# Dismantling Plan for the CX-10 Reactor

NRC License No. CX-10
Docket 50-13

July, 1984

Babcock and Wilcox
Lynchburg Research Center
Lynchburg, Virginia

# Dismantling Plan
# for the CX-10 Reactor

## 1.0 Purpose

The purpose of this document is to provide a plan for dismantling the reactor, disposing of the component parts, disposing of radioactive material and decontaminating the facility. Upon successful completion of dismantling and decontamination, Babcock and Wilcox will submit a final radiation survey report to the NRC and request that license No. CX-10 be terminated and that the facility be released for unrestricted use.

## 2.0 Facility Description

### 2.1 Location

The facility, is located in Building A at the Lynchburg Research Center (LRC). The LRC is one of three facilities owned by the Babcock & Wilcox Co. that occupy a 525 acre site located in Campbell County Virginia approximately three air miles east of the city of Lynchburg.

The location of the facility within the LRC is shown as the shaded areas on figure 2-1. The liquid waste retension basin is shown as the small shaded area to the right of Building A. Figure 2-2 is a floor plan for the second floor of Building A with the facility shaded. Figure 2-3 is a plan of the first floor of Building A with the facility shaded.

### 2.2 History of Building A

Building A was the first building errected on that portion of the B&W site now occupied by the LRC. The building was constructed in four phases.

#### 2.2.1 Phase No. 1 (Figures 2-2 & 2-3)

Phase 1 which consisted of Bay No. 1, an adjacent storage room, a subassembly room used in the preparation of reactor experiments, a counting room, health physics laboratory, a reactor control room, electronics shop, physics laboratory, rest rooms and offices. Construction of Phase No. 1, was completed in 1956. A tank-type critical experiment facility was licensed for operation in March, 1957 (License No. CX-1). The reactor ceased operations in 1971 and the license was terminated on June 6, 1973.

Another tank-type critical experiment reactor was added in the bay and licensed for operation in January, 1958 (License No. CX-19). This facility license was also terminated on June 6, 1973. At that time the bay and support areas were transferred to the purview of the site materials license (License No. SNM-778).

2.2.2 Phase No. 2 (Figures 2-2 & 2-3)

Phase No. 2 was constructed in 1957 which consisted of two floors. The first floor was comprised of the lower portion of Bay No. 2, a sub-assembly room, a physics laboratory, restroom and three offices. The second floor was comprised of the continuation of the upper portion of Bay No. 2, control room, chemistry laboratory, electronics shop and two offices.

Bay No. 2 housed two critical experiment reactors. License CX-10 was issued in January, 1958 for the operation of a tank-type reactor. The CX-10 reactor was last operated on September 16, 1983. License CX-12 was issued in September, 1958 and terminated in February, 1972.

2.2.3 Phase No. 3 (Figures 2-2 & 2-3)

Phase No. 3 was added in 1958 to house a pool-type research reactor named the "Lynchburg Pool Reactor" which was licensed in September, 1958 (License R-47).

The first floor consisted of the lower portion of the reactor pool and an adjacent work area. An autoclave with its associated piping, valves and heat exchanger was added in the work area in 1962.

The second floor was comprised of the upper portion of the reactor pool, the contol room area and in 1962 the autoclave control console was added.

In 1962 a heat exchanger room and cooling tower were added on the northwest side of phase 3.

In 1982 the reactor and associated systems were dismantled. License R-47 was terminated on July 20, 1982 and Phase No. 3 was released for unrestricted use.

2.2.4 Phase No. 4 (Figures 2-2 & 2-3)

Phase No. 4 was added in 1963. The first floor was comprised of a shipping and receiving area, storage area and offices. The second floor was comprised of a conference room and offices. This addition was not part of any reactor facility.

## 2.3 CX-10 Licensing History

The following is a listing of the CX-10 licensing actions that have been transacted.

### 2.3.1 Construction Permit

Construction Permit Number CPCX-9 was issued on October 2, 1957 authorizing the construction of that portion of Building A described in §2.2.2.

### 2.3.2 License

License Number CX-10 was issued on January 22, 1958 authorizing the operation of the facility at power levels not to exceed 1000 watts (thermal).

### 2.3.3 Amendment No. 1

Amendment No. 1 was issued on May 7, 1959 authorizing the conduct of critical experiments utilizing stainless steel clad, low enriched, uranium - dioxide fuel.

### 2.3.4 Amendment No. 2

Amendment No. 2 was issued on June 25, 1959 authorizing the conduct of critical experiments utilizing aluminum-clad thoria-urania fuel.

### 2.3.5 Amendment No. 3

Amendment No. 3 was issued on Febraury 7, 1961 authorizing the conduct of critical experiments utilizing heavy water. It further authorized the possession and use of up to 305 kilograms of contained U-235, up to 2600 kilograms of contained thorium and up to 80 grams of plutonium in the form of plutonium - beryllium neutron sources.

### 2.3.6 Amendment No. 4

Amendment No. 4 was issued on August 23, 1961 adding a condition to the license regarding procedures to be followed with respect to operations with the facility shut down which might involve a change in core reactivity.

### 2.3.7 Amendment No. 5

Amendment No. 5 was issued on May 31, 1962 authorizing the possession and use of up to 575 kilograms of uranium-235, 1155 kilograms of thorium

oxide and 160 grams of plutonium in plutonium-beryllium neutron sources.

2.3.8 Amendment No. 6

Amendment No. 6 was issued on June 11, 1965 authorizing the conduct of critical experiments using various neutron absorbing and neutal materials.

2.3.9 Amendment No. 7

Amendment No. 7 was issued on March 8, 1973 authorizing the possession and storage but not the use up to 6 kilograms of contained $PuO_2$-$UO_2$ in fuel rods.

2.3.10 Amendment No. 8

Amendment No. 8 was issued on July 1, 1976 deleting amendment No. 7.

2.3.11 Amendment No. 9

Amendment No. 9 issued on March 2, 1977 and incorporated the facility security plan as a condition of the license.

2.3.12 Amendment No. 10

Amendment No. 10 was issued on November 29, 1978 authorizing the substitution of americium-beryllium neutron sources for plutonium-beryllium neutron sources.

2.3.13 Amendment No. 11

Amendment No. 11 was issued on May 30, 1980 authorizing a wider range of non-moderator to moderator volume ratios then previously authorized.

2.3.14 Amendment No. 12

Amendment No. 12 was issued on March 11, 1982 approving the security plan submitted for compliance with 10 CFR 73.67 and incorporating the plan as a condition of the license.

Figure 2-1

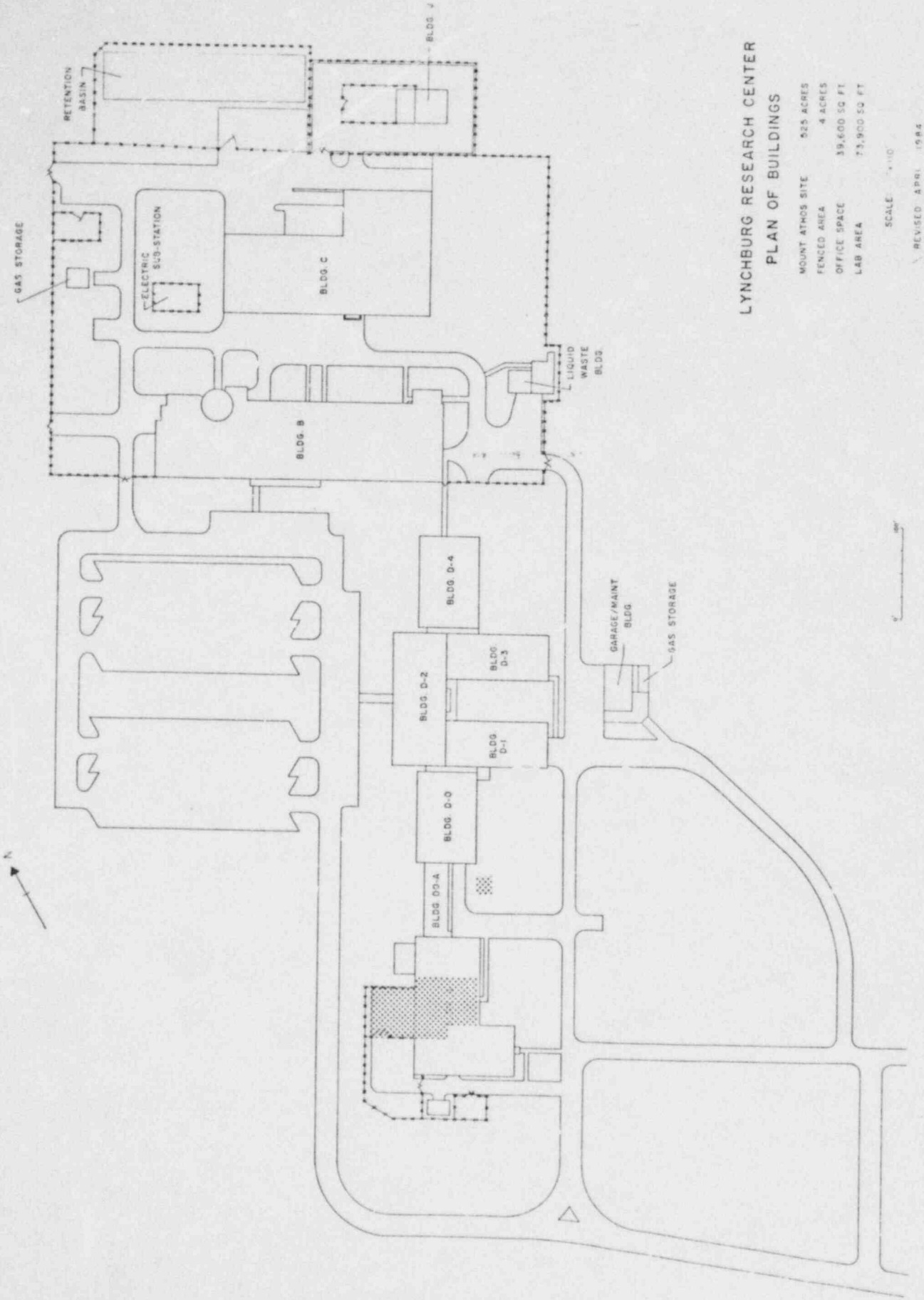

LYNCHBURG RESEARCH CENTER
PLAN OF BUILDINGS
MOUNT ATHOS SITE 525 ACRES
FENCED AREA 4 ACRES
OFFICE SPACE 39,600 SQ FT
LAB AREA 73,900 SQ FT
SCALE
REVISED APRIL 1984
RETENTION BASIN
BLDG J
GAS STORAGE
ELECTRIC SUB-STATION
BLDG C
LIQUID WASTE BLDG
BLDG B
BLDG D-4
BLDG D-3
BLDG D-2
BLDG D-1
BLDG D-0
BLDG D0-A
GARAGE/MAINT BLDG
GAS STORAGE
N

Figure 2-2

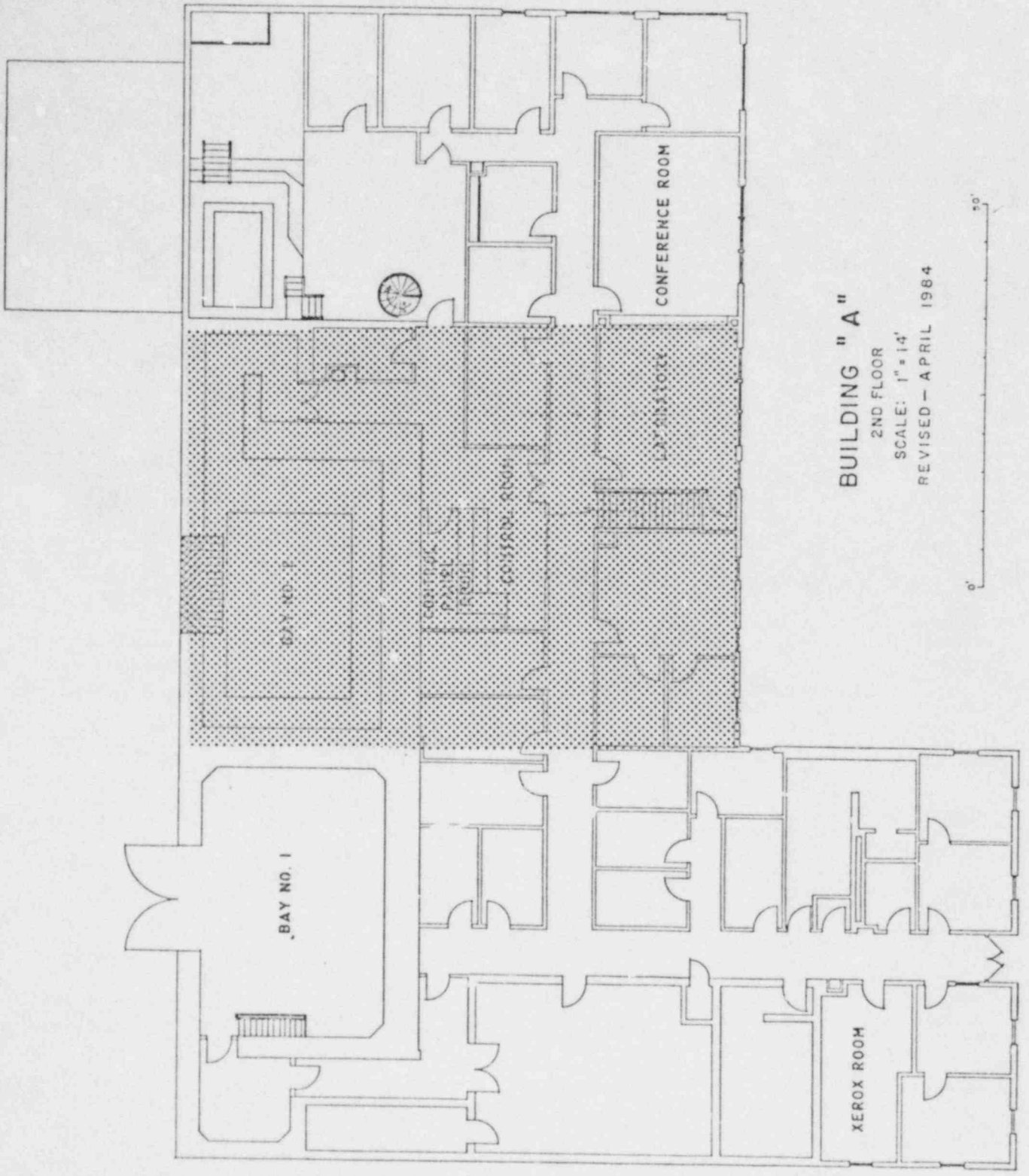
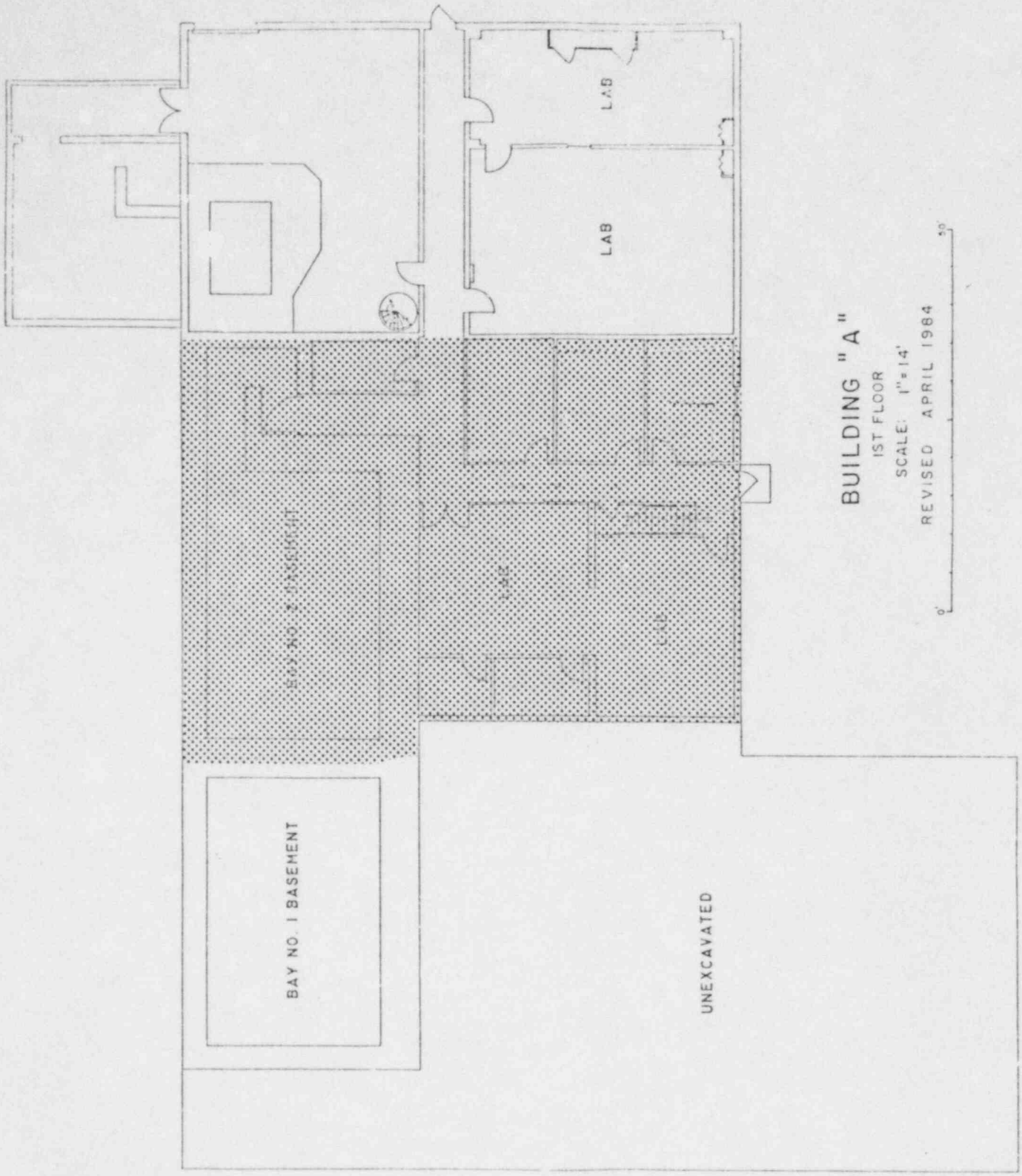

CONFERENCE ROOM
BAY NO. 1
XEROX ROOM
BUILDING "A"
2ND FLOOR
SCALE: 1" = 14'
REVISED - APRIL 1984
0'
10'

Figure 2-3


LAB
LAB
BAY NO. 2 BASEMENT
BAY NO. 1 BASEMENT
UNEXCAVATED
BUILDING "A"
1ST FLOOR
SCALE: 1" = 14'
REVISED APRIL 1984
0'
50'

## 3.0 Current Status

### 3.1 Bay No. 2 (Figures 3-1 & 3-2)

Bay No. 2 houses the CX-10 core tank, moderation storage tanks, pumps, pipes and vaives, and the stored fuel. The reactor was last operated on September 16, 1983. The fuel was removed from the core tank and placed in storage on September 23, 1983.

Preparations are in progress for shipment of the fuel to the Department of Energy at Oak Ridge, Tennessee.

### 3.2 Control Room (Figure 3-1)

The reactor controls remain in place and unused since the last operation on September 16, 1984.

### 3.3 Room A (Figure 3-1)

This room was originally designated as a storage room. No change has been made to it since construction.

### 3.4 Offices B&C (Figure 3-1)

These two offices were formed from one single office designated as the Operations Office in the construction permit application.

### 3.5 Office D (Figure 3-1)

This office was made smaller then that described in the 1957 application. The hall was extended through Office D for access to Phase No. 3. This office is presently utilized to house a computer terminal

### 3.6 Offices F, F, & G (Figure 3-1)

These three offices were constructed in the area previously occupied by the Electronics shop.

### 3.7 Laboratory H (Figure 3-1)

Laboratory H is a microcomputer laboratory. Previously this room was a chemistry lab.

### 3.8 Room I (Figure 3-2)

Room I is a restroom and has not been used for other purposes.

### 3.9 Rooms J, K, & L (Figure 3-2)

Rooms J & K are offices and Roo~ L is an electronics shop. These three spaces were created from what was originally Subassembly Room No. 2. The subassembly room served Bay No. 2 as a fuel storage area and experiment assembly room. License material was handled in this room until 1967; at which time the room was decontaminated, surveyed and released for non licensed material use.

3.10 Room M (Figure 3-2)

Room M was previously designated as a physics laboratory. It is presently a part of the electronics shop.

3.11 Offices N, O, & P (Figure 3-2)

These three offices have not been changed since construction with the exception of refurbishment.

Figure 3-1

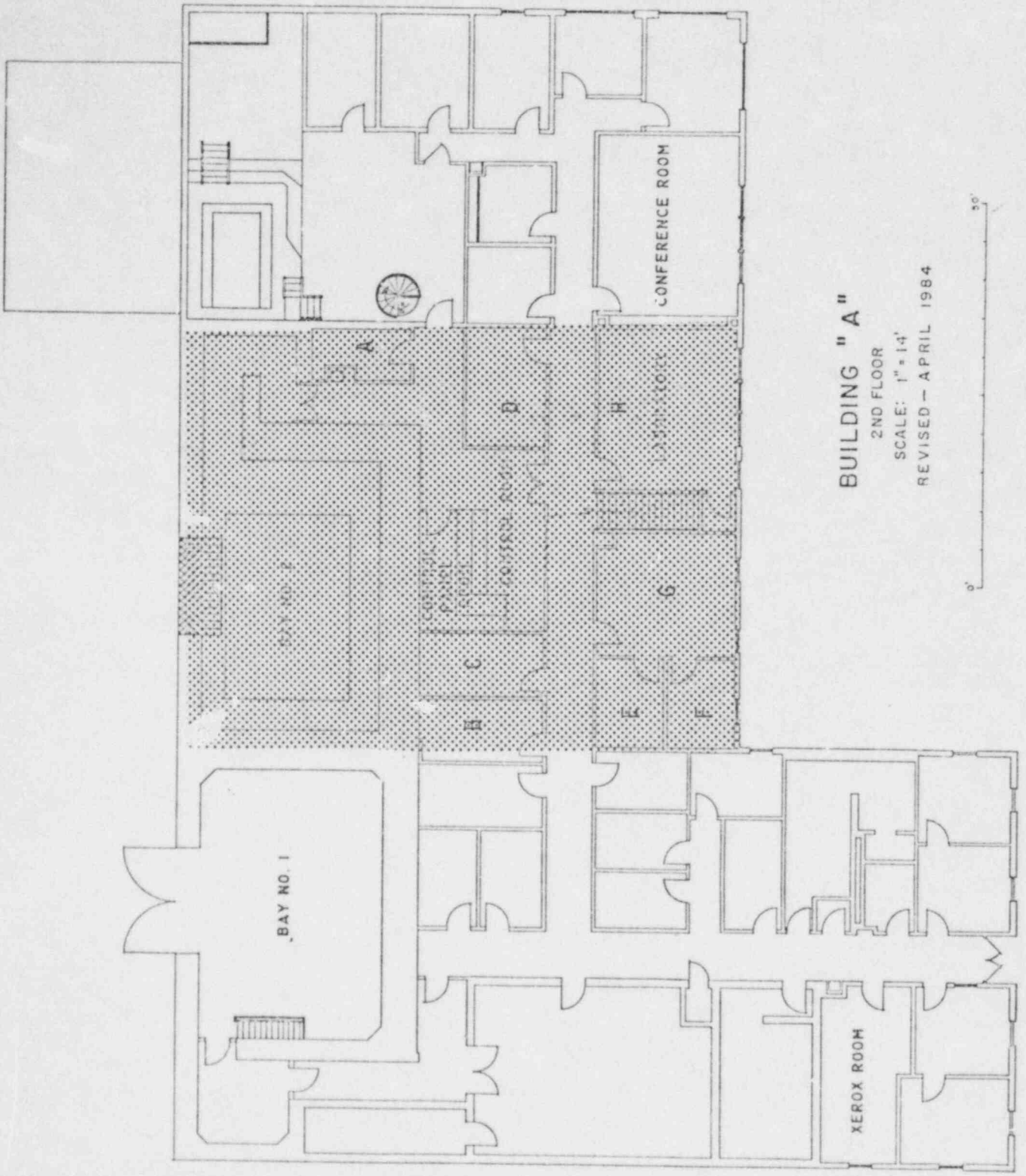
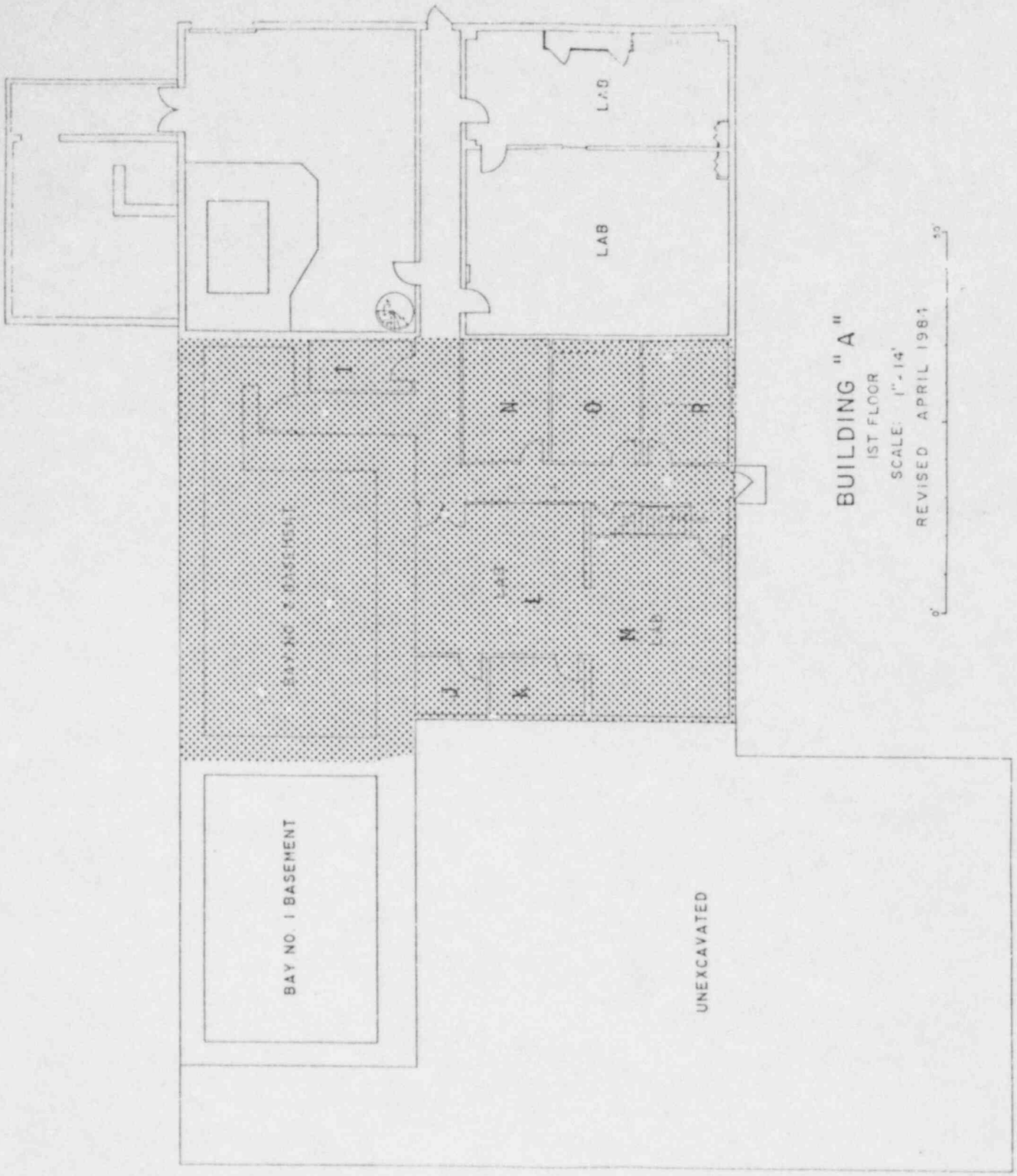

CONFERENCE ROOM
BAY NO. 1
XEROX ROOM
A
B
C
D
E
F
G
H
BUILDING "A"
2ND FLOOR
SCALE: 1" = 14'
REVISED - APRIL 1984
30'
0'

Figure 3-2


LAB
LAB
N
O
R
T
M
L
K
J
BAY NO. 1 BASEMENT
UNEXCAVATED
BUILDING "A"
1ST FLOOR
SCALE: 1"-14'
REVISED APRIL 1981
0'
5'

4.0 Criteria for Release for "Unrestricted Use".

The goal of this plan is termination of the license and release of the facility for unrestricted use. To achieve this the following criteria shall be applied.

4.1 Facility Contamination Criteria.

Facility floors and other horizontal surfaces which can reasonably be expected to be contaminated shall be surveyed for the presence of fixed and removeable contamination. The release criteria specified in Regulatory Guide 1.86, June, 1974, Table I will be used. Specifically the criteria listed in Table I for U-235, U-238; Th-nat., Th-232; and Beta-Gamma emitters shall apply.

4.2 Intrinsic Activity Criteria.

Those portions of the facility that can reasonably be expected to have become activated as a result of reactor operation shall be surveyed. A release criterion of 10μR/hr above natural background when measured at one meter from the surface shall apply. Natural background shall be established by measuring the activity of similar materials that have not been exposed to neutron flux.

4.3 Equipment Contamination Criteria.

Equipment that is to be removed from Bay No. 2 and its associated Control Room shall be surveyed for the presence of fixed and removeable contamination. The release criteria specified in Regulatory Guide 1.86, Table I, will be used. Specifically the criteria listed in Table I for U-235, U-238; Th-nat., Th-232; and beta-gamma emitters shall apply.

4.4 Pipe, Drainline and Duct Contamination Criteria.

Pipes, drainlines and ductwork shall be surveyed for the presence of contamination at all traps and appropriate access points, provided that any contamination that may be found at these locations is likely to be representative of contamination on the interior of the pipe, drainline or ductwork. The release criteria specified in Regualtory Guide 1.86, Table I will be used. Specifically the criteria listed in Table I for U-235, U-238; Th-nat., Th-232; and beta-gamma emitters shall apply.

4.6 Soil Contamination Criteria.

Soil that may be sampled pursuant to this plan shall meet the following limits:

| | |
|---|---|
| Enriched uranium (U-234, U-235, U-238) | 30 picocuries/gram |
| Natural thorium and Th-232 (Th-232, Th-228) | 10 picocuries/gram |

4.7 Measurement Instrumentation.

Each instrument utilized measure the radioactivity pursuant to this plan shall be within its calibration interval. Calibrations shall be traceable to the National Bureau of Standards.

4.7.1 Fixed Alpha Contamination.

Fixed contamination levels shall be measured utilizing the Eberline PAC-4G. The sensitivity of this type of instrument sufficient to determine compliance with the release criteria specified in Regulatory Guide 1.86.

4.7.2 Removeable Alpha and Beta-Gamma Contamination.

Removeable contamination shall be sampled utilizing standard smearing technique. Smears shall be counted utilizing a gas proportional counting system with adequate sensitivity to determine compliance the release criteria specified in Regulatory Guide 1.86.

4.7.3 Intrinsic Activity.

Intrinsic Activity shall be measured utilizing pressurized Ionization Chamber or an Eberline Model PRM-7. Both instruments are capable of determining compliance with the 10μR/hr @ one meter criterion.

4.7.4 Soil Contamination.

Soil contamination shall be determined utilizing a High Resolution Gamma Spectroscopy system. This system shall have sufficient sensitivity to determine that soil samples comply with the criteria specified in §4.6 of this plan.

## 5.0 Initial Work

### 5.1 Fuel

The three types of fuel utilized in the operation of the CX-10 reactor is stored in Bay No 2. This fuel, 2.46% enriched $UO_2$ in aluminum rods and 4.02% enriched $UO_2$ in stainless steel rods, and 1.93% enriched $UO_2$ in aluminum rods is owned by the Department of Energy (DOE). DOE has requested that the fuel be transferred to their facility at Oak Ridge, Tennessee. The LRC is making arrangements to honor DOE's request. The present schedule indicates that all fuel will be shipped from the LRC by September 28, 1984.

### 5.2 Security

Subsequent to shipment of all SNM from the facility, the Reactor Security Plan, as amended, will not serve a useful purpose and its implementation will be discontinued. Access to the control Room and Bay No. 2 shall be controlled in compliance with the requirements of 10 CFR, Part 20 for purposes of control of personnel exposure.

### 5.3 Sealed Sources

Sealed sources stored in the facility shall be transferred to other areas of the LRC under the control of License SNM-778 for future use, transferred to another licensee, or disposed of at a licensed disposal facility.

## 6.0 Dismantling Operation

### 6.1 Schedule

Facility dismantlement will begin at the conclusion of fuel shipment and approval of this plan by the Nuclear Regulatory Commission. The present estimated date for commensing dismantling is October 1, 1984.

### 6.2 Plan and Procedures

Dismantling and decontamination activities will be conducted in accordance with this plan and procedures implementing the plan. Procedures developed in this regard will be reviewed and approved by the Manager, Building A Decommissioning and the LRC's Safety Review Committee. Preliminary radiation surveys of the facility indicates that no shielding or remote handling will be necessary to dismantle any components of the facility. However, the implementing procedures will incorporate provisions for ALARA concepts to limit exposures to personnel from radiation and contamination.

### 6.3 Disposition of equipment

#### 6.3.1 Department of Energy (DOE)

The following items of equipment may be transferred to DOE for further use.

1. $B_4C$ rods
2. Glass rods
3. Five foot diameter core tank (1)
4. Safety blades (4)
5. Chamber wells (4)
6. Five foot diameter grid plates (2)
7. Fuel storage racks

#### 6.3.2 Transfer to Another Licensee

The following items will be transferred to another licensed facility which may include the LRC.

1. Nine foot diameter core tank (1)
2. Moderator dump tank, 5000 gal. (1)
3. Drive units for safety blades (4)
4. Drive unit for moderator height probe (1)
5. Compensated Ion chamber (1)
6. Uncompensated Ion chamber (5)

7. $BF_3$ chambers (3)
8. 12-inch dump valve (1)
9. 1-inch fill valve (1)
10. Moderator recirculation pump (1)
11. Moderator fill pump (1)
12. Reactor instrumentation
13. Reactor console (1)
14. Liquid waste tank, 5000 gal. (1)

6.3.3 Waste Disposal

Facility equipment which are found to be radioactive or contaminated above release limits may be disposed of as radioactive waste. Such waste shall be disposed of at a licensed waste burial facility, in accordance with the applicable provisions of 10 CFR Parts 61 and 71.

5.3.4 Decontamination

Items of equipment or portions of the facility that are found to be radioactive or contaminated above the criteria specified in section 4 of this plan, and where there exists sufficient economic justification, will be decontaminated. The methods chosen for decontamination will be appropriate for the type of surface to be cleaned and the type of contamination present. At the present time only standard methods of decontamination, ie; washing, scrubbing or abraiding surfaces, are anticipated.

6.3.5 Final Survey and Report

Upon completion of the dismantling and decontamination effort, a final radiation survey will be made to confirm that the criteria specified in Section 4 of the plan have been achieved. A report summarizing the results of the final survey will be submitted to the NRC along with a request that, based on the final survey results, License CX-10 be terminated and the facility be released for unrestricted use.

## 7.0 Safety Consideration

### 7.1 Criticality Safety

All SNM shall be removed from the facility prior to implementation of this plan. Nuclear criticality safety is therefor not a consideration for this plan.

### 7.2 Radiation Safety

The preliminary radiation survey of the facility indicates that exposure of personnel involved in the dismantling and decontamination will be low. There are no high radiation areas in the facility and no airborne radioactive material areas. Prior to commencing dismantling and decontamination work, start up sources will be removed from the facility.

The exposure of personnel to radiation and contamination shall be controlled by the LRC's Health and Safety Group. Section 8 of this plan describes the make up and responsibilities of this group.

The radiation safety shall also be insured through the review and approval functions of the LRC's Safety Review Committee (SRC). As described in Section 8 of this plan, the SRC shall review and approve all procedures developed to implement this plan. The SRC also has an audit function through its subcommittee for audits (SAS). The SAS shall audit the progress of the activities associated with this plan to detect weaknesses in the procedures and ensure compliance with the requirements.

### 7.3 Industrial Safety

Programs and procedures are reviewed for industrial safety consideration by the Facility Supervisor and the SRC. The Facility Supervisor consults with the Industrial Safety Officer in making his determination.

This dismantling and decontamination plan, as all projects at the LRC, is under the purview of the Industrial Safety Program. The program manual addresses the following subjects that apply to this project:

1. PROGRAM AND PURPOSE

   1.1. Job Preplanning

2. POLICY

3. RESPONSIBILITIES

   3.1. Director
   3.2. Managers
   3.3. Supervisors
   3.4. Industrial Safety Officer

4. INDOCTRINATION

   4.1. Indoctrination

5. COMMUNICATIONS

   5.1. Communications

6. INDUSTRIAL SAFETY COMMITTEES AND MEETINGS

   6.1. Safety Purpose and Organization
   6.2. Committees and Meetings

7. TRAINING

8. ACCIDENTS

   8.1. Responsibilities
   8.2. Investigations
   8.3. Reporting
   8.4. Injuries & Illnesses
   8.5. Record Keeping

10. PERSONAL PROTECTIVE EQUIPMENT

    10.1. Eyewear and Face Shields
    10.2. Head Protection
    10.3. Respirators
    10.4. Hearing Protection
    10.5. Foot Protection
    10.6. General Body Protection

11. TOOLS

    11.1. Hand Tools

12. HOUSEKEEPING

    12.1. Housekeeping

13. WELDING, CUTTING, AND BRAZING

    13.1. Welding, Cutting, and Brazing
    13.2. Cutting and Welding Permit

14. CONFINED SPACES

    14.1. Entry

15. SAFETY INSPECTIONS

- 15.1. Facility Inspections
- 15.2. Reports

16. SAFE WORK PRACTICES

- 16.1. Safe Work Practices
- 16.2. Tag and Lockout Procedure
- 16.3. Unattended Equipment Operation Notice

17. EMERGENCIES

- 17.1. Emergency Organization

18. PROGRAMS

- 18.1. Contests and Incentive Programs
- 18.2. Off-the-Job Safety Activities

19. FIRE PROTECTION

- 19.1. Facilities
- 19.3. Portable Fire Extinguishers
- 19.4. Fire and Rescue Team
- 19.5. Flammable and Combustible Liquid Handling and Storage

20. COMPRESSED GAS CYLINDERS

- 20.1. Handling and Storage

21. MATERIAL HANDLING

- 21.1. Manual Lifting
- 21.2. Powered Industrial Trucks

22. HAZARDOUS MATERIAL

- 22.1. Handling

## 8.0 Administrative Requirements

### 8.1 Technical Specification

The technical specifications for the CX-10 facility have not been designated, in as much as the facility was licensed for operation prior to January 16, 1969. As specified in 10 CFR 50.36 (d)(1), the technical specifications shall be deemed to include the entire safety analysis report as technical specifications. These technical specifications address the safety of the facility during operation and will no longer be applicable for the operations specified in this plan. Therefor, subsequent to the removal of the fuel from the facility and transfer of the Am-Be sealed sources, the technical specifications shall be replaced with the requirements specified in this plan.

### 8.2 Organization

Figure 8-1 is the organization chart for the CX-10 Decommissioning project.

8.2.1 Director LRC - The Director, LRC is responsible for all activities at the LRC.

8.2.2 Manager, Building A Decommissioning

The Manager, Building A Decommissioning is appointed by the Director. He shall be responsible for managing the dismantling and decontamination activities associated with the CX-10 decommissioning, retaining the necessary records, preparing all required reports and controlling the project expenses. The Manager, Building A Decommissioning reports to the Director.

8.2.2 Foreman, Building A Decommissioning

The Foreman, Building A Decommissioning is appointed by the Manager, Bldg. A Decommissioning. He shall report to the Manager. The foreman directs the day to day activities of the work crew assigned to the project. The foreman holds a license as Senior Reactor Operator for the CX-10 facility and is experienced and trained in the safe handling of radioactive material.

8.2.3 Manager, Facilities

The Manager, Facilities shall be appointed by the Director. His duties include the supervision and direction of four groups (Office Services, Project Services, Plant Engineering , and Health and Safety). He assists in planning and coordinating work for other departments involving Facilities personnel and outside contractors.

Other responsibilities include assisting technical sections in planning and designing systems and facilities to carry out their objectives, and recommending, designing, estimating, and supervising new construction and modifications to existing structures and systems.

8.2.4 Supervisor, Plant Engineering

The Supervisor, Plant Engineering is appointed by and reports to the Manager, Facilities. His duties include supervising the activities the custodians, two group of maintenance personnel and contractors.

8.2.5 Supervisor, Health and Safety

The Supervisor, Health and Safety is appointed by and reports to the Manager, Facilities and has direct access to the Director in matters concerning Health and Safety. This supervisor shall have a B.S. degree in a technical field and professional experience in assignments involving radiation protection at a supervisory level. He shall have five years experience and demonstrated proficiency in the application of radiation safety principles and be knowledgeable in the fields related to radiation protection.

His duties include supervising the activities of the Industrial Safety technician, the Health Physics group, consisting of one health physicist and two technicians. The Building C Cleanup group, consisting of one health physicist and four monitors, the Industrial Safety group, consisting of one technician and the Health Physics Records Center, with one records administrator.

8.2.6 Health Physicist, Health Physics Group

The Health Physicist shall be appointed by and reports to the Supervisor, Health and Safety. He shall have a B.S. degree with course work in Health Physics. His responsibilities include:

1. Performing area surveys
2. Administering the air survey program
3. Administering the respiratory protective program
4. Administering the bioassay program
5. Leak testing sealed sources
6. Supervising shipping and receiving of radioactive material
7. Supervising and coordinating the waste disposal program

8. Assisting in personnel, equipment and facility decontamination
9. Conducting radiation safety training
10. Providing expertise in all aspects of radiation protection
11. Generating, maintaining and distributing records and reports required by regulations or procedures pertainent to the group's activities
12. Distributing and processing personnel monitoring equipment

8.2.7 Technician, Industrial Safety

The Industrial Safety Technician shall be appointed by and report to the Manager, Health and Safety. He shall have at least one year's experience in radiation and industrial safety. He shall be familiar with the codes and requirements of OSHA and NFPA. His responsibilities shall include:

1. Administering the industrial safety program.
2. Reviewing proposed facility changes to insure fire safety.
3. Providing expertise in fire prevention to the facility supervisor and Safety Review Committee.
4. Performing tests, inspections and maintenance of fire protection, control and extinguishing equipment.
5. Provide training for the LRC fire and rescue team.
6. Conducting safety inspections.

8.2.8 Manager, Accounting and Administrative Services

The Manager, Accounting and Administrative Services is appointed by and reports to the Director. This manager supervises the financial accounting of the LRC, the SNM Accountability Specialist and the License Administrator.

8.2.9 Accountability Specialist

The Accountability Specialist reports to the Manager, Accounting and Administrative Services. He is responsible for maintenance and retension of the SNM accountability records, preparing and transmitting required reports.

8.2.10 License Administrator

The License Administrator shall have a B.S. degree in science or engineering and three year's experience in nuclear technology or and A.S. degree in science or nuclear technology and 12 years experience in nuclear technology. This administrator reports to the Manager, Accounting and Administrative Services.

The License Administrator shall be responsible for administering the LRC licenses. He shall be the primary liaison with the NRC and other federal, state and local agencies regarding nuclear matters. He is the coordinator of the Safety Review Committee and is the management representative on the

SRC. He is the chairman of the Safety Audit Subcommittee and is the Facility Supervisor. The License Administrator is the LRC's internal auditor for regulatory compliance.

8.2.11 Manager, Quality Assurance

The Manager, Quality Assurance reports to the Director. He is responsible for supervising and directing the Quality Assurance program for the LRC through the Quality Assurance Administrator.

8.2.12 Quality Assurance Administrator

The Quality Assurance Administrator reports to the Manager, Quality Assurance. He shall be responsible for reviewing and approving Quality Assurance program plans. He performs vendor audits and audits LRC projects for compliance with approved QA program plans. He shall administer the technical procedure program.

8.2.13 Facility Supervisor

The Facility Supervisor is appointed by and reports to the Director. He shall demonstrate to Company management proficiency in the application of good principles of radiation protection, industrial safety and nuclear criticality safety as related to activities at the LRC. He shall be responsible to the Director for the safe conduct of all operations at the LRC and for assuring that these operations are conducted in accordance with all license conditions. He shall also be responsible for reviewing and approving all area operating procedures.

8.2.14 Safety Review Committee

The Safety Review Committee (SRC) is comprised of at least five senior technical members appointed by the Director. The membership shall be constituted of no more then 75% from the LRC. There shall be one member representing LRC management who will act as the committee coordinator. The combined experience of the members includes reactor operations, reactor engineering, health physics radiologial safety, licensed material handling and chemistry. Specialized consultants are also available to the SRC. The Faciltiy Supervisor shall determine the items that come before the committee.

The following are examples of items that require SRC approval:

1. Any change requiring a license amendment.
2. Any new process which involves the use of licensed material.
3. Any change of a technical specification.
4. Any change, test, or experiment pursuant to a reactor license envolving an unreviewed safety question as defined in 10 CFR 50.59 (c).

The Committee also has the following functions:

1. Review general procedures for handling and using licensed material.
2. Review procedures for the acquistion and disposal of licensed material.
3. Review procedures for maintaining an accurate inventory of licensed material.
4. Review procedures for the control of radiation and the protection of personnel from radiation exposure.
5. Review procedures and proposed projects for fire safety and fire prevention considerations.
6. Review any changes in the foregoing procedures that require a significant deviation from established procedures before the changes are instituted.
7. Review abnormal occurrences as defined in appropriate reactor licenses.
8. Review proposed experiments and tests at the reactor and critical experiment facilities which are significantly different from those previously performed at the facilities.
9. Provide the LRC with general consulting services in the field of radiation protection and radioactive materials handling.

Committee approval of new processes and practices prior to the writing of procedures will be occasionally necessary due to the experimental nature of the work performed at the LRC. In these instances, the Committee will review, with those responsible for the safe operation of the process or practice, the potential hazards and philosophy of operation. The approval by the Committee shall constitute approval to perform the work without written procedures. The SRC shall meet four times annually. A quarum shall consist of a majority of the membership.

8.3 Procedures

Procedures developed to implement this plan shall be reviewed by the Manager, Building A Decommissioning and the Safety Review Committee.

8.4 Facility Work Orders (Figure 8-2)

Major activities conducted in accordance with this plan shall be described on the Facility Work Order Form. These forms shall be reviewed and approved as indicated on the form.

Major activities include:

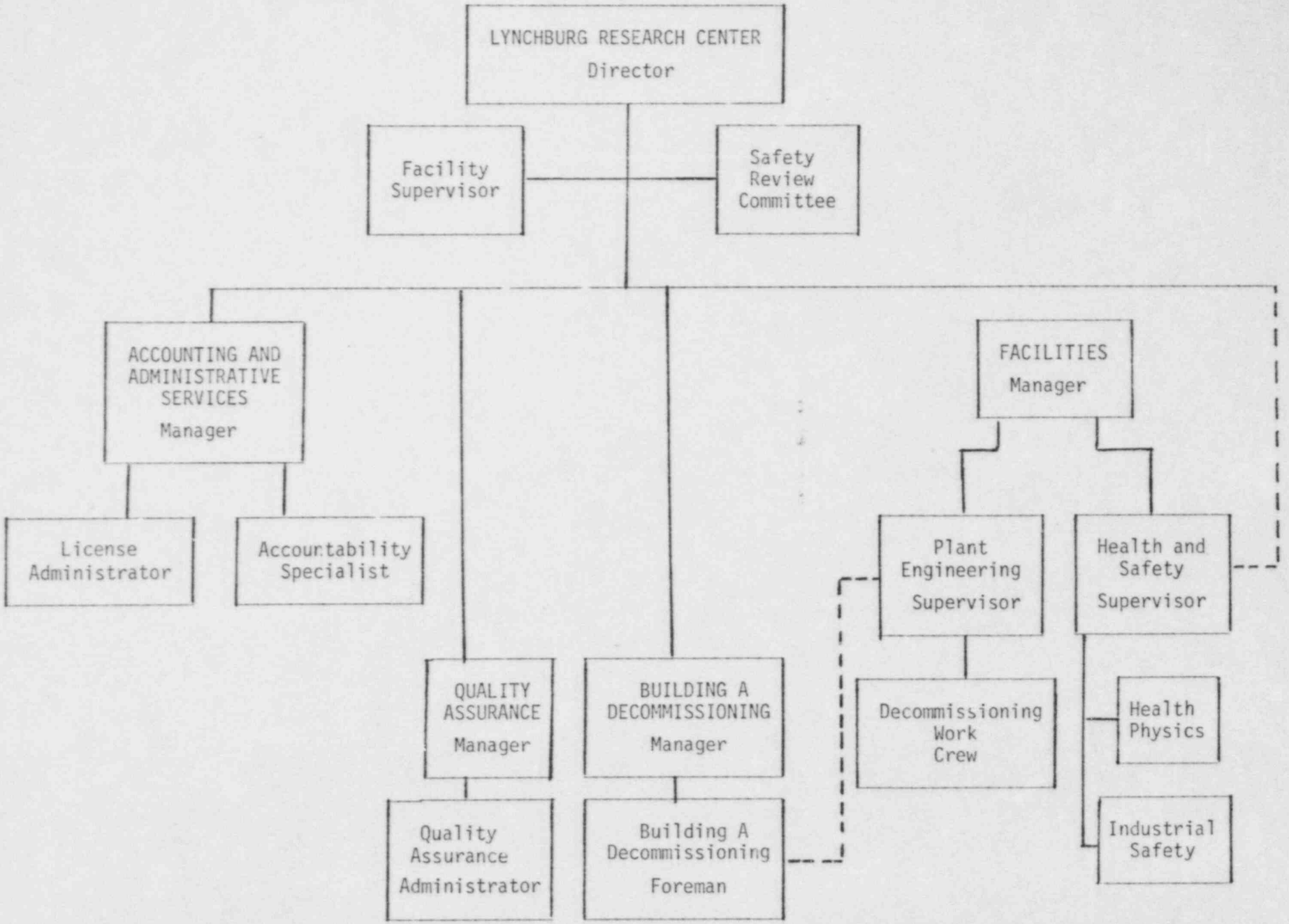
1. Disassembly of facility structural members.
2. Removal of the ventillation system.
3. Removal of reactor instrumentation.
4. Welding and cutting operations outside of a designated welding or cutting area.

8.5 Records

The following records shall be retained until the CX-10 license is terminated:

1. Abnormal occurrences.
2. Shipments of radioactive material.
3. Personnel radiation exposure records.
4. Inventory and transfer of fuel.
5. Facility radiation and contamination surveys.
6. Minutes of the Safety Review Committee meetings.
7. Audit reports of the Safety Audit Subcommittee.
8. Corrective actions taken in response to audit findings.

FIGURE 8-1. DECOMMISSIONING ORGANIZATION



## 9.0 Environmental Considerations

This dismantling plan addresses the disassembly, decontamination and removal of the reactor related structures and components. At the time of the implementation of this plan the facility fuel and start up sources will have been removed from the facility. The fuel shall be shipped to the Department of Energy's Oak Ridge, Tennessee facility for future use. Radioactive sealed sources will be transferred to another area at the Lynchburg Research Center for future use or disposed at a licensed burial facility. These transferred sources will be possessed and used pursuant to the Center's Special Nuclear Materials License No. SNM-778.

Reactor components shall be decontaminated to meet the criteria specified in the plan for release for unrestricted use, transferred to another licensed facility or disposed of at a licensed burial ground.

The Building housing the reactor will be left standing with very little change. The facility structure will be surveyed and decontaminated as necessary to meet the criteria specified in the plan for release for unrestricted use.

Radioactive waste that is generated as a result of decontamination will be placed in Department of Transportation approved shipping containers and transported in accordance with NRC and DOT regulations to a licensed radioactive waste burial site for disposal.

## 9.1 Alternatives to Dismantling

The CX-10 reactor has been shutdown because B&W has determined that there is no economic justification for its continued operation. Removal of radioactive material in the dismantling process and releasing the reactor facility for unrestricted use will permit the conduct of other research projects that do not utilize radioactive material to be conducted in the vacated space. The alternative of not dismantling and decontaminating would restrict future use of the reactor space.

## 9.2 Cost and Benefits

The cost to dismantle the reactor, dispose of its components and decontaminate the facility for unrestricted use is estimated to be $227,124. The reactor space cannot be economically used for other activities at the LRC if dismantling is not accomplished. Dismantling therefore provides the

benefit of putting the facility into a condition that is amenable to the long range future plans at the LRC.

9.3 Long-term Effects of Dismantling

Following dismantlement, the CX-10 facility can be put to use in other programs at the LRC. The reactor fuel will be utilized in DOE programs that are not a part of B&W's long range plans. The non radioactive components may utilized in other projects at the LRC or disposed of as scrap. Radioactive sources and reactor components may be disposed of at a licensed burial facility or retained for use under license SNM-778.

9.4 Conclusion

The dismantling and decontamination of the CX-10 facility and disposal of its component parts and waste will have no significant environmental impact.