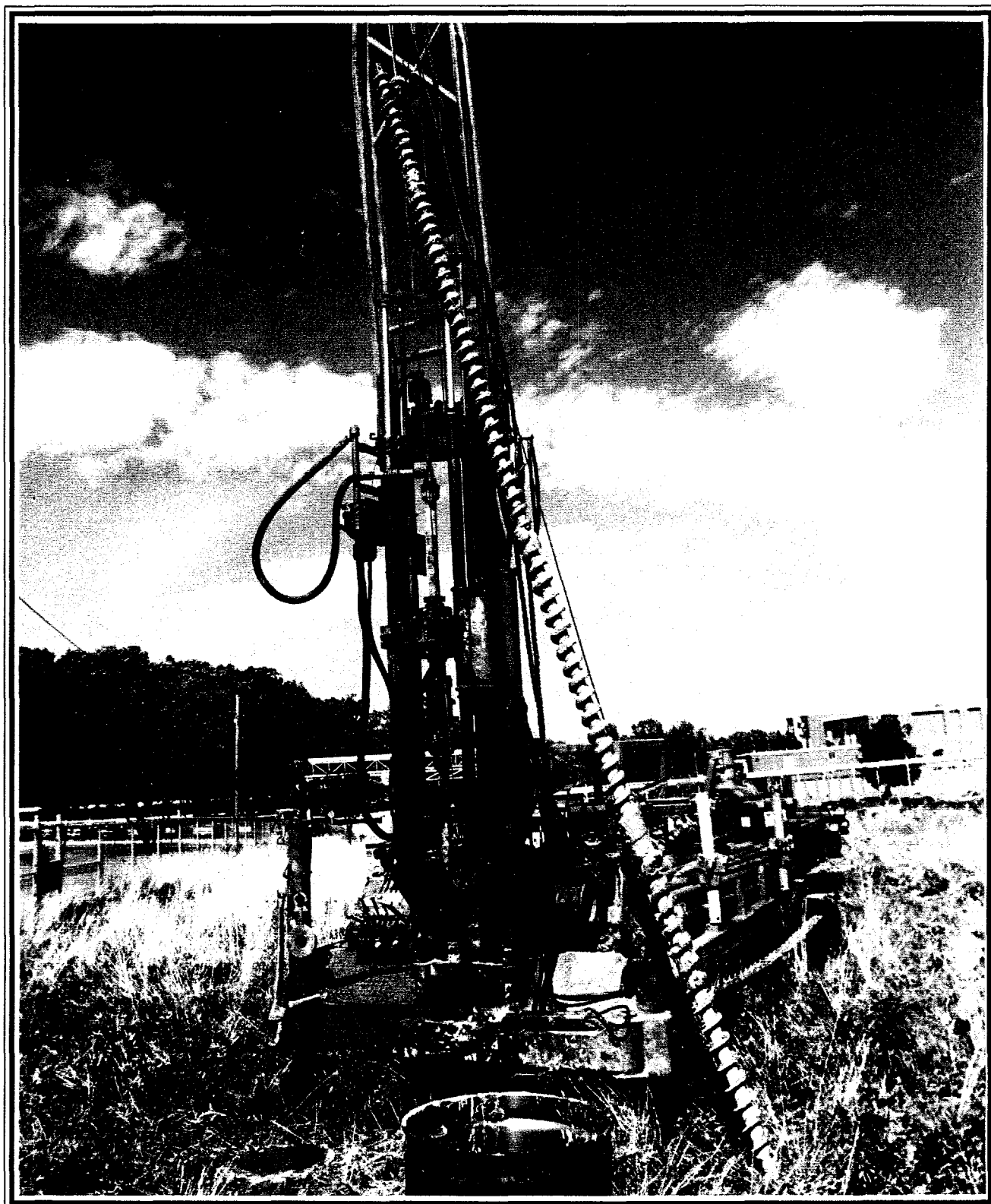
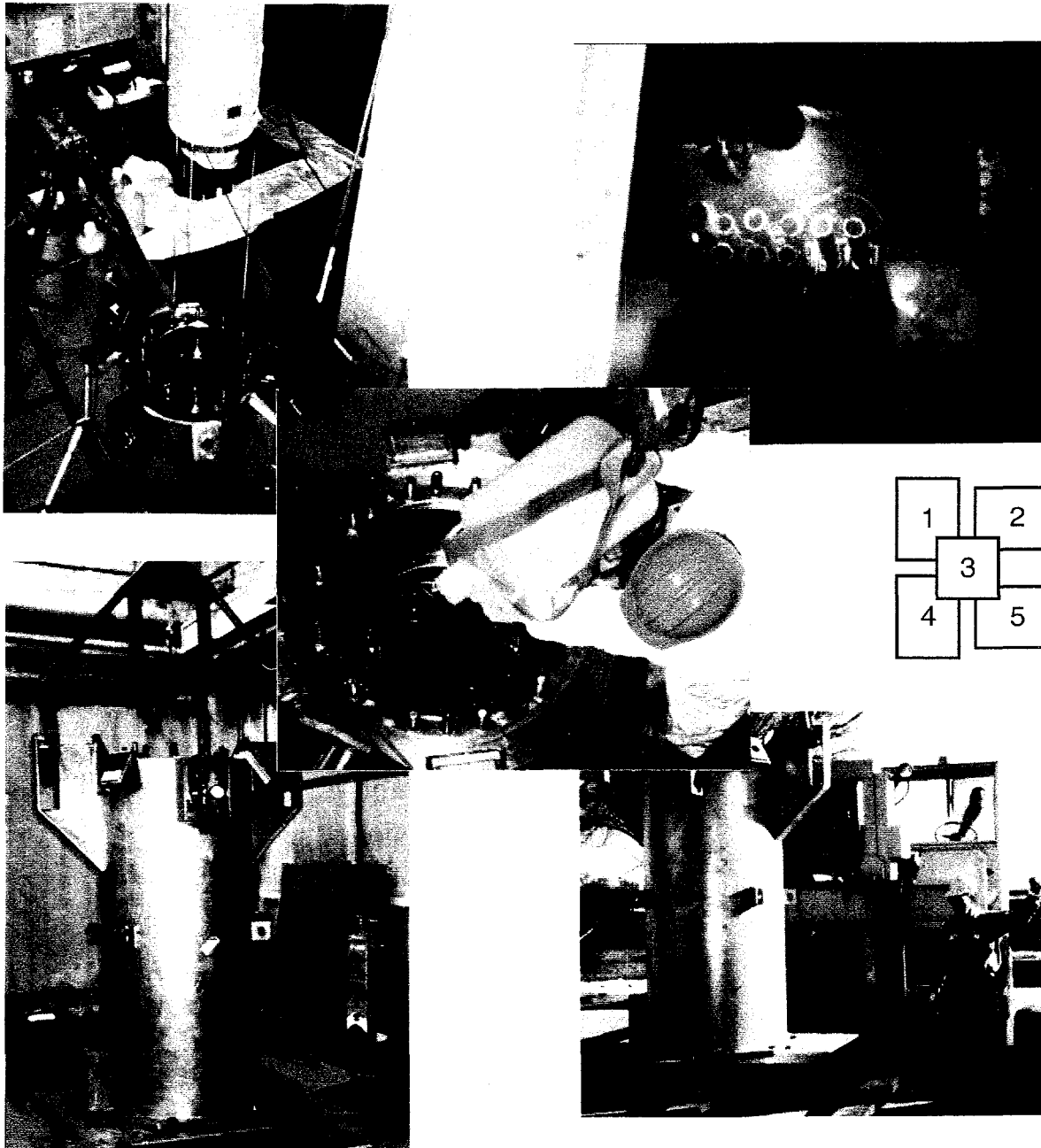


FIGURE 36

LOW-LEVEL RADIOACTIVE CP-5 SCRAP METAL BEING LOADED FOR TRANSPORT TO AN SEG METAL MELTING FACILITY
(Neg 16017K #13A)

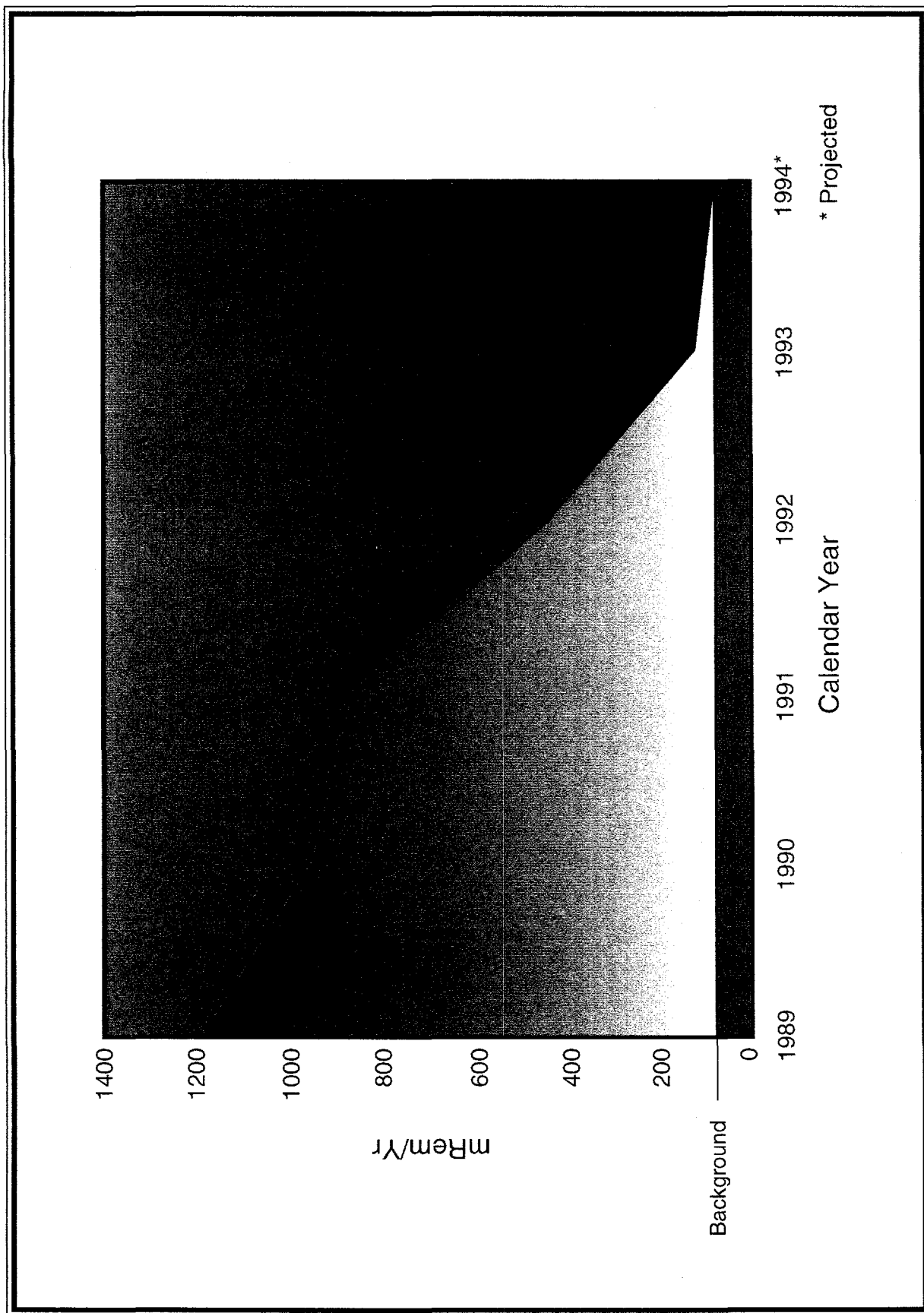


FIGURE 37
JANUS FUEL TRANSFER



- 1) BMI cask after transfer to the CP-5 canal area; before fuel loading (Neg 17700K)
- 2) JANUS fuel stored in the CP-5 fuel pool (Neg 17701K)
- 3) Technician filling the BMI cask with water before fuel loading (Neg 17702K)
- 4) Loading JANUS fuel into the BMI cask (Neg 17703K)
- 5) Loading the BMI cask for shipment (Neg 17704K)

FIGURE 38
CP-5 YARD AREA DOSE RATE* AFTER CLEANUP ACTIVITIES



FY 1994 ACCOMPLISHMENTS

During FY 1994, efforts at the CP-5 D&D project were concentrated on releasing the yard storage area from radiological control, demolishing the obsolete outbuilding structures that supported reactor operations, removing and packaging materials from the 76 storage holes in the rod storage area, and removing all reactor systems except the primary water systems.

Accomplishments of this project in FY 1994 (Figures 39-50):

- ▶ Removal, size reduction, and packaging of the five remaining highly radioactive items stored in shielded casks in the yard area
- ▶ Decontamination of the yard area, including all yard structures; radiological survey and release of the yard area, including all yard structures, from radiological control
- ▶ Demolition of grade-level and below-grade-level structures in the yard area
- ▶ Removal, size reduction, and packaging of highly radioactive materials from 76 storage holes in the rod storage area; successful decontamination (free release levels) of 41 storage holes
- ▶ Removal of all reactor systems except tritium-contaminated systems; commercial removal of tritium-contaminated systems
- ▶ Recycling of 68,710 pounds of radioactive contaminated metal scrap to SEG

FY 1994 ACCOMPLISHMENTS (continued)

- ▶ Free release of the vaporsphere structure yard building to the Road Maintenance Group for reuse as a salt storage building. (This reuse, rather than rebuilding a new structure, resulted in \$200,000 in savings to DOE. In addition, Waste Management Operations continued use of Building 329 as a mixed-waste storage area.)
- ▶ Recycling of 40,000 pounds of nonradioactive lead
- ▶ Recycling of 200,000 pounds of nonradioactive metal scrap
- ▶ Size reduction and packaging of two experimental uranium-235 (U-235) neutron converters into one specially designed stainless steel can, and placement into lead-shielded cask for storage
- ▶ Surveillance and maintenance activities

FIGURE 39

H-26 CASK IN YARD AREA — 30,000-POUND CONCRETE AND STEEL SHIELDING CASK CONTAINING A RADIOACTIVE COLLIMATOR FROM A REACTOR BEAM LINE. (Neg 19247K)

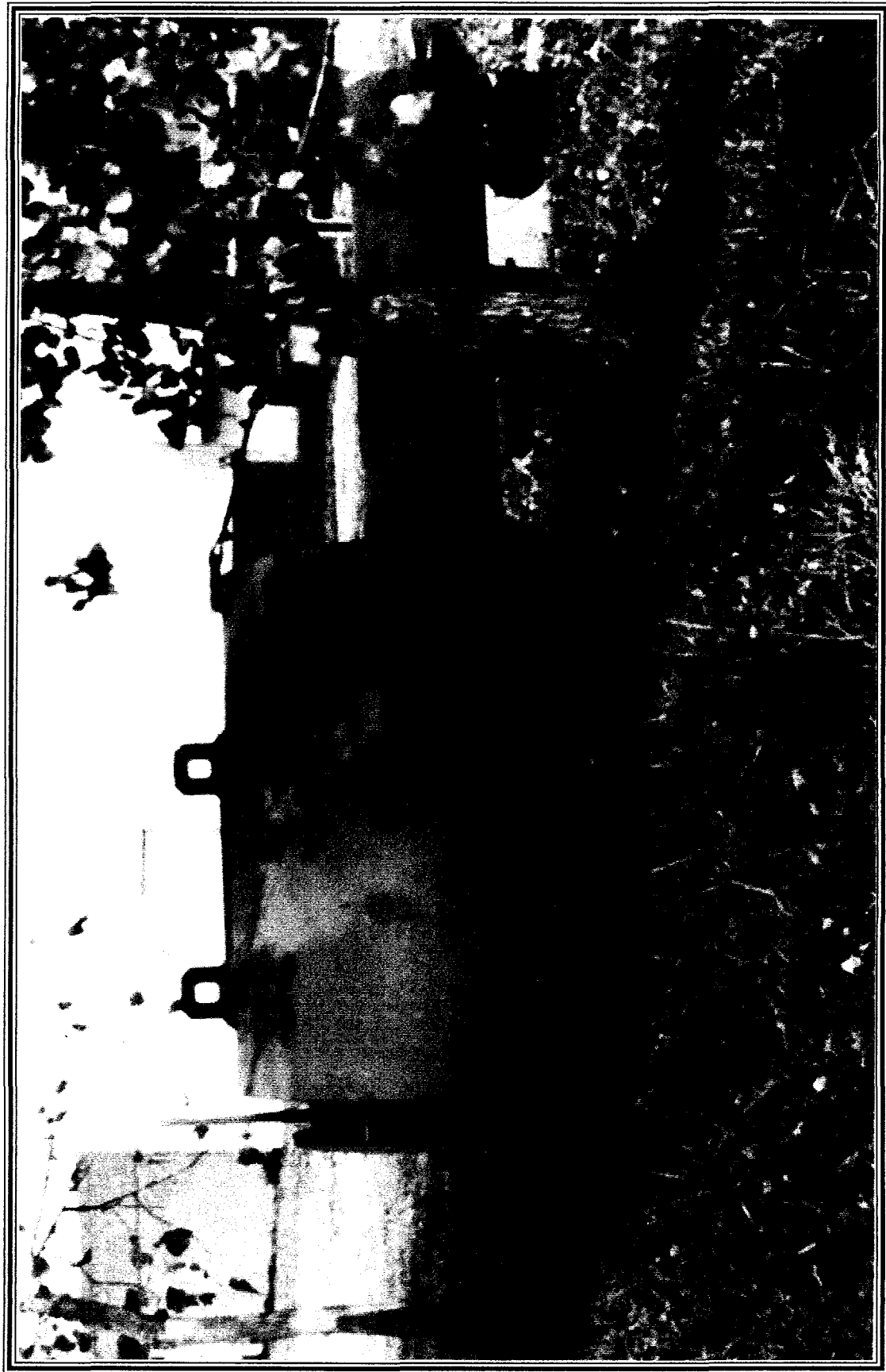
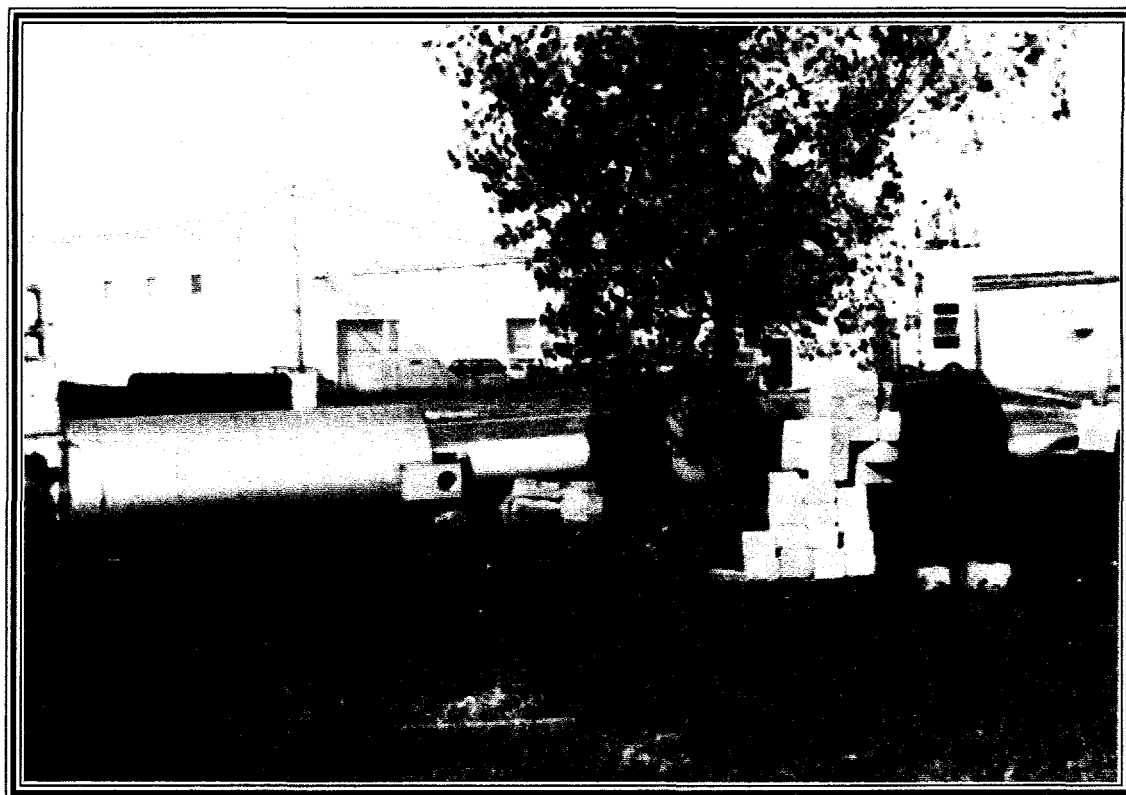


FIGURE 40

TRANSFER OPERATIONS — ALIGNMENT OF ONE OF THE TWO 40,000-POUND LEAD CASKS CONTAINING RADIOACTIVE COLLIMATOR PLUGS, WITH THE CASKS USED TO TRANSFER THE PLUGS INTO THE BUILDING FOR SIZE REDUCTION. (Neg 19249K)



FIGURE 41
CP-5 YARD AREA — BEFORE AND AFTER D&D.



BEFORE
D&D
(Neg 19245K)



AFTER
D&D
(Neg 19246K)

FIGURE 42

HYDRAULIC JACK HAMMER DEMOLISHING OBSOLETE STRUCTURES IN THE YARD AREA (Neg 19250K)

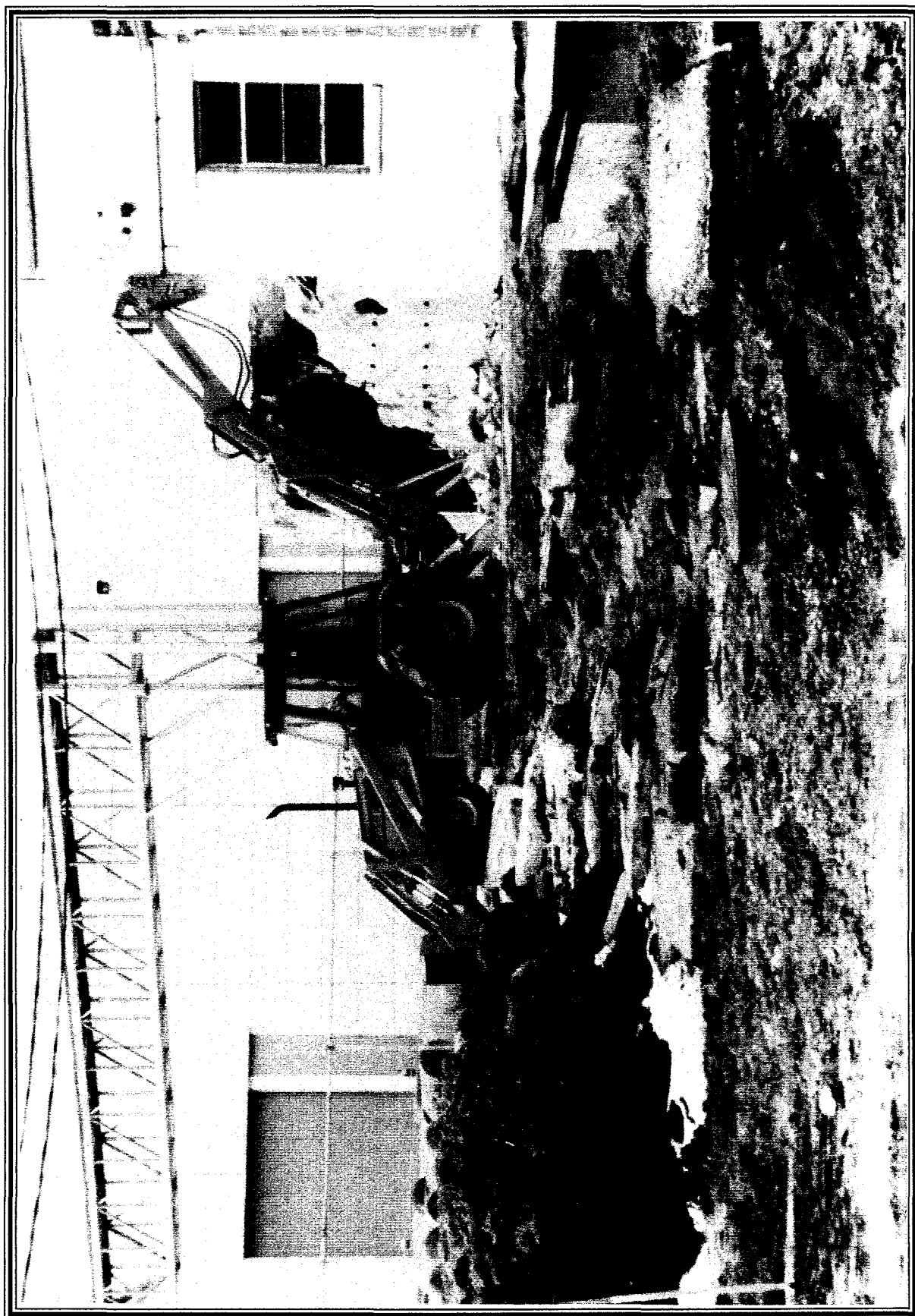


FIGURE 43

REMOVAL OF UNDERGROUND PIPING IN THE YARD AREA (Neg 19251K)

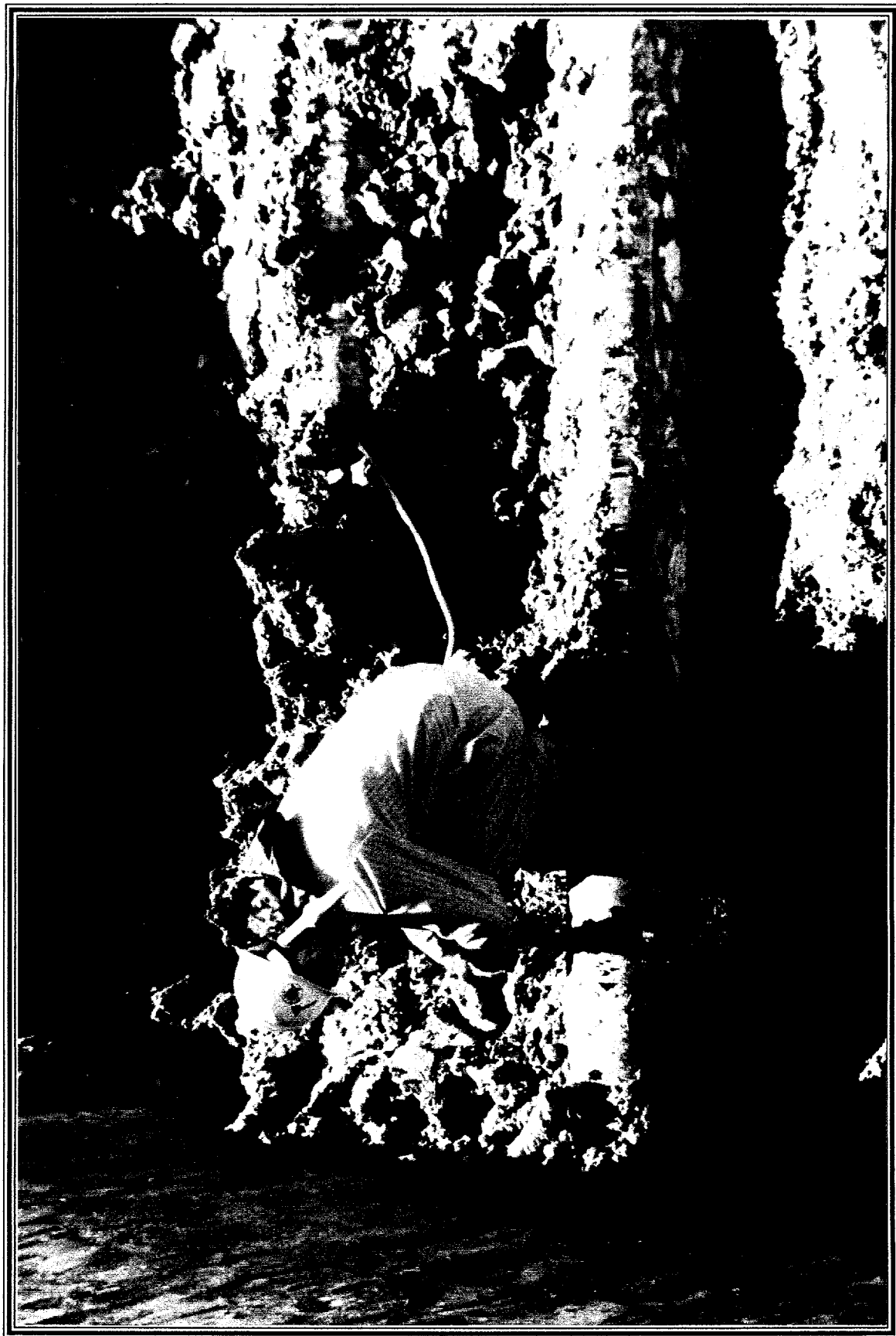


FIGURE 44
WORKERS PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (INCLUDING AIR RESPIRATORS) BEFORE WORKING IN A
TRITIUM-CONTAMINATED AREA (Neg 19252K)

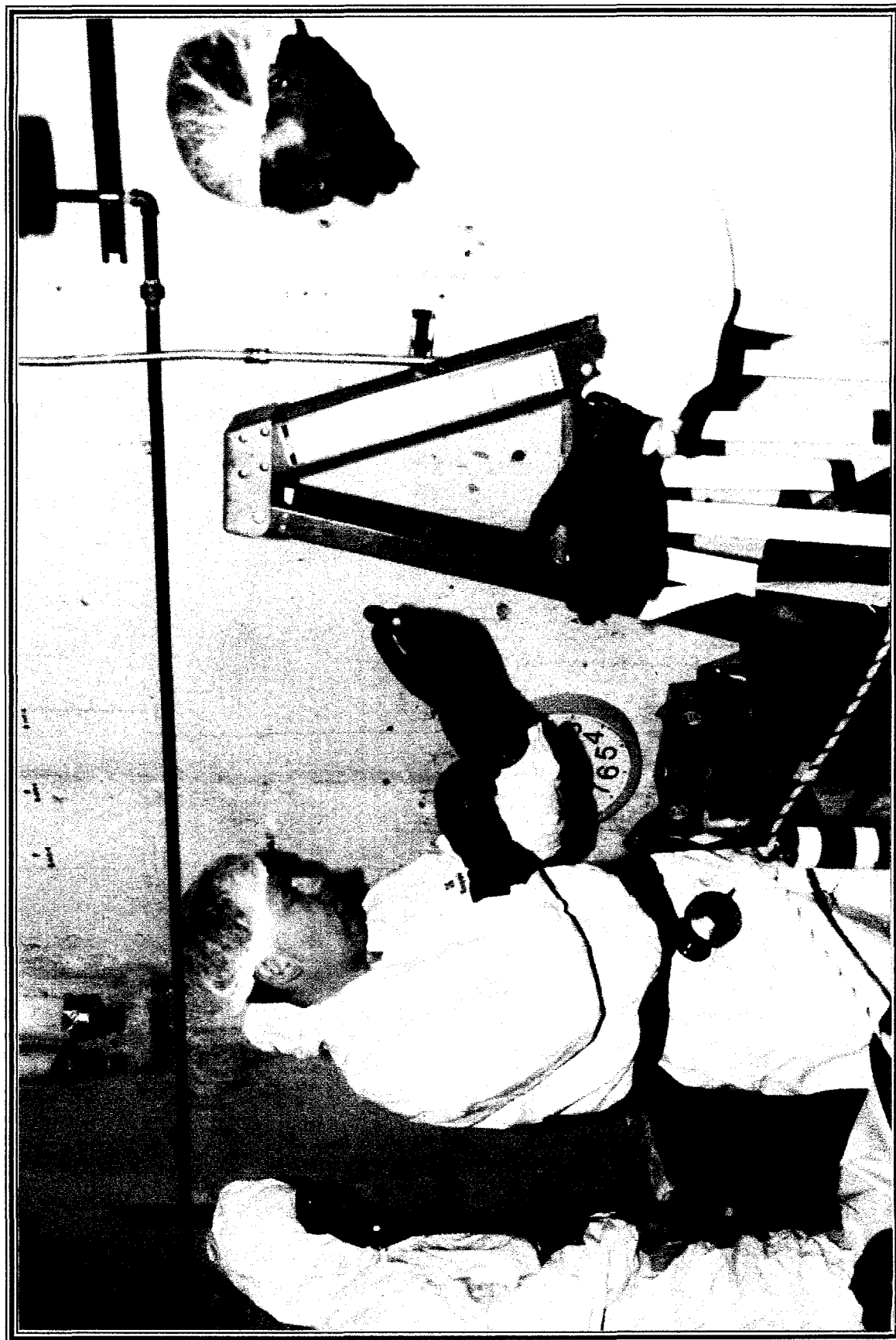


FIGURE 45

TRITIUM-CONTAMINATED REACTOR PURIFICATION (LEFT), HELIUM PURGE (CENTER), AND EXPERIMENTER COOLING LOOP (RIGHT) SYSTEMS BEFORE REMOVAL (Neg 197-82-11)

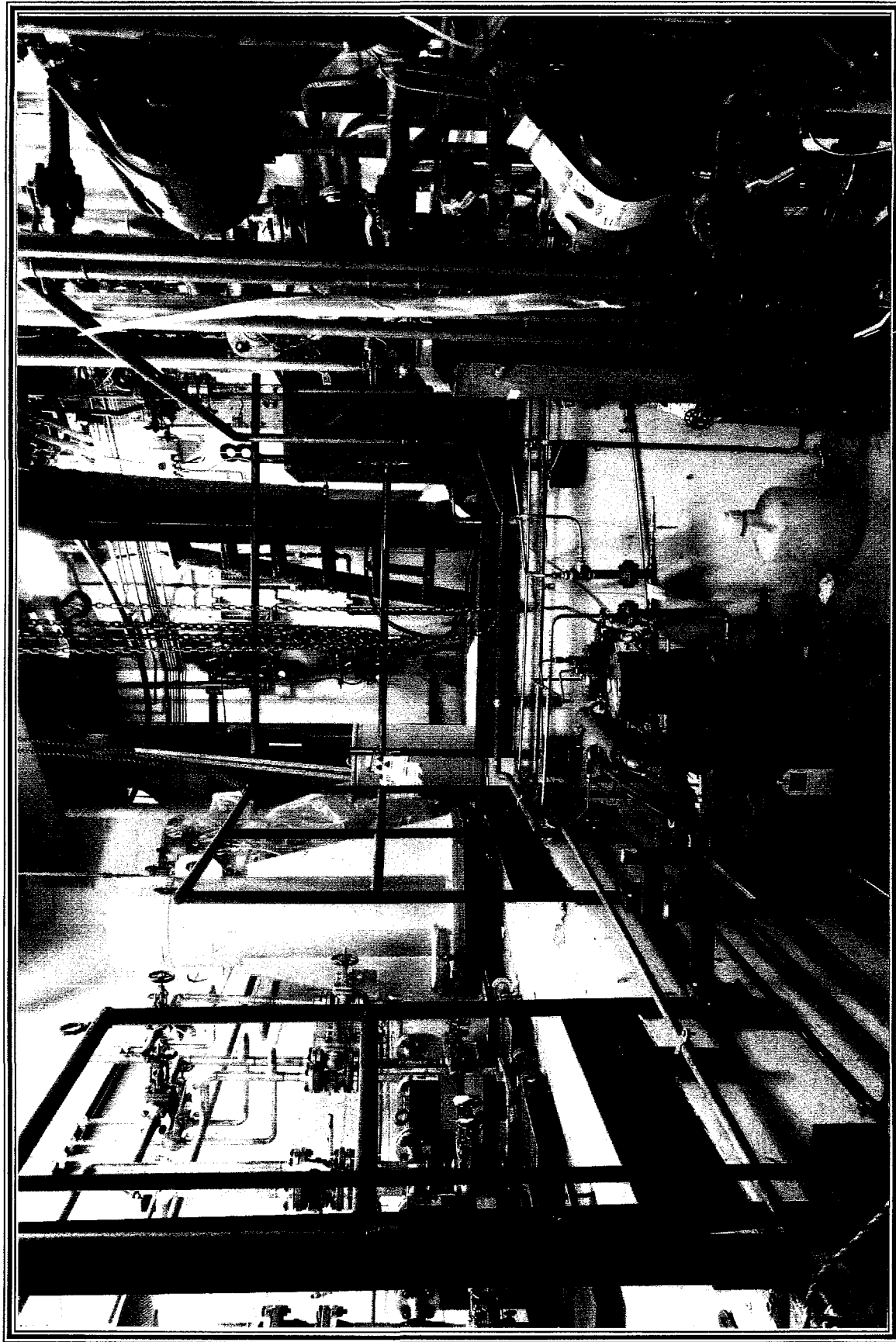


FIGURE 46

TRITIUM-CONTAMINATED EXPERIMENTER COOLING LOOP SYSTEM BEFORE REMOVAL

(Neg 144-1065)

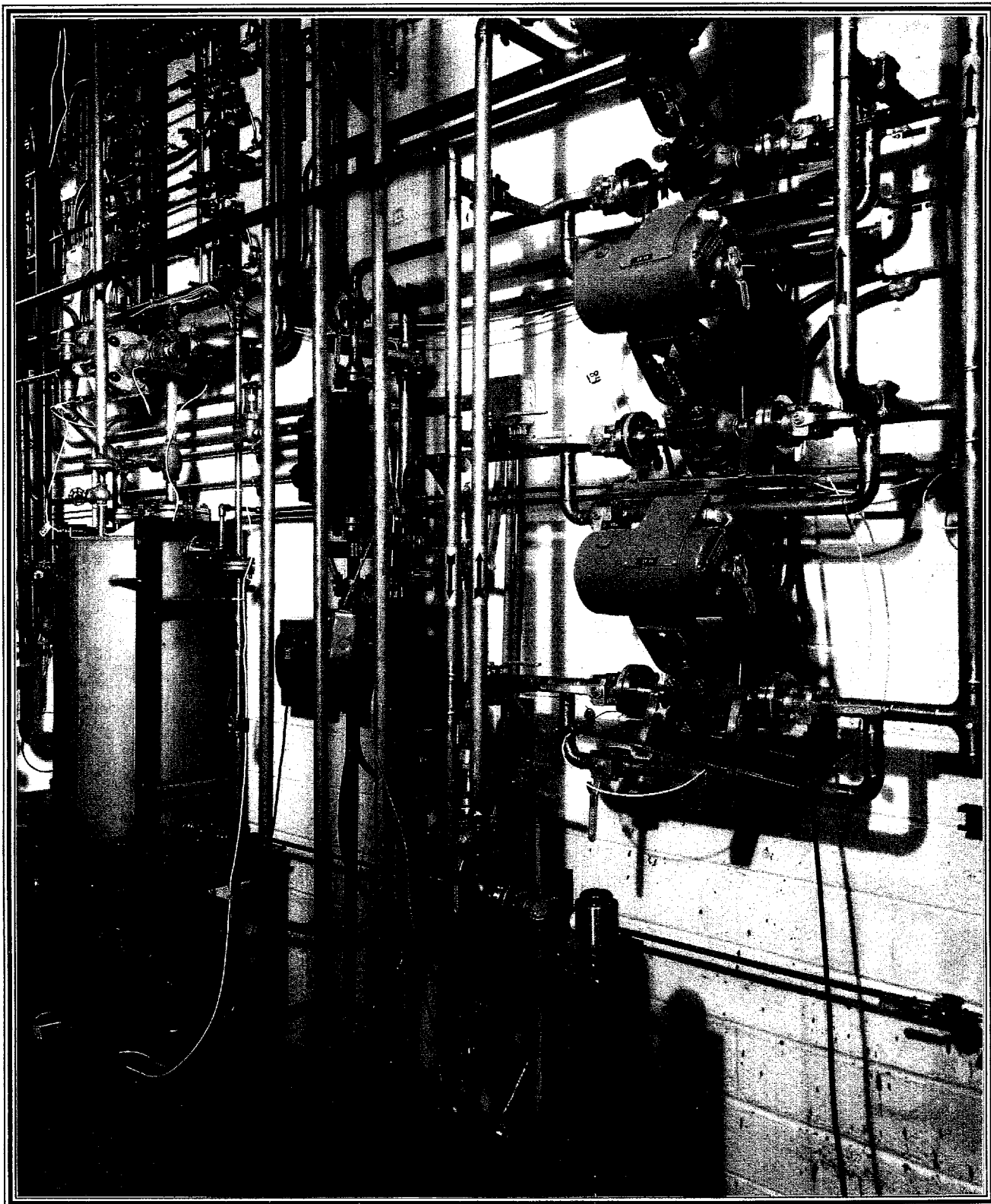


FIGURE 47
TRITIUM-CONTAMINATED REACTOR PURIFICATION SYSTEM BEFORE REMOVAL (Neg 144-1066)

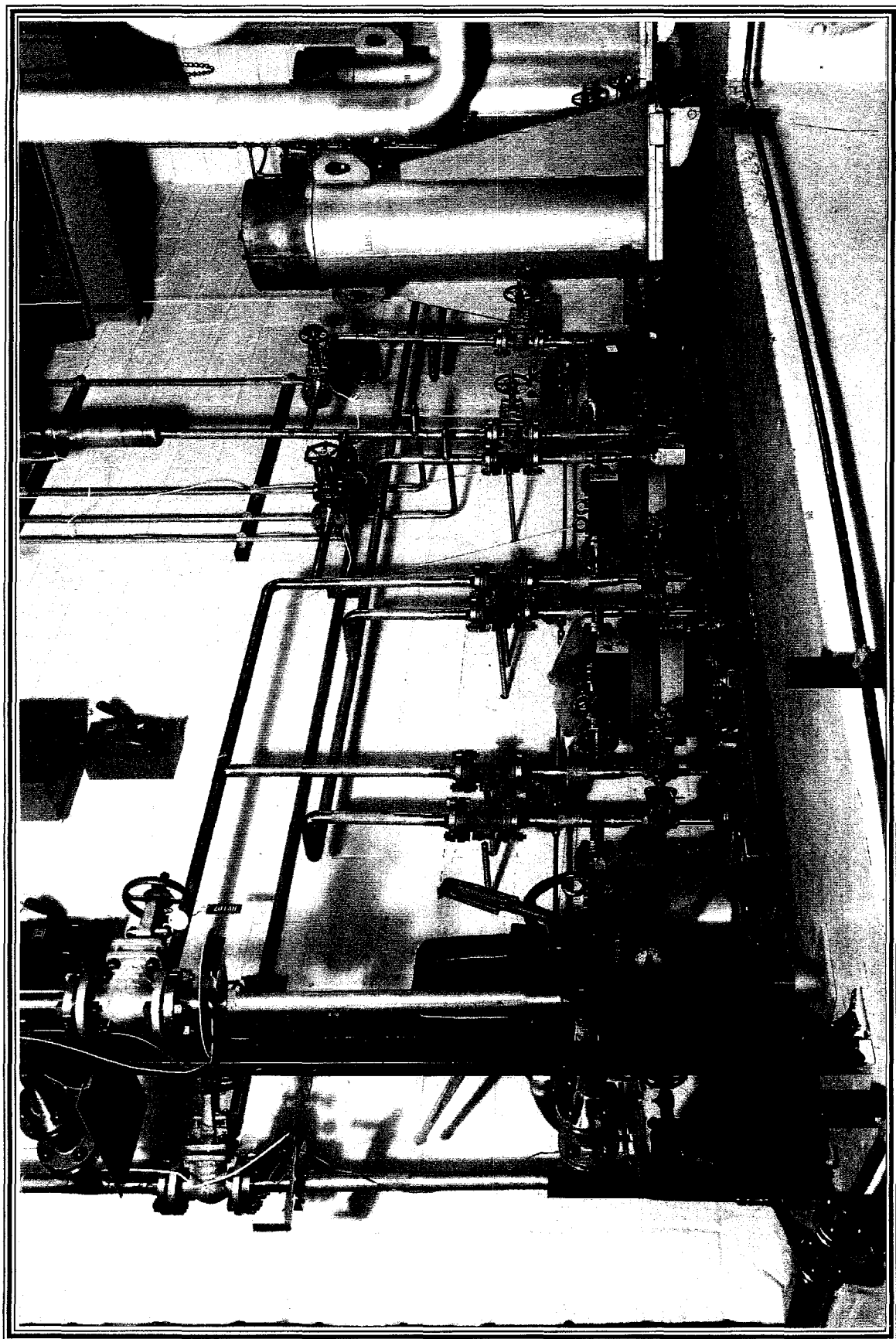


FIGURE 48

AFTER REMOVAL OF REACTOR PURIFICATION, HELIUM PURGE, AND EXPERIMENTER COOLING SYSTEMS (Neg 19248K)

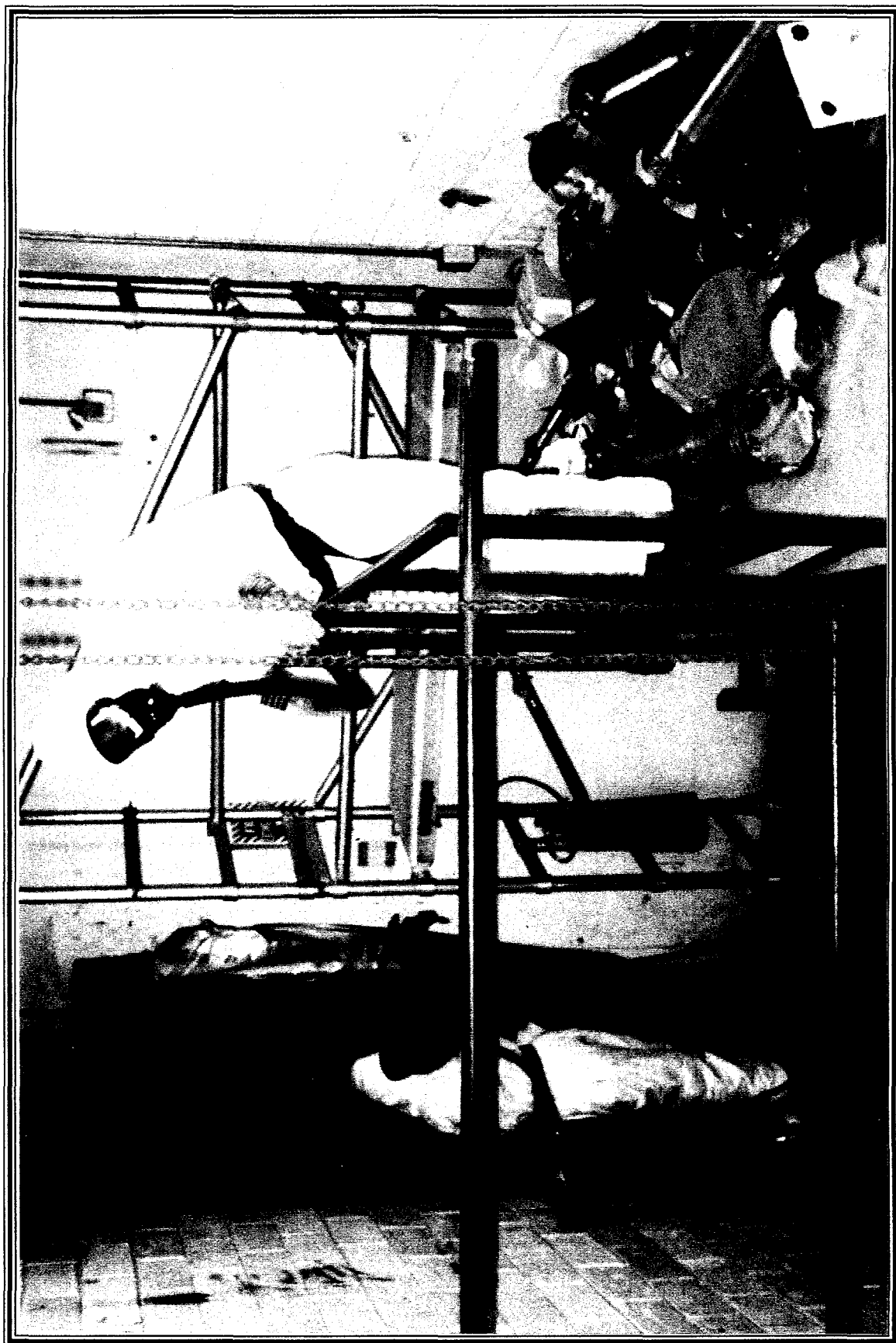


FIGURE 49

THE VAPORSPHERE WAS RECYCLED BY THE ANL-EAST GROUNDS DEPARTMENT FOR USE AS A ROAD SALT BUILDING

(Neg 18557K #5)

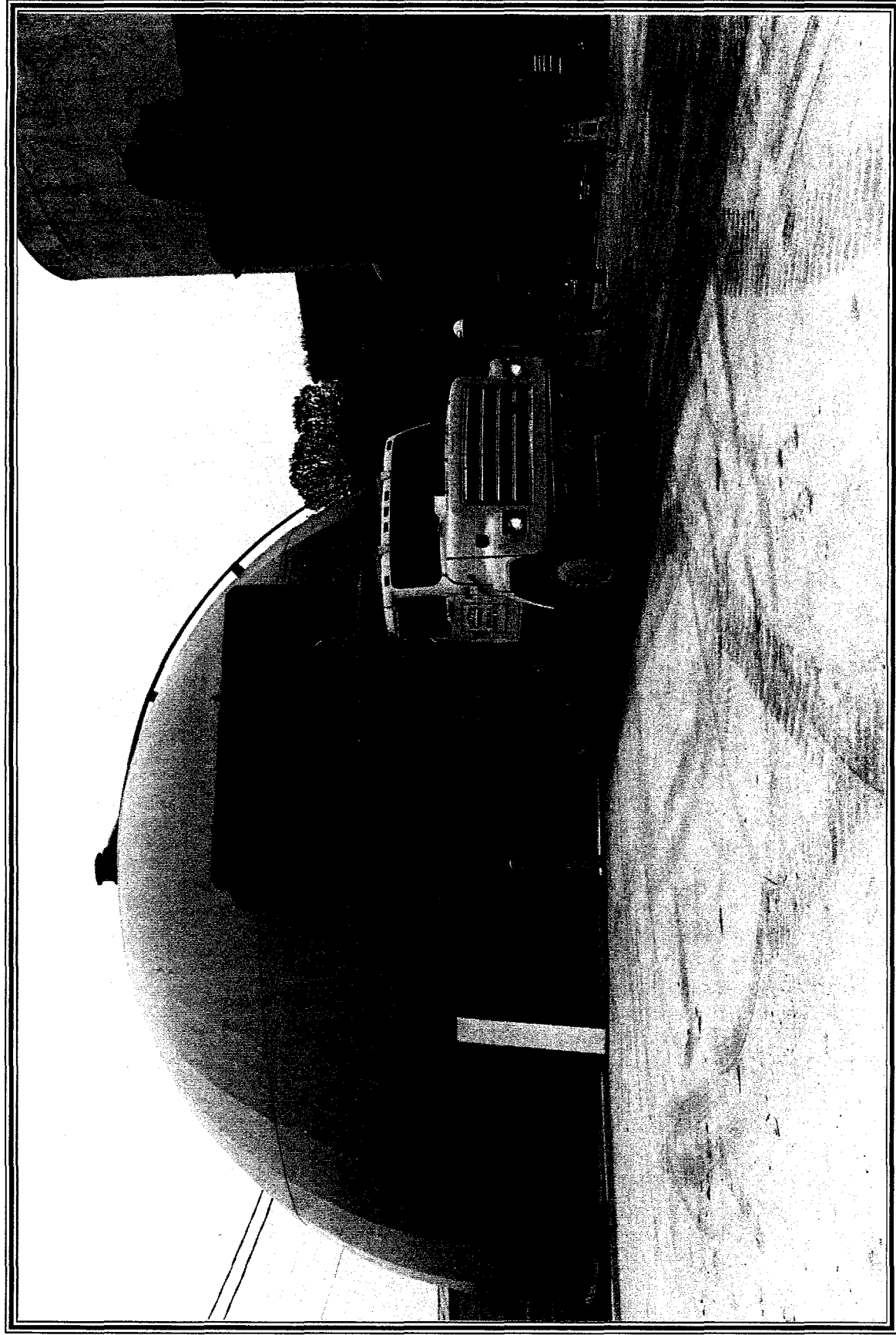
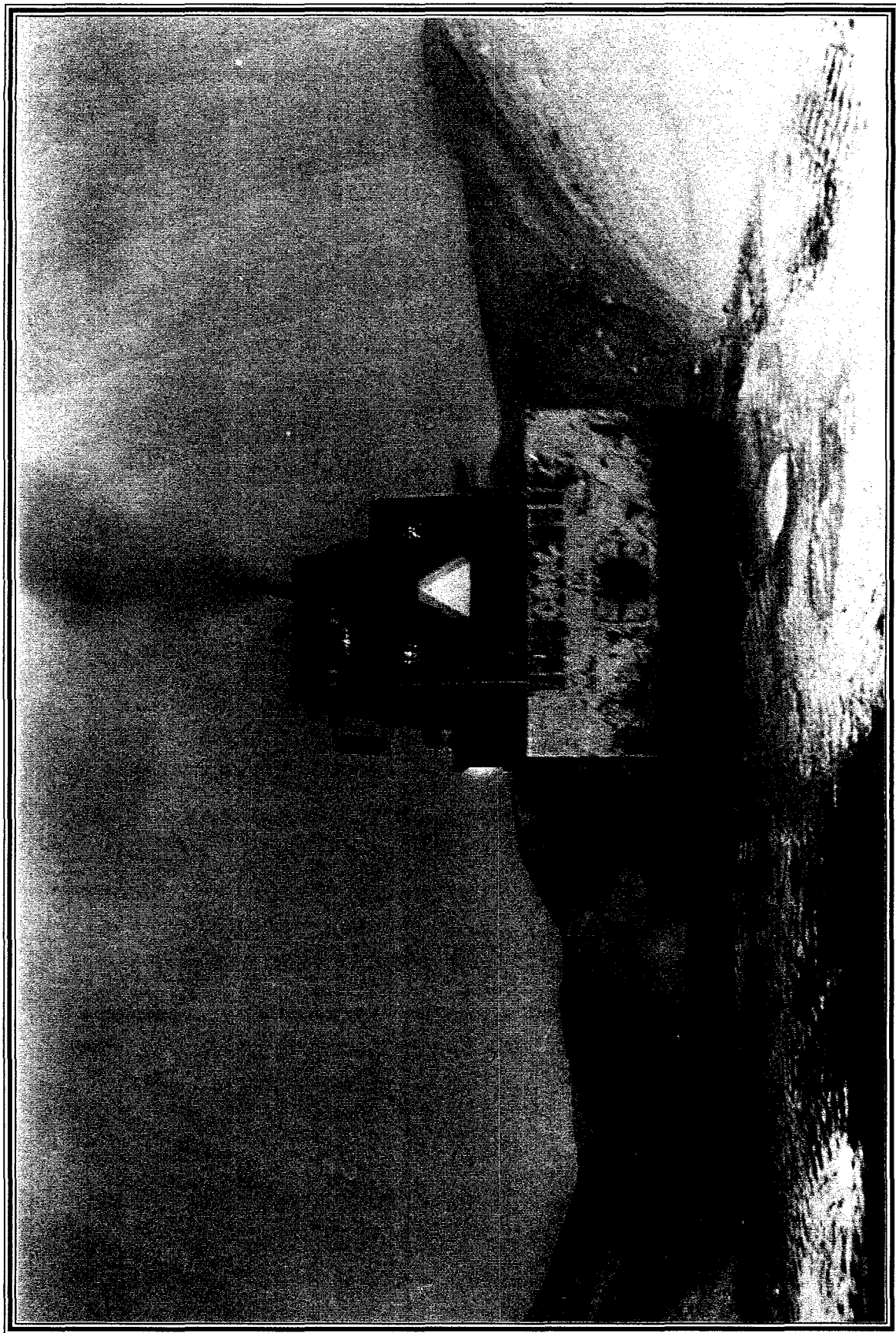


FIGURE 50
FRONT-END LOADER MOVING SALT INSIDE THE SALT STORAGE BUILDING (Neg 18557K #11)



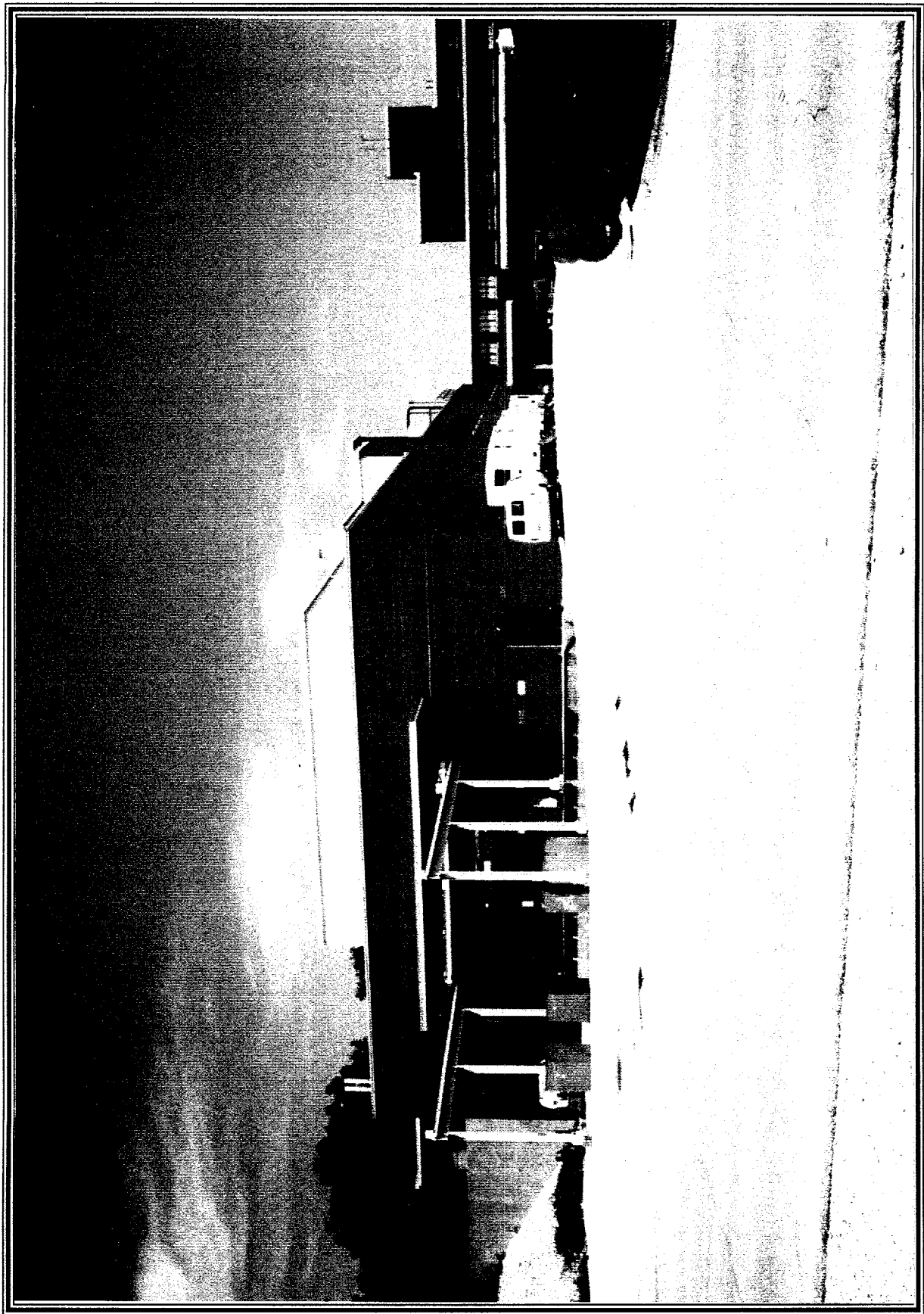
FY 1995 GOALS

During FY 1995, efforts at the CP-5 D&D project will be concentrated on completing the following activities:

- ▶ Removal, size reduction, and packaging of the tritium-contaminated thermal column cooling loop system
- ▶ Removal, size reduction, and packaging of the tritium-contaminated vertical thimble 47 and 53 cooling loop system
- ▶ Removal, size reduction, and packaging of the tritium-contaminated auxiliary and primary water cooling systems
- ▶ Surveillance and maintenance activities

BUILDING 200 M-WING HOT CELLS D&D PROJECT

FIGURE 51
BUILDING 200 (Neg 17551K #22A)





BUILDING 200 M-WING HOT CELLS D&D PROJECT

DESCRIPTION

The Building 200 (Figure 51) M-Wing hot cells currently being decontaminated and decommissioned include A-1, K-1, K-3, M-1, and M-3. Hot cells K-1, K-3, M-1, and M-3 were used for a joint U.S. Navy/ANL POB research program that was part of a national DOE effort to develop technology for breeding uranium-233 (U-233) from thorium-232 (Th-232) in light-water reactors. Hot Cell K-1 was used as a dissolver cell; hot cell K-3, as an analytical cell; hot cell M-1, as a dissolver cell; and M-3, as a shear cell. The research work with irradiated blanket fuel pins from the Shippingport Reactor was completed in 1985. As part of this program, hot cell A-1 was used for examination of irradiated reactor fuel specimens from the Zion Nuclear Power Station. The fuel specimens were sheared, pulverized, dissolved, and analyzed to determine their isotopic composition. After completion of the research, neutralized, cemented waste from the POB project was packaged and shipped to the DOE Westinghouse Hanford Company disposal site, and the contaminated equipment and structures in the hot cells were left in place.

The five hot cells are to be decontaminated to less than or equal to 1 milliroentgen per hour general area and placed in safe standby status. The objective of this project is to substantially reduce the emission of 2,600 curies of radioactivity of radon-220 (Rn-220) each year, thereby removing the major source of radioactive air emissions at ANL-East.

FY 1993 ACCOMPLISHMENTS

Accomplishments of this project in FY 1993 (Figures 52-61):

- ▶ Size reduction and packaging of the fuel shear in hot cell M-3
- ▶ FY 1993 surveillance and maintenance activities, including the monitoring and reporting of Rn-220 emissions from the Building 200 M-Wing hot cell exhaust stacks

FIGURE 52

PUTTING ON PROTECTIVE CLOTHING FOR AIR LINE ENTRY INTO A RADIOACTIVE-CONTAMINATED HOT CELL (NOTE THE FIVE-MINUTE BACKUP COMPRESSED AIR CYLINDER.) (Neg 15411K #8A)

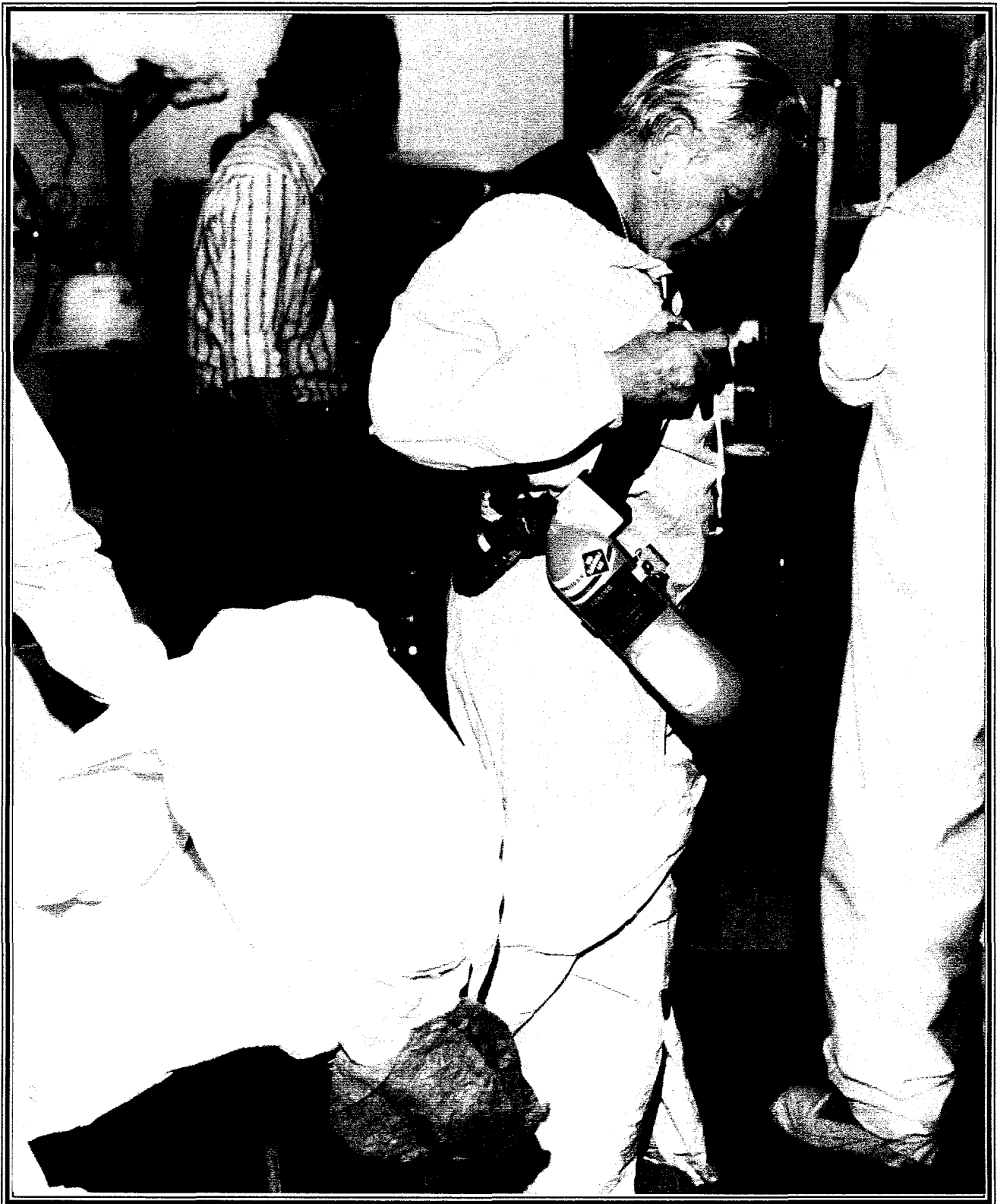


FIGURE 53
DISASSEMBLY OF STRUCTURES IN HOT CELL K-3, BUILDING 200 (Neg 16379 #33)

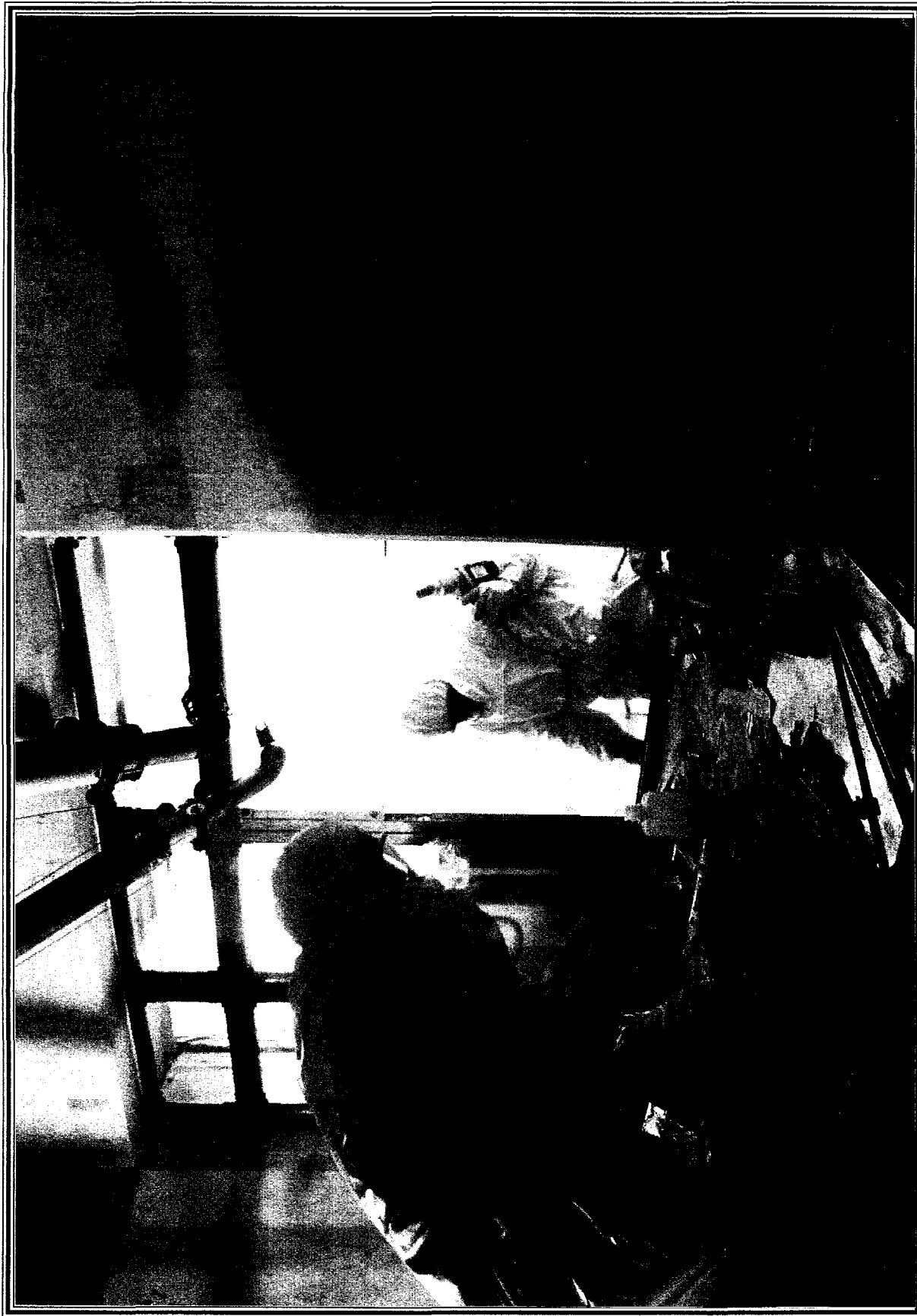


FIGURE 54

AIR LINE PROTECTIVE SUIT ENTRY INTO A RADIOACTIVE-CONTAMINATED HOT CELL FOR REMOVAL OF SIZE-REDUCED SHEAR COMPONENTS IN HOT CELL M-3 (Neg 15410 #2)

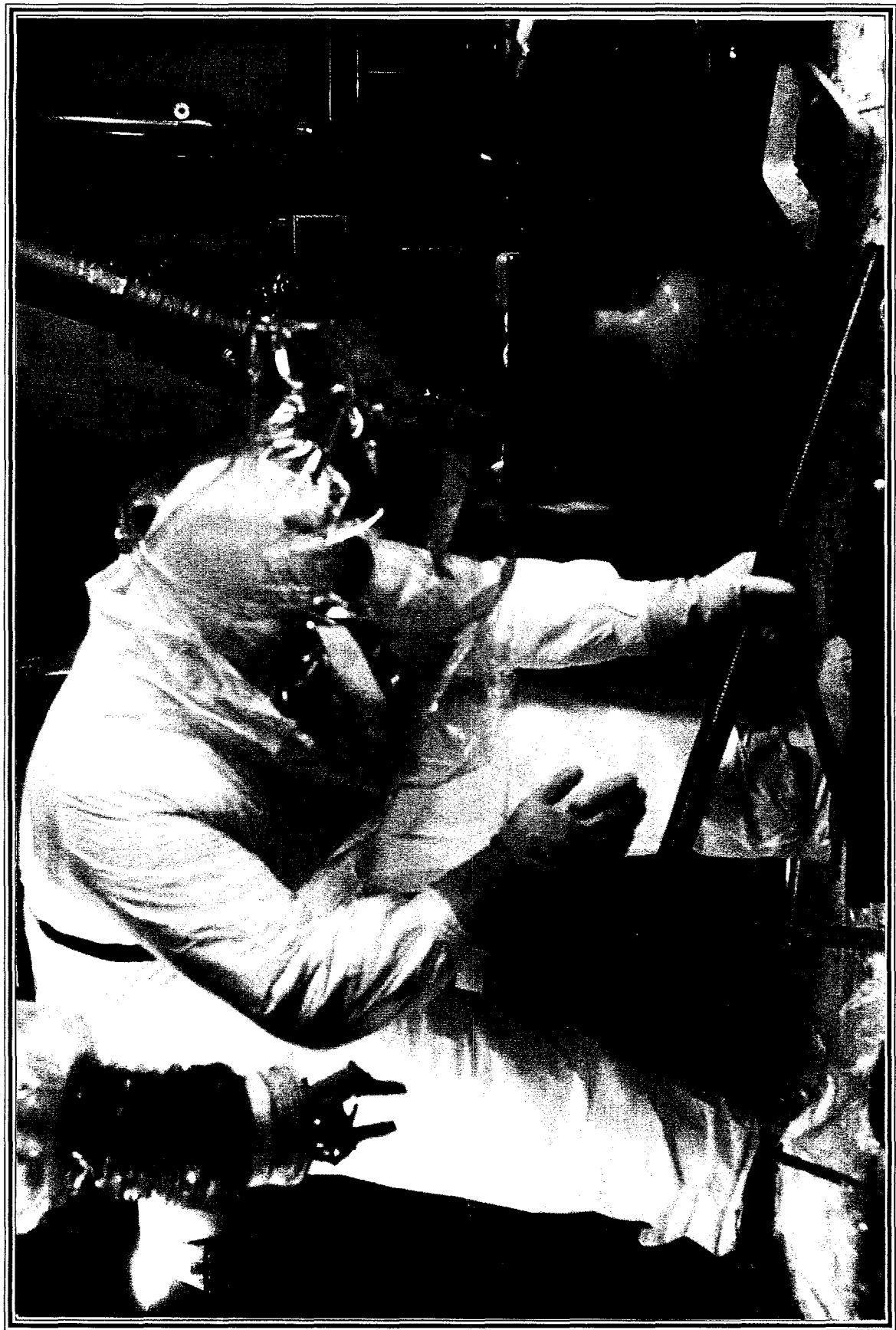


FIGURE 55
BUILDING 200 — RADON-220 EMISSIONS

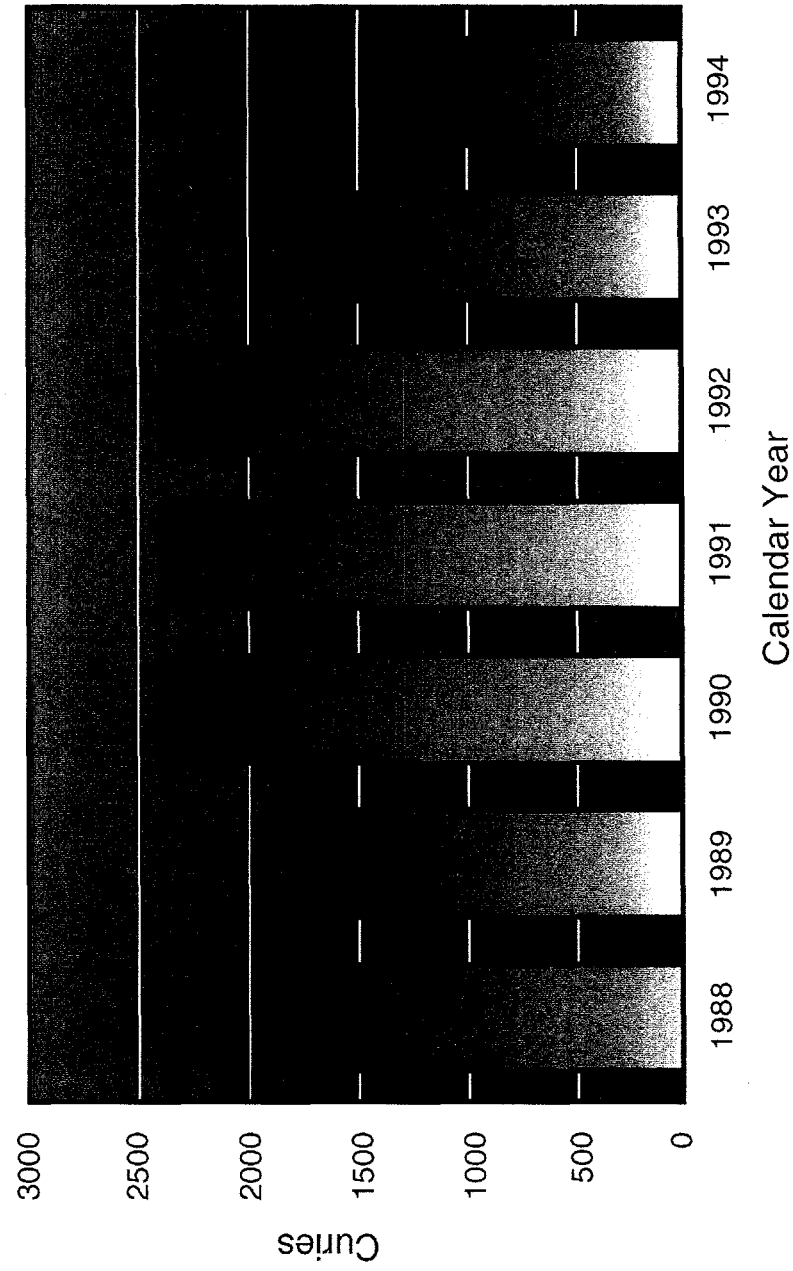


FIGURE 56

RADON-220 EMISSIONS BY CELL — CELL-BY-CELL CONTRIBUTION* TO TOTAL EMISSIONS FROM CELLS UNDERGOING D&D.

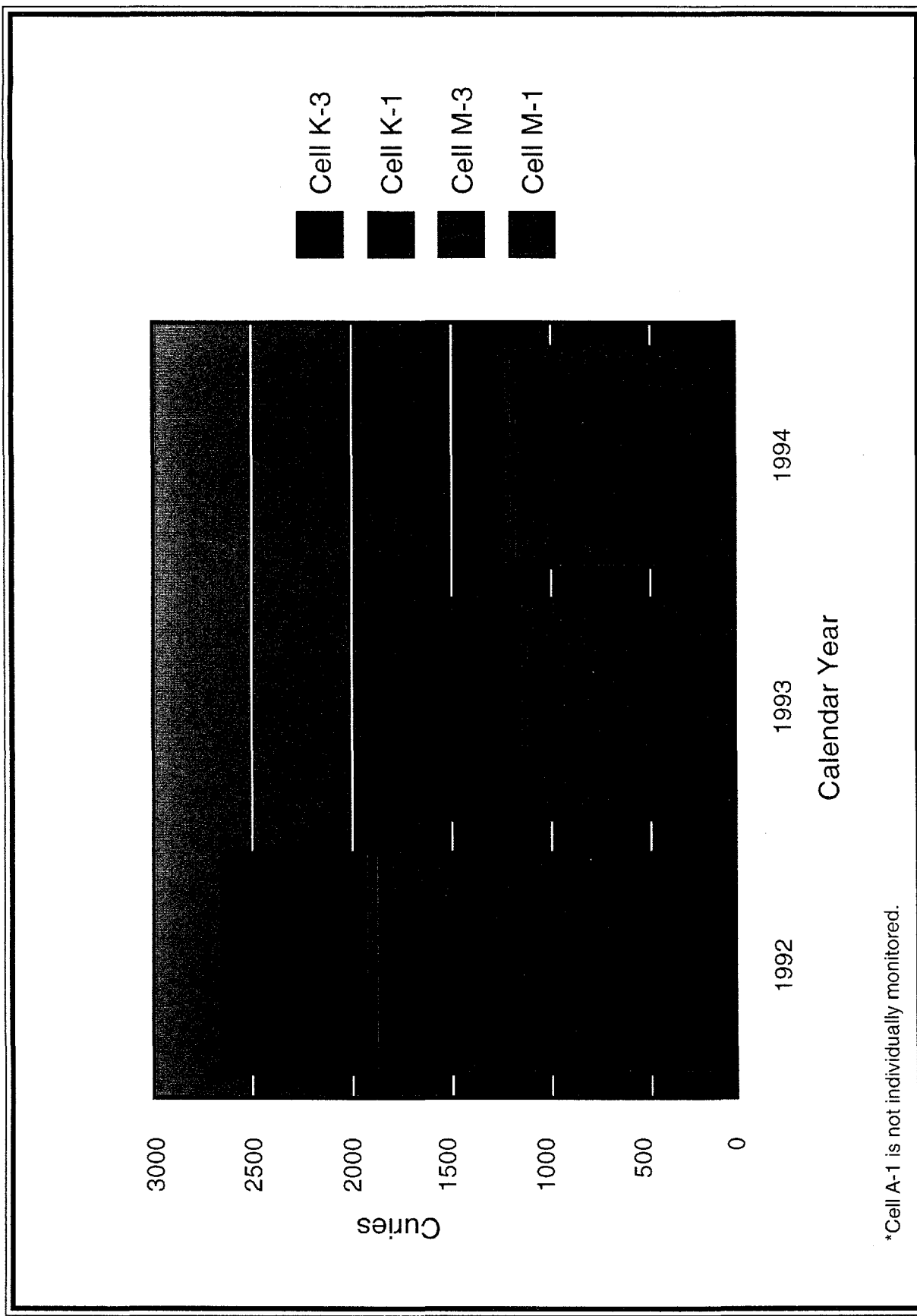
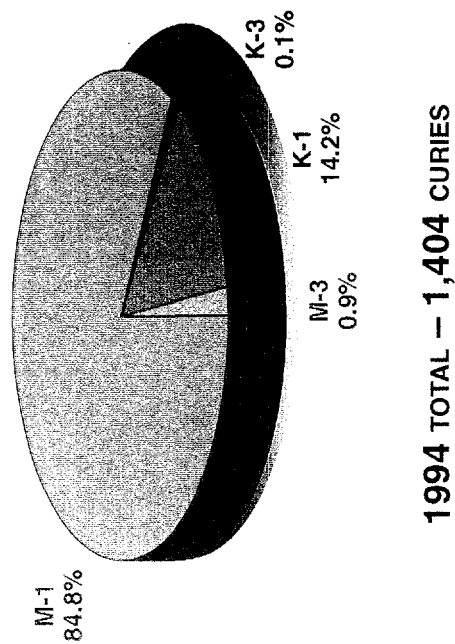
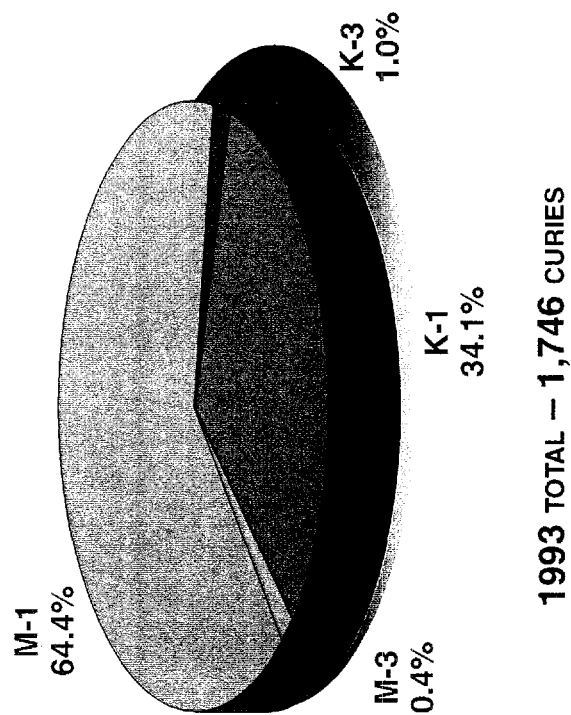


FIGURE 57
1993 EMISSIONS BY CELL – TOTAL EMISSIONS FOR 1993 AND 1994.



Note: Cell A-1 was not a significant contributor to emissions. A different type of fuel was analyzed in this cell.

FIGURE 58

SIZE REDUCTION AND EQUIPMENT REMOVAL PHASE — REMOTE SIZE REDUCTION OF LARGE COMPONENTS USING MANIPULATORS IN CELL K-1. (Neg 16065 #6)

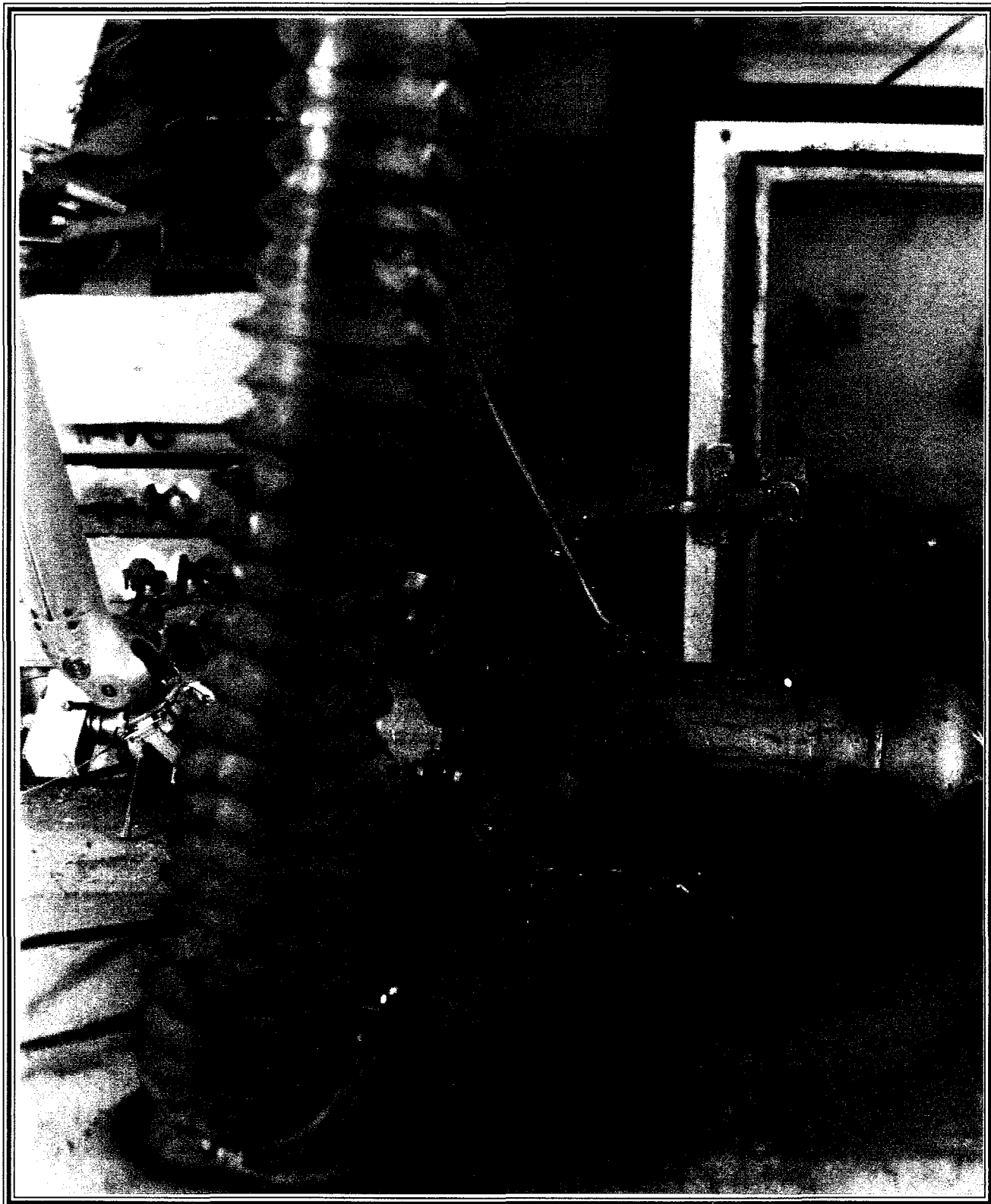


FIGURE 59

INITIAL DECONTAMINATION PHASE – REMOVAL OF STRIPPABLE COATING FROM FALSE FLOOR USING MANIPULATORS

IN CELL K-3. (Neg 16065 #9)

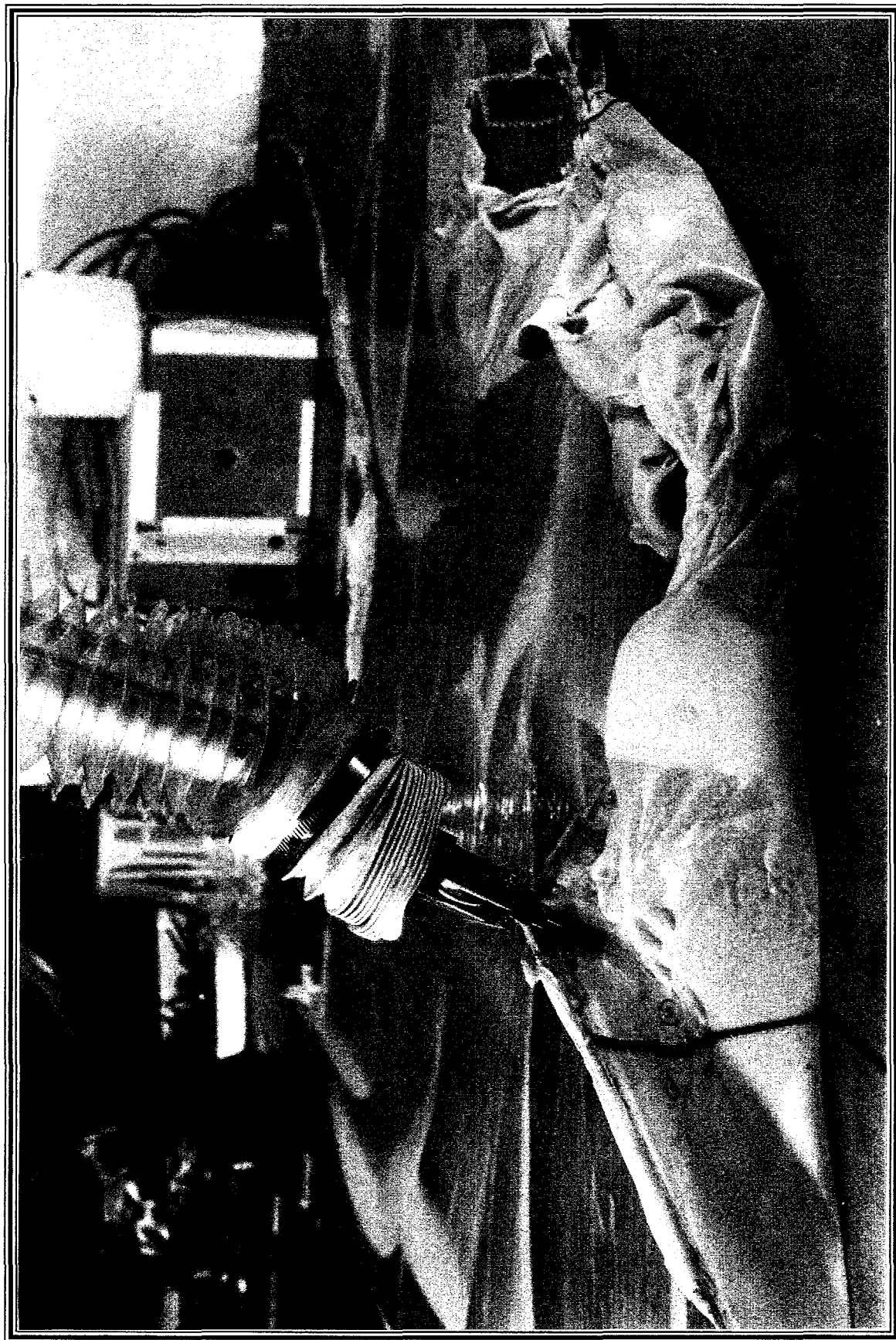
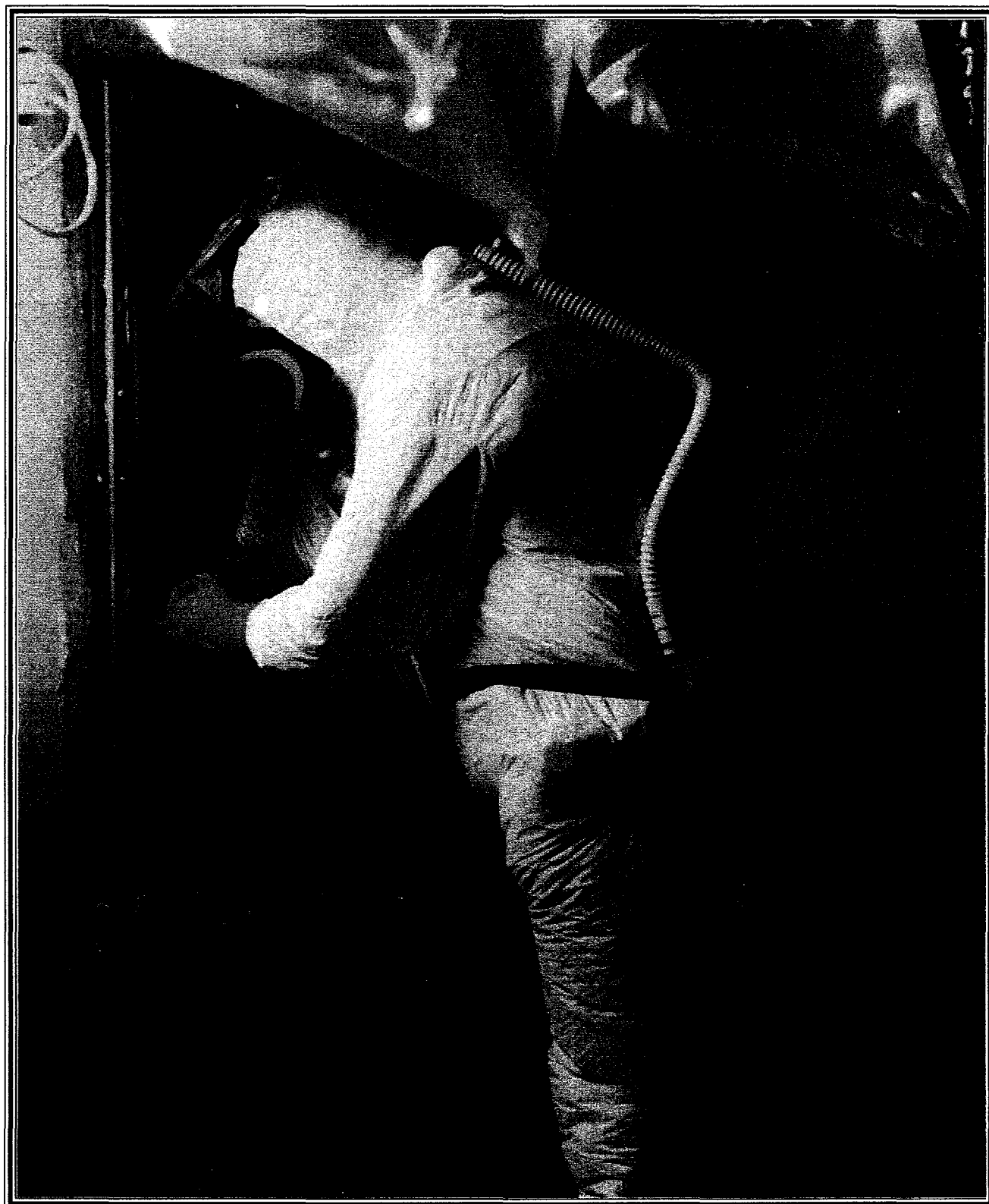


FIGURE 60
ALPHA SHIELD AND FALSE FLOOR REMOVAL PHASE -- WORKER REMOVING ALPHA SHIELD AND
FALSE FLOOR IN CELL K-3. (Neg 16380 #5)



FIGURE 61

**FINAL DECONTAMINATION PHASE – REMOVAL OF STRIPPABLE COATING IN
CELL K-1. (Neg 18874K #24)**



FY 1994 ACCOMPLISHMENTS

Accomplishments of this project in FY 1994:

- ▶ Completed D&D activities in hot cells A-1 and K-3
- ▶ Equipment removal and initial decontamination in hot cell K-1 (final decontamination is expected to be completed in early FY 1995)
- ▶ Repackaging of eight drums of historic waste associated with the POB Program and transfer to hot cell M-3
- ▶ Reduction in Rn-220 emissions to approximately 53% of their peak value

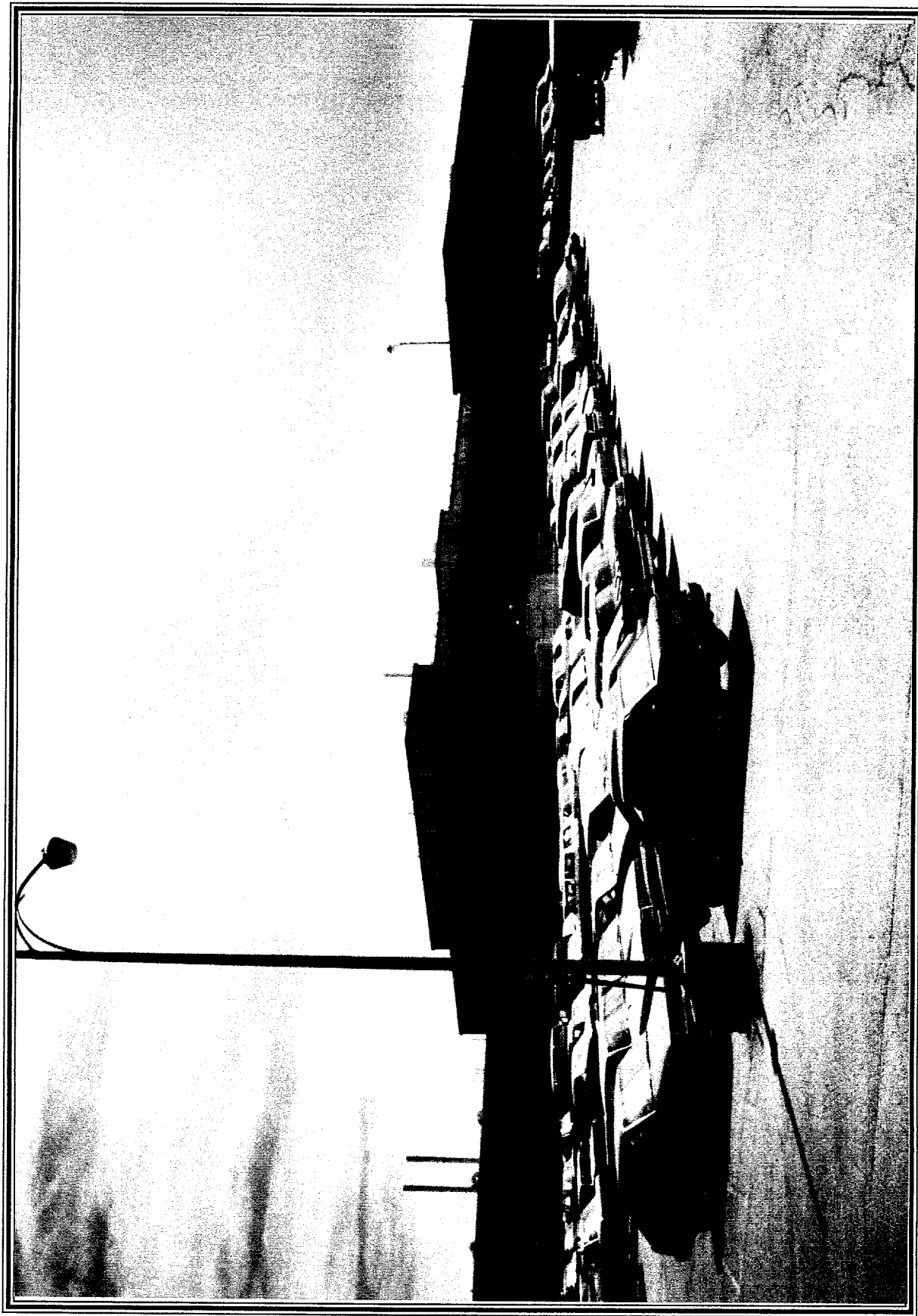
FY 1995 GOALS

Physical D&D activities will be completed at the Building 200 M-Wing hot cells during FY 1995. Specific activities for FY 1995:

- ▶ Complete decontamination of hot cell K-1
- ▶ Complete remote decontamination, equipment removal, and final decontamination of hot cell M-1
- ▶ Complete final waste shipments
- ▶ Ship all waste material associated with this project to the DOE Westinghouse Hanford Company disposal site

BUILDING 212 PLUTONIUM GLOVEBOXES D&D PROJECT

FIGURE 62
BUILDING 212 (Neg 17551K #20A)





BUILDING 212 PLUTONIUM GLOVEBOXES

D&D PROJECT

DESCRIPTION

A total of 61 plutonium gloveboxes located in Building 212 (Figure 62) D-Wing have been used in various DOE energy research programs to support unirradiated reactor fuel composition research and basic studies on TRU metals. The programs have been phased out, and the gloveboxes are to be decommissioned. The primary contaminants in the gloveboxes are plutonium, americium, and uranium. The D&D of the gloveboxes will include removal and packaging of the glovebox contents; decontamination, size reduction, and packaging of the glovebox; and removal of contaminated external glovebox support systems. The nine laboratories in Building 212 are to be left in a clean, unrestricted use condition for subsequent programmatic needs. The objective of this project is to remove the risk associated with the surplus plutonium-contaminated gloveboxes in these laboratories and to allow the use of the facilities for future DOE programmatic research.

FY 1993 ACCOMPLISHMENTS

Accomplishments of this project in FY 1993 (Figures 63-68):

- ▶ Completed equipment removal and bagouts from 22 of the 61 plutonium gloveboxes
- ▶ Restructured radiological control program to more effectively prevent contamination occurrences

FIGURE 63
BUILDING 212 PLUTONIUM GLOVEBOXES (Neg 6594 #13)

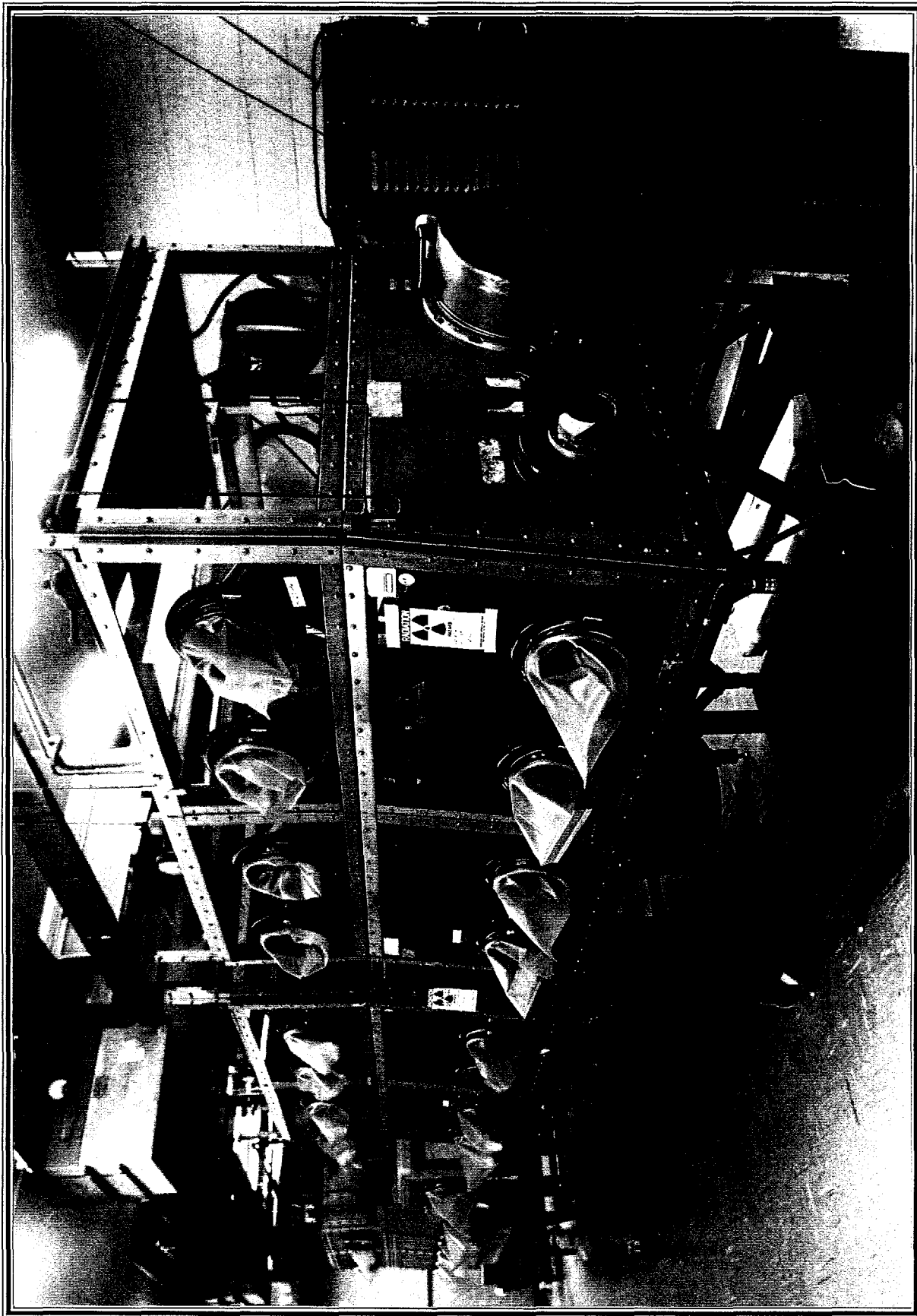


FIGURE 64
PLUTONIUM GLOVEBOX AND EQUIPMENT CONTENTS (Neg 6594 #22)

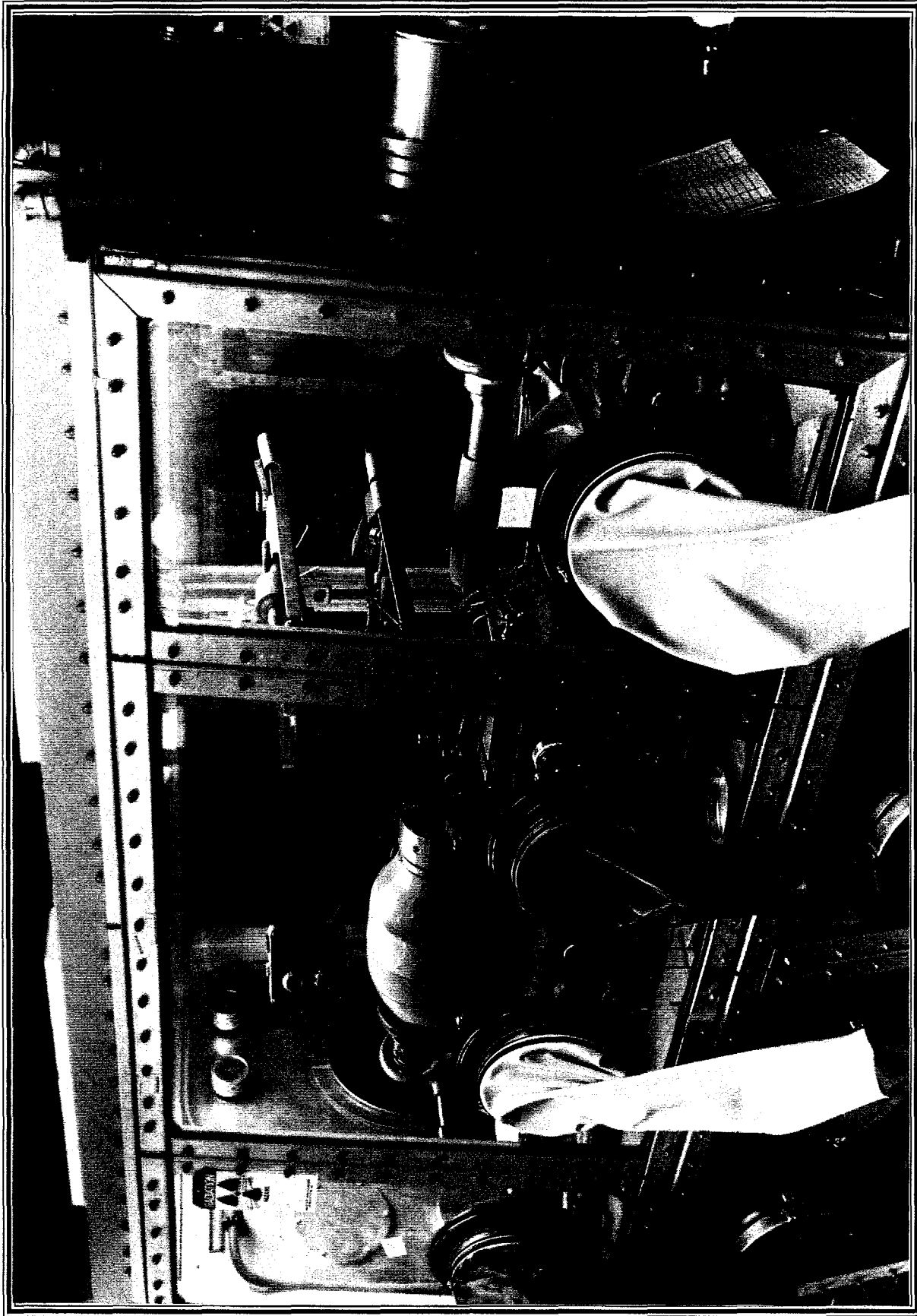


FIGURE 65
DISASSEMBLY AND REMOVAL OF PLUTONIUM GLOVEBOX CONTENTS (Neg 16810K #21A)

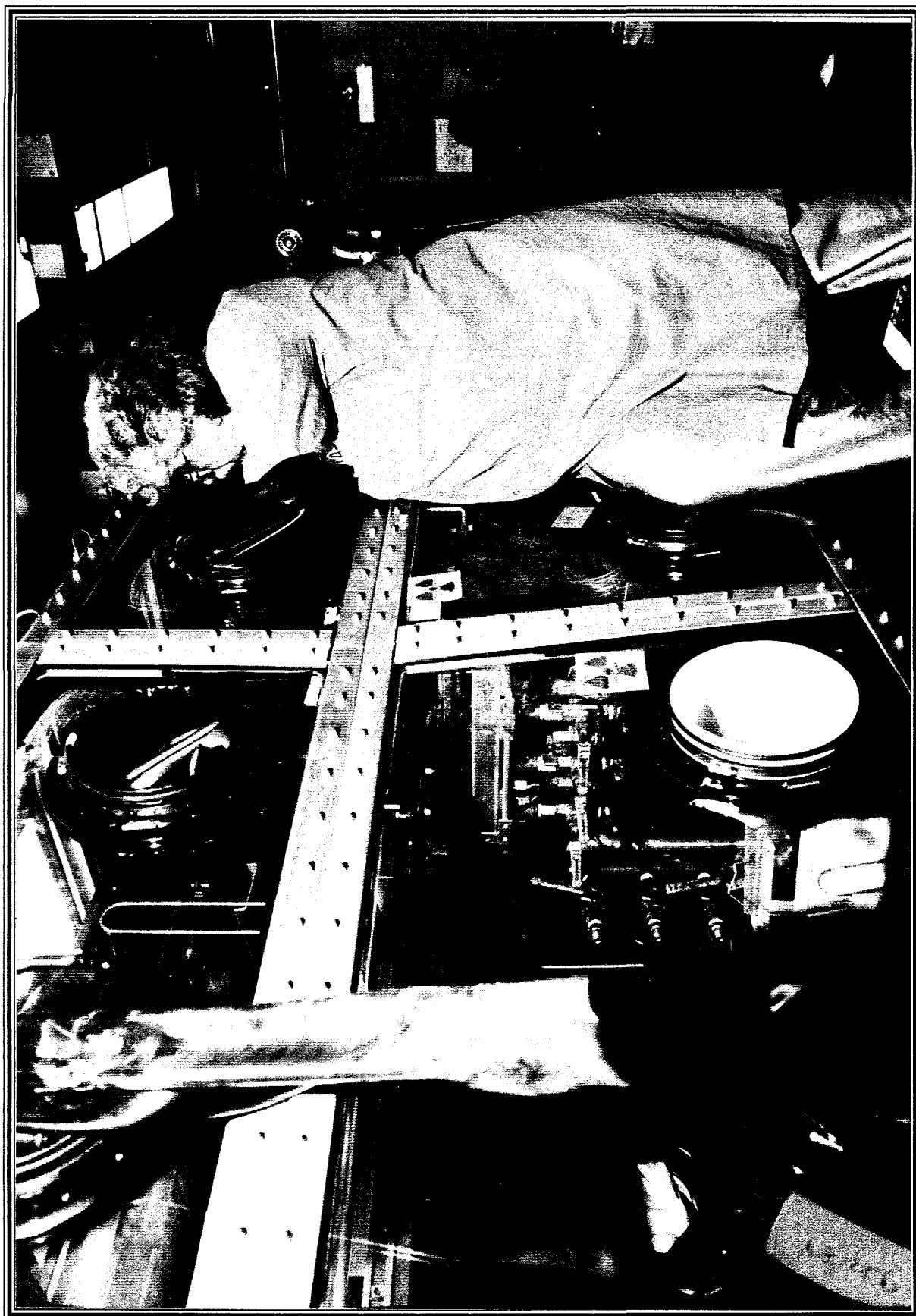


FIGURE 66

DISASSEMBLY AND REMOVAL OF PLUTONIUM GLOVEBOX CONTENTS – CLOSE-UP (Neg 16811K #6A)



FIGURE 67
DISASSEMBLY AND SURVEY OF PLUTONIUM GLOVEBOX VACUUM PUMPS (Neg 16379 #10)

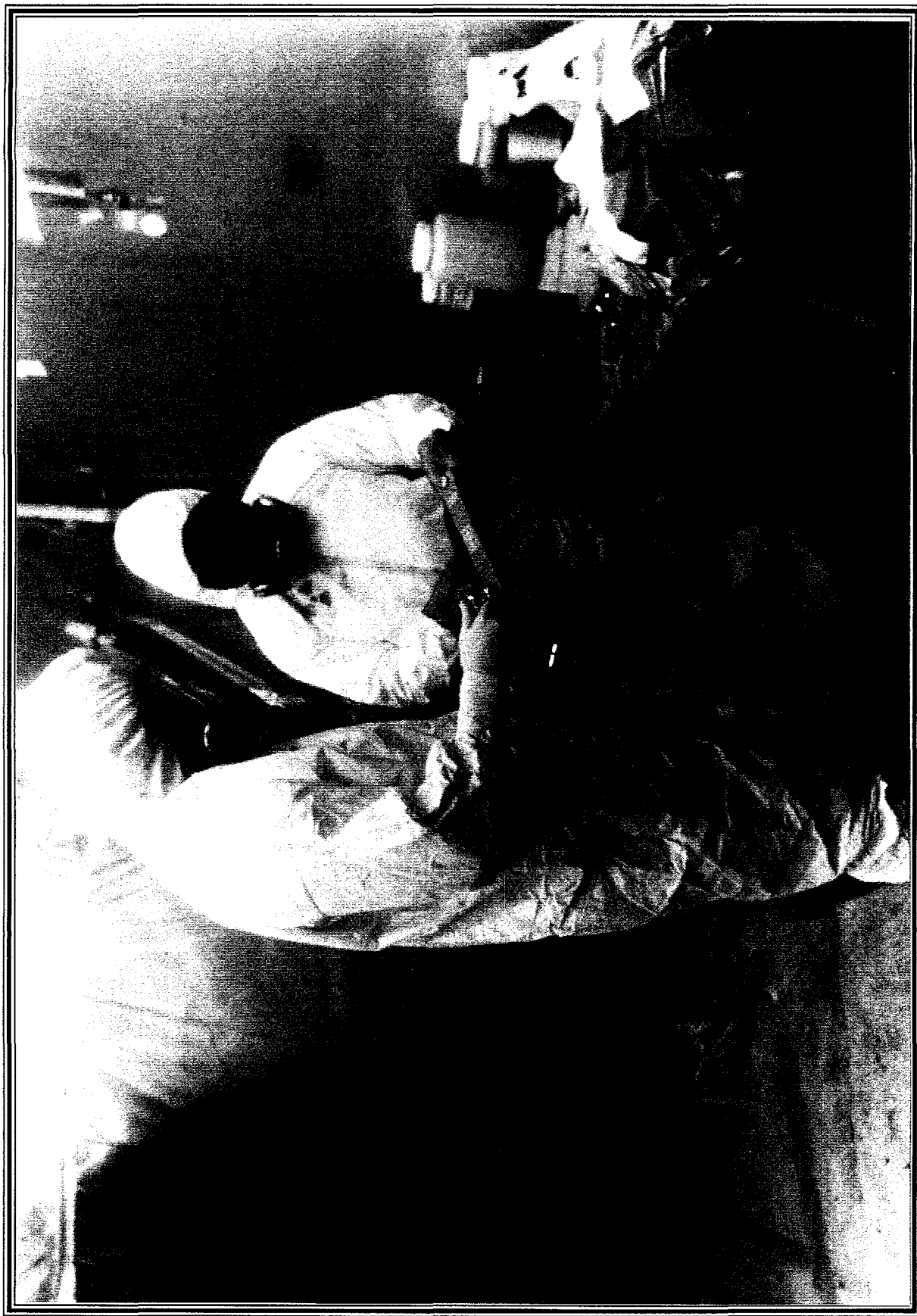
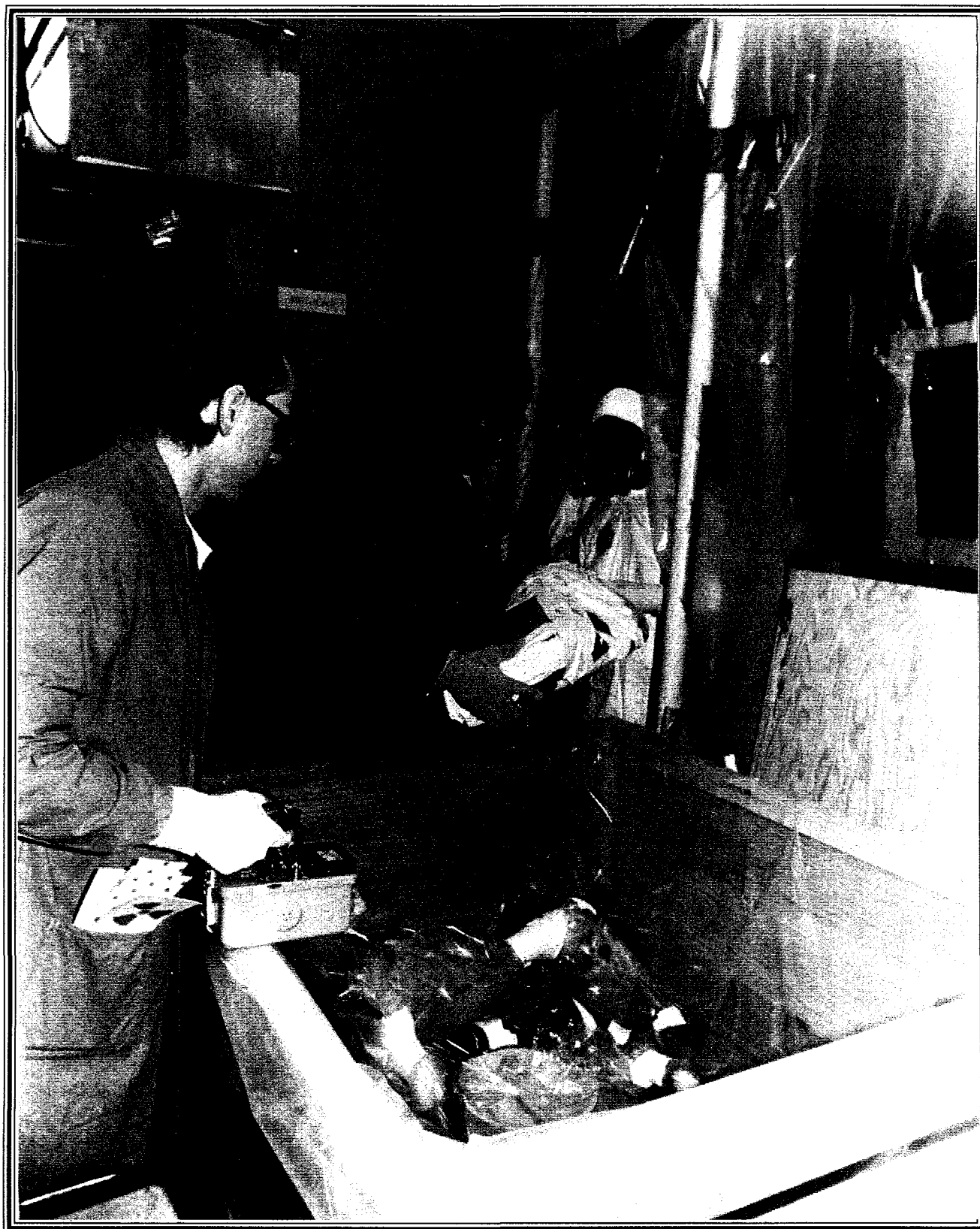


FIGURE 68

PACKAGING OF PLUTONIUM GLOVEBOX VACUUM PUMPS (Neg 16379 #19)



FY 1994 ACCOMPLISHMENTS

Accomplishments of this project in FY 1994 (Figures 69-73):

- ▶ Issued contract for D&D services contractor to complete remainder of work
- ▶ Completed equipment removal from all gloveboxes
- ▶ Completed decontamination of gloveboxes to below TRU waste criteria
- ▶ Completed assay, using active/passive neutron assayer, of all gloveboxes and waste drums generated during equipment removal phase

FIGURE 69
EXTERIOR OF SIZE-REDUCTION TENT DURING INSTALLATION (Neg 18877K #4)



FIGURE 70
INTERIOR OF SIZE-REDUCTION TENT DURING INSTALLATION (Neg 18877K #13)

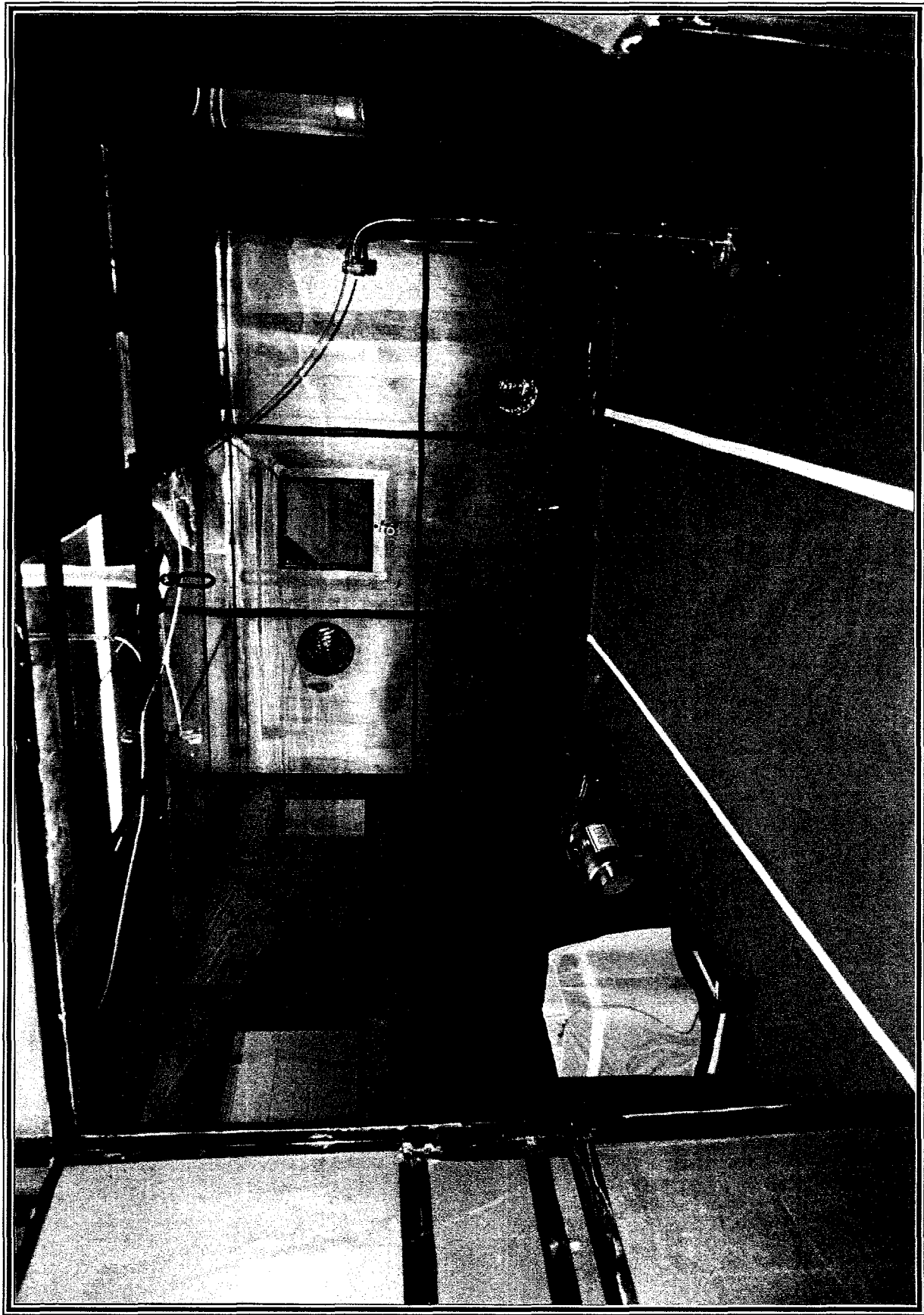


FIGURE 71

TRANSURANIC WASTE DRUMS AWAITING INTERIM STORAGE -- SOME OF THE APPROXIMATELY 160 TRANSURANIC WASTE DRUMS GENERATED DURING THE EQUIPMENT REMOVAL PHASE. (Neg 18873K #9)

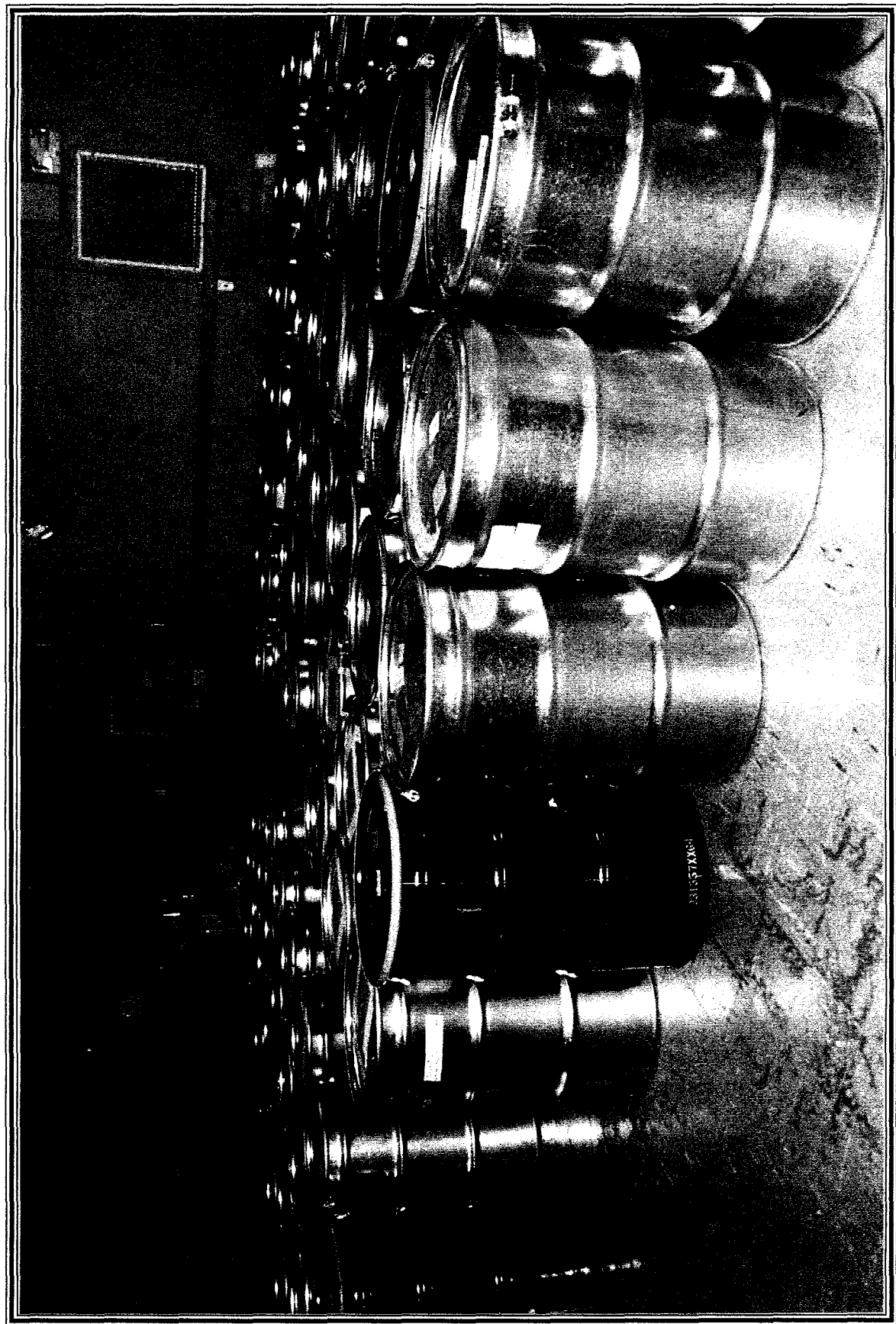


FIGURE 72

EQUIPMENT REMOVAL PHASE – CONTRACTOR TECHNICIANS REMOVING EQUIPMENT AND MATERIALS FROM GLOVEBOXES. (Neg 19619K #4)

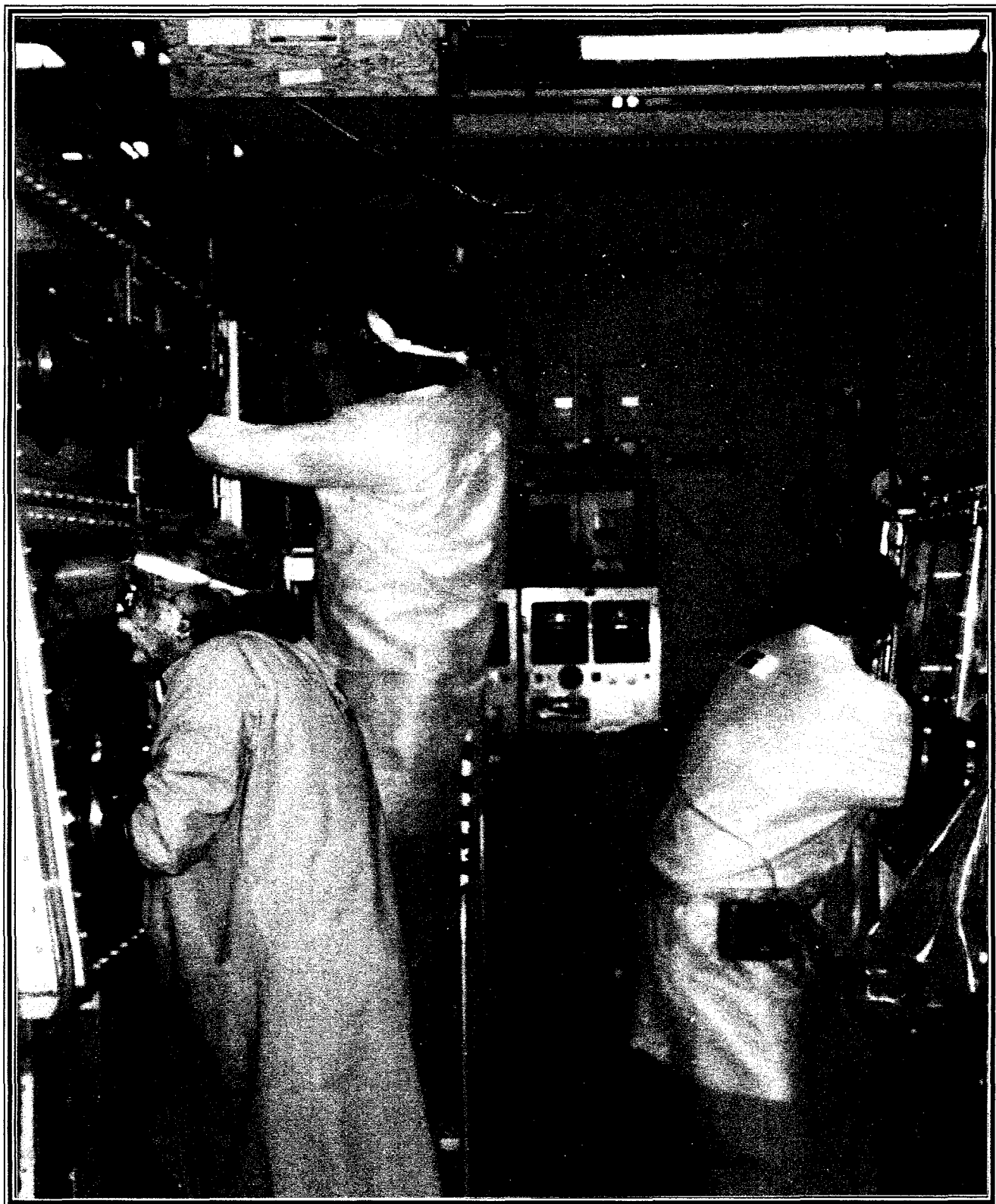
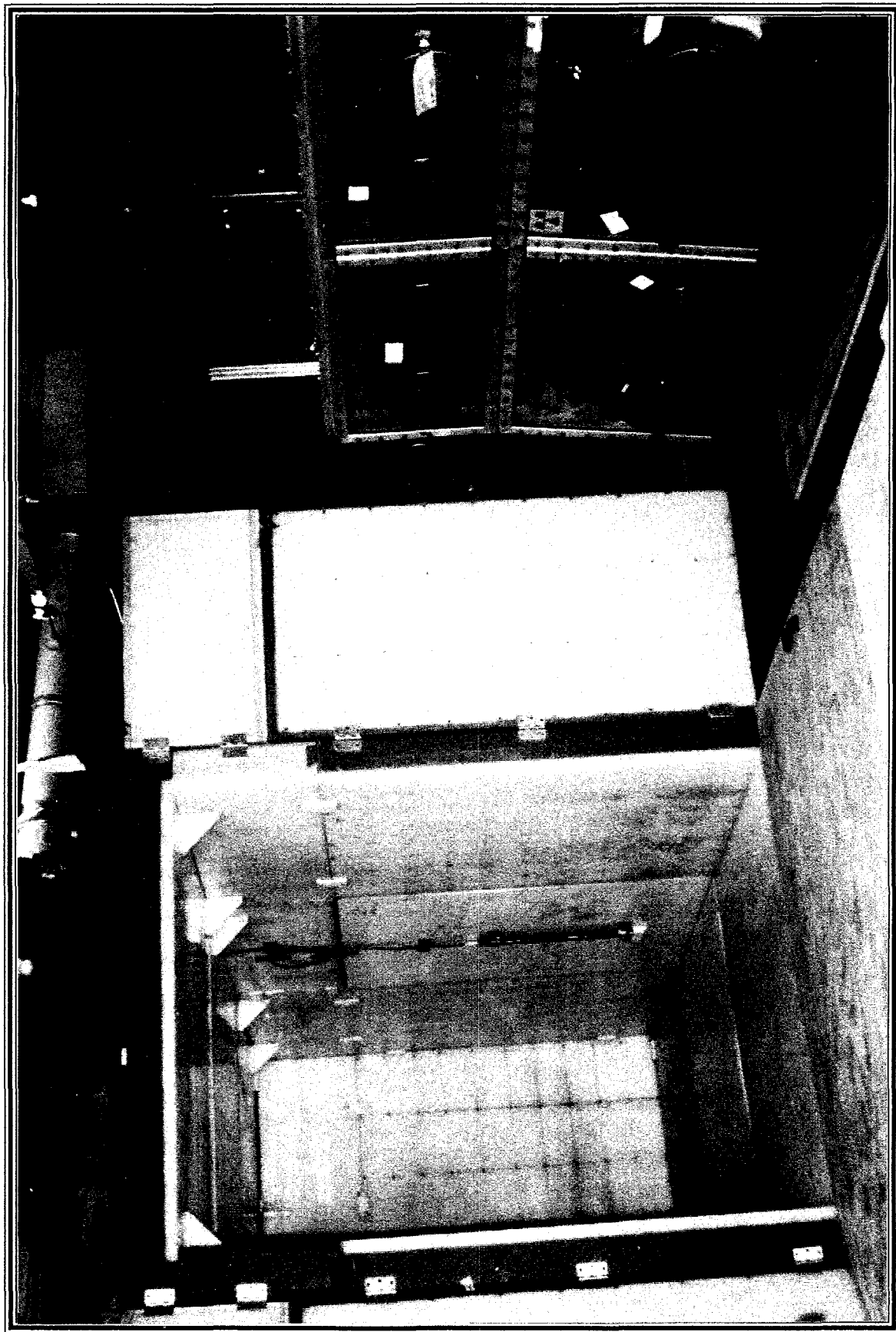


FIGURE 73
PAJARITO SCIENTIFIC CORPORATION -- ACTIVE-PASSIVE NEUTRON ASSAY SYSTEM WITH GLOVEBOX STAGED FOR PLACEMENT
INTO CHAMBER. (Neg 19619K #3)



FY 1995 GOALS

D&D activities will continue at Building 212, with specific activities for FY 1995 to complete:

- ▶ Size reduction and packaging of all 61 gloveboxes
- ▶ Removal of all support systems and potentially contaminated ventilation equipment
- ▶ Final radiological surveys and release of laboratories for unrestricted use

SUMMARY



SUMMARY

The D&D Projects Department at ANL-East has the goal of providing DOE with a top-quality D&D program by:

- ▶ Keeping the D&D projects progressing as closely to schedule and budget as possible, and
- ▶ Maintaining a cohesive D&D program structure and routinely implementing the program.

The D&D Projects Department is making strides in both of these areas and will continue to do so in FY 1995. With a comprehensive D&D program, the department expects only minor changes to its current program as new federal and state regulations and DOE orders are issued. The establishment of a strong D&D program at ANL-East will be a noteworthy accomplishment that will ensure timely, coordinated, and efficient D&D of surplus radioactive-contaminated facilities at the Laboratory.

The current D&D projects under way at ANL-East demonstrate how funding can be effectively used to clean up facilities that are radioactive contaminated from past research activities. The D&D Projects Department is constantly working to improve upon the conduct of D&D operations at this site and the development of the infrastructure necessary to support the D&D program. In FY 1995 and beyond, continued support will be provided to fully establish and maintain the infrastructures necessary for the program. The continued funding and support for all of these activities, as well as the initiation and completion of D&D activities at all other surplus facilities/areas at ANL-East, will indeed demonstrate our pledge to maintain Argonne's commitment to being "first among equals."