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DOE/ET/37247--1 Attach. 1-2-3

DE82 012034

Attachments: 1 Plan for Fully Decontamination and Decommissioning of the Westinghouse Advanced Reactors Division Fuel Laboratories at Cheswick

2 Environmental Assessment for Decontamination and Decommissioning the Westinghouse Advanced Reactors Division Plutonium Fuel Laboratories, Cheswick, PA.

3 WARD-386, Quality Assurance Program Description for Decontamination and Decommissioning Activities

TO

FINAL REPORT FOR

DECONTAMINATION AND DECOMMISSIONING

OF

ADVANCED REACTORS DIVISION FUEL LABORATORIES

AT

CHESWICK, PA

JANUARY, 1982

UNDER

DOE CONTRACT NO.: DE-AC02-80ET37247

DISCLAIMER

ATTACHMENT 1

PLAN FOR FULLY DECONTAMINATING AND DECOMMISSIONING OF THE WESTINGHOUSE ADVANCED REACTORS DIVISION FUEL LABORATORIES AT CHESWICK, REVISION 3, FEBRUARY 2, 1981

TO

FINAL REPORT FOR

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REVISIONS

Revision 1
March 31, 1980

Page 25	The listed milestones were eliminated and listed separately in Figure 13 through 17.
Page 38 Figure 12	Modified overall phase schedule.
Pages 39 through 43	New schedules listing milestones for each phase of D&D Program are added.

Revision 2
May 20, 1980

Page ii	Table I, title changed.
Page 3	Item 2 - add, "if required," after volume reduction.
Page 7	Change in date for approval of Environmental Assessment
Page 9	In the middle of the page change the word "will" to "may" after volume reduction.
Page 25	Approximate time to complete changed from 33 to 29 months.
Page 26	Table 1 revised.
Page 31	Figure 5 repackaging method revised.
Pages 38 through 42	Schedules were modified.

REVISIONS
(cont'd)

Revision 3
February 2, 1981

Page 7	Preparation of Environmental Assessment changed to Environmental Data and Paragraph Reworded.
Page 11	Changed reference in last paragraph from"10 CFR 711" to "40 CFR 1500 and DOE's implemented procedures (45 Fed. Reg. pp. 20694-20701, dated March 28, 1980)."
Page 16	Complete rewording of Phases 5 text.
Pages 38 through 42	Schedule Revised

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VIII. TABLES AND FIGURES (cont.)

PLAN FOR FULLY DECONTAMINATING AND DECOMMISSIONING THE WESTINGHOUSE ARD PLUTONIUM LABORATORY LOCATED AT CHESWICK, PENNSYLVANIA

by

WESTINGHOUSE
ADVANCED REACTORS DIVISION

I. INTRODUCTION

A. Background

The Westinghouse Advanced Reactors Division (W-ARD) operates at the Cheswick Site in the township of Harmar in Allegheny County two laboratories comprising the Cheswick Fuel Operations -- these are the Plutonium Laboratory (Building 7) and the Advanced Fuels Laboratory (Building 8).

These operations are complementary to the Plutonium Fuels Development Laboratory (PFDL) operated by another Westinghouse Division, Nuclear Fuels Division (W-NFD), for development and fabrication of Light Water Recycle Fuel. Not only is the site shared, but also buildings, analytical services, license administration, safeguard compliances, security, health physics monitoring, and many other day-to-day operating requirements of a laboratory whose common end point is the utilization and the recycling of plutonium -- either in a pressurized water reactor or in a fast breeder nuclear power plant.

The Plutonium Laboratory was established in 1966 for the purpose of process and fabrication development and characterization of mixed uranium-plutonium carbide fuel materials and fuel elements. Sodium

bonded fuel pins were fabricated under Government contract from 1967 to 1969 for irradiation testing in the GETR and in EBR-II.

Stemming from the AEC's decision in 1969 to decrease and phase out Government support of carbide fuel for the Liquid Metal Fast Breeder Reactor (LMFBR) applications and emphasize oxide fuel for the Fast Flux Test Facility (FFTF) and the Clinch River Breeder Reactor Plant (CRBRP), the Plutonium Oxide Laboratory was established in Building 8 (PFDL). This facility was designed initially to operate with a once-thru air atmosphere in the glove boxes, but provisions were made for later conversion to an inert atmosphere in the glove boxes, if required. A significant number of uranium, plutonium oxide fuel assemblies were fabricated in this facility under Government contracts from 1969 to 1973 for irradiation test in EBR-II.

The Advanced Reactors Division became a participant in the LMFBR Advanced Fuels Program in 1974. Extensive facility modifications were made primarily in the Building 8 fabrication area to make possible the fabrication of the uranium, plutonium carbide material. Following these modifications, approximately 250 fuel pins containing uranium, plutonium carbide fuel were fabricated for test in EBR-II in the period 1975 through 1979.

Facility modifications have continued over the past few years directed at increasing throughput and providing a capability for fabricating the longer Fast Test Reactor (FTR) type pins. With this increased throughput and longer pin capability established, full scale fabrication of fuel pins of FTR assemblies became possible. Fabrication of the initial complement of pins (ACN-1), for test in FTR was completed.

In addition, a separate fuel fabrication facility has also been established for fabricating blanket fuel rods. During the past two years, sufficient blanket rods for five assemblies have been fabricated; two assemblies for test in EBR-II, and three for test in FTR.

B. Scope

The scope of work covered by this plan includes the complete decontamination and decommissioning (D&D) of the W-ARD Cheswick Fuel Facilities in the shortest possible time--estimated at two to three years. This will be accomplished in five phases as follows: 1) preparation of documents and the necessary paperwork and collection, packaging and shipping to a reprocessing agency all special nuclear materials in acceptable form; 2) decontamination of all facilities and equipment, volume reduction, if required, of glove boxes and equipment, and loading of bins and barrels; 3) remove facilities services and dispose of all contaminated boxes and equipment; 4) final survey of remaining facilities and their certification for nonrestricted use and preparation of final report; 5) W-ARD's prorated share for D&D of the Chemistry Laboratory. The conduct of work according to these five phases will be in accordance with applicable regulations regarding the D&D of research facilities and the packaging, transportation, and burial and storage of radioactive materials.

The work details associated with the above five major phases are described in Section II which follows. Each major phase is broken down into tasks which represent only the principal operations to be performed. Not all tasks will be required for each item handled within the scope of a phase; rather, one or more of the listed tasks will be required as determined by evaluations on a case-by-case basis Operational procedures, as required, will be developed for tasks within each phase. Many of the routine operations associated with

each task will be regulated by existing health physics and operational procedures. Nonroutine operations will require special health physics and operation approval.

II. PROGRAM PHASES

Phase 1 - Preparatory Steps

This phase consists of several preparatory tasks which could be accomplished in accordance with existing operational procedures. The tasks to be performed within the scope of this phase include the following:

1. Preliminary Planning - Prior to initiating the major D&D tasks, efforts will be directed toward preliminary planning of various operational phases to ensure safety, efficiency and appropriate scheduling. The experience developed by other facilities currently undergoing D&D will be considered wherever possible. To do this effectively, on-site visits by W-ARD personnel to these facilities are anticipated.

   Under this task, detailed procedures, an Environmental Assessment Report, and a Quality Assurance Program Description will be prepared. Where possible, major equipment items as well as expendable materials and supplies required by the D&D effort, will be identified and placed on order.

2. Disposal of Special Nuclear Material (SNM) - The objective of this task will be to identify the current inventory of SNM and dispose of it as expeditiously as possible in accordance with appropriate regulations. This task will be given high priority since security requirements commensurate with the license are based on SNM quantity. A prompt reduction in SNM inventory and, therefore, security requirements will have a direct bearing on the cost effectiveness of the D&D effort.

SNM may take various forms, namely; 1) virgin PuO_2 and enriched UO_2 powders; 2) scrap $(U,Pu)O_2$ powders; 3) scrap (U,Pu)C pellets, and 4) $(U,Pu)O_2$ and (U,Pu)C pellets contained in welded fuel elements currently being stored as archive/replacement elements in accordance with the appropriate irradiation test program specification.

Virgin PuO_2 and UO_2 and scrap $(U,Pu)O_2$ powders will simply require repackaging prior to shipment to a designated site while (U,Pu)C pellets must be converted to $(U,Pu)O_2$ powder prior to packaging for shipment. A new storage site external to Westinghouse Cheswick properties will have to be identified for $(U,Pu)O_2$ and (U,Pu)C archive/replacement fuel elements and shipments made thereto. This task will also include the identification and procurement of shipping packages to effect shipment of the SNM in compliance with the rules and regulations of the appropriate regulatory agencies.

3. Preliminary Laboratory Cleanup - Uncontaminated equipment will be catalogued, disconnected, and relocated to contaminant-free areas from where it can be disposed of in accordance with the appropriate corporate procedures. The disposal of this equipment will also be given high priority so that valuable space can be made available for the storage of the voluminous supplies, empty waste/scrap shipping containers, and other equipment required for the D&D program.

   A major effort of this task will be the removal of unnecessary, miscellaneous contaminated items from glove boxes. Basically all small tools, supplies, and equipment that can easily be passed out of a glove box will be removed in addition to larger equipment items that can readily be disassembled. All items will be subjected to a gross decontamination prior to removal and nondestructively assayed for accountable SNM after removal. Packaging of items for shipment will be in accordance with applicable waste disposal site regulations.

4. Preliminary Decontamination of Glove Box Interiors - The interior glove box surfaces will be decontaminated by conventional methods of washing and wiping. Other cleaning methods recommended by other facilities engaged in D&D may be used as the program progresses. In either case, a primary consideration will be to maximize decontamination and minimize resultant generation of waste materials.

5. Preparation of D&D Plan - This document will include the plan for complete D&D of the W-ARD Plutonium Laboratories located at Cheswick, PA. It will be submitted to Department of Energy and Chicago Operations & Regional Office (DOE-CORO) prior to January 15, 1980, for information and comments. Westinghouse assumes that any comments will be received by March 1 so as not to delay the Phase 2 portion of plan, due to start on April 1, 1980.

6. Preparation of Environmental Data - Required environmental data will be submitted to DOE-CORO for review, comment and approval prior to March 31, 1980. DOE's Environmental Assessment is required by December 31, 1980, so as not to interfere with irreversible actions, i.e., removal of services and ducting.

Phase 2 - Decontamination and Volume Reduction

Under this phase, all glove boxes will be disposed of at a DOE retrievable site, as determined by the levels of contamination within each glove box. There are 28 glove boxes which are primarily stainless steel. The relative location of each is shown in Figures 1 and 2. The tasks to be performed within the scope of this phase include the following:

1. Final decontamination of glove box interior - For those glove boxes where physical configuration and history permit, decontamination at low specific activity (LSA) (NONTRU <10nCi/gm) levels will be undertaken. Extensive equipment, tool and/or appendage removal will be performed as required. This will be followed by a thorough cleaning process, which may vary from standard wash-down procedures to extensive surface removal by chemical dissolution or mechanical abrasion. Appropriate measurements will be made to enable verification of the glove box as LSA waste. If a glove box is to be segmented or volume reduced for disposal in an M-III bin, sufficient cleaning, along with appropriate surface fixation, will be performed to minimize undue dispersal of contamination during the sectioning or volume reduction operations. This process will provide an additional measure of safety to the personnel and facility. Measurements will be made prior to volume reduction to obtain an estimate of the amount and type of SNM contained in the glove box.

2. Assay of glove box interiors - Contamination levels in the glove boxes will be measured by direct in-box assay to determine their potential waste categorization: TRU (>10nCi/gm) versus NONTRU (<10nCi/gm).

3. Disconnection of glove box utility services - Electrical, inert gas, cooling water, and any experimental services will be disconnected.

4. Disconnection of glove box exhaust system - Glove boxes will be disconnected from their filters and proper sealing of the existing exhaust system will be conducted to prevent a release of contamination.

5. Volume reduction of equipment - Volume reduction commonly refers to a process whereby large contaminated equipment is reduced to smaller portions. The decision to employ volume reduction for contaminated waste disposal is influenced by a number of considerations. Factors such as retrievable waste storage requirements, availability of approved containers of adequate size, shipping requirements, and cost assessments impact on the decision to volume reduce contaminated waste.

   In the event large equipment cannot be cleaned to NONTRU levels, volume reduction may be necessary. This effort will require:

   - Construction of a temporary room within a laboratory. This temporary room must have appropriate ventilation, air lock(s) interior surfaces from which gross contamination can be removed readily; and a separate passageway for personnel movement into and out of the work space.
   - Provision for supplied air respiratory protection and appropriate backup for those working in the room.
   - Supply of adequate clothing, gloves, etc. to prevent external contamination of those working in the contaminated environment.
   - Sufficient Health Physics staff and equipment to monitor the personnel entering and exiting, as well as provide constant surveillance in case of emergencies.

- A variety of equipment and supplies for handling, preparing, cutting, dismantling, and packaging for items reduced in size.

Phase 3 - Removal of Facility Services and Packaging, Shipping and Disposal/Storage of Waste

Due to the complexity of Phase 3, each task may not be completed prior to initiation of another. In fact, certain tasks will be conducted simultaneously while planning for others is in progress. As some services are removed from the laboratory, temporary provisions must be made to assure that operations continue in compliance with safety standards. Specific examples of this would be provisions for temporary portable fire detectors, alpha radiation monitors, and fire exit signs. It is anticipated that the removal of the auxiliary systems will require preplanning and coordination to maintain a safe operation.

The anticipated waste to be generated by the decontamination effort is listed in Table 1 along with method of packaging and shipping.

If, due to circumstances, letters of agreement from TRU disposal sites cannot be obtained for some time, there is not sufficient storage space at the Westinghouse complex to temporarily store the waste containers generated. Thus, temporary storage of waste containers for this period will require additional space other than intermediate buildings, and is not part of this plan.

After the glove boxes have been removed from the laboratory, the next phase will involve the decontamination and removal of the various utility services and exhaust systems. In accordance with 40 CFR 1500 and DOE's implemented procedures (45 Fed. Reg. pp. 20694-20701, dated March 28, 1980),an environmental assessment of the decontamination effort will be completed and approved prior to making irreversible changes to the laboratory. The main branches of the laboratory exhaust systems are shown in Figures 3 and 4.

Initially, the utility services, i.e., water, gas, and electrical will be removed and assayed. Following this the laboratory exhaust system will be decontaminated, disassembled and removed. All ducting up to the final facility filters will be removed and assayed.

Removal of the auxiliary systems from the laboratory will require a systematic approach. The schedule has been designed to prevent interfering or conflicting operations from being performed simultaneously. Although several of these tasks may require the development of special procedures, many of the operations involved will be regulated by existing health physics and operational procedures. The currently identified tasks are:

- Removal of false ceiling tiles from Plutonium Laboratory -- Each tile will be removed from its position, monitored for contamination and placed in a disposal crate. After removal of all tiles, the supporting framework will be removed.

- Removal of gas supply lines -- The piping associated with these supply lines will be removed, assayed, and packaged. No need is anticipated for decontamination; however, pressurized air may be required for use during the decontamination. Air lines will be removed when no longer necessary.

- Removal of electrical service -- The laboratory's main electrical service must be disconnected in order to proceed with conduit and wiring removal. Therefore, temporary power must be installed to provide lighting, ventilation, and maintenance of emergency services.

- Removal of air supply and air flow control system -- Adequate air flow will be maintained during the decontamination efforts. If the existing air supply and associated control systems are contaminated, the ducting that supplies air to the laboratory and air flow control systems will be removed and a temporary service provided.

- Removal of the laboratory exhaust system -- This task involves the determination of the extent of contamination in the exhaust ducts, cleaning of the duct interiors, removal and sectioning of ducts, and packaging. It is intended that the final filter plenums, filters, and blowers will remain intact until all decontamination efforts in the facility have been completed. Temporary reconstruction of certain portions of the exhaust system, cleaning of the plenums, and the installation of clean filters will be accomplished as required.

Each of the tasks described above will generate waste products possessing varying levels of activity in different forms. Shipments will be made in accordance with the applicable portions of 10CFR71 and 10CFR49 and the choice of disposal site will be effected pursuant to the conditions in DOE/ERDAM 0511. Waste containing greater than 10nCi/gm (TRU) will be sent to a DOE site for 20-year retrievable storage. Those wastes (or packages) containing less than 10nCi/gm (NONTRU) will also be sent to a DOE site (see Waste Management Scheme, Figure 5).

Phase 4 - Final Facility Decontamination and Survey

Decontamination of the interior walls, ceilings, and floors of the laboratories will involve only those areas that have been exposed to the release of contamination. These areas are outlined in Figures 6 and 7. Although other areas requiring decontamination such as hallways, workshop, etc., may be identified later, it is not currently anticipated that this will occur and is not part of this plan.

The walls of the Plutonium Laboratory, Building 7, are constructed of concrete block; whereas, the roof is corrugated sheet metal and the floors are concrete. Although most of the walls and the floors were coated with epoxy paint prior to initiation of plutonium operations, the metal ceiling and walls above the false ceiling are not protected with epoxy paint and may pose some difficulty in decontamination. It is anticipated that removal of contamination can be accomplished by washing with conventional detergents or with special stripping solutions. If, however, it is found that this is inadequate; then, a mechanical abrasion technique such as sandblasting will be accomplished. Most likely, a combination of washing/stripping and mechanical abrasion will be used to achieve decontamination to the levels required in the proposed ANSI Standard N328 and Site Health Physics Manual.

The walls and ceiling of the Advanced Fuels Laboratory, Building 8, are constructed of plaster on gypsum board fastened to steel studs. The floor is poured concrete. The walls and ceiling were covered with two coats of Pitt Glaze and the floor was covered with epoxy paint.

A method for decontaminating the interior walls, ceilings, and floors of the laboratory will be developed based upon the results of preliminary experimentation conducted by W-ARD and prior Westinghouse experience. The methods currently anticipated include: (1) washing with conventional detergents, (2) surface cleaning with commercial decontamination products, (3) surface removal by mechanical abrasion techniques such as sandblasting.

The use of washing and surface cleaning solutions is considered the most expedient and economic method and will therefore, be tested in detail. Although, decontamination by use of mechanical abrasion causes several problems in controlling loose contamination, it is being considered, since both washing and mechanical abrasion may be needed on some surfaces to achieve the required decontamination levels set in the proposed ANSI Standard N328.

After the resulting data have been evaluated, a final plan for surface decontamination will be developed. A final procedure will be prepared in accordance with the results of the data and will be used to decontaminate the interior surfaces.

Phase 5 - Decontamination of Chemistry Laboratory

The scope of work covered under this phase is the complete D&D of the Analytical Chemistry Laboratory. The work will consist of decontamination of facilities and equipment, packaging and disposal of contaminated equipment, hoods and glove boxes using the whole glove box method, final cleaning and survey of the laboratory area (walls, floors, ceiling), certification and release for unrestricted use and preparation of a final report.

The conduct of work will be in accordance with applicable DOE, NRC, and DOT rules and regulations covering D&D activities and packaging, transportation, storage and burial of radioactive materials. Operations, quality assurance, health physics, safety, security, accountability and environmental monitoring procedures developed and implemented in performance of the work described in Phases 1-4 will be utilized.

III. SUPPLEMENTAL CONSIDERATIONS

In addition to conducting the major phases associated with the laboratory decontamination, additional programs must simultaneously be maintained to assure personnel and environmental safety and provide guidance and regulation in the planned operations. A brief description of each of these programs identifying their involvement in the overall effort is given below.

Occupational Health Physics

The current procedures and practice of Health Physics coverage in the Plutonium Laboratories are considered sufficient to enable the decontamination to be performed without exceeding radiological safety guidelines. Operations such as equipment removal and decontamination have all been performed in the course of normal operations. Therefore, the proposed effort does not present problems which have not already been considered in some related operation. The only exception to this is the process of volume reduction. This represents a new technology and would require additional training. Assistance of DOE contractors, experienced in volume reduction, has been enlisted in this process. We have reviewed this operation as performed by them so we are familiar with the tooling and equipment necessary to maintain health and safety.

Normal radiation monitoring, which consists of continuous room monitors, appropriate dosimetry devices, and smear surveys, will continue uninterrupted. Additional portable and continuous air monitors are planned for local use in high risk situations in order to provide the highest possible degree of personnel safety. Approved respiratory protection devices will be employed as the operations required. All such devices will be approved and used in compliance with appropriate regulations and standards.

Currently, five Health Physics technologists are employed full-time in the laboratories. The support of the Health Physics staff will permit the program to be completed safely and without undue hazard to the operating personnel or the general public. Implementation processes for health physics coverage are addressed in Section IV, "OPERATING RESTRICTIONS AND/OR REQUIREMENTS."

Safety

The Plutonium Laboratories currently operate under a comprehensive safety program which includes routine monitoring, safety evaluations, and both outside and administrative auditings. This program will continue during the decontamination program.

The Safety Program follows guidelines issued by the Department of Energy (DOE), Nuclear Regulatory Commission (NRC), Occupational Health and Safety Act (OSHA), National Fire Code (NFC), and National Electrical Code (NEC). The laboratories are audited by DOE, NRC, and the American Nuclear Insurers (ANI). The decontamination program will involve laboratory use of chemicals and solutions that are somewhat hazardous from an industrial hygiene viewpoint. The use of these chemicals will be reviewed by the Health and Safety Office.

The fire detection and extinguishing system presently in operation will remain intact except for individual glove box detectors. These detectors will be taken out of the system only after the associated glove box has been disconnected from its auxiliary systems.

Chemical and flammable material storage areas are provided and will be maintained throughout the decommissioning program.

As their usefulness diminishes, hazardous chemicals and materials will be removed from the area. Both combustible and noncombustible trash and debris will be administratively controlled and removed as practical.

SNM Accountability

Excess Usable Material

This material will be separated and packaged, based on material type and isotopic content, in a form suitable for shipment. A listing of these materials will be compiled and submitted to DOE Production and Materials Management (PMM) through the Materials Management and Safeguards Branch in accordance to the procedures set forth in ERDA Manual Chapter 7400, Appendix 7451, Part VI. Westinghouse expects to hold the material in storage for a reasonable time while awaiting final disposition/instructions from PMM or DOE-CORO.

Scrap

Scrap materials will be segregated by material type and isotopic content; then, packaged in a form suitable for shipment. Each scrap container will be assigned an appropriate ANSI Scrap Classification Number.

In accordance with ERDA Manual Chapter 7400, Appendices 7451 and 7452, as soon as an economically sufficient number of scrap containers are generated, Forms R1-511A, C, and D (Request for ^{239}Plutonium Scrap Processing Service), will be completed and submitted to the Central Scrap Management Office (CSMO), Richland Operations Office, through the Materials Management and Safeguards Branch. Westinghouse expects to hold this material in storage for a reasonable time while awaiting final disposition/instructions from CSMO.

Waste Materials

Waste SNM, upon being assigned fissile values, will be loaded into 55-gallon 17-C (or equivalent) waste drums. These drums, when filled, will be placed in the Waste Drum Storage Area. Upon completing contractual agreements through DOE-CORO with an appropriate disposal

site, the drums will be loaded into a DOT 6400 (Super Tiger) overpack or equivalent and forwarded to the retrievable burial site. All of these operations will be performed in accordance with ERDA 0511 and shipped per requirements set forth in 49CFR, and the planning by Westinghouse assumes availability of transportation services as required.

Environmental Monitoring

Monitoring of effluents and the environment will continue during decontamination. The environmental monitoring will consist of the same effort that has been described in submittals to the Nuclear Regulatory Commission. Effluent and environmental monitoring and reporting conforms to the requirements of Title 10 Code of Federal Regulations. The effluent and environmental monitoring effort has been sufficiently broad in coverage and explicit in analysis to detect, by normal procedures, any radioactivity resulting from decontamination efforts and appearing in the media sampled. Figures 8, 9, and 10 show the locations at which routine evnironmental samples of air, water, and soil, respectively, are obtained.

Quality Assurance

The quality assurance program for the D&D activities will be prepared utilizing those parts of the existing Quality Assurance Program FC-1, which implements the applicable criteria of 10CFR50 Appendix B and Westinghouse Advanced Reactors Division Quality Program Description (W-ARD-357). Where differences between the existing Quality Assurance Program (FC-1) and the requirements of 10CFR50 Appendix are noted, the procedures will be revised or written to meet the requirements of 10CFR50, Appendix B.

The implementation of the Quality Assurance Program for the D&D activities is the responsibility of the management of Reactor Technology Department who perform the work and Development Quality Assurance who verify that the work is performed in accordance with approved procedures and specified

requirements. The Development Quality Assurance Manager who reports directly to the General Manager through the Product Assurance Manager is provided with the organizational freedom and authority specified in 10CFR50, Appendix B.

Operations will be conducted in accordance with written and approved instructions and procedures. Measurement data will be documented, reviewed, and approved by the operator, supervisors, and quality assurance personnel.

Data generated and inspection instrumentation and apparatus will be calibrated, traceable to the National Bureau of Standards, where applicable.

Operators conducting measurements, data generating, safety related, or potentially hazardous operations shall be certified as being qualified to perform the functions.

Physical Security

The Westinghouse Plutonium Fuel Development Laboratory which houses and includes the W-ARD Advanced Fuels Laboratory is secured in compliance with the current Nuclear Regulatory Commission regulations governing the control and protection of strategic special nuclear material (SSNM).

This security will be maintained as long as quantities or enrichments of special nuclear materials exceeds the moderate strategic significance category. When the quantities of SNM fall within the moderate strategic significance category, presently estimated at March 31, 1980, physical security will be reduced to the level required by the NRC for these quantities.

IV. OPERATING RESTRICTIONS AND/OR REQUIREMENTS

The conditions under which the laboratory is operated are controlled by a number of responsible agencies and committees. These conditions will be maintained throughout the decontamination program. Westinghouse will comply with regulations that apply to the operation and decontamin- of its plutonium laboratories.

Nuclear Safety Committee

The purpose of the Nuclear Safety Committee is to review, advise, and make recommendations to the Laboratory Manager in radiological and nuclear criticality safety matters; to assist the managers in assessment and evaluation of their proposed operations involving potentially significant radiological and nuclear criticality hazards and to assure that these operations are conducted in a manner that will reduce, to acceptable levels, radiological hazards to operations personnel and equipment, the public, and the environment; to mitigate the effects of and direct the recovery from a serious radiological incident and, in particular, an incident which has a high potential for release of contaminants to the environment. The committee also audits operations to assure compliance with Nuclear Regulatory regulations and any other applicable regulations.

Health and Safety Review

Health and Safety constantly reviews the normal operations of the laboratory and recommends changes to ensure maximum safety for the general public and environment as well as operations personnel.

Nonroutine operations which have been preplanned and reviewed by the laboratory management must also be reviewed by Health and Safety to ensure safety. Review and approval by the Manager of Health, Safety,

and Services is required prior to starting an off-normal operation. If deemed necessary, the Manager of Health, Safety, and Services may request a review of operations be made by the Nuclear Safety Committee if it is felt license conditions do not give him sufficient authority. If during performance of a phase it appears that an undue safety hazard exists or will be caused to exist, these authorities can effect cessation of activities until further precautions or preventive measures are taken. Other officers having similar authority include the Supervisor of Industrial Hygiene, Administrator of Fire and Safety, or selected top-line management. This system provides a hierarchy of planning, review, and audit which function to ensure maximum radiological and nuclear criticality safety during all activities--both routine and unusual.

Occupational Safety and Health Administration (OSHA)

Operations conducted during the decontamination and decommission phase will meet OSHA requirements in accordance with Westinghouse policy and federal regulations.

V. SPECIAL CONSIDERATIONS

A. Package Review

W-ARD will comply with packaging requirements of the selected waste disposal sites. Since a currently approved container is proposed for use, package review should require minimum effort. In cases where deviations from specified packaging are required, W-ARD will submit, to the DOE burial/storage site through CORO, appropriate packaging modification acceptance requests and other documentation as required. Prompt response to such requests will be required.

B. Government Property Management

All capital equipment used in the past fuels programs is owned by Westinghouse and will be disposed of as scrap where the equipment is contaminate or through normal Westinghouse procedure where not contaminated. All special nuclear materials, owned by DOE, will be disposed of as advised by DOE. Prompt disposition action will be required.

C. Program Organization

Figure 11 presents an overall organization chart for this program. Dr. W. R. Jacoby, Manager ARD Fuel Laboratories will be program manager for the Decontamination and Decommissioning Program. As shown on Figure 11, Dr. Jacoby reports to Mr. J. S. Theilacker, Manager, LMFBR Fuel Cycle who reports to Mr. J. E. Zerbe, Manager Reactor Technology, who reports to Mr. R. Fillnow, General Manager, Advanced Reactors Division.

VI. REPORTING

Monthly progress letters will be provided by W-ARD during the course of the program. Progress reports will be prepared by all activities. A final report detailing specific operations, problems encountered, methods attempted, etc., will be prepared at the end of the program.

VII. SCHEDULE

Figure 12 is an overall schedule of the D&D program. Figures 13, 14, 15, 16, and 17 list the milestones of each phase of the program. It is estimated that this program, which was initiated in July, 1979, will be completed in approximately twenty nine (29) months.

VIII. TABLES AND FIGURES

Pertinent Tables and Figures are included herein as Pages 26 through 43.

Table 1

ESTIMATED COST FOR SHIPPING/PROCUREMENT/BURIAL

5/29/80

. Cost of Barrels, Bins and Boxes

Barrels	140	@	$62 ea.	=	$ 8,680	
Bins	6	@	$1000 ea.	=	6,000	
Boxes	35	@	$1500 ea.	=	52,500	
			Sub Total			$ 67,180

. Shipping

Barrels - Super Tiger	5	@	$9000	=	$ 45,000	
Bins - Poly Panther	1	@	$8000	=	8,000	
Boxes - Super Tiger	30	@	$9000	=	270,000	
			Sub Total			323,000

. Shoring

Barrels	0					
Bins	6	@	$1000 ea.	=	$ 6,000	
Boxes	35	@	$1500 ea.	=	52,500	
			Sub Total			58,500

. Burial

Barrels	0				
Bins	125 ft^3 x $10 x 6	=	$ 7,500		
Boxes	250 ft^3 x $10 x 35	=	87,500		
	Sub Total				95,000
			TOTAL		$543,680

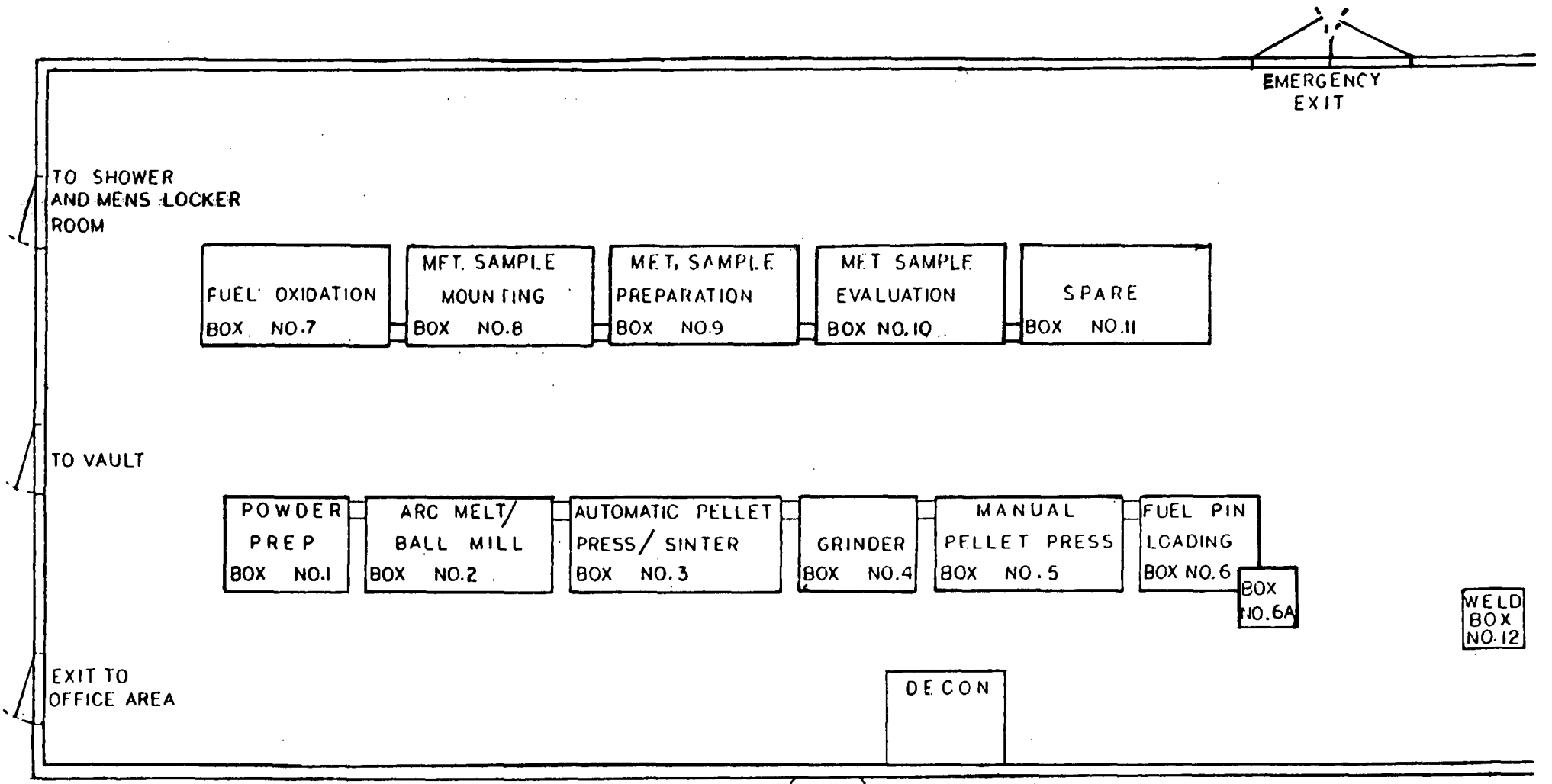


FIG.1 PLUTONIUM LABORATORY (BLDG 7) GLOVEBOX LAYOUT

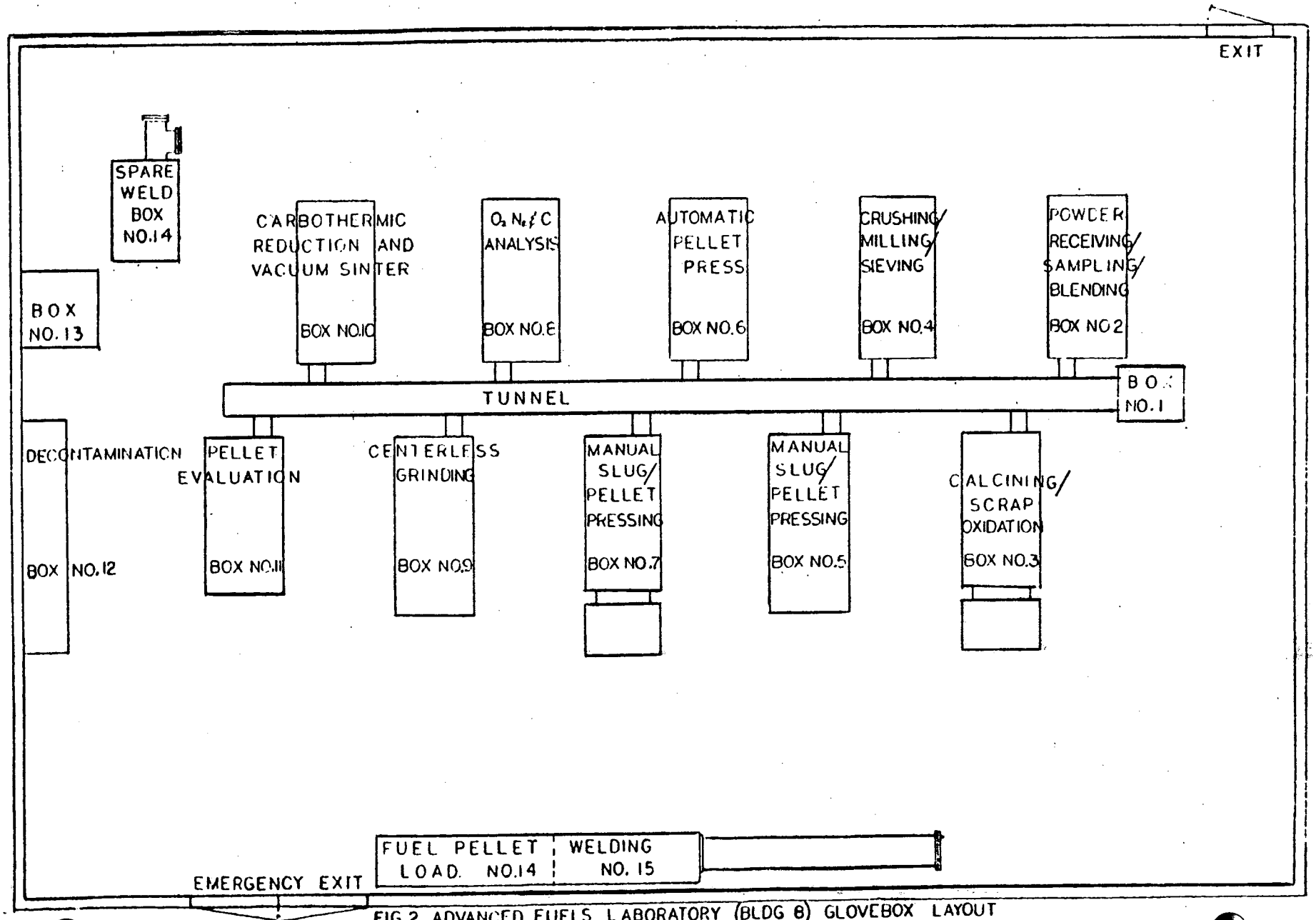
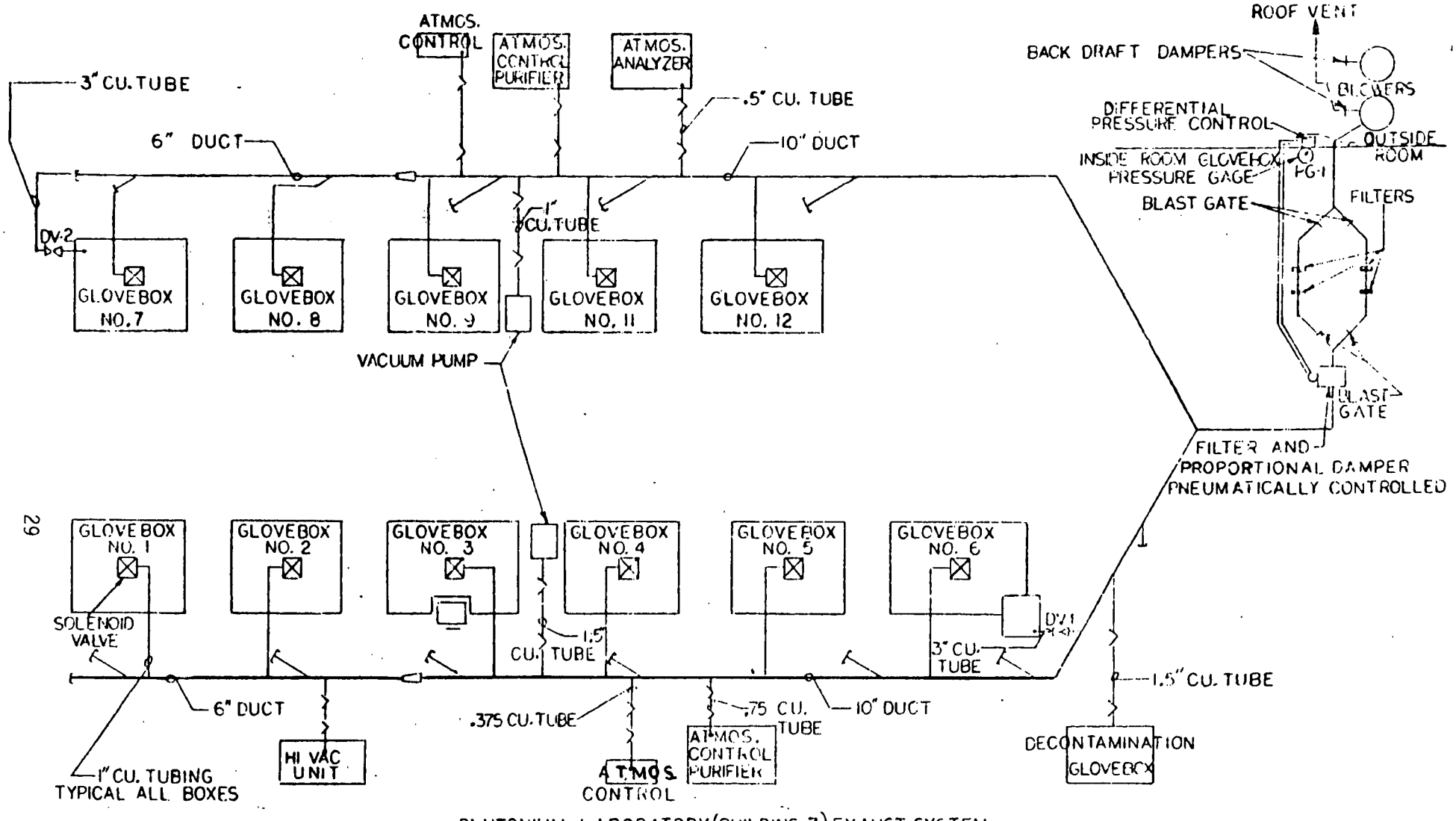
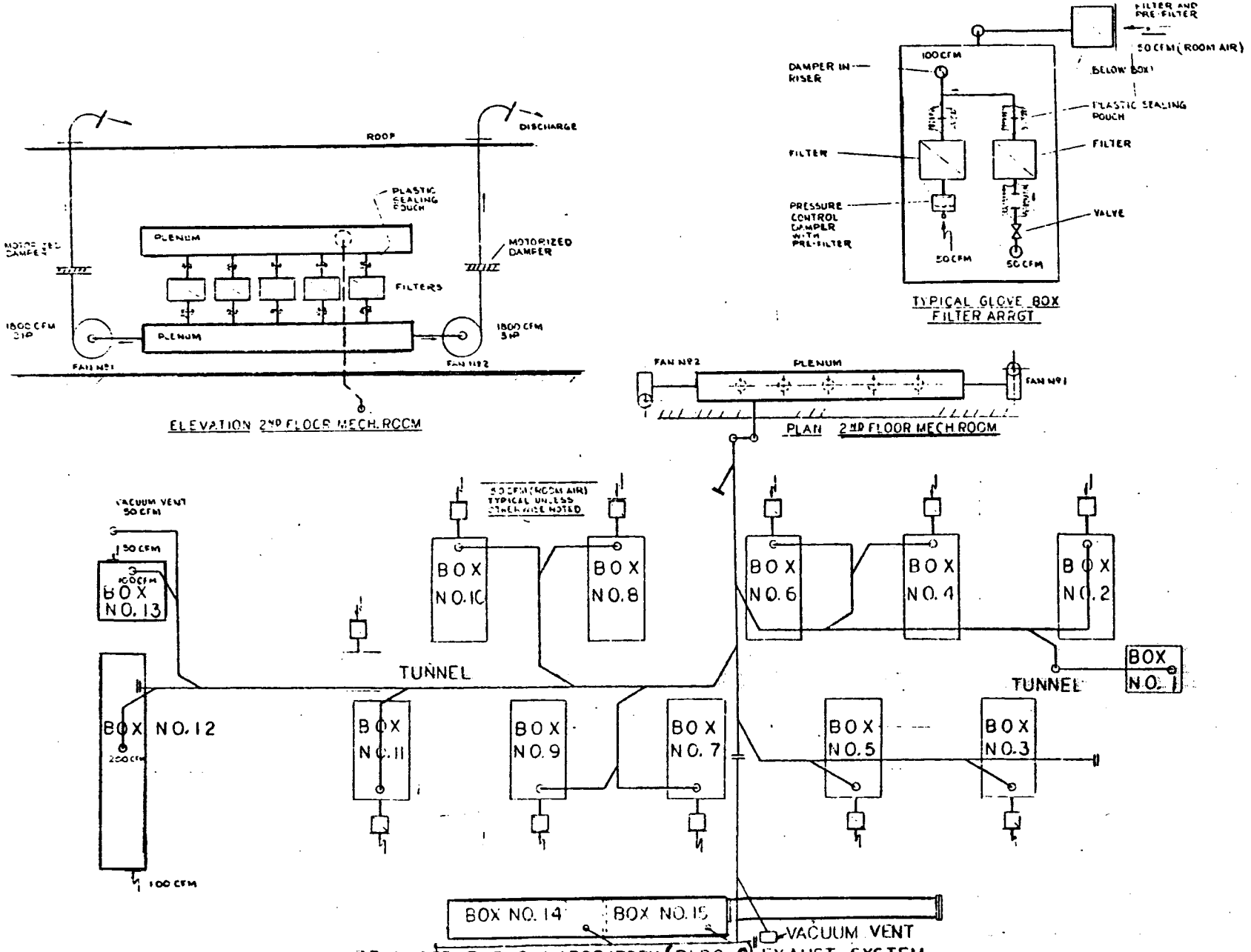


FIG. 2 ADVANCED FUELS LABORATORY (BLDG 8) GLOVEBOX LAYOUT



PLUTONIUM LABORATORY (BUILDING 7) EXAUST SYSTEM
FIGURE 3


ROOF
DISCHARGE
PLASTIC SEALING POUCH
PLENUM
MOTORIZED DAMPER
FILTERS
1800 CFM 5HP
PLENUM
1800 CFM 5HP
FAN NO 1
FAN NO 2
ELEVATION 2ND FLOOR MECH. ROOM
FILTER AND PRE-FILTER
50 CFM (ROOM AIR)
DAMPER IN RISER
100 CFM
BELOW BOX)
PLASTIC SEALING POUCH
FILTER
FILTER
PRESSURE CONTROL DAMPER WITH PRE-FILTER
VALVE
50 CFM
50 CFM
TYPICAL GLOVE BOX FILTER ARRGT
FAN NO 2
PLENUM
FAN NO 1
PLAN 2ND FLOOR MECH ROOM
VACUUM VENT 50 CFM
150 CFM
100 CFM
BOX NO. 13
50 CFM (ROOM AIR) TYPICAL UNLESS OTHERWISE NOTED
BOX NO. 10
BOX NO. 8
BOX NO. 6
BOX NO. 4
BOX NO. 2
BOX NO. 1
TUNNEL
TUNNEL
BOX NO. 12
200 CFM
100 CFM
BOX NO. 11
BOX NO. 9
BOX NO. 7
BOX NO. 5
BOX NO. 3
BOX NO. 14
BOX NO. 15
VACUUM VENT
ADVANCED FUELS LABORATORY (BLDG. B) EXAUST SYSTEM
FIG. 4

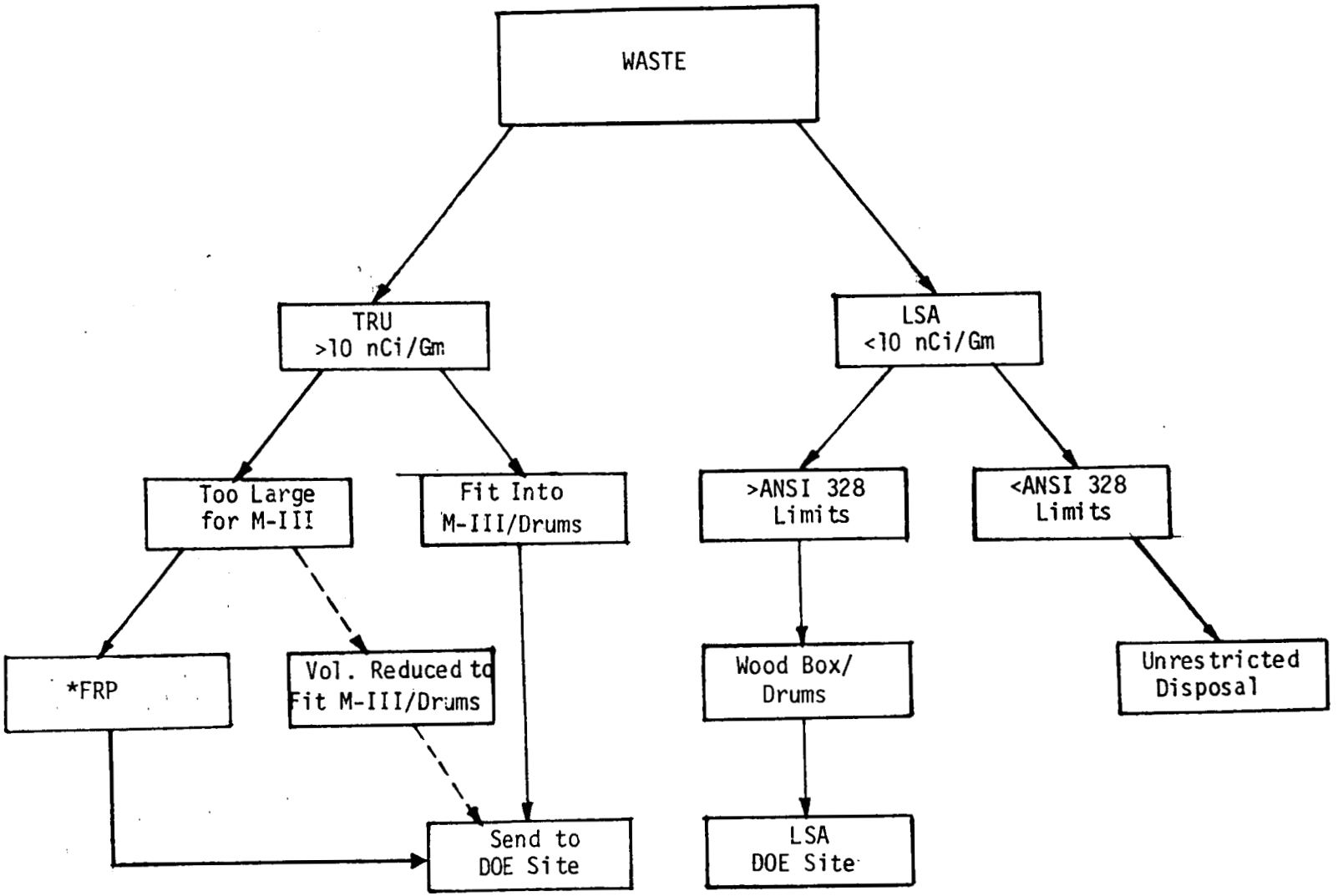
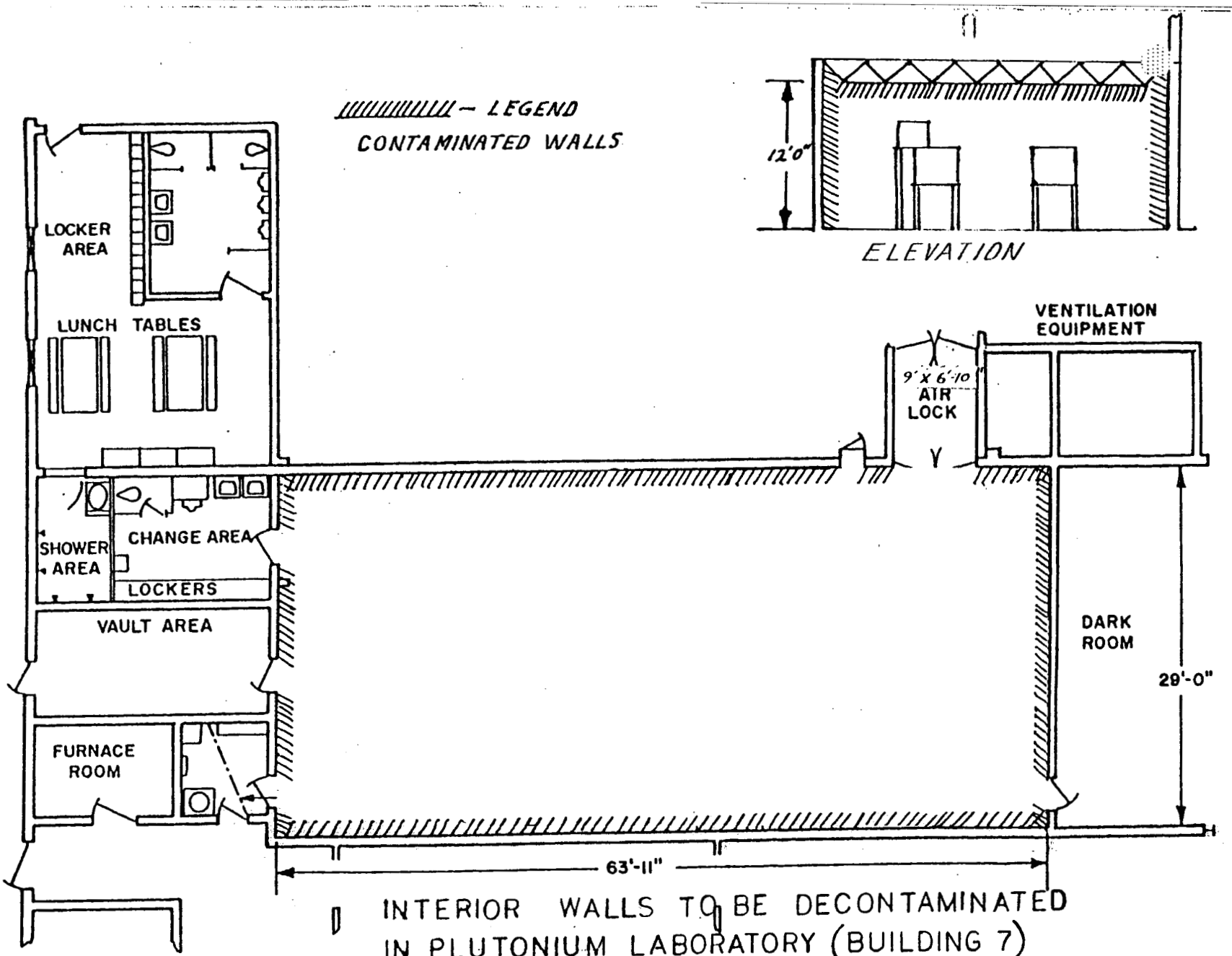


FIGURE 5 WASTE MANAGEMENT SCHEME

*Fiberglas Reinforced Polyester Wood Box



INTERIOR WALLS TO BE DECONTAMINATED
IN PLUTONIUM LABORATORY (BUILDING 7)
FIGURE 6

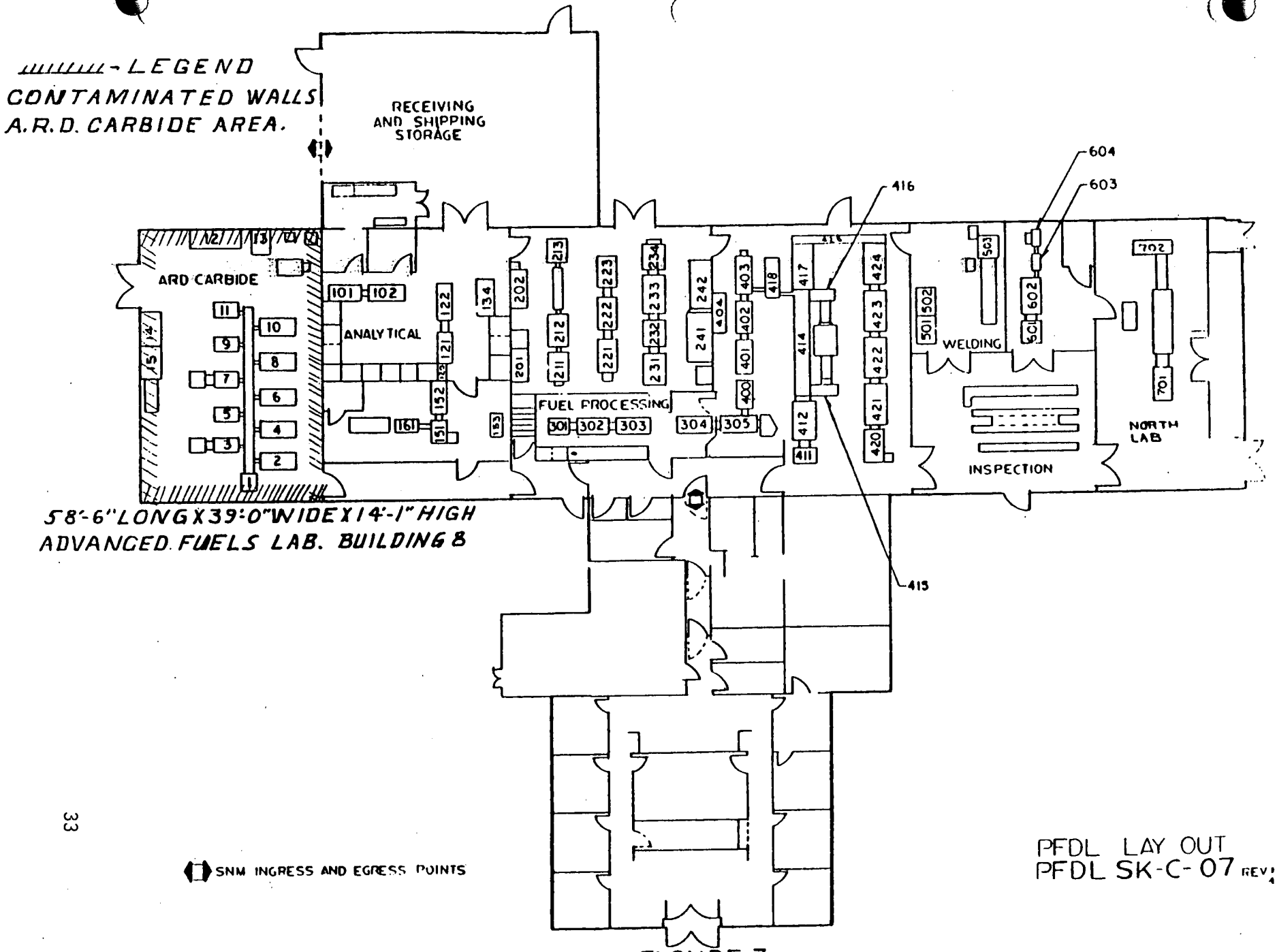


FIGURE 7

Interior Walls to be Decontaminated in Advanced Fuels Laboratory (Building 8)

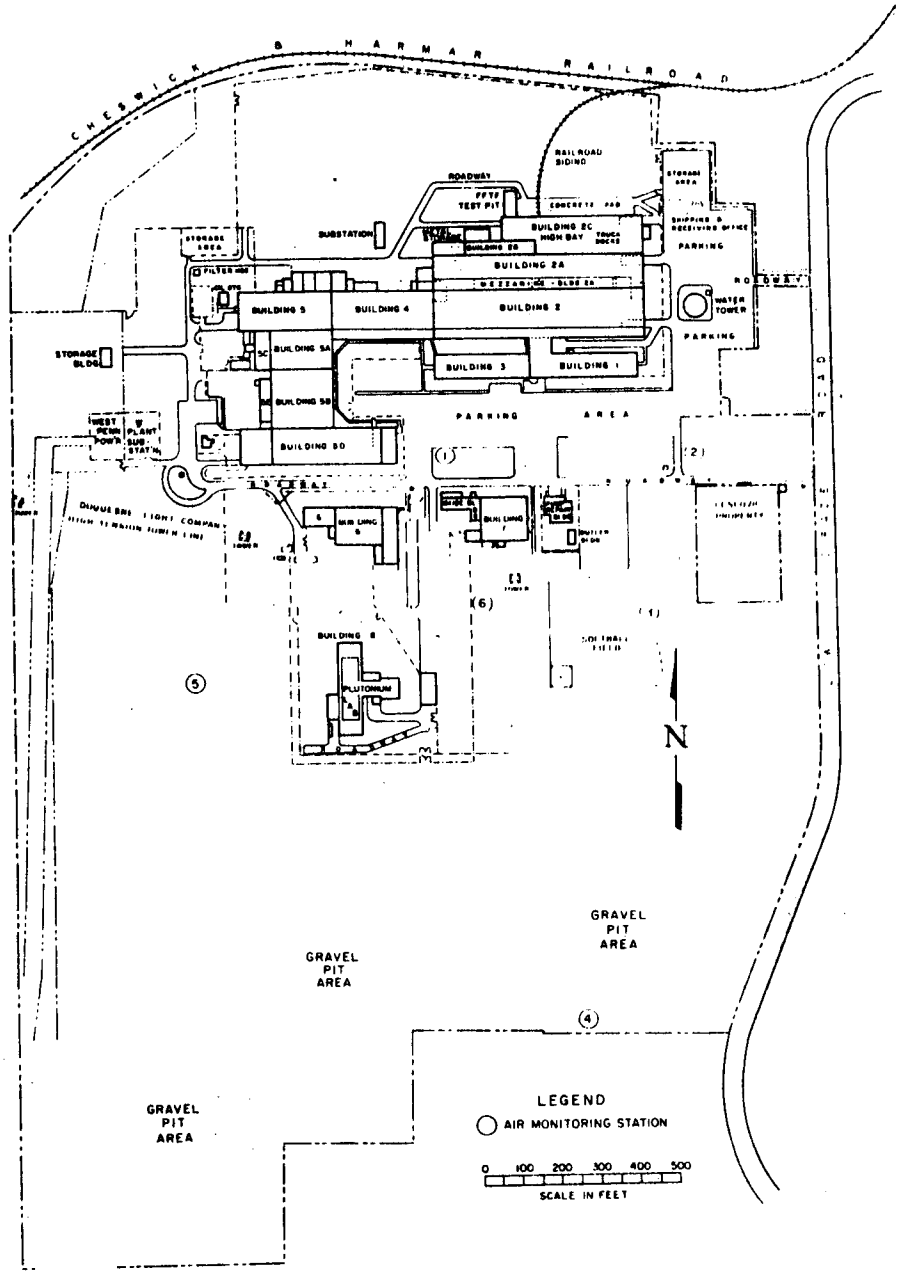


Figure 8 On-Site Air Monitoring Stations

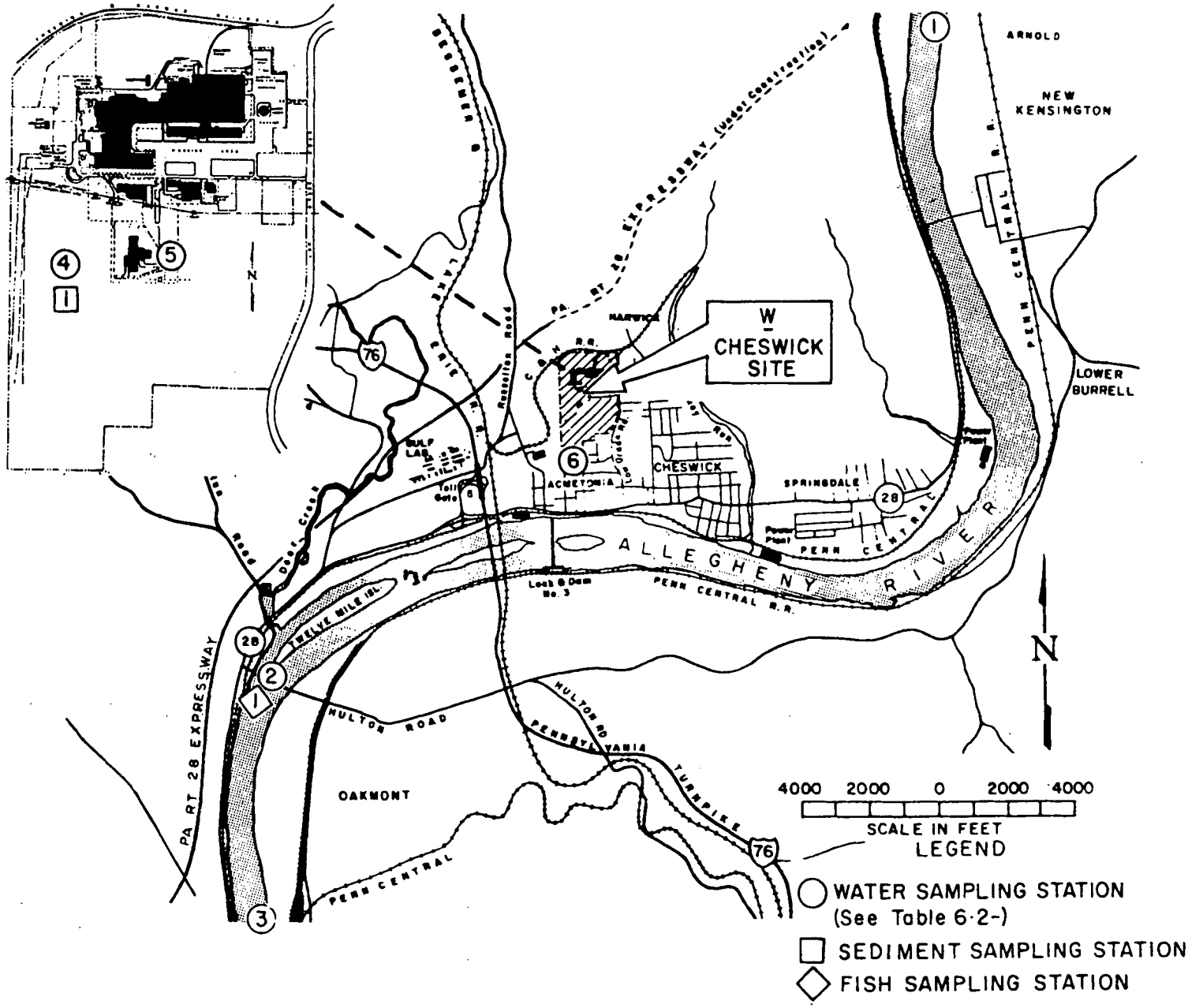


Figure 9 Locations of Water, Fish and Sediment Sampling Stations

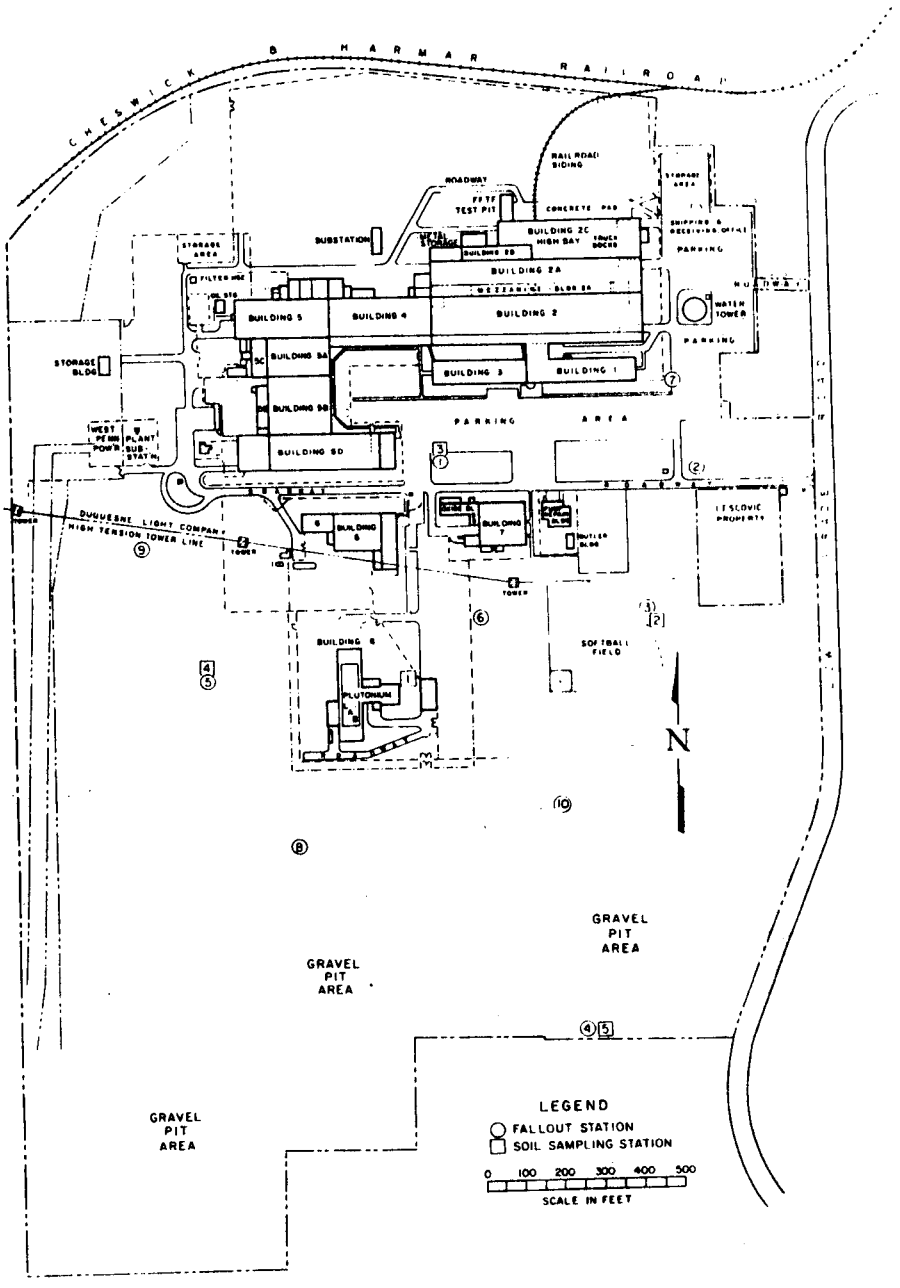
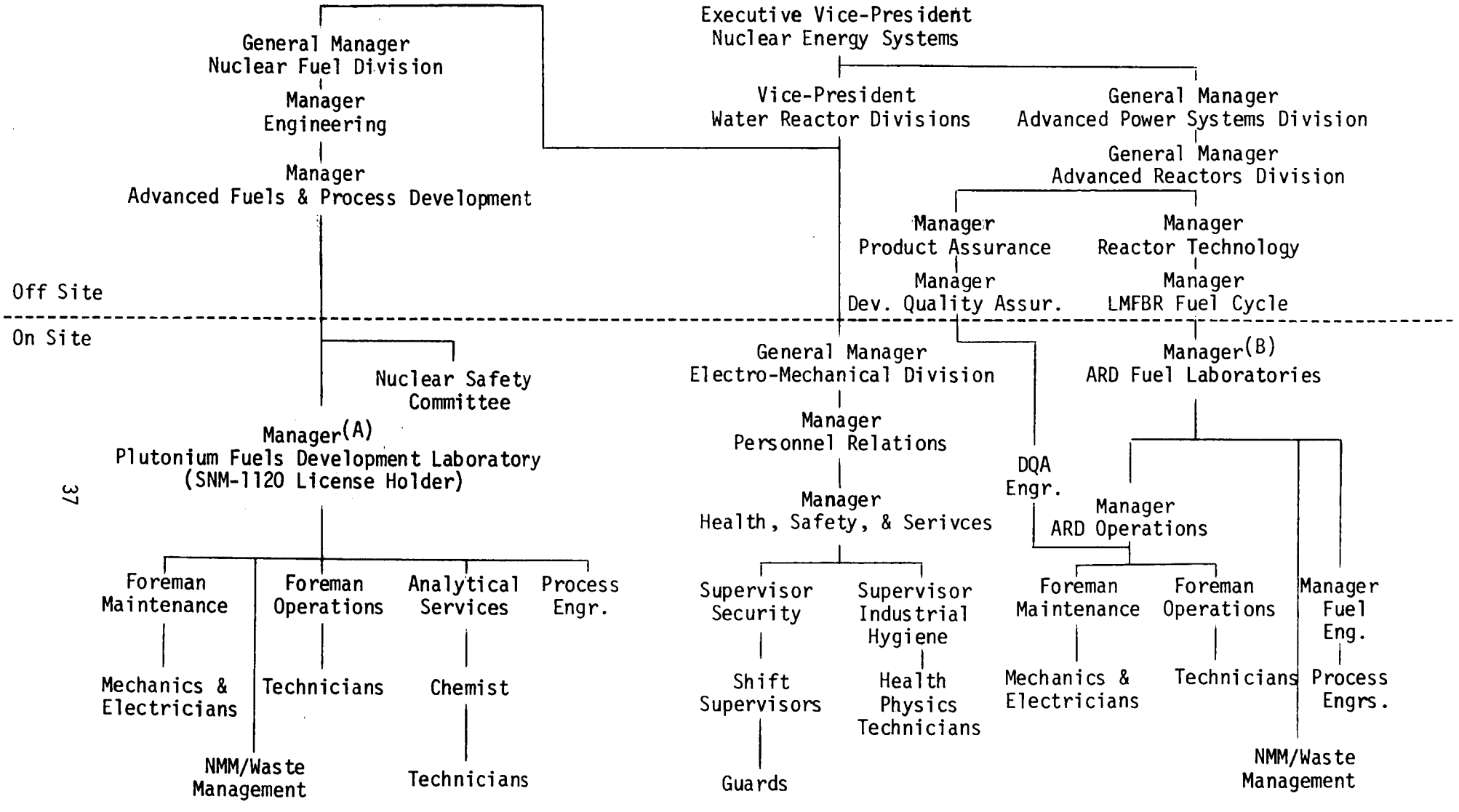


Figure 10 Soil and Fallout Monitoring Stations



(A) Directly responsible for safety and security of Building 8 (PFDL) and the Uranium Laboratory in Building 7.

(B) Directly responsible for safety and security of the Plutonium Laboratory in Building 7 and Advanced Fuels Laboratory in Building 8 (PFDL).

Figure 11
PROGRAM ORGANIZATION

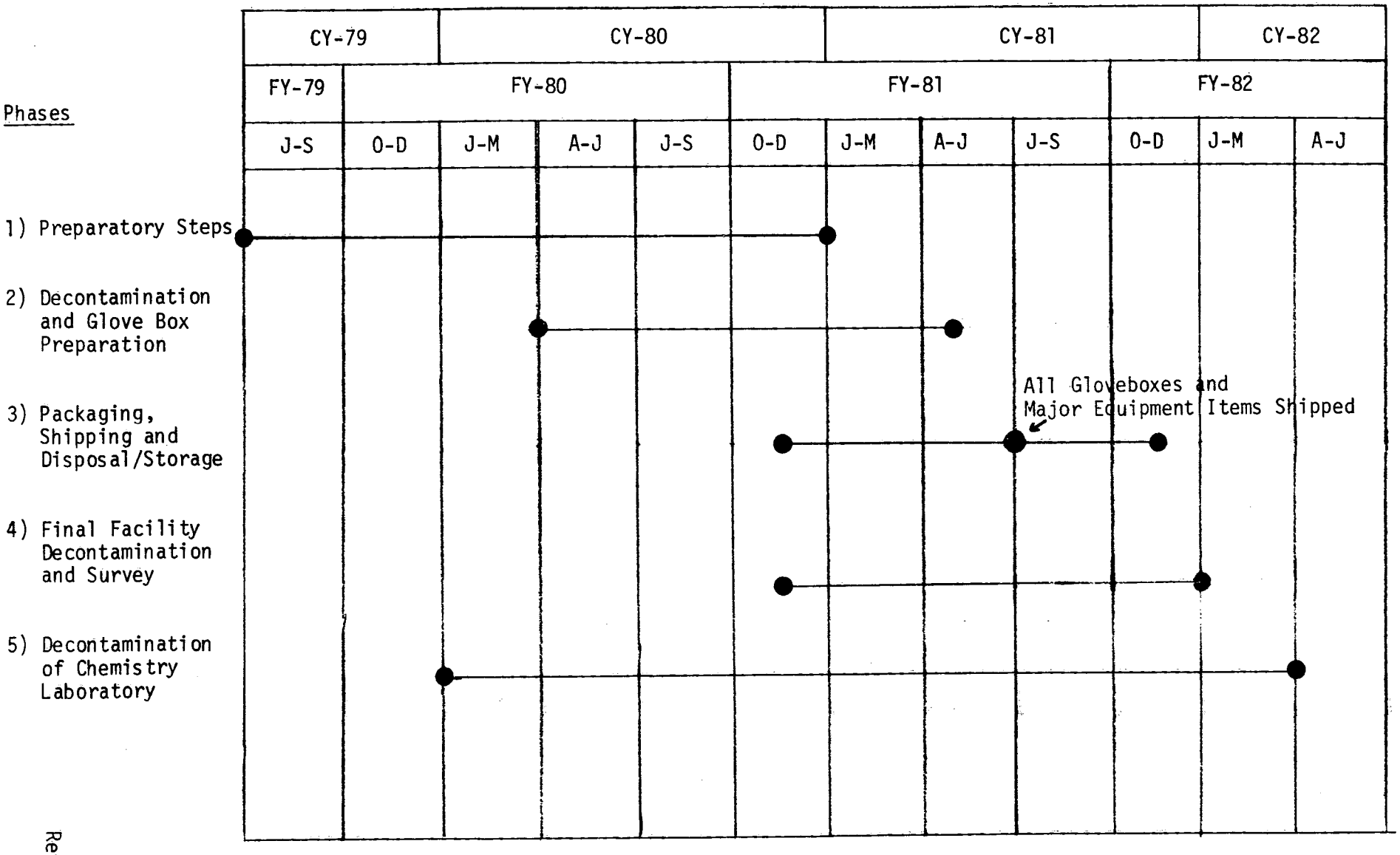
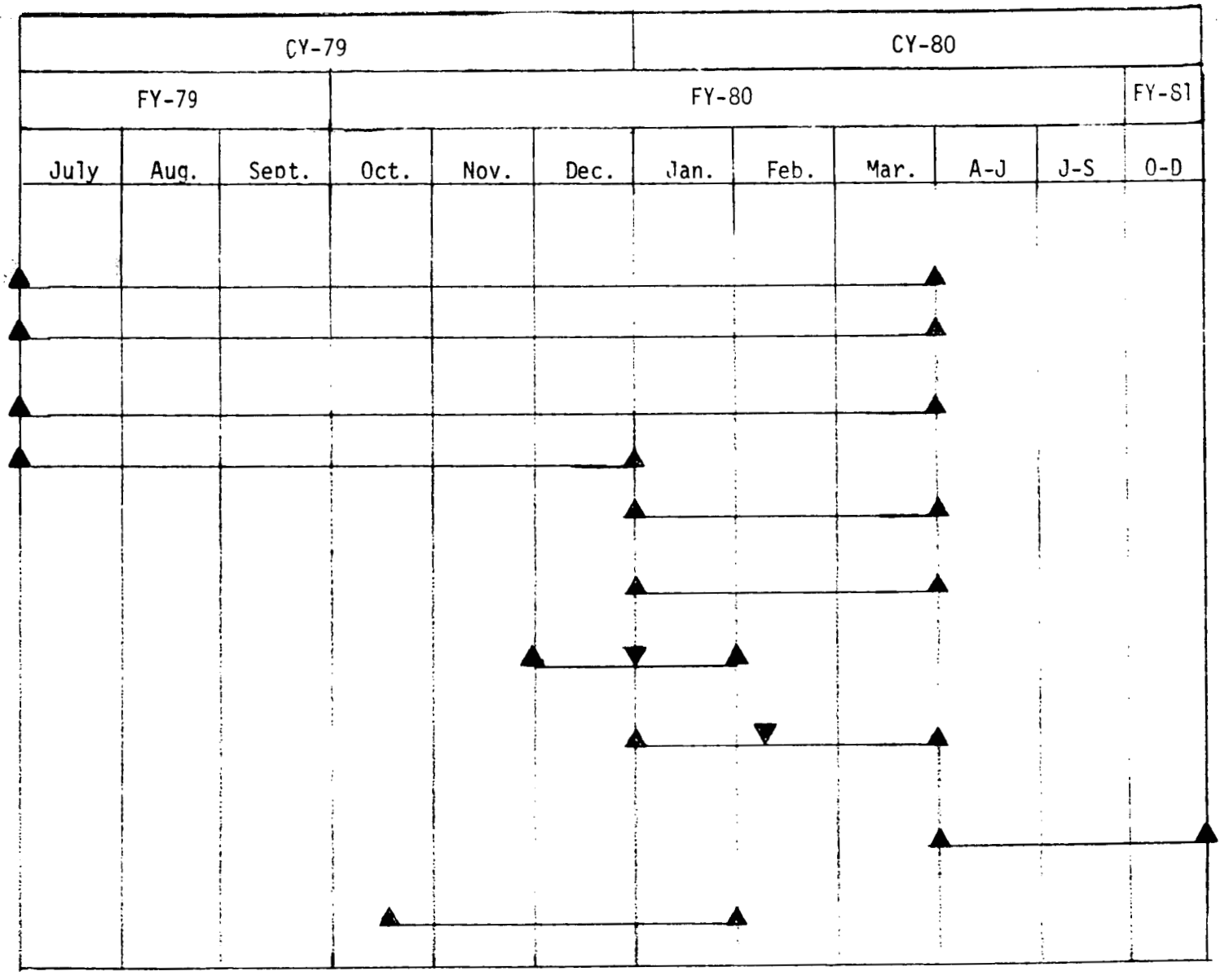


Figure 12 Schedule of Phases for Conducting D and D Program



Key:

∠ - Anticipated start or completion of activity

▲ - Completed activity

▼ - Early completion of activity

Figure 13 Phase I Schedule with Milestones

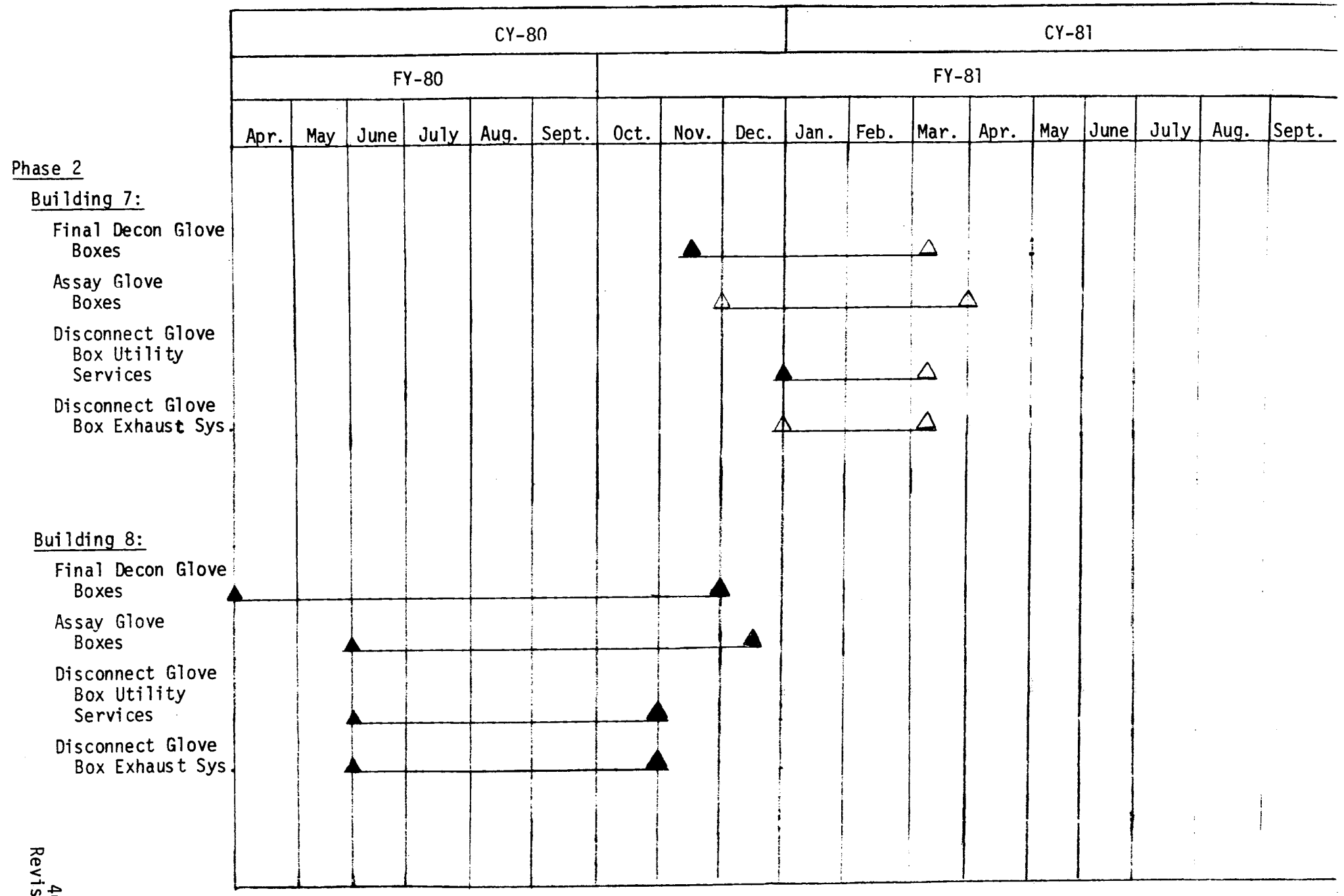


Figure 14 Phase 2 Schedule with Milestones

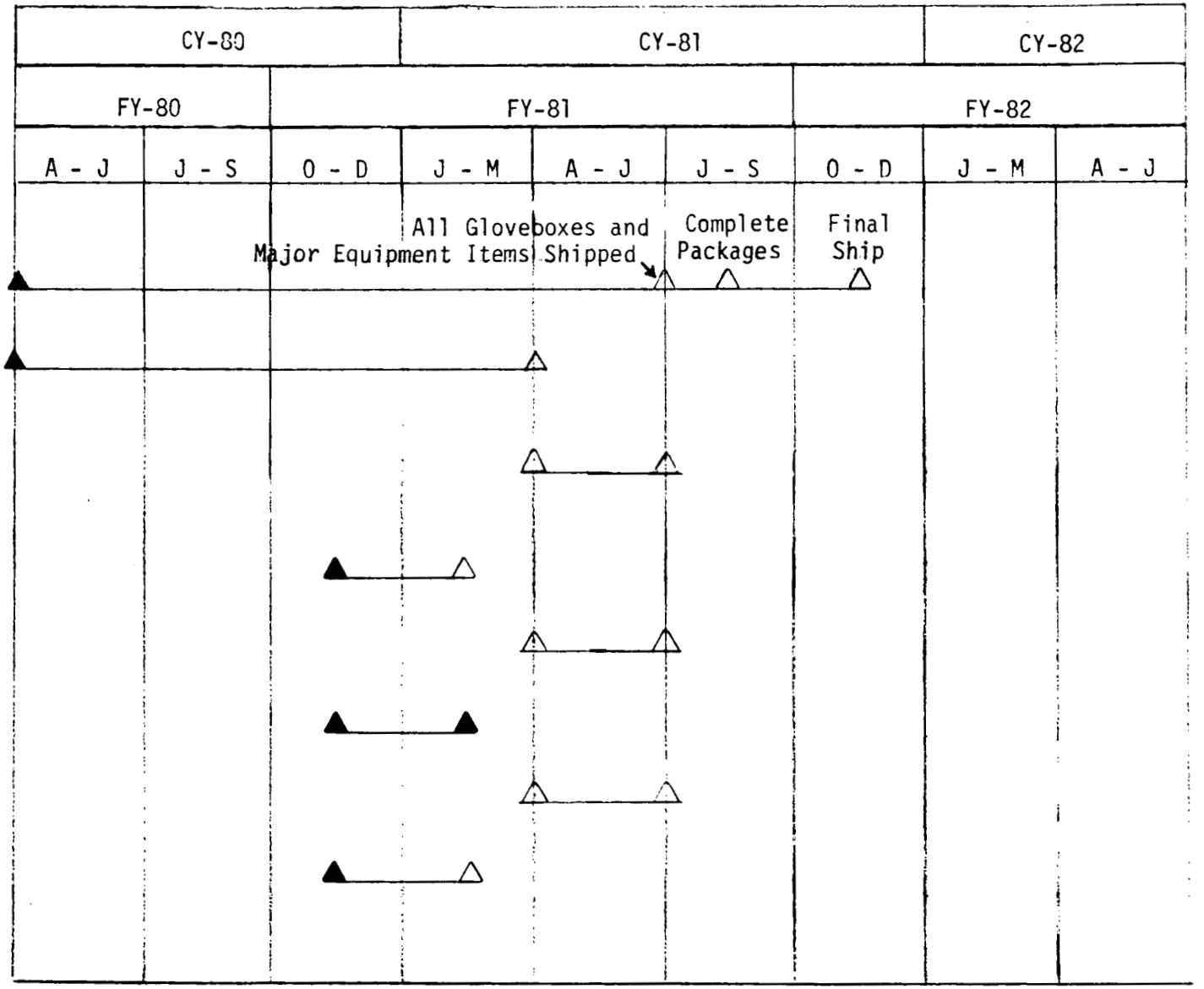


Figure 15 Phase 3 Schedule with Milestones

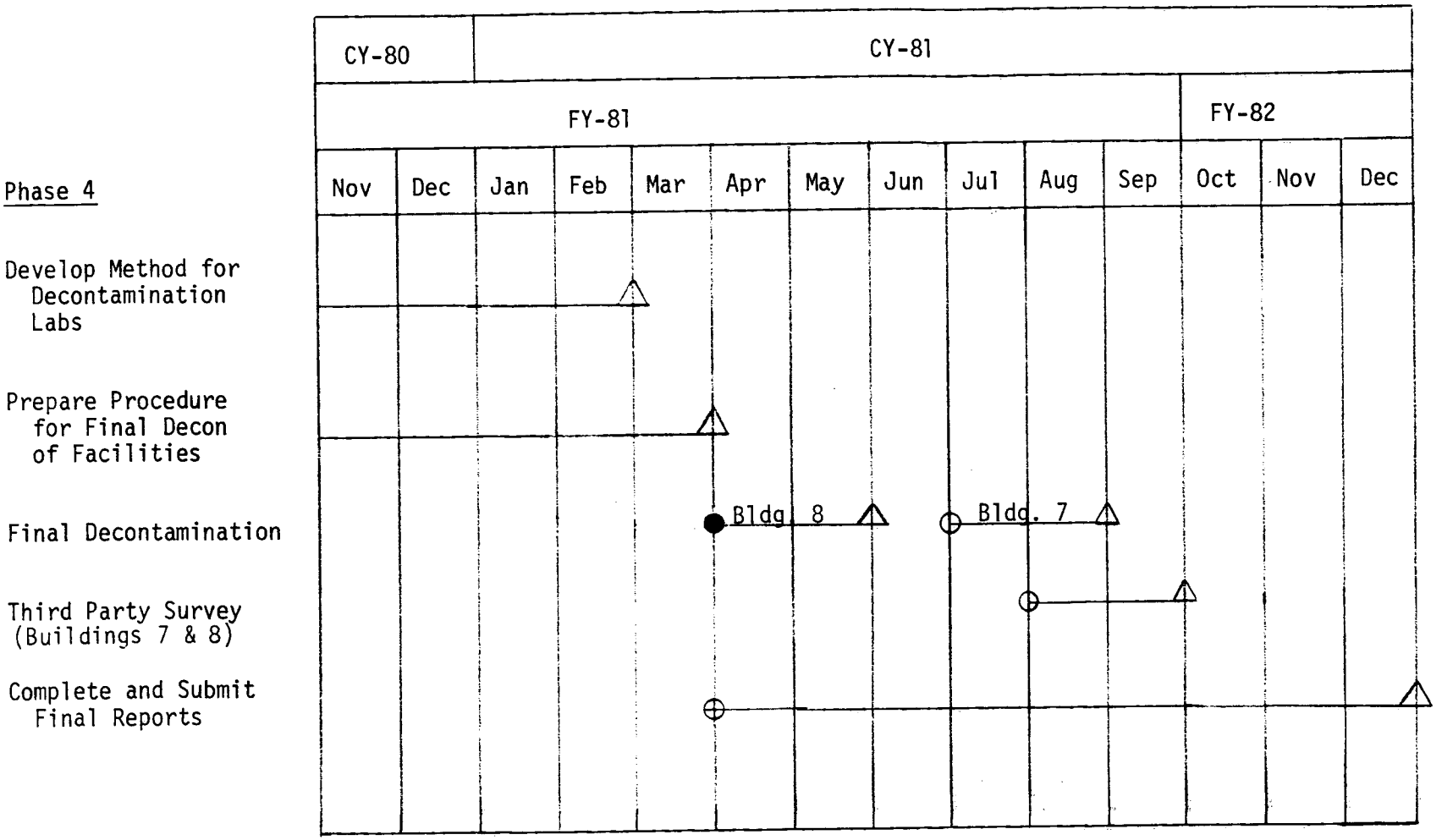


Figure 16 Phase 4 Schedule with Milestones

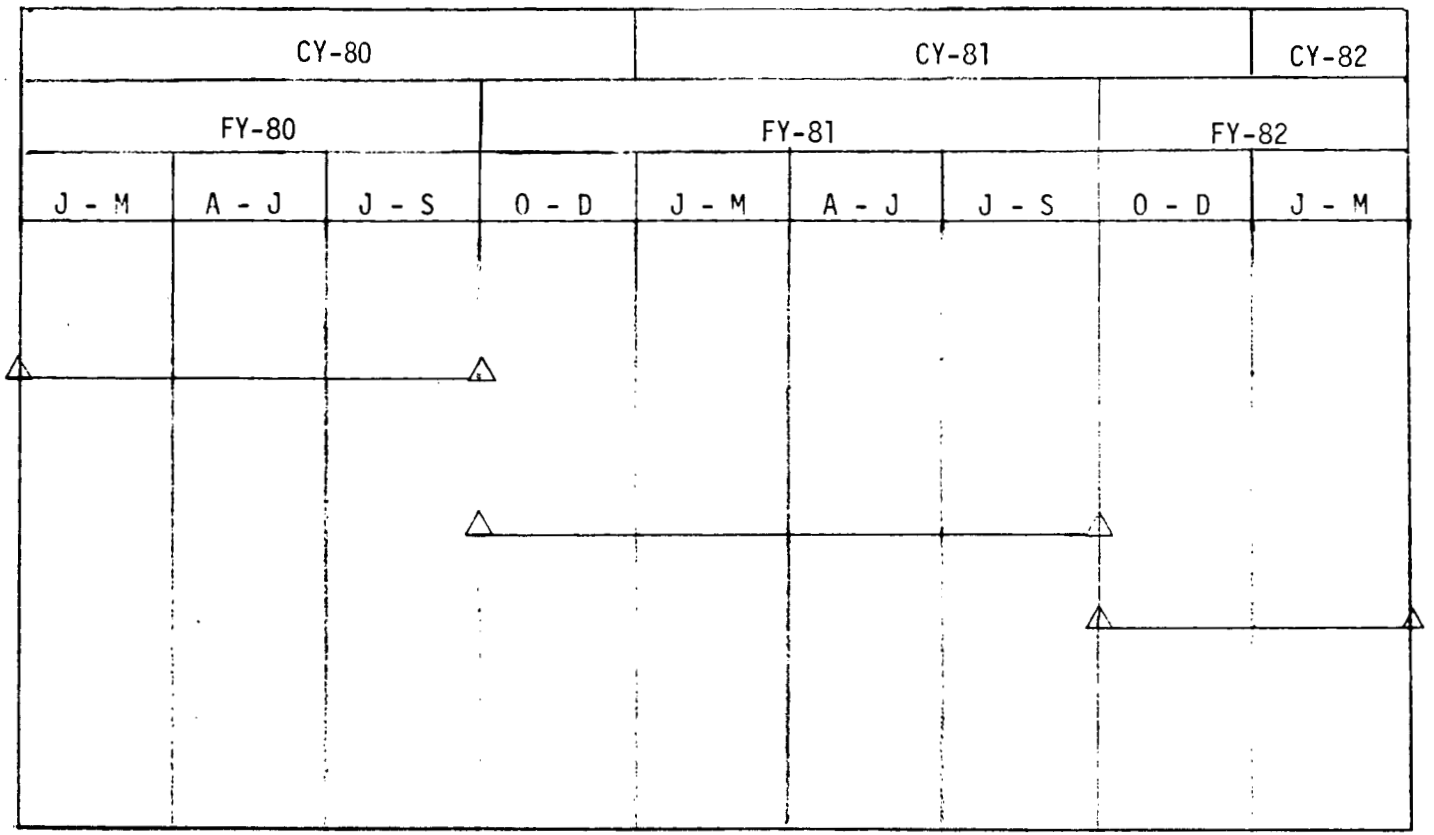


Figure 17 Phase 5 Schedule with Milestones

ATTACHMENT 2

DOE/EA-0133

ENVIRONMENTAL ASSESSMENT FOR DECONTAMINATION AND DECOMMISSIONING THE WESTINGHOUSE ADVANCED REACTORS DIVISION PLUTONIUM FUEL LABORATORIES, CHESWICK, PA

DECEMBER 1980

TO

FINAL REPORT FOR

DECONTAMINATION AND DECOMMISSIONING

OF

ADVANCED REACTORS DIVISION FUEL LABORATORIES

AT

CHESWICK, PA

JANUARY 1982

PREPARED BY

U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C. 20585

WITH THE ASSISTANCE OF

WESTINGHOUSE ADVANCED REACTORS DIVISION
PLUTONIUM FUEL LABORATORIES

UNDER

DOE CONTRACT NO.: DE-AC02-80ET37247

REVISION RECORD

Original Issue - March, 1980

Revision 1 - August 5, 1980

Extensive rewrite covering nearly all pages in response to questions and comments from DOE.

Revision 2 - August 29, 1980

Page 2-5. Revised last sentence of first paragraph and added sentence on effects.

Page 3-4. Revised fourth paragraph on dumping of liquid effluents.

Page 5-4. Corrected typographical error in second paragraph.

Page C-12. Expanded Note 1 of Table XI to clarify material involved.

Revision 3 - December, 1980

Page iv Incorporate Preface to document

Page 1-1. Typo Correction

Page 2-1. Typo Correction

Pages 2-7 and 2-8
Revised Section 2.6 to reflect waste shipments to Richland only.

Page 3-1. Clarified statement on personnel training

Page 3-4. Clarified third paragraph with respect to filtration and monitoring air effluent and treatment and disposal of liquid effluents.

Page 3-5. Editorial change in last sentence

Page 4-9. Corrected reference note.

Appendix D Relocated information from front of document and included addresses.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

FINDING OF NO SIGNIFICANT IMPACT

Decontamination and Decommissioning of the Westinghouse Advanced Reactors Division Plutonium Fuel Laboratories, Cheswick, Pennsylvania

The Department of Energy has prepared an environmental assessment on the proposed decontamination and decommissioning of the Westinghouse Advanced Reactors Division Plutonium Fuel Laboratories, Cheswick, Pennsylvania. Based on the environmental assessment, which is available to the public on request, the Department has determined that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969, 42 U.S.C. 4321 et seq. Therefore, no environmental impact statement is required.

The proposed action is to decontaminate and decommission the Westinghouse Advanced Reactors Division fuel fabrication facilities (the Plutonium Laboratory - Building 7, and the Advanced Fuels Laboratory - Building 8). Decontamination and decommissioning of the facilities would require removal of all process equipment, the associated service lines, and decontamination of the interior surfaces of the buildings so that the empty buildings could be released for unrestricted use. Radioactive waste generated during these activities would be transported in licensed containers by truck for disposal at the Department's facility at Hanford, Washington. Useable non-radioactive materials would be sold as excess material, and non-radioactive waste would be disposed of by burial as sanitary landfill at an approved site.

There are no significant environmental impacts associated with the proposed action. All decontamination and decommissioning operations will be carried out within the plutonium laboratory facilities or in temporary enclosures (within the facilities) with appropriate filtered ventilation systems. Emissions of contaminated materials to the air will be minimal (less than

0.096 x 10^{-14} microcuries per milliliter) since all exhaust air will be filtered through at least two, in-series, high efficiency particulate air filters. Liquid radioactive waste is expected to be minimal, and any contaminated liquid produced during the decommissioning will be collected and disposed as radioactive waste. Radiation exposure to decontamination personnel will be less than 2 rems per person per year, and will be below the Department's exposure guidelines as stated in Manual Chapter 0524, "Standards for Radiation Protection." Radiation exposure to truck drivers and to the general public have been assessed for both normal and accident conditions. With the exception of an extremely severe accident (probability of 4.18 x 10^{-6}), radiation exposures during transport of the materials are well within the guidelines of Manual Chapter 0524.

Alternatives to the proposed action considered in the environmental assessment include: (1) decontamination and decommissioning of the facilities over a long period of time, and (2) placing the facilities in a standby condition for an indefinite period.

Copies of the environmental assessment are available from:

Dr. Paul Kearns
Department of Energy
Chicago Operations and Regional Office
Operational and Environmental Safety Division
9800 South Cass Avenue
Argonne, Illinois 60439
312-972-2253

For further information contact:

Robert Strickler, EV-121
U.S. Department of Energy
Office of Environmental Compliance
and Overview
NEPA Affairs Division
Room 4G-064
Forrestal Building
1000 Independence Avenue, S. W.
Washington, D.C. 20585
202-252-4610

1. GENERAL INFORMATION

1.1 PURPOSE OF THIS REPORT

The announcement that the Department of Energy (DOE) has decided to conclude test fuel fabrication activity at the Westinghouse Advanced Reactors Division Fuel Fabrication Facilities early in FY 1980 has resulted in the formulation of a complete decontamination and decommissioning plan for these facilities. The plutonium processing operations conducted within the facility were housed in glove box type containment structures. Decontamination and decommissioning of the facilities requires the removal of all process equipment, the associated glove box containment structures, the glove box ventilation ductwork and filtration systems, and associated service lines. The interior surfaces of the buildings will be decontaminated as necessary such that the empty buildings can be released for unrestricted use. The objective of this plan is to complete the decontamination and decommissioning of these facilities in the shortest possible time, estimated to be two to three years. This action is needed to restore the buildings for unrestricted use and to remove the potential hazard for dispersal of residual plutonium from contaminated equipment in the event that these buildings were subjected to a destructive occurrence.

1.2 BACKGROUND

The Westinghouse Advanced Reactors Division (ARD) operates at the Cheswick Site, Harmar Township, Allegheny County, in two laboratories comprising the Cheswick Fuel Operations--these are the Plutonium Laboratory (Building 7) and the Advanced Fuels Laboratory (Building 8).

These operations are complementary to the Plutonium Fuels Development Laboratory operated by the Westinghouse Nuclear Fuel Division for development and fabrication of light water recycle fuel. Not only is the site shared, but also buildings, analytical services, license administration, safeguards compliances, security, Health Physics monitoring, and many other day-to-day operating requirements of a laboratory whose common endpoint is the utilization and recycling of plutonium--either in a pressurized water reactor or in a fast breeder nuclear power plant.

The ARD's Plutonium Laboratory was established in 1966 within Building 7 for the purpose of process and fabrication development and characterization of mixed uranium-plutonium carbide fuel materials and fuel elements. Sodium bonded fuel pins were fabricated under Government contract from 1967 to 1969 for irradiation testing in the General Electric Test Reactor (GETR) and in the Experimental Breeder Reactor No. II (EBR-II).

Stemming from the AEC's decision in 1969 to decrease and phase out their support of carbide fuel for Liquid Metal Fast Breeder Reactor (LMFBR) applications and emphasize oxide fuel for the Fast Flux Test Facility (FFTF) and Clinch River Breeder Reactor Plant (CRBRP), the ARD Plutonium Oxide Laboratory was established in Building 8. This facility was designed initially to operate with a once-through air atmosphere in the glove boxes, but provisions were made for later conversion to an inert atmosphere in the glove boxes, if required A significant number of uranium-plutonium oxide fuel assemblies were fabricated in this facility under Government contracts from 1969 to 1973 for irradiation test in EBR-II.

In response to a request from the AEC in 1974, Westinghouse ARD became a participant in the LMFBR Advanced Fuels Program. Extensive facility modifications were made, primarily in the Building 8 fabrication area, to make possible the fabrication of the uranium-plutonium carbide material. Following these modifications, approximately 250 fuel pins containing uranium-plutonium carbide fuel were fabricated for test in EBR-II in the period 1975 through 1979.

Facility modifications over the past few years were directed at increasing throughput and providing a capability for fabricating the longer Fast Test Reactor (FTR) type pins. With this increased throughput and longer pin capability established, full scale fabrication of fuel pins of FTR assemblies was accomplished. Fabrication of the initial complement of pins (ACN-1) for test in FTR has been completed.

In addition, a separate fuel fabrication facility was also established for fabricating blanket fuel rods. During the past two years, sufficient blanket rods for five assemblies were fabricated: two assemblies for test in EBR-II, and three for insertion in FFTF.

Building 8, designated the Plutonium Fuels Development Laboratory (PFDL), is shared with ARD by part of the Engineering Department of Westinghouse Nuclear Fuel Division (NFD). NFD is responsible for the fabrication of fissionable materials used to fuel nuclear power reactors. NFD's program at PFDL involved the development of recycle plutonium obtained from light water fuel for fabrication in mixed oxide fuel (PuO_2-UO_2) for use in light water reactors.

Building 7 is also shared by NFD for their use in uranium oxide fuel development activities.

1.3 SITE LOCATION AND LAYOUT

The Cheswick Site is located in the southwest section of Pennsylvania in Allegheny County. It is approximately ten miles northeast of Pittsburgh and is easily reached by the Pennsylvania Turnpike, Route 76 as shown in Figure 1. Nearby towns, industrial plants, public facilities, the Allegheny River, and transportation links are shown in Figure 2. The Site is bounded by the Cheswick and Harmar Railroad to the north and west, and by Low Grade Road to the east and the borough of Acmetonia to the south.

Buildings 7 and 8 are located in the center of approximately 113 acres of existing disturbed commercial land at 960 feet above mean sea level (MSL). Figure 3, a contour map of the Site, shows the Building 8 perimeter and exclusion area boundary. Figure 4 shows a floor plan of Building 7 with occupied ARD areas and fenceline exclusion area boundaries. Figure 5 shows a similar floor plan for Building 8 with ARD occupied areas noted.

The area around the Site is primarily hilly with a rural area to the north and commercial and residential areas to the east, south, and west. Plant Site drainage flows by gravity following original drainage patterns to the Allegheny River.

There are no plans for major Site modifications in the immediate future. The unused land on the site (approximately fifty acres) is intended to remain in its present state.

1.4 PROPOSED PROJECT SCHEDULE

The decontamination and decommissioning (D&D) plan to restore plutonium facilities to unrestricted use was formulated in 1979, and D&D operations were initiated in 1979. With the announcement that DOE had decided to conclude test fuel fabrication activity at the Westinghouse Advanced Reactors Division Fuel Fabrication Facilities early in fiscal year 1980 (which began on October 1, 1979), a decision was made to completely decontaminate and decommission (D&D) these facilities. Simultaneously, it was decided that the commercial fuel fabrication facilities operated by the Nuclear Fuel Division would also be decontaminated and decommissioned. Thus complete D&D of the fuel laboratories in Buildings 7 and 8 which fall under license SNM 1120 will be accomplished in the shortest possible time consistent with achieving safe, approved disposal of all nuclear materials.

Plutonium processing operations within the facilities were ceased in the latter half of 1979. D&D activities conducted to date have included:

1) Cleanout of all glove boxes to accumulate all recoverable amounts of scrap Special Nuclear Material (SNM).
2) Packaging and shipment of all scrap and virgin SNM to other government locations.
3) Cleanup of glove boxes (continuing) to remove process equipment and waste and to package such materials for disposal as contaminated waste.
4) Cleaning of interior glove box surfaces in preparation for eventual disposal.
5) Removal of noncontaminated equipment from the facilities.
6) Removal of service lines to the glove boxes.

The D&D effort is expected to require approximately 2-1/2 years and be completed early in 1982.

1.5 PREVIOUS LICENSING ACTIONS

The Westinghouse Site at Cheswick, Pennsylvania, has a history of activities involving SNM that goes back to 1957 when the Westinghouse Atomic Fuel Department commenced operations fabricating reactor cores for the Naval Reactors Program under contract arrangements. In 1957 License SNM-338 was issued to authorize activities leading to a growing commercial reactor fuel facility. In 1963 the Westinghouse Astronuclear Laboratory added its core fabrication facility to the Site. This activity was subsequently phased out in 1972. In the meantime, under License SNM-338, the Navy core activity ceased and a uranium oxide laboratory activity was initiated in Building 7, followed by an Advanced Reactors Division (ARD) Plutonium Development Laboratory in the same building.

The license authorizing the use of SNM at the PFDL, SNM-1120, was issued in 1969. In 1970 the ARD Plutonium Laboratory was granted a separate license, SNM-1170. As indicated in the following tabulation, the activities carried out in Building 7 were transferred to SNM-1120 in 1971, and the superseded License SNM-1170 was terminated. In 1972 the low enriched uranium activities carried on by NFD were phased out. License SNM-338 has been inactive since 1973, and is currently in the process of being completely terminated. When License SNM-338 officially closes, it will leave SNM-1120 as the only SNM license active on the Site. License SNM-1120 is a dynamic document that undergoes minor changes as required. The major milestones in its existence to date are listed below:

Chronology of Licensing Actions

November 12, 1968	Original application submitted.

Chronology of Licensing Actions (cont.)

February 24, 1969	Modified application transmitted, asking receipt and possession only of 1.5 kg of plutonium
March 7, 1969	Original license issued, in response to 2/24/69 application, for receipt and possession only of plutonium
May 16, 1969	License amended in response to 11/12/68 application as revised, to authorize possession and use of a full 20 kg quantity of plutonium
June 13, 1969	Application submitted to expand license to include ARD activities in Building 8
August 22, 1969	Licensed quantity in PFDL increased to 50 kg plutonium
October 17, 1969	License amended in its entirety, in response to 6/13/69 application as revised, to authorize addition of ARD activities
December 30, 1970	Licensed quantity increased
December 10, 1971	Application submitted to include ARD and PFDL activities in Building 7
August 11, 1972	License again amended in its entirety, in response to 12/10/71 application as revised, to include Building 7 activities
January 6, 1974, Through May 7, 1974	License amendments providing upgraded physical security and nuclear materials safeguards negotiated and issued
March 18, 1974	License renewal requested.
September, 1974	Westinghouse Cheswick Site Fuel Development Laboratories Environmental Report submitted
February, 1975	Revision 1 of Environmental Report submitted
May, 1975	Application for an amended special nuclear material license for the Plutonium Fuels Development Laboratory submitted

Chronology of Licensing Actions (cont.)

June, 1975	Revision 2 of Environmental Report submitted (report expanded to add Appendix 4.H)
September, 1975	Revision 3 of Environmental Report submitted (ARD carbide fuel development activities added)
July, 1976	Revision 1 of License Application submitted (May, 1975, document revised in response to NRC letter of June 29, 1976)
November, 1976	Revision 2 of License Application submitted (editorial and clarifying changes made)
June, 1978	Revision 3 of License Application submitted (some pages retyped for clarity and continuity)
November, 1978	Revision 4 of License Application submitted (complete rewrite per NRC/Westinghouse review)
July, 1979	Revision 5 of License Application submitted (area posting changes noted)

2. DESCRIPTION OF OPERATING LEVEL ENVIRONMENT

During the eleven years of operation of fuel laboratories on the Cheswick Site, all occupational and general population standards for radiation protection have been met (DOE/ERDAM 0524, 10 CFR 20), including the criteria of "as low as reasonably achievable" (ALARA) (Tables I, II, and III). Radiation exposures and releases for toxic materials have been below acceptable health and safety standards (OSHA-NIOSH) and applicable regulatory environmental levels (EPA 40 CFR 190 and NRC 10 CFR 20) (see Tables IV, V, and VI). These data, which are summarized below, provide a basis for estimating maximum exposure levels during planned decommissioning activities.

2.1 EXTERNAL RADIATION EXPOSURES TO OPERATING PERSONNEL

External radiation exposures to operating personnel as measured with thermoluminescent dosimeters (TLDs) have been recorded and tabulated according to major job function categories by year in nine incremental exposure ranges as reported in Table I. All whole body exposures are below NRC limits of 5 rem/year, and the annual population exposure for all operating personnel has decreased about a factor of 2 from the 1976-1977 time period to the 1978-1979 time period. Table I also shows that ARD personnel exposures were approximately 25 percent of the total fuel laboratory personnel exposures, except for the year 1978 when ARD accounted for 58 percent of the total. The decrease in external exposures to laboratory personnel in 1978 and 1979 was achieved primarily through enforcement of administrative procedures, but partially through added facility shielding to comply with as low as reasonably achievable (ALARA) requirements of 10 CFR 20.1(c).

Table II summarizes the external exposure history for operating personnel at the Cheswick Fuel Laboratories for the years 1975 through 1979. These data confirm the fact that both the total occupational population exposure and the average occupational exposure per individual has decreased significantly over the period 1975 through 1979. Typical values for 1979 were 12 man-rem for total laboratory population exposure (3.1 man-rem due to ARD operations) and 0.25 rem average exposure for operating personnel receiving measurable

exposures. This average amounts to only 5 percent of maximum allowable exposure limits.

2.2 AIRBORNE RADIATION EXPSOURE LEVELS TO OPERATING PERSONNEL

Historical data on the number of daily air samples for which the airborne alpha concentration exceeded maximum permissible concentration (MPC) limits at the Cheswick Fuel Laboratories are summarized in Table III. These data are summarized by work area for the years 1976 through 1979. The distribution of the number of daily samples exceeding various multiples (e.g., 1, 2, 3, 4, 10, 100) of MPC are also provided for the total laboratory in the "Distribution" column. The last column of Table III presents the "Figure of Merit" in terms of "Percentage of Possible MPC-Sample Days." The decreasing figure of merit value for the room air samples again indicates a generally improving air environment within the PFDL over the last several years. It is also worth noting that the ARD lab area was below lab average in terms of the percent of air samples exceeding MPC.

Using an average exposure for the four-year period of record (1976 through 1979) of <5.0 percent MPC, the average annual individual bone dose exposure to PFDL personnel is estimated to be <1.5 rem*. The comparable average lung exposure as a result of insoluble forms of plutonium is estimated to be ≤0.05 rem*. For ARD personnel during the referenced time period (1975 through 1979), only the latter increment would be expected to apply since only solid materials were handled, and these materials were generally considered insoluble (nontransportable) in body fluids.

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*Since existing regulations (40 CFR 190 and 10 CFR 20) for operating plants are based on maximum annual dose increments, this parameter is utilized in Sections 2 and 3 rather than the 50-year (lifetime) dose commitment considered for accident conditions as addressed in Section 4. The relationship between 50-year dose commitment for continuous intake and the maximum annual dose increment is discussed in Appendix 4D of Reference 1.

2.3 OFF-SITE RADIATION EXPOSURE LEVELS FROM AIRBORNE EFFLUENTS

Off-site airborne environmental levels of plutonium discharged from the PFDL and ARD Plutonium Laboratory in Building 7 are calculated for the years 1975 through 1979 based on measured stack releases the annual average meteorological dispersion factors (χ/Q) given in the Cheswick Site Environmental Report [1] and conversion of inhaled activity to organ dose by the methods outlined in the 1979 ALARA Report [12].

Based on these conditions, the maximum dose increments to an off-site individual as a result of inhalation of plutonium discharged from the PFDL were calculated as 0.01 mrem/yr to the lung if the plutonium were all in an insoluble form and 0.043 mrem/yr to the bone if the plutonium were all in a soluble form. These levels are only about 0.01 percent and 0.04 percent of annual average whole body background exposure by gamma rays from environmental background activity. ARD effluents typically contributed only 7.5 percent of the total. Comparable increments at the same location as a result of Building 7 Plutonium Laboratory releases were calculated as 0.0015 mrem/yr to the lung and 0.0064 mrem/yr to the bone for 100 percent insoluble or 100 percent soluble forms of plutonium, respectively. Based on the conditions defined above, the total airborne discharge of plutonium averaged 1.28 μCi/yr or less from the Cheswick Plutonium Laboratories. These relatively low values are, most likely, a large overestimate of actual conditions since analysis of stack samples performed in 1975 and presented in Appendix 4.H of Reference 1 showed that plutonium activity was only about 4 percent of the total alpha activity.

Off-site airborne environmental levels are also evaluated due to NFD Uranium Laboratory stack discharges. The annual average discharge concentration of alpha activity in the Building 7 NFD Uranium Laboratory exhausts for the period 1971 through 1979 are summarized in Table V. The calculated annual rate of uranium alpha activity released to the atmosphere is also shown in Table IV. For the last five years of operation (1975 through 1979), the discharge concentration has averaged 4.0×10^{-13} Ci/cc, and the total discharge to the atmosphere has averaged 31 μCi/hr. Utilizing methods for calculating

dose rate similar to those used for the plutonium analysis and with dose conversion factors for uranium taken from Reference 2, the dose rate increments from uranium inhalation by the nearest off-site individual were calculated as 0.6 mrem/yr to the lung and 0.0091 mrem/yr to the bone. These values are typically about 0.5 percent and 0.008 percent of whole body background exposure due to gamma rays from existing environmental activity.

All dose increments are summarized in Table IV.

The total off-site dose increment to the lung from all Cheswick Fuel Laboratories operations, assuming that all effluents are in the insoluble form, was calculated to be 0.61 mrem/yr. This amounts to only 2.5 percent of the EPA standard[3] and 0.041 percent of the NRC standards[4]. The total dose increment to the bone, assuming that all effluents are in the soluble form, was calculated to be 0.058 mrem/yr. This amounts to only 0.23 percent of the EPA standard[3] and 0.002 percent of the NRC standards[4] for the off-site environment. The ARD laboratory contributions amount to only 0.0023 and 0.01 mrem/yr to lung and bone, respectively, which are equivalent to 0.002 and 0.008 percent of annual whole body background exposure due to gamma rays from existing environmental activity. These dose increments are clearly a very small fraction of existing levels and thus the additional contribution is considered insignificant.

2.4 OFF-SITE EXPOSURES TO TOXIC CHEMICALS FROM AIRBORNE EFFLUENTS

The only nonradioactive airborne pollutants at the Cheswick Site Fuel Laboratories are from the gas heater exhaust and from the intermittent operation of the emergency gas-powered generator exhaust[1]. The small amounts of CO, NO_x and particulates from these combustion sources are estimated based on Air Pollution Engineering Manual [5] data of typical measured combustion values. The resulting concentration of these pollutants at the nearest off-site residence are calculated as shown in Table VI, and these values are compared with national ambient air standards, existing ambient levels (where monitored)

and with eight-hour OSHA standards (where applicable). The calculated values are based on annual average emission rates and meteorological dispersion parameters; but for short-term (eight-hour) concentrations (for comparison with OSHA standards), the calculated values could be increased by up to a factor of 10 to allow for more extreme meteorological effects and maximum discharge rates. The total estimated levels for nonradioactive gaseous effluents from PFDL and Building 7 are very low relative to national standards and monitored levels in this area. Furthermore, these levels will decrease with the termination of testing and occassional use of the emergency electrical generators. NO_x and CO are not presently monitored because these pollutants are expected to be well below regulatory limits. Total suspended particulate concentration in the surrounding areas does not meet the National Secondary Ambient Air Standards and thus the area is considered a "Non-Attainment Area" for this pollutant[13]. As noted in Table VI, the contribution from the operations conducted in PFDL and Building 7 does not significantly affect the surrounding area.

2.5 OFF-SITE RADIATION EXPOSURE LEVELS FROM LIQUID EFFLUENTS

Off-site radiation exposures are also possible as a result of controlled, low concentration plutonium and uranium releases from the Cheswick Fuel Laboratories liquid effluents discharged through the sanitary sewer system. Such releases are permitted only after analysis of the contents of suspect liquids in quarantine tanks shows that the activity levels are below maximum permissible concentration levels according to NRC Regulation 10 CFR 20.303[4]. The ARD operations do not, by themselves, directly involve discharges of plutonium or uranium containing liquid effluents to the environment. The ARD Plutonium Laboratory in Building 7 solidifies its liquid waste, and thus, ships it out for solid waste burial. ARD operations at the PFDL over the last several years (1975-1979) have involved plutonium carbide development by a dry process and, thus, liquid wastes from the process itself have been nonexistent. Some chemical analysis of samples was required, and these analyses, in turn, generate some liquid wastes; but this chemical analysis was purchased as a service from NFD. Thus, from a strict interpretation of ARD operations, no liquid waste is released to the environment. However, from an environmental viewpoint, ARD requirements for laboratory operations (floor wash, dehumidifiers, etc.) causes some liquid wastes which are eventually released to the environment. Thus, the liquid release pathway will

also be considered for all fuel laboratory operations at the Cheswick Site.

Large dilution factors result from mixing these suspect waste discharges with nonradioactive sanitary waste water from the entire Cheswick Site. This nonradioactive waste water averages 50,000 gallons per day, which thoroughly mixes with the suspect waste from the Building 7 Uranium Laboratory and the PFDL prior to being processed by the Allegheny Valley Joint Sewage Authority, and is further diluted as it enters the Allegheny River.

Summaries of the annual activity and volumes of suspect waste discharged from the PFDL and Building 7 Uranium Laboratory facilities are presented on Tables VII and VIII, repsectively, for the 1974 through 1979 time period. All activity less than the minimum detectable level has been considered to be at this level. Thus, in cases where this makes a significant fraction of the total, discharges are listed as equal to or less than the average value.

Uptake through fish would be the most likely route of obtaining a measurable exposure from liquid effluent discharges. It is postulated that fish dwell in the sanitary sewage discharge water with an average annual plutonium concentration for a typical year (1977), that this water received no additional dilution, and that these fish accumulate plutonium through uptake from contaminated water. Based on a fish having a bioaccumulation factor of 4[6], an assumed ingestion of 50 grams of fish per day on an annual year-round basis, and EPA dose conversion factors by water ingestion[2], the bone dose to an individual human was calculated to be 0.59 mrem/hr. Several of the above postulates are recognized as being unrealistic and extremely pessimistic (e.g., it is very unlikely that (a) fish would live only in sewer discharge water, (b) no additional dilution would take place, (c) no removal of plutonium would take place prior to discharge and (3) that an individual would catch and eat 50 grams of fish from this one site in the manner described above.) But even under these extreme conditions, the maximum dose to an individual would be only 2.4 percent of the 40 CFR 190 limits of 25 mrem/yr.

Using the same EPA dose conversion factors noted in the previous paragraph[2], and the equivalent concentration after complete mixing in the river for the typical year (1977), the bone dose to an individual taking 2 liters of water per day for drinking plus food preparation from a downstream Allegheny River supply would be 2.6×10^{-5} mrem/yr to the bone. Thus, evaluation of the Cheswick Fuel Laboratories liquid effluent effects shows incremental radiation exposures to be very small relative to the airborne pathway. This is especially true with regard to ARD operations where the effects are determined as contributing only a small fraction of the above estimates.

2.6 OFF-SITE EXPOSURES FROM RADIOACTIVE WASTE SHIPMENTS

Radiation exposure resulting from radioactive waste shipments from the Cheswick Fuel Laboratories for the period 1975 through 1979 are summarized in Table X. Based on the model given in Reference 1, the population dose exposure to nearby residents on the route used by the moving truck shipment is estimated as 1.8×10^{-6} man-rem per mile. This value results from the exposure of 300 persons per mile with a radiation level of 1.0 mrem/hr at 10 feet from the center of the truck. This is a conservative estimate since the normal radiation level associated with these shipments is much lower. Based on this conservative estimate, the cumulative population dose per shipment would be 0.0052 man-rem per shipment to Richland, Washington (a distance of 2900 miles).

Additionally, an exposure of two onlookers for three minutes at 6 feet from the truck surface will result in a dose of 0.05 mrem per person per truck stop. For Richland, (29 truck stops) the estimated total population dose would be 0.0029 man-rem/shipment.

In addition to the exposure of nearby residents and onlookers at truck stops, two truck drivers for each shipment will receive a dose rate of 0.02 mrem/hr in the truck cab for a time period consistent with an average truck speed of thirty miles per hour. Also, both truck drivers are estimated to spend one

hour at three feet from the cargo areas at an average dose rate of 2 mrem per hour. These exposures will result in a total population dose to truck drivers of 0.0079, man-rem per shipment for shipments to Richland. These values are less than 0.0002 percent of the background population exposure to the population within a 5 mile radius of the Cheswick facilities.

Incremental doses to the general population as a result of waste shipments from the Cheswick Fuel Laboratories in the period 1975 through 1979 are summarized in Table X. The total population dose from waste shipments during the five-year period is 0.29 man-rem for an annual average of 0.059 man-rem per year. The ARD wastes have typically averaged about 10 percent of the total waste as reported in Tables IX and X.

3. POTENTIAL IMPACT FROM DISMANTLING AND DECOMMISSIONING

The reason for the proposed action is to reduce all sources of contamination from the Plutonium Facilities to levels which allow unrestricted use of the building. This will be accomplished by removal and subsequent packaging and shipping of contaminated materials in accord with the regulations of the U.S. DOT, DOE, and NRC to a licensed or Government-owned disposal site.

3.1 OCCUPATIONAL SAFETY - EXTERNAL AND INTERNAL RADIATION EXPOSURES

During the process of decontamination there is a potential for adverse effects in the exposure of employees to radiation and radioactive materials which may become airborne in workroom air. Excessive exposure of employees will be avoided through the use of detailed procedures developed in advance, in conjunction with the continued use of safety systems and procedures established for operation of the Cheswick Plutonium Fuel Laboratories, and air handling and filtration systems described below.

Since significant quantities of radioactive materials will not be handled during the decontamination effort, maximum external dose rates to Operations personnel are not expected to exceed 1.0 to 2.0 rem/yr. Average external dose rates should not exceed the average of 0.25 rem/yr or about 5 percent of maximum permissible doses[4] established for the past two years due to the reduced quantity of fuel present. Internal doses to Operations personnel will be avoided by using appropriate ventilation control, radionuclide containment, and respiratory protection devices.

All personnel who are involved in tasks of decontaminating the Cheswick Plutonium Fuel Laboratories will receive training on the normal exposure control procedures. These procedures include area surveying and monitoring, continuous and special workspace air monitoring, job assignment and exposure time control, personnel whole body radiation exposure monitoring, individual breathing zone air samples, workspace ventilation control, limited area or volume containment of radioactivity, and the application of personal protective equipment. These procedures are the one which have been applied as needed in the Plutonium Facilities over the years of operation. Due to this experience, no

new hazards are expected although the required frequency of applied safety controls may increase.

Standards for radiation protection given in 10 CFR 20 will be observed throughout the decontamination program.

By utilizing the procedures for gross decontamination of glove boxes and other contaminated equipment which have been successful to date in the NFD portaion of the Plutonium Fuel Facilities, the decommissioning of the ARD Plutonium Labs should be completed with no occupational exposure significantly above typical operating levels previously noted in Sections 2.1 and 2.2.

3.2 ENVIRONMENTAL SAFETY - EFFECTS OF AIRBORNE AND LIQUIDBORNE RADIOACTIVITY

The potential impact on the local environment will be in the steps required for: (1) removal of glove boxes and auxiliary systems, (2) packaging and transportation of contaminated equipment, and (3) disposal of noncontaminated equipment and supplies at a sanitary landfill. During removal of the glove boxes and auxiliary systems, there exists potential for release of radioactivity in airborne and waterborne form.

Release of airborne radioactivity will be controlled by conducting all operations with such potential either in the Plutonium Laboratory Facilities or a temporary enclosure having an appropriate filtered ventilation system. The current facility ventilation system and associated HEPA filtration provide excellent assurance of isolation from the surrounding environment with the average airborne concentration of plutonium at the site boundary being $\leq$ 0.016 percent of the regulatory concentration guide which is 6×10^{-14} μCi/ml. Stack monitoring systems currently installed will be maintained throughout the decontamination of the facility. Similar filtration and monitoring will be used in temporary exhaust systems to be installed when current exhaust systems are scheduled for decontamination and removal.

Volume reduction of glove boxes will be accomplished, if required, using techniques similar to those developed at other DOE plutonium facilities. This procedure will consist of chemically cleaning the box interior to remove loose contamination, coating the interior surfaces with an appropriate medium

to "fix" any residual material, and then cutting the box into plates which will fit into approved waste disposal containers. Volume reduction operations will be performed in appropriately constructed temporary enclosures or a dismantling room (DR) complex designed to prevent spread of contamination into the general laboratory area. It is anticipated that a DR complex will be constructed in the North Lab area of the PFDL and glove boxes will be moved to this area for processing. This DR will consist of four operating and three air lock modules. These modules will be connected to the main ventilation system through auxiliary HEPA filters to prevent exchange of the DR and laboratory atmospheres. Individuals working inside the DR will wear National Institute of Occupational Safety and Health (NIOSH) approved respiratory protection as well as appropriate protective clothing. Health Physics staff personnel will be in attendance to ensure proper dress of operators and effectiveness of respiratory protection equipment prior to entering the DR, to monitor personnel leaving the DR, and to ensure that all possible measures are taken to prevent spreading contamination from the DR to other areas of the laboratory.

Primary operations in the DR will include disassembly of glove boxes and other equipment, removal and fixation of contaminated residuals, sectioning or cutting of equipment into sizes compatible with approved shipping containers, and wrapping of sectioned pieces.

The ventilation system for the DR will be independent from the existing PFDL system. The air supply for the DR will be taken from the rooms in the North Lab and will be returned to the same area after triple filtration through HEPA filters. The final two states of HEPA filters will be tested for integrity and efficiency of filtration. Because the DR will have an independent ventilation system, it can provide the capability needed for the removal of existing plant duct work when dismantling of it is undertaken.

In the event that volume reduction of glove boxes is not required, the boxes will be chemically cleaned and decontaminated, the interiors will be coated to "fix" residual material, and integral components (e.g., process equipment) will be removed and packaged as required. For this case, the DR system design and operations would be considerably simplified.

All contaminated solid waste, including filters, or residues resulting from air and water purification will be packaged and shipped to the government waste storage site at Hanford, Washington. Uncontaminated material or equipment will be thoroughly checked by Health Physics personnel, and if no contamination is found, such items will be disposed of by normal excessing procedures. Excessing procedures involve selling or giving materials or equipment to other Westinghouse operations or by scrapping the items along with other uncontaminated trash.

Environmental and effluent monitoring which has been conducted at the Cheswick Site Fuel Facilities during normal operations will be continued during the decontamination program. This environmental monitoring will consist of the same effort which has been described to the NRC. Effluent and environmental monitoring conforms to the License SNM-1120 requirements. The monitoring efforts are sufficiently broad in coverage and explicit in analyses to detect, by normal procedures, any additional radioactivity resulting from decontamination efforts and appearing in the media sampled.

Because a system of triple HEPA filtration of the air will be used in the DR operations, no increases over the previously established operating levels is anticipated for airborne discharges. However, continuous monitoring of stack and environmental radioactive levels will occur throughout the decommissioning to ensure that no increase in airborne discharges, as a result of this action, occurs. Suspect liquid effluents are generated during the normal operations of the facility which are independent of processing operations. Such sources include floor washings, sinks for non-contaminated washing, dehumidifer condensate from ventilation system, etc. These liquids are suspect because of their generation within the facility. Historically, however, liquid wastes have not proven to be contaminated. If contamination levels above the MPC are found, the liquid will be filtered to attempt to remove the radioactive material. If such actions are not adequate, contaminated lequid waste will be collected for disposal as radioactive waste.

Liquidborne discharges are also not expected to show any significant increase over operating level conditions since: (1) liquid contamination is minimum

(especially for ARD operations), (2) the suspect waste liquid discharged to the environment is monitored to determine that it does not exceed MPC limits prior to leaving the hold-up tanks. Radioactive concentrations in the sewer discharges and neighboring well and river water samples are analyzed periodically according to the SNM-1120 license conditions.

3.3 EXPOSURES TO THE GENERAL POPULATION FROM SHIPPING RADIOACTIVE WASTES

The principal radioactive materials to be shipped from the Cheswick ARD Plutonium Facilities will consist of unirradiated SNM as follows:

Scrap SNM - Recoverable forms of SNM

Transuranic contaminated waste (TRU) - Waste having TRU concentrations greater than 10 nCi/g of waste

Nontransuranic contaminated waste (non-TRU) - Waste having TRU concentrations less than 10 nCi/g of waste

Handling and shipment of virgin and scrap SNM has been a standard operation in the nuclear industry for 25 years. Packaging and shipping procedures are dependent upon quantity and type of SNM to be shipped. All shipments are made in accordance with U.S. DOE, DOT and/or NRC requirements.

TRU wastes will be shipped in appropriately licensed containers to a DOE waste storage site. Waste will be contained in either DOT Spec. 7A steel bins or DOT Spec. 7A steel drums. All shipping containers will further meet the requirements of the waste storage site as well as being packed in a shipping overpack (such as "Super-Tiger" or "Poly-Panther") to meet transportation requirements. TRU waste in drums will be transported in the "Super-Tiger" while that in steel bins will be shipped in the specifically designed "Poly-Panther."

Non-TRU waste will be placed in steel drums or stout containers which ensure containment and physical integrity and will be shipped in accordance with 49 CFR regulations.

Estimates of the total TRU shipments show that 28 Super Tiger shipments with volume of 7,400 ft^3 and four Poly Panther shipments with a volume of 2,900 ft^3 (total volume of 10,300 ft^3) will be required to dispose of ARD wastes.

The estimated quantity of non-TRU, low level waste is more difficult to establish since it is dependent upon the amount of equipment which can be decontaminated to non-TRU levels as well as that which may become contaminated during the decontamination process. It is currently estimated, that a total of eight MIII bins (960 ft^3 total volume), twenty 17C barrels (150 ft^3 total volume), and 250 stout wooden crates (4,080 ft^3 total volume) will be shipped.

The total number of truck shipments required is estimated to be 32 for TRU wastes and eight for non-TRU wastes from ARD sources. A summary of the projected radioactive materials to be disposed of as a result of D&D operations is shown in Table XI. The destination of these shipments (for both TRU and non-TRU wastes) will be the DOE facility at Hanford, Washington, a distance of approximately 2,900 miles.

Efforts are presently underway to assure coordination of activities with the Hanford site. This has included providing the waste disposal site with information on the volumes, form, and packaging of the waste to obtain approval. Considering the limited volume and time period involved in this D&D activity, the additional load on the Hanford Reservation's waste handling capability is not considered significant.

Based on the same population exposure models as previously used for waste shipments due to normal operations (Section 2.6), the forty ARD waste shipments would result in a total population exposure of 0.64 man-rem. Averaged over the 2-1/2 years of decommissioning, this amounts to 0.26 man-rem/yr, or about three times the total Cheswick Fuel Laboratories shipments during 1975 and 1976.

4. IMPACT OF ACCIDENTS

Many of the types of accidents which would be likely to occur during the D&D operations have already been analyzed in the Cheswick Site Fuel Development Laboratories Environmental Report[1]. These include glove tears, removal of a glove, glove box window loss, ventilation system failure, waste holdup tank leak, power failure, water supply failure, minor plutonium spills, fuel transportation accidents, and solvent explosion and fire inside a glove box. Analysis of these accidents will not be reiterated here, but it should be noted that some of them (e.g., those dealing with glove boxes) should be significantly mitigated during D&D operations since the glove boxes have all had some internal cleanup and since the amount of plutonium available for release is considerably reduced. Also, some of the more severe accidents, such as the sintering furnace explosion, resin fire, and criticality event, are now impossible due to lack of sufficient quantity of fuel materials in the form required for such accidents. There are, however, some additional types of accidents not covered in the previous analysis which are characteristic of the D&D operations. These include: hazards from handling contaminated materials; increased airborne contamination from disassembling glove boxes and related equipment, removing vacuum lines and ventilation system ducting; additional fire hazards from painting glove boxes; hazards of dispersing contamination during the transporting of glove boxes from Building 7 to the PFDL for further decontamination and disassembly; additional fire hazards introduced by the Dismantling Room (DR) materials of construction and operations; and additional hazards of elevated plutonium concentration in the ambient air due to DR operations. These types of accidents are analyzed as discussed below. Where numerical values are given, the methods of analysis and basic assumptions and models are the same as presented in Reference 1. Radiation doses are 50-year commitment values based on the Cheswick Site Emergency Manual dose conversion factors[7].

4.1 HAZARDS FROM HANDLING PLUTONIUM-CONTAMINATED MATERIALS

During disassembly and decontamination operations in the Cheswick Site Plutonium Facilities, some contaminated surfaces previously confined or restricted from direct handling by virtue of their orientation or configuration in the laboratory will be exposed. Such exposed, contaminated surfaces provide additional hazards for human uptake through ingestion, injection through skin surface wounds, or through air suspension and inhalation. Two recent accidents have occurred where some plutonium uptake resulted via wound injection. Although neither of these accidents was a reportable incident and the amount of material remaining in the wound after treatment was less than 2 percent of the maximum permissible body burden (Table XII), these incidents emphasize the need for care and vigilance during the D&D operations. To emphasize the importance of safety in this regard, special procedures for safe handling and disassembling of contaminated materials and equipment have been written, and special, abrasion-resistant gloves are now required when handling sharp-edged or breakable objects. Also, specific training sessions to indoctrinate personnel on the use of the new procedures to emphasize the safety aspects of handling contaminated materials have taken place. Because of these increased safety precautions and vigilance, no further accidents of this type are anticipated. However, if one does occur, it would be expected to have no greater consequences than those accidents of this type which have occurred to date. Accidents which have occurred to date have not caused any excessive releases or contamination of the off-site environment.

4.2 INCREASED CONTAMINATION FROM DISASSEMBLY OPERATIONS

In the disassembly of glove boxes and related equipment and in the disassembly of the facility's ventilation system ducting, additional airborne contamination could occur, thus increasing the hazards of inhaling plutonium in the working environment. Several steps will be taken to offset and mitigate the effects of this potential hazard. Precautions include: (1) ventilation systems with glove boxes will be maintained and used during box cleaning operations, (2) after cleaning of interior glove box surfaces, residual contamination will be fixed in place by aerosol spray

painting, (3) glove box windows and disassembly and cutting of glove boxes will generally occur in a specially designed dismantling room (DR) temporarily constructed within the PFDL where respiratory protection and whole body protective clothing will be required at all times, (4) some glove boxes might require disassembly in situ using local construction of a tent with air filtration and respiratory protection, (5) the DR will have its own independent, triple HEPA-filtered ventilation system to confine and remove excessive air contamination and limit excess contamination to a small part of the laboratory area, (6) removal of ventilation ducting and laboratory vacuum line systems will require special precautions which may include respiratory protection and protective clothing, and (7) while the facility's ventilation system is being removed, an auxiliary HEPA-filtered system will be used for personnel protection. Room air will continue to be monitored by both continuous air monitors (CAMs) and fixed head air samplers (which are read daily) located throughout the plutonium laboratories. CAMs are set to alarm when they have accumulated the equivalent of 300 MPC-hours (e.g., 3 hours at 100 times maximum permissible concentration [MPC]), while the daily room air samples have a detection sensitivity of 5.5 percent MPC with an action level for further investigation at 50 percent of MPC. Thus, increased concentration levels of plutonium in laboratory room air near or above MPC will be rapidly detected and corrective actions will be taken such as evacuation of room or utilization of respiratory protection. In the DR area where plutonium concentration in air might range from 1 to 100 times MPC, respiratory protection and total body protective clothing will be required. Also, for these areas, very stringent requirements and checks of the respiratory equipment will be made. For example, prior to use of a respirator, a quantitative check of its overall protection factor for the individual wearing that respirator will be made. Also, all respirators will be inspected, smeared, cleaned, decontaminated, and repaired, as necessary, following each daily use by a qualified Health Physics technician. A complete set of procedures will be followed in the use, care, and testing of respiratory protection equipment; and each person in the Window Removal Area and the Glove Box Sectioning Area of the DR will be monitored by an air sampling line located inside the outer protective hood. Because of these safety precautions, it is unlikely that any individual will inhale air containing plutonium in excess of 10 CFR 20 regulations. The most extreme accident which

is likely to occur relative to producing excessive exposure of an individual to airborne plutonium is the malfunction or leakage due to misadjustment of a full face respirator. For this case, it is conservatively hypothesized that the respiratory protection is completely ineffective over an eight-hour period and that the ambient concentration during this time is 100 times MPC. Thus, the worker would receive 100 MPC-days of exposure from this accident. The equivalent fifty-year dose to the bone (assuming 100 percent soluble material) would be 4.6 rem or 1.8 percent of the maximum allowable dose to blood[4], forming organs (Table XII). No effect on the off-site environment would occur as a result of this accident.

4.3 IMPACT OF INCREASED FIRE HAZARDS

To some extent, potential fire hazards will increase because of constructing the DR modules of flammable material (wood) and by using flammable aerosol paint to fix the residual plutonium in place on the inside surfaces of glove boxes.

To significantly minimize the hazard in the DR area, the following protective systems will be utilized:

1. Fire detectors will be strategically placed in each DR module. These detectors will be connected to the site alarm system.

2. Portable fire extinguishers of the dry chemical type will be located conveniently within the DR modules ready for manual operation.

3. An overhead, central system for spreading dry chemical fire suppressant will be provided for manual actuation external to the DR.

4. The overhead fire detector and water sprinkling system now in use at PFDL will remain operational in areas external to the DR. Curbing at the exterior walls of the building is designed to contain the water if the sprinkling system is activated.

Additional precautions inside the glove boxes include the use of once-through nitrogen gas to provide an inert atmosphere during aerosol painting. No flammable decontaminating agents will be used in the DR area.

If, in spite of these precautions, a fire occurred in the auxiliary HEPA filter system controlling the environment in the DR area, a major part of the activity could be released in a short period of time into the DR and from there through the PFDL ventilation system to be filtered through the triple HEPA and stack exhaust to the atmosphere.

If the removable contamination on the inside of glove box surfaces is reduced to 100,000 dpm per 100 cm^2* and each box contains a total surface area of 160 square feet plus a 50 percent allowance for gloves and other exposed areas not included in the previously noted value, the total removable activity per box is calculated to be 100 μCi. Based on this value, the expectation that 1 percent would become airborne during disassembly operations and a total of 70**boxes, then as much as 70 μCi of activity could be lodged in the DR ventilation system filters near the end of the D&D operations. If a fire occurred in these filters and all of the 70 μCi of activity became airborne and, hence, was filtered through the PFDL ventilation system, the maximum dose to an individual located at the nearest off-site residence would be 6.2×10^{-5} mrem to the bone if the material were soluble, and 1.4×10^{-5} mrem to the lung if the material were insoluble (Table XII). Thus, the consequence of such an accident to an off-site individual is calculated to be very insignificant and much less than the 25-mrem/yr allowed by 40 CFR 190[3] for normal operation.

If a fire occurred in a glove box, a potentially larger amount could be released within the DR area since a single glove box could contain up to 6.3 curies of alpha activity; and if a major fire occurred in the box, up to 10 percent of this activity could possibly become airborne. If the DR ventilation systems

*Early experience on cleaning the internal surfaces of glove boxes has indicated that after fixation, the removable surface contamination has been reduced to levels below 10,000 dpm per 100 cm^2. The higher figure is used to provide a conservative basis for the accident analysis.

**This includes the total number of boxes in the Plutonium Laboratories. ARD utilized 28 of the 70 and, thus, the ARD contribution could be considered to be proportional to this source, i.e., 28/70 times the total.

remained in operation during this accident, the maximum dose to the nearest off-site resident is calculated to be only 6.5×10^{-6} mrem to the lung. If the DR ventilation systems were not functioning when this incident occurred, the maximum dose to the nearest off-site resident would be 1.3×10^{-1} mrem to the lung (Table XII). These effects are also considered to be very trivial and approximately the same order of magnitude as the average annual exposure received during previous operations.

4.4 HAZARDS FROM TRANSPORTING GLOVE BOXES FROM BUILDING 7 TO PFDL

Since disassembly of glove boxes will take place in the DR area of the PFDL, the glove boxes which are located in Building 7 must be transported between buildings and are, thus, subject to accidental releases during this brief transport period.

When such glove boxes are moved between buildings, the following precautions will be followed. Prior to transport, all but a small fraction of the removable activity remaining after cleaning will be fixed in place by spray painting. Boxes will then be wrapped and taped in plastic, and they will be placed in a wooden container during transport.

Even though these precautions are taken, for purposes of this evaluation an accident is assumed to occur in which plutonium is released to the atmosphere. It is postulated that a box is dropped during transit and 0.1 percent of the removable contamination (0.1 μCi) is released to the atmosphere. If this event happened near to Building 7, the maximum dose to the nearest off-site resident is estimated to be 5.1×10^{-3} mrem to the bone (Table XII).

This accidental release would also be less than the annual average exposure during previous operations and much less than the 25 mrem/yr allowed by 40 CFR 190[3] for normal operations.

4.5 IMPACT OF WASTE TRANSPORTATION ACCIDENTS

It is very unlikely that any radioactive waste material would be dispersed to the environment as a result of a transportation accident involving ARD plutonium waste shipments from D&D operations. No transportation accidents involving TRU waste resulting from the Cheswick Plutonium Laboratories operations have occurred to date. The frequency and nature of these shipments over the last five years are reported in Table IX.

However, the waste shipment frequency is expected to increase somewhat during D&D activities and, thus, an evaluation of the environmental hazards resulting from this transportation of ARD waste is included in this analysis.

No consideration of transportation accidents involving mixed oxide fuel rods or mixed oxide or plutonium oxide fuel powder is given here since this material has already been safely shipped to its ultimate destination.

The most likely (moderate class) type of transporation accident involving a shipment of ARD plutonium containing waste is that involving the disablement of a truck without any of the contents of the shipment being released to the environment. Shipping regulations permit, from a radioactive materials shipment, a maximum radiation increment of 10 mrem/hr at 2 meters[9]. In the event of vehicular disablement not involving rupture of the fuel containment*, the incremental radiation exposure to onlookers at a distance of 15 meters (50 feet) would be 1.2 mrem/hr. A 15-meter radius circle would accommodate approximately 154 people. An individual remaining 15 meters from the disabled vehicle for a period of 2 hours would receive an exposure of 2.4 mrem, or less than 2 percent of the annual background dose for most U.S. residents. It is estimated that onlookers would be dispersed by local authorities within 2 hours. Based on these assumptions and the probability of a transportation accident in this category of 3×10^{-7} accidents per vehicle mile[9], an average of 7.2 waste shipments per year, and a 2,900-mile shipping distance,

*The radiation increment external to the truck will not change significantly if waste containing a low density of plutonium is dispersed outside the shipping package, but is still confined within the truck.

the total risk to the population potentially exposed on route is calculated as 2.3×10^{-3} man-rem/yr (whole body exposure). This risk is much less than the 0.25 man-rem/yr (bone) received by off-site residents from laboratory operations and only 0.00005 percent of the background exposure to the population located within 5 miles of these facilities.

The second type (severe class) of transportation accident considered is the collision of a truck resulting in spilling the contents of one drum of packaged waste. The estimated release of total plutonium activity (1 μCi) which is airborne as a result of this accident was taken from WASH-1238[9], Table 10, Appendix B. Dispersion of the airborne material is assumed to be consistent with that given in Regulatory Guides for other radiological accidents[10,11] (i.e., Pasquill Type F diffusion conditions, with a wind speed of 1 m/sec and uniform wind direction, for the first 8 hour period following the accident). A distance of 100 meters is postulated between the nearest individual and the release, which results in a dispersion factor $\chi/Q = 0.02$ sec/m^3 (Figure 1, Appendix B of WASH-1238). Using this value for χ/Q, an estimated release of 1 μCi, and a given breathing rate of 3.47×10^{-4} m^3/sec, the amount inhaled is calculated to be 6.7×10^{-6} μCi β activity (Pu-241) and 2.4×10^{-7} μCi α activity (Pu-238, 239, 240, 242, and Am-241). These amounts of activity result in 50 year dose commitments to the lung and bone of 0.13 mrem and 0.55 mrem for 100 percent Class Y (insoluble) and 100 percent Class W (soluble) material, repsectively.

If the probability of a transporation accident in this category of 8×10^{-9} accidents per vehicle mile[9], an average of 7.2 waste shipments per year, and a 2,900-mile shipping distance are combined with the dose per shipment times the total people involved per accident (two truck drivers), the total risk to the truck drivers is calculated as 4.3×10^{-8} man-rem/yr to the lung, and 1.8×10^{-7} man-rem/yr to the bone if 100 percent Class Y or 100 percent Class W solubility conditions prevail. Thus, risk is much, much less than the 0.25 man-rem/yr (bone received by off-site residents from laboratory operations.

The third type (extra severe class) of accident, which is considered extremely unlikely, is a case where 25 drums of radioactive waste are broken open. The amount of Class B type waste which would be released and become airborne (taken from Table 10, WASH-1238[9]) is 0.25 Ci. Using this value, the same meteorological dispersion factor at 100 meters, and the same breathing rate as for the severe accident, the maximum dose to an individual's lung (if the solubility of material inhaled is Class Y) is calculated as 32 rem. If the material is 100 percent Class W solubility, the 50-year dose commitment to the same individual's bone is 76 rem. These dose increments are 13 and 30 percent of the maximum allowable 50 year dose to blood forming organs based on permissible occupational exposure[4]. If the probability of a transportation accident in this category of 2×10^{-10} accidents per vehicle mile, an average of 7.2 waste shipments per year, and a 2,900-mile shipping distance are combined with the dose received per individual in each accident and a total of 40 individuals exposed (truck drivers plus cleanup crew), the total risk to the exposed workers is calculated to be 5.29×10^{-3} man-rem/yr (lung) for 100 percent Class Y, and 1.26×10^{-2} man-rem/yr (bone) for 100 percent Class W solubility materials, respectively. This risk is also significantly less than the 0.25 man-rem/yr (bone) received by off-site residents for laboratory operations.

The previously described impact values are summarized in Table XIII. Based on this analysis, radiological risks for all categories of transportation accidents involving ARD plutonium waste shipments from D&D operations are small relative to normal operations, and would be expected to have no measurable impact.

5. ALTERNATIVES TO THE PROPOSED ACTION

Since all government supported fuel development activities at the Cheswick Plutonium fuel laboratories has been terminated, the most realistic viable alternatives to the proposed decontamination and decommissioning (D&D) of the ARD Plutonium Facilities at Cheswick include: (1) D&D of the facilities in a longer period of time (approximately five years instead of 2-1/2 years) and (2) placing the facilities in a standby condition for an indefinite period. Based on a lack of defined need for the type of fuels which could be fabricated within this facility, continued operation is not considered a viable option. In its present status, the facility cannot be utilized for other activities. The decontamination and decommissioning activities are necessary before the facility can be released to other productive uses. The economic and environmental costs (or benefits) which could result from the two viable alternative actions are discussed in this section.

5.1 ECONOMIC COSTS

The economic costs for the two viable alternatives have been evaluated and compared with the proposed action. For the first option, i.e., to stretch out the D&D operation to five years, an estimated added cost of $410,000 results. For the second option, i.e., placing the facility in a standby mode, the estimated added costs include a $2.23 million increment to place the facility in standby condition plus an incremental cost of $1.08 million a year for "operating maintenance" costs. It is assumed in the latter case that the same D&D costs would occur as for the proposed action but at a later date. In reality future D&D costs would most likely be higher than present costs, but the amount of this increment is so uncertain that it has been excluded in this analysis. Economic advantages could offset the near term disadvantages for the second option, if government support were reestablished in the not too distant future but this is not expected to occur.

5.2 ENVIRONMENTAL COSTS

For Option 1, the stretch out of D&D activities by an additional 2-1/2 years, will result in additional radiation exposures to the workers and to the nearby off-site population, since occupational and environmental exposure levels would be maintained for a longer time period. The occupational exposures during decommissioning activities, would be offset to some extent by a lower work force requirement, but this would not completely compensate for the longer time period.

External radiation expsoures within the ARD Plutonium Facilities have averaged a total population exposure of 5.5 man-rem (whole body) during the last four years. Assuming that this exposure will continue at this level for an additional 2-1/2 years due to stretch out of D&D operations, an additional 13.8 man-rem would result.

Internal body exposures with the ARD Plutonium Facilities have averaged 0.05 rem/yr to each person's lungs or about 1 percent of maximum allowable dose permitted by occupational exposure. Based on a 11-person staffing over the additional 2-1/2 years, an added increment of 1.4 man-rem (lungs) would result.

Additional off-site population exposures would also occur as a result of stretching out the D&D activities by 2-1/2 years. Assuming that effluent discharges during the decontamination process will not exceed existing operating levels (Section 2.3), this population exposure will provide an added increment of 0.25 man-rem/yr (bone), or 0.63 man-rem over the 2-1/2 year period compared with 4700 man-rem/yr due to background radiation exposure to the population within 5 miles of the Cheswick Fuel Facilities.

No additional population exposure would result from spreading the waste shipments over 5 years instead of over a 2-1/2 year period. In fact, there might be an undefined benefit to certain individuals by spreading the fuel shipments over a longer time period since the annual population dose would decrease a

factor of 2 although the cumulative man-rem exposure would not be decreased.

Liquid effluent population exposures could also increase by a delay in decommissioning, but this increment is so small as to be undetectable. The population exposure through liquid release pathways from normal operations has been estimated to be only 0.0022 man-rem per year[1]. Thus, similar discharges during a 2-1/2 year stretch-out would not significantly increase the population exposure in comparison to the total exposure from other pathways.

No other significant environment or economic costs or benefits can be attributed to Option 1. Thus, the total effect is to increase the population exposures by 13.8 man-rem (whole body), 1.4 man-rem (lungs), and 0.63 man-rem (bone). No environmental benefits appear to offset these penalties.

To evaluate the environmental effects of Option 2, a minimum time period of 5 years (4 years after being placed in standby condition) is assumed. During the period when the facilities are being placed in a standby condition, the average occupation exposure to the external body is assumed conservatively to be the same as during the 1978 and 1979 time period. Thus, the 22 persons placing the facility in standby would receive a population exposure (whole body) of 5.5 man-rem. Following placement in standby, the personnel requirements would be reduced to 8 people who would receive a total population exposure over a 4-year period of 8 man-rem (whole body). Thus, the total external radiation exposure of ARD personnel within the Plutonium Facilities would be 13.5 man-rem for the 5-year period. This is essentially the same as the 13.8 man-rem which ARD personnel would receive under the proposed action of D&D in a 2-1/2 year period.

An evaluation of internal body (lung) exposure due to inhalation by ARD workers provides a maximum estimate of 1.1 man-rem population exposure during the first year and 1.6 man-rem during the following 4 years for a total of 2.7 man-rem. This compares with an increment for the proposed action of 1.4 man-rem.

Additional population exposures to off-site residents may also occur. No change in airborne effluent discharges over the 5-year period are expected since levels should remain below minimum detectable levels (MDL) because they are primarily determined by filter effectiveness and monitoring. Thus an added increment of 0.63 man-rem (bone) for the additional 2-1/2 year increment is estimated.

The waste shipments to place the facility in a standby mode would decrease from 40 to 5. Thus, the total population exposures due to waste shipments would decrease from 0.64 man-rem to 0.08 man-rem (whole body) during the 5-year standby period. However, since the facility must still be decommissioned at some later date, this apparent saving will be compensated for by future shipments when D&D occurs. Also, the full increments outlined above for Alternate 1 are expected to apply since an additional 2-1/2 years of D&D activities will be required.

Changes in population exposures due to differences in liquid waste releases are again not significant relative to other changes. In summary, the evaluated environmental effects of Option 2 show an increased exposure to the internal body (lung) of ARD personnel by 2.7 man-rem and to the whole body of 13.5 man-rem, and an increased exposure to the lungs of off-site residents of 1.26 man-rem. Thus, Option 2 has higher environmental effects and economic effects than Option 1.

The above environmental penalties (as well as economic penalties [Section 5.1]) are summarized in Table XIV.

For both Alternatives 1 and 2, both the net economic effect and the environmental effect are negative (increasing effect) relative to the proposed action. Thus, the proposed action of decontaminating and decommissioning in the shortest possible time period is judged the best choice.

6. CUMULATIVE AND LONG-TERM ENVIRONMENTAL EFFECTS

As indicated in the preceding paragraphs, the decontamination operation will be performed in such a way that release of radioactivity to the surroundings will be minimized and will be kept well under applicable limits.

The solid radioactive wastes, consisting of contaminated materials and equipment, and solids such as filters, ion exchange beds, rags, etc., generated in the decontamination process will constitute a potential long-term environmental impact due to the radiological nature of the materials. Disposal will be in an approved manner at approved sites and will result in lower cumulative environmental effects than if the radioactive material were allowed to remain in its present site. The total TRU waste to be disposed of is estimated to be 10,300 cubic feet; the total non-TRU, low level radioactive waste is estimated to be 5190 cubic feet (see Section 3.3).

Noncontaminated solid wastes (ordinary trash) will accumulate during decontamination operations at a rate of approximately 3.5 m^3/week and this material will be disposed of by burial as sanitary landfill. However, if laboratory operations were to continue, this number would be approximately doubled. Although placing the facilities in a standby condition could decrease the rate of solid waste generation, the total cumulative waste would be greater than by the proposed decommissioning in the shortest possible time.

The estimates of total waste volume are based on the latest evaluation which assumes that the glove boxes are disposed of as units rather than cutting them up into smaller segments. This is considered to be the conservative approach since the Dismantling Room concept would be anticipated to result in a total waste volume which is equal to and possibly less than the whole box concept.

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

The decontamination operation will destroy valuable laboratory facilities with construction costs of about $6.4 million*, a replacement cost as much as 10 times this, and a loss of potential for many years of continued productivity as a plutonium research facility. However, funding for this research is not available at this time, and does not appear to be available in the near future. For reasons enumerated, it is considered preferable to decontaminate the facility in a prompt and orderly manner and, thus, remove the contamination from the site and make the building available for other types of work.

The radioactive waste generated in the decontamination will be placed in or on land considered dedicated to that purpose, and such waste is considered at this time as irretrievable. Nonradioactive equipment and wastes will be used in other research or commercial areas or will be disposed of in sanitary landfills after being rendered unattractive.

Decontamination efforts will require the use of natural resources, such as vehicle fuel, electrical power, and associated machinery; but the quantity involved will be insignificant. No other irreversible or irretrievable commitments exist.

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*This represents the total building costs. The ARD portion represents about 30 percent by area of the total.

8. CONFLICTS WITH FEDERAL, STATE, REGIONAL, OR LOCAL PLANS

The decontamination of the Cheswick Plutonium Facilities will be performed in conformance with all applicable Federal, State, Regional, or local programs and rules. No known conflicts exist, and all authorities which may have an interest in this operation will be kept informed of the plans and progress of the process. To date, discussions have been held with the U.S. Nuclear Regulatory Commission and the Pennsylvania Department of Environmental Resources, during which these agencies were informed of the intent to decontaminate and decommission the facilities.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

1. Westinghouse Cheswick Site Fuel Development Laboratories Environmental Report, Nuclear Fuel Division, Advanced Reactors Division, Revision 3, September, 1975.

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5. "Air Pollution Engineering Manual," Air Pollution Control District, County of Los Angeles, Compiled and Edited by J. A. Danielson, U.S. Department of Health, Education and Welfare, Public Health Service, Bureau of Disease Prevention Environmental Control, National Center for Air Pollution Control, Cincinnati, Ohio, 1967.

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10. Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of Coolant Accident for Pressurized Water Reactors," U.S. Nuclear Regulatory Commission.

11. Regulatory Guide 3.34, Revision 1, "Assumptions Used for Evaluating the Radiological Consequences of Accidental Nuclear Criticality in a Uranium Fabrication Plant," U.S. Nuclear Regulatory Commission, Office of Standards Development, July, 1979.

APPENDIX A

REFERENCES (contd.)

12. Westinghouse Electric Corporation, SNM-1120 Operations, Cheswick, PA., Efforts to Maintain Occupational Radiation Exposures As Low As Reasonably Achievable During the Period January 1 through December 31, 1979, by A. J. Nardi, H. C. Woodsum, June 19, 1980.

13. Telephone Communication May 12, 1980, H. C. Woodsum to Roger Westman, Bureau of Air Pollution Control, Allegheny County.

APPENDIX B

FIGURES

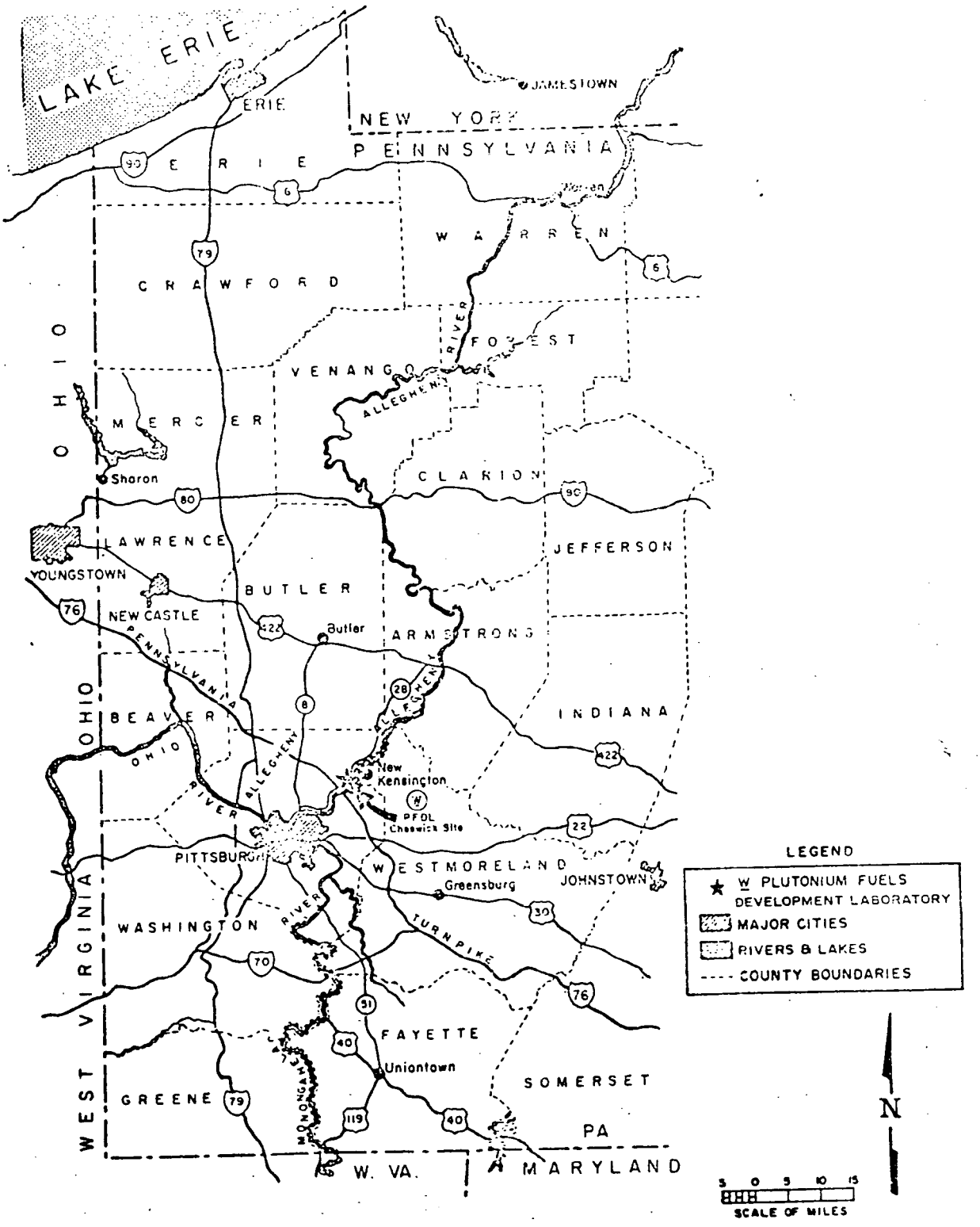

FIGURE 1. GENERAL SITE LOCATION

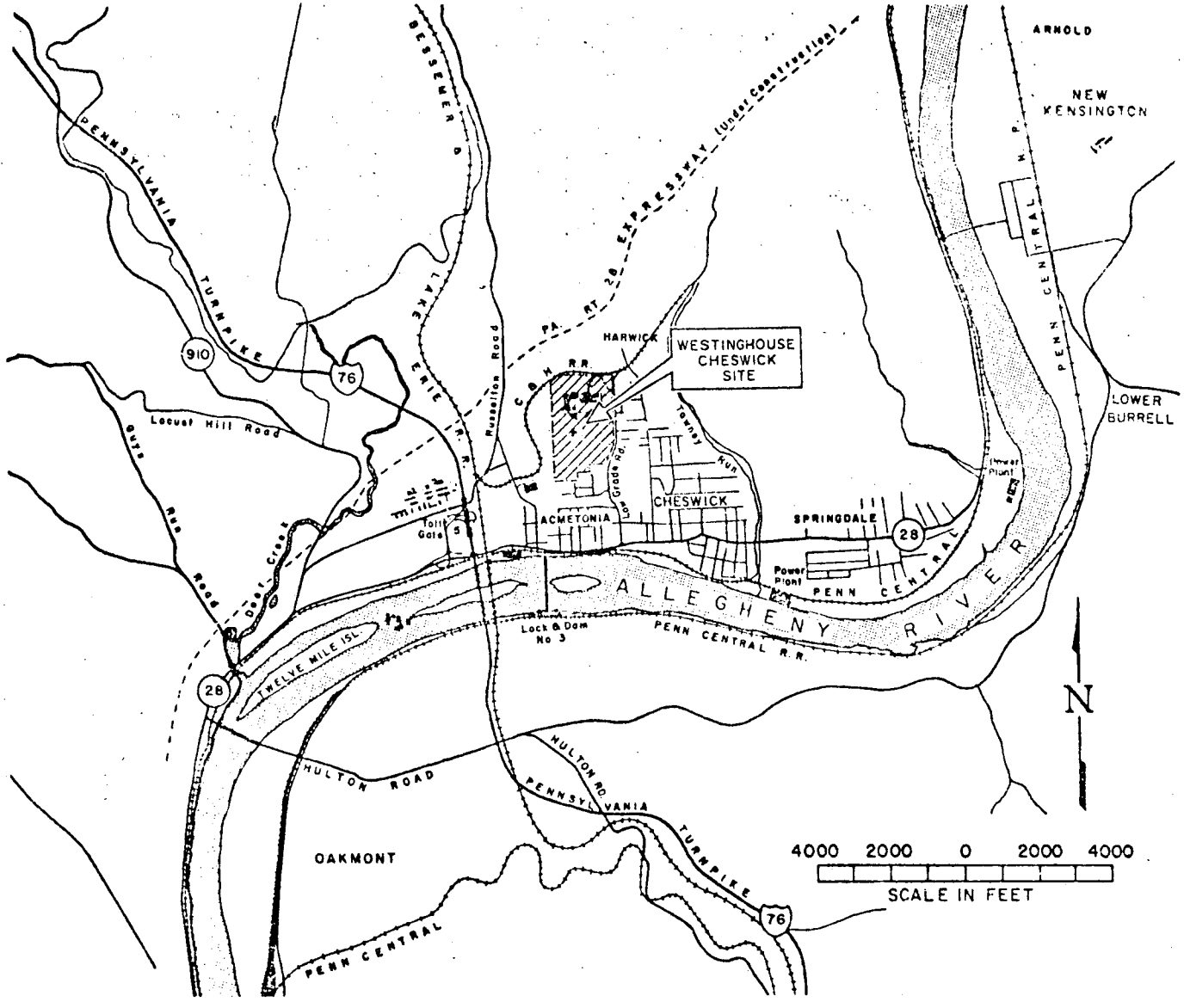

FIGURE 2. CHESWICK SITE LOCATION

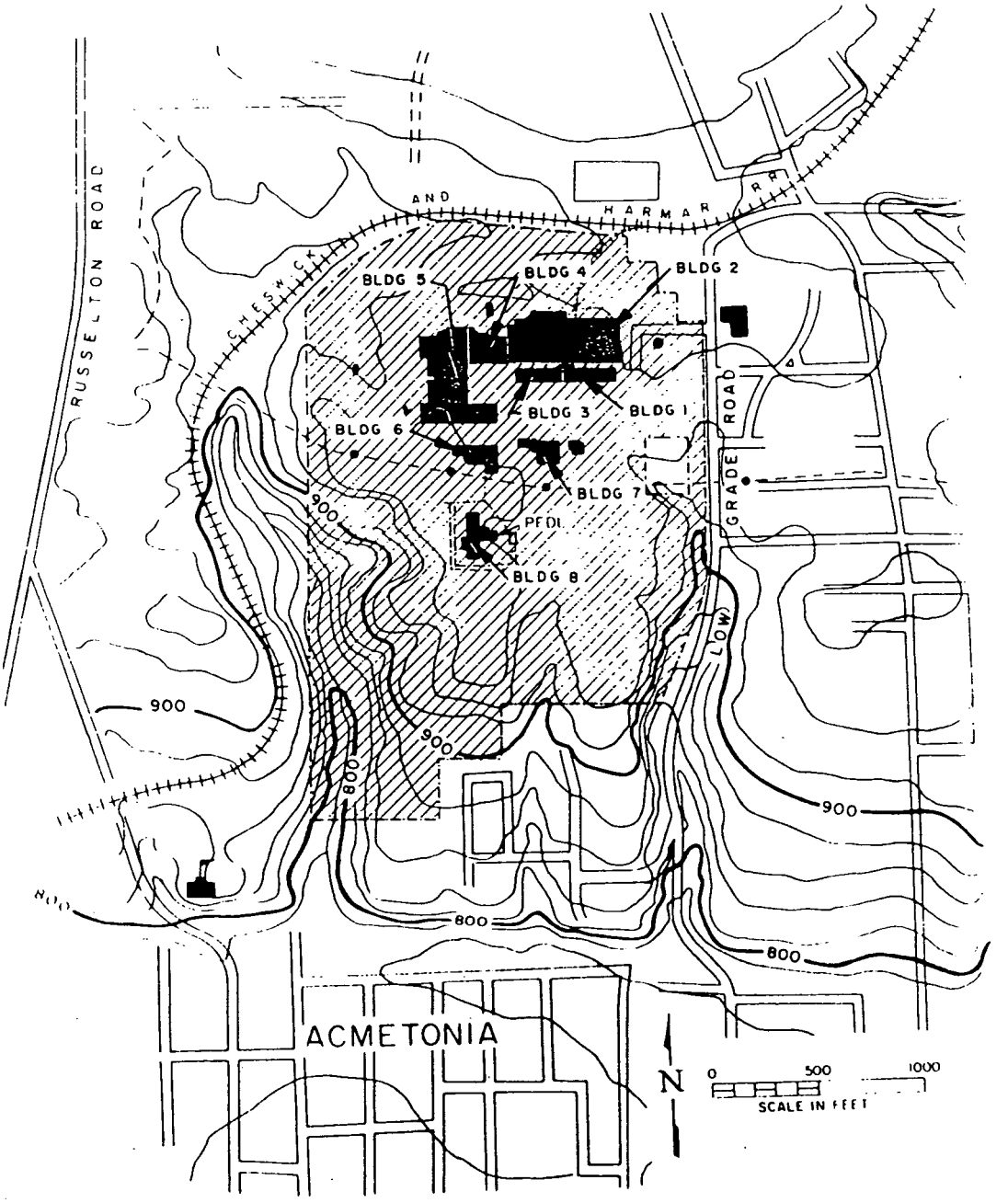

FIGURE 3. CONTOUR MAP OF THE SITE AREA

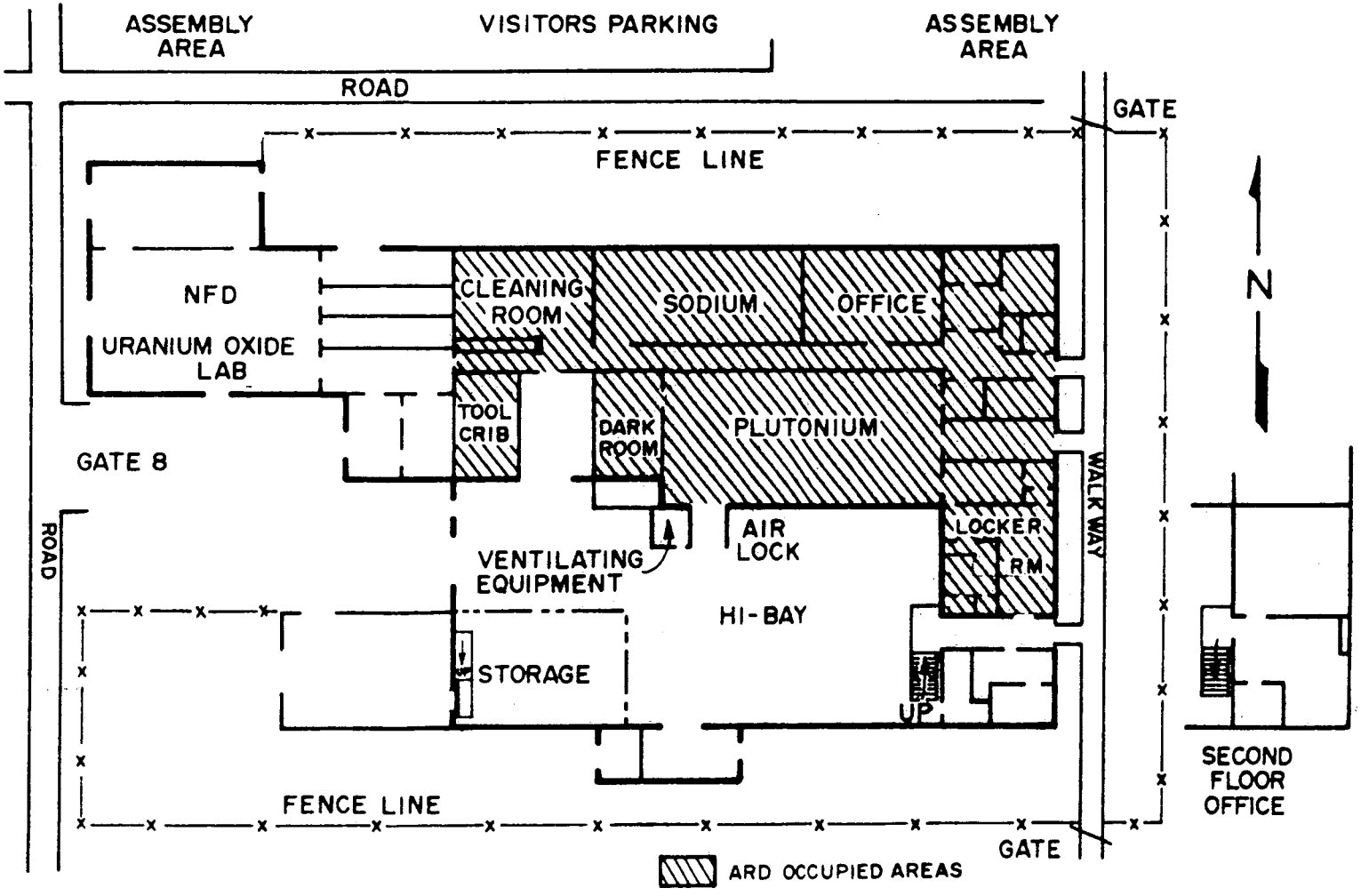

FIGURE 4. BUILDING 7 FLOOR PLAN

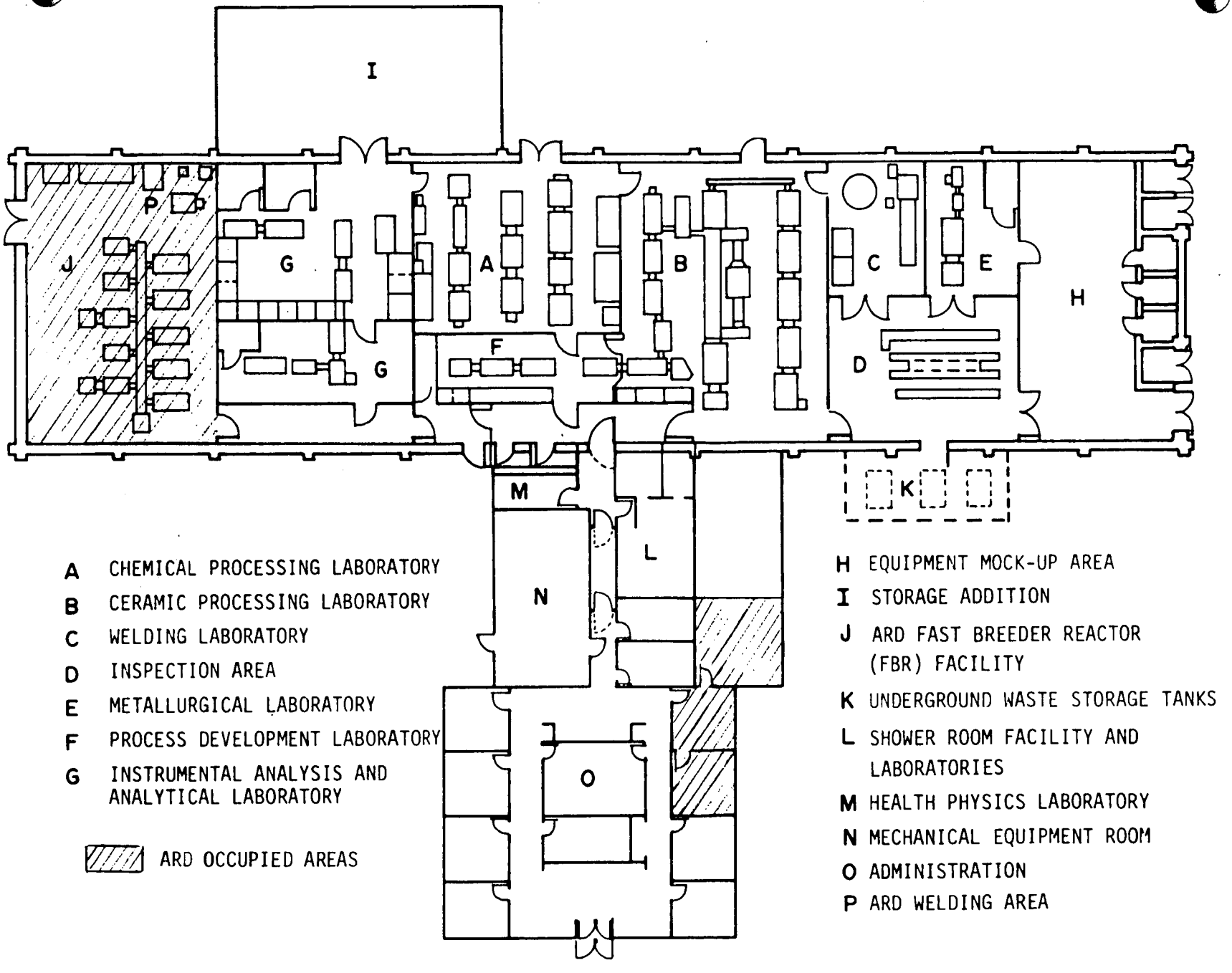

FIGURE 5. PFDL (BUILDING 8) FLOOR PLAN

APPENDIX C

TABLES

TABLE I

EXTERNAL RADIATION EXPOSURE FOR OPERATING PERSONNEL

SNM-1120 OPERATIONS

Exposure Range (rem)	NFD																ARD												EMD				Total			
	Management, Professional, Secretarial				Technicians				Analytical Technicians				Maintenance				Management, Professional, Secretarial				Technicians				Maintenance				Health Physics, Security, Medical							
	76	77	78	79	76	77	78	79	76	77	78	79	76	77	78	79	76	77	78	79	76	77	78	79	76	77	78	79	76	77	78	79	76	77	78	79
Less Than Measurable	11	5	6	5	-	-	-	-	-	-	-	-	-	-	2	1	13	18	14	15	-	2	1	6	4	3	3	5	22	30	25	22	50	59	51	54
0.10	13	6	5	5	-	-	3	-	-	-	-	-	4	-	5	7	3	1	6	4	5	5	6	1	-	1	2	1	5	-	5	6	18	13	32	26
0.10-0.25	-	1	-	3	1	-	2	-	1	1	2	3	5	8	2	-	1	1	2	-	-	1	1	-	-	1	1	-	1	-	2	1	9	13	12	7
0.25-0.50	-	2	-	-	2	2	5	4	4	3	2	-	-	-	-	-	-	1	1	-	-	2	1	2	-	-	-	-	2	-	-	-	8	10	9	6
0.50-0.75	-	-	-	-	1	2	1	3	-	1	1	1	-	-	-	-	-	-	-	-	1	1	1	2	-	-	-	-	-	-	-	-	2	4	3	6
0.75-1.00	-	-	-	-	4	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3	2	1	-	-	-	-	-	1	-	-	-	8	5	1	1
1-2	-	-	-	-	5	6	-	2		-	-	-	-	-	-	-	-	-	-	-	1	1	3	1	-	-	-	-	-	-	-	-	6	7	3	3
2-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Man-rems	0.1	1.2	0.3	0.5	12.6	13.6	2.6	6.9	1.7	1.9	1.6	1.2	1.1	1.4	0.4	0.3	0.3	0.6	0.9	0.2	5.0	5.1	6.3	2.9	0	0.2	0.4	0.0	2.0	0	0.4	0.5	23	24	13	12

Summary: Man-rem

Year	76	77	78	79	
	23	24	13	12	Total Labs
	5.3	5.9	7.6	3.1	ARD
	23	25	58	31	ARD Percent of Total

TABLE II

EXTERNAL EXPOSURE

RADIATION HISTORY FOR OPERATING PERSONNEL
SNM-1120 OPERATIONS

Year	Number of Individuals Monitored	Total Number of Man-rems	Annual Avg. Exposure Per Individual, rem	
			All Exposures	Measurable Exposures
1975	98	55	0.56	0.83
1976	101	23	0.23	0.46
1977	110	24	0.22	0.47
1978	111	13	0.12	0.22
1979	103	12	0.12	0.25

TABLE III

SUMMARY OF AIR SAMPLES > MPC

FOR SNM-1120 OPERATIONS

Number of Daily Room Air Samples > MPC

	Building 7		PFDL										
Year	ARD Pu Lab	U-Lab	North Lab and Addition	Ceramics Lab	Chemical Development Lab	Analytical Lab	ARD Lab	Wet Oxide Lab	Penthouse and Clean Areas	Total Labs	Distribution (XMPC)	*	**
1976	0	4	0	0	0	21	2	8	0	35	1X-12 4X-4 2X-6 10X-2 3X-10 100X-1	190	1.0%
1977	0	2	0	3	3	17	0	1	0	26	1X-12 10X-2 2X-11 4X-1	58	0.3%
1978	1	3	0	0	1	11	0	0	0	16	1X-7 4X-1 2X-5 5X-1 3X-2	32	0.2%
1979	0	4	0	1	0	2	0	4	0	11	1X-8 2X-3	14	0.07%
Four Year Total	1	13	0	4	4	51	2	13	0	88	1X-39 10X-4 2X-25 100X-1 3X-12 4X-6 5X-1	294	0.4%
% of Total Samp. Taken in Area	0.03%	0.13%	0%	0.05%	0.1%	0.4%	0.02%	0.2%	0%	0.11%			

*Figure of Merit (MPC Sample - days)

**Figure of Merit (% of Possible MPC Sample - days)

TABLE IV

SUMMARY OF RADIOACTIVE AIRBORNE
EFFLUENTS FROM PFDL AND BUILDING 7
OPERATIONS AND MAXIMUM OFFSITE DOSES VS
REGULATORY LIMITS

Pollutant	Origin of Source	Stack Effluent Concentration (μCi/cc)	Total Annual Avg. (μCi/yr)	Calculated* Dose Rate (mrem/yr)	Dose Limits: NRC Limit (10CFR20) (mrem/yr)	Dose Limits: EPA Limit (40CFR190) (mrem/yr)	Concentration Limits: NRC Limit (10CFR20) (μCi/cc)
Pu	PFDL (ARD / NFD)	$\leq 5.9\times10^{-15}$	$\leq$ 1.22	$\leq$0.01(lung) $\leq$0.042(bone)	1500** 3000**	25** 25**	6.0×10^{-14}
Pu	Bldg. 7 (ARD)	$\leq 3.3\times10^{-15}$	$\leq$ 0.062	$\leq$0.0015(lung) $\leq$0.0064(bone)	1500 3000	25 25	6.0×10^{-14}
U	Bldg. 7 (NFD)	$\leq 4.0\times10^{-13}$***	31***	0.60(lung) 0.0091(bone)	1500 3000	25 25	4.0×10^{-12}
			Total, Fuel Labs Cheswick Site	$\leq$0.612(lung) $\leq$0.058(bone)			
			ARD Labs Only	$\leq$0.0023(lung) $\leq$0.010(bone)			

*Maximum off-site dose rate increment to nearest off-site individual.

**NRC or EPA limits apply to all activities in the fuel cycle at a given site. Thus, limits apply only for total dose rate increment for all laboratory releases from the Cheswick Site.

***For 1975 to 1979 time period. See Table V.

TABLE V

AVERAGE YEARLY DISCHARGE CONCENTRATIONS OF URANIUM ALPHA ACTIVITY
BASED ON MEASURED BUILDING 7 URANIUM LABORATORY EXHAUSTS
(1971 to 1979)

Year	Avg. α Discharge Concentration (μCi/ml)	Total Uranium** Activity Released (μCi/yr)
1971	4.0 (-14)*	3.0
1972	2.7 (-13)	20.0
1973	5.6 (-14)	4.2
1974	1.4 (-13)	11.0
1975	3.8 (-13)	29.0
1976	4.7 (-13)	35.0
1977	3.9 (-13)	29.0
1978	4.0 (-13)	30.0
1979	4.0 (-13)	30.0
	Avg. 2.8 (-13)	21.0
	Avg. (Last 5 yrs.) 4.0 (-13)	31.0

* 4.0 (-14) = 4.0×10^{-14}

** Conservatively assumes an annual average exhaust flow rate of 5000 cfm.

TABLE VI

SUMMARY OF NONRADIOACTIVE AIRBORNE POLLUTANT CONCENTRATIONS
FROM PFDL AND BUILDING 7 OPERATIONS AND COMPARISON WITH
EXISTING LEVELS AND AIR QUALITY STANDARDS

Annual Average Concentration
at Nearest Offsite Resident
($\mu g/m^3$)

Pollutant	Calculated* Concentration	OSHA Standard (8 hr)	EPA Primary Standard	EPA Secondary Standard	Existing[12] Levels (1979)
NO_x	4.3		100	100	NA**
CO	49.4	10,000			NA**
Particulates	0.90	5,000-15,000	75	60	66 Logan's Ferry 61 Springdale

*Short Term (8-hour average) concentrations could be as much as 10 times the annual average values given above. Thus the calculated concentrations should be multiplied by 10 for comparison with OSHA Standards.

**Not measured in the Allegheny County monitoring program, but expected to be within all regulatory limits.

TABLE VII

EVALUATION OF ALPHA CONCENTRATION LEVELS IN LIQUID EFFLUENTS
PREVIOUSLY DISCHARGED FROM THE PFDL (BUILDING 8)

Discharge Period Calendar Year)	Total Volume of Suspect Waste (gallons)	Total Annual α Activity Discharged (μCi)	Annual Average α Concentration Discharged to Sanitary Sewer (μCi/ml)	Annual Average Concentration Discharged to Sanitary Sewer (% of MPC)**	Annual Average Concentration in Sanitary Sewer (% of MPC)*	Annual Average Concentration in Allegheny River (% of MPC)+
1974	4.49 (4)*	1.72 (2)	1.02 (-6)	1.57	3.8 (-3)	4.0 (-7)
1975	3.80 (4)	1.63 (2)	1.13 (-6)	1.74	3.6 (-3)	3.7 (-7)
1976	1.97 (4)	≤2.70 (1)	≤3.62 (-7)	≤ 0.56	≤6.0 (-4)	≤6.2 (-8)
1977	2.55 (4)	≤4.69 (1)	≤4.86 (-7)	≤ 0.75	≤1.0 (-3)	≤1.1 (-7)
1978	3.79 (4)	≤3.98 (1)	≤2.78 (-7)	≤ 0.43	≤8.9 (-4)	≤9.1 (-8)
1979	2.47 (4)	≤2.25 (1)	≤2.40 (-7)	≤ 0.37	≤5.0 (-4)	≤5.1 (-8)

* 4.49 (4) = 4.49×10^4, etc.

** MPC = the maximum permissible concentration for soluble plutonium isotopes in sanitary sewer systems (including allowance for β activity in the Pu mixture) according to 10CFR20, Appendix B, Table I [4] = 6.5×10^{-5} μCi/cc. See Appendix 4B of reference 1 for derivation.

+ MPC = the maximum permissible concentration of soluble plutonium isotopes in effluents to unrestricted areas (including allowance for β activity on the Pu mixture) according to 10CFR20, Appendix B, Table II[4] = 2.6×10^{-6}. See Appendix 4B of reference 1 for derivation.

TABLE VIII

EVALUATION OF ALPHA CONCENTRATION LEVELS IN LIQUID EFFLUENTS
PREVIOUSLY DISCHARGED FROM THE BUILDING 7 URANIUM LAB

Discharge Period (Calendar Year)	Total Volume of Suspect Waste (gallons)	Total Annual Activity Discharged (μCi)	Annual Average α Concentration Discharged to Sanitary Sewer (μCi/ml)	Annual Average α Concentration Discharged to Sanitary Sewer (% of MPC)**	Annual Average α Concentration in Sanitary Sewer (% of MPC)**	Annual Average α Concentration in Allegheny River (% of MPC)+
1974	1.17 (4)*	4.00 (2)*	9.03 (-6)	9.0 (-1)	5.8 (-4)	7.9 (-8)
1975	1.31 (4)	3.14 (2)	6.33 (-6)	6.3 (-1)	4.5 (-4)	6.2 (-8)
1976	4.38 (4)	5.40 (2)	3.26 (-6)	3.3 (-1)	7.9 (-4)	1.1 (-7)
1977	1.16 (4)	≤8.03 (1)	≤1.83 (-6)	≤1.8 (-1)	≤1.1 (-4)	≤1.6 (-8)
1978	1.73 (4)	≤1.02 (2)	≤2.32 (-6)	≤2.3 (-1)	≤2.2 (-4)	≤3.0 (-8)
1979	1.82 (4)	≤1.17 (2)	≤1.70 (-6)	≤1.7 (-1)	≤1.7 (-4)	≤2.3 (-8)

* $1.17\ (4) = 1.17 \times 10^{4}$, etc.

** MPC = 1×10^{-3} μCi/ml = the maximum permissible concentration for natural uranium in sanitary sewer systems, according to 10CFR20, Appendix B, Table I [4].

\+ MPC = 3×10^{-5} μCi/ml = the maximum permissible concentration for natural uranium in effluents to unrestricted areas, according to 10CFR20, Appendix B, Table II[4].

TABLE IX

SUMMARY OF WASTE SHIPMENTS FROM CHESWICK FUEL LABORATORIES
FOR PERIOD 1975 THROUGH 1979

Year	Month	Volume (cu.ft.)	Containers	Destination	Type of Material
1975	Apr	313.9	34 drums, 7 boxes	Beatty, Nevada	TRU Waste
	Jun	315.0	42 drums	Beatty, Nevada	TRU Waste
	Jul	501.8	36 drums, 2 boxes 20 cartons	Beatty, Nevada	TRU, U Waste
	Aug	315.0	42 drums	Beatty, Nevada	TRU Waste
	Nov	315.0	42 drums	Richland, Washington	TRU Waste
	Dec	324.5	37 drums, 5 cartons	Richland, Washington	TRU, U Waste
ANNUAL TOTALS		2085.2 ft^3	233 drums 9 boxes 25 cartons	6 shipments	
Year	Month	Volume (cu.ft.)	Containers	Destination	Type of Material
1976	Feb	315	42 drums	Richland, Washington	TRU Waste
	Mar	329.6	36 drums, 4 boxes	Richland, Washington	TRU Waste
	Apr	303.8	35 drums, 4 boxes	Richland, Washington	TRU Waste
	May	315	42 drums	Richland, Washington	TRU Waste
	Jun	315	42 drums	Richland, Washington	TRU Waste
	Nov	299.1	30 drums, 7 boxes	Richland, Washington	TRU Waste
ANNUAL TOTALS		1877.5 ft^3	227 drums 15 boxes	6 shipments	

TABLE IX
(contd.)

SUMMARY OF WASTE SHIPMENTS FROM CHESWICK FUEL LABORATORIES
FOR PERIOD 1975 THROUGH 1979

Year	Month	Volume (cu.ft.)	Containers	Destination	Type of Material
1977	Feb	315.0	42 drums	Richland, Washington	TRU Waste
	Jun	315.2	30 drums, 5 boxes	Richland, Washington	TRU Waste
	Oct	310.2	32 drums, 9 boxes	Richland, Washington	TRU Waste
ANNUAL TOTALS		940.4 ft^3	104 drums 15 boxes	3 shipments	
Year	Month	Volume (cu.ft.)	Containers	Destination	Type of Material
1978	Mar	1005	drums, boxes, cartons	Barnwell, S.C.	Natural U, Thorium
	Mar	315	42 drums	Richland, Washington	Pu, U
	Jul	315	42 drums	Richland, Washington	Pu, U, Th
ANNUAL TOTALS		2171 ft^3		4 shipments	
Year	Month	Volume (cu.ft.)	Containers	Destination	Type of Material
1979	Jul	868.8	8 drums, 18 boxes 7 cartons	Barnwell, S.C.	U Waste
	Sep	315.0	42 drums	Richland, Washington	TRU Waste
ANNUAL TOTALS		1183.8 ft^3	50 drums 18 boxes 7 cartons	2 shipments	

TABLE X

SUMMARY OF ESTIMATED POPULATION EXPOSURES AS A RESULT OF WASTE SHIPMENTS FROM THE CHESWICK SITE FUEL FACILITIES FOR THE PERIOD 1975 THROUGH 1979

			Incremental Population Exposures (man-rem/shipment)			
Year	No. of Shipments	Destination	Residents	Onlookers	Truck Drivers	Total (man-rem)
1975	4	Beatty, Nevada	0.0043	0.0024	0.0072	0.0556
	2	Richland, Washington	0.0052	0.0029	0.0079	0.032
					Total 1975	0.0876
1976	6	Richland, Washington	0.0052	0.0029	0.0079	0.096
					Total 1976	0.096
1977	3	Richland, Washington	0.0052	0.0029	0.0079	0.048
					Total 1977	0.048
1978	2	Richland, Washington	0.0052	0.0029	0.0079	0.032
	2	Barnwell, South Carolina	0.0012	0.0006	0.0049	0.0134
					Total 1978	0.0454
1979	1	Barnwell, South Carolina	0.0012	0.0006	0.0049	0.0067
	1	Richland, Washington	0.0052	0.0029	0.0079	0.016
					Total 1979	0.0227

TABLE XI

PROJECTED SNM MATERIAL TO BE DISPOSED OF DURING DECONTAMINATION AND DECOMMISSIONING OF THE CHESWICK ARD PLUTONIUM FUEL LABORATORIES

Type of Material	No. of Containers	Total Volume (ft^3)	Destination
Scrap SNM	15 FL-10 Containers (1)	----	Hanford, WA (Rockwell)
TRU Waste	23 boxes 210 drums 24 bins	5,800 1,600 2,900 10,300	Hanford, WA
<10 nCi/g Waste	240 boxes 20 drums 8 bins	4,080 150 960 5,190 (Subtotal)	Hanford, WA

(1) These fifteen containers have already been shipped. It is intended that this scrap material will be held by Rockwell Hanford until recovery of the plutonium and uranium can be accomplished. This scrap material included unused PuO_2 and UO_2 powders leftover from fabrication jobs conducted by ARD along with other scrap containing recoverable quantities of plutonium and enriched uranium.

TABLE XII

SUMMARY OF ACCIDENT ANALYSES FOR DECONTAMINATING
AND DECOMMISSIONING ARD PLUTONIUM FACILITIES AT CHESWICK, PA

Hypothetical Accident	Causes	Probability of Occurrence	Safety Measures and Preventatives	Effect (50-Year Organ Dose to Nearest Resident)
Skin surface puncture	Handling sharp, contaminated objects	Credible	Safety procedures. Abrasion-proof gloves.	$\leq$ 2% mpbb*[†]
Failure of respirator in 100X MPC atmosphere	Lack of fit or mechanical malfunction	Credible	Respirators inspected daily; Qualitative fit test befoe use.	4.6 rem (bone)[†]
Fire in DR HEPA filters	Electrical malfunction	Remotely possible	Fire extinguishers. Flammable solvents prohibited.	6.2×10^{-5} mrem (bone) or 1.4×10^{-5} mrem (lung)
Fire in glove box	Electrical spark, aerosol paint spray	Remotely possible	Inert gas (N_2) in box	1.3×10^{-1} mrem (lung)
Damage glove box during interbuilding transport	Fall off fork lift or run into by another vehicle	Remotely possible	Wrapped in plastic and placed in wooden box. Loose contamination fixed in place.	5.1×10^{-3} mrem (bone)
Rupture of TRU waste container	Motor vehicle accident during transport	Incredible during D&D waste shipments	Triple containment packaging	Not applicable. See Table XIII.

[†]Effect on person involved, not nearest resident.

*Maximum permissible body burden = 40 nCi for Pu.

TABLE XIII

SUMMARY OF ACCIDENT PROBABILITIES, MAXIMUM DOSE TO INDIVIDUAL, POPULATION EXPOSURE, AND ANNUAL RISKS FROM TRANSPORT OF ARD PLUTONIUM WASTE FROM D&D OPERATIONS

Accident Class	Description of Accident	Critical Organ Exposed	Estimated Maximum Dose to Individual	Number of Individuals Exposed	Probability (Accidents/Yr)	Population Exposure Man-rem/ Accident	Risk to Population Man-rem/Yr
Moderate	"Design Basis Accident" (No Release Outside Containers)	Whole Body	2.4 mrem	154	6.2×10^{-3}	3.7×10^{-1}	2.3×10^{-3}
Severe	Truck Collison, Contents of 1 Drum of Waste Spilled	Lung	0.13 mrem (100% Class Y)*	2	1.7×10^{-4}	2.6×10^{-4}	4.3×10^{-8}
		Bone	0.55 mrem (100% Class W)*		1.7×10^{-4}	1.1×10^{-3}	1.8×10^{-7}
Extra Severe	Truck Crash, 25 Drums of Waste Broken Open	Lung	32 rem (100% Class Y)*	40	4.18×10^{-6}	1.26×10^{3}	5.30×10^{-3}
		Bone	76 rem (100% Class W)*		4.18×10^{-6}	3.02×10^{3}	1.26×10^{-2}

*Class Y, nontransportable dust with ~ 500-day biological half life in the lung.
Class W, transportable dust with ~ 50-day biological half life in the lung, ~ 100-year half life in the bone.

TABLE XIV

COMPARISON OF ECONOMIC AND ENVIRONMENTAL COSTS RELATIVE TO THE PROPOSED ACTION

ALTERNATIVE 1*			ALTERNATIVE 2**		
Item	Parameter	Value Relative to Proposed Action	Item	Parameter	Value Relative to Proposed Action
Economic Cost	Labor, Materials and Services	+$410,000	Economic Cost		+$309,000**
Environmental Cost	Occupational (Whole Body)	+13.8 man-rem	Environmental Cost	Occupational (Whole Body)	-0.3 man-rem
Environmental Cost	Occupational, Internal (Lung)	+1.4 man-rem	Environmental Cost	Occupational, Internal (Lung)	+1.3 man-rem
Environmental Cost	Off-Site Resident, Internal (Bone)	+0.63 man-rem	Environmental Cost	Off-Site Resident, Internal (Bone)	+0.63 man-rem
			Environmental Cost	Off-Site Waste Shipments (Whole Body)	-0.56 man-rem
			Environmental Cost	Eventual D&D of Facilities:	
				a. Occupational (Whole Body)	+13.8 man-rem
				b. Occupational, Internal (Lung)	+1.4 man-rem
				c. Off-Site Residents, Internal (Bone)	+0.63 man-rem
				d. Remaining Waste Shipments (Whole Body)	+0.56 man-rem

*Assumes a 2-1/2 year stretch-out of D&D activities.

**Assumes a 5-year standby period followed by decommissioning. For increasing standby time, add $1,082,000 per year. Also, total D&D costs at a later date must be added.

APPENDIX D

LIST OF PREPARERS AND
LIST OF INTERESTED AGENCIES

LIST OF PREPARERS

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2) A. J. Nardi, Westinghouse Electric Corporation

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Federal Emergency Management Agency
Region 3 Office
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ATTACHMENT 3

WARD-386, QUALITY ASSURANCE PROGRAM DESCRIPTION FOR DECONTAMINATION AND DECOMMISSIONING ACTIVITIES

TO

FINAL REPORT FOR

DECONTAMINATION AND DECOMMISSIONING

OF

ADVANCED REACTORS DIVISION FUEL LABORATORIES

AT

CHESWICK, PA

JANUARY, 1982

UNDER

DOE CONTRACT NO.: DE-AC02-80ET37247

CONTROLLED COPY NO. _____

ASSIGNED TO _____

APPROVED _____

A. J. Martini, Manager
Product Assurance

Revisions to this document will be distributed to holders of controlled copies. The document holder is responsible to enter changes in his copy. This document is the property of Westinghouse and is to be returned to the Manager, Product Assurance when it is no longer needed or in the event of position reassignment.

WARD-386

QUALITY ASSURANCE PROGRAM DESCRIPTION FOR DECONTAMINATING AND DECOMMISSIONING ACTIVITIES

Westinghouse Electric Corporation
Advanced Reactors Division
P.O. Box 158
Madison, Pennsylvania 15663

HOLDERS OF CONTROLLED COPIES OF
QUALITY ASSURANCE PROGRAM DESCRIPTION FOR
DECONTAMINATING AND DECOMMISSIONING ACTIVITIES

WARD-386

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11 - J. J. Bastin, NFD

12 - W. L. Kirkpatrick

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14 - J. L. Shoulders

15 - H. N. Miller - DOE/CORO

16 - A. T. Chernega, Library

17 - A. T. Chernega, Library

18 - A. T. Chernega, Library

Westinghouse Electric Corporation

Advanced Power Systems Divisions

W H Arnold
General Manager
Advanced Reactors Division

Box 158
Madison Pennsylvania 15663

May 29, 1981

Subject: Decontaminating and Decommissioning Activities
Quality Assurance Program Description - WARD-386

Compliance with this document and the policies and procedures identified in the Quality Assurance Program Index included in this document is mandatory. It must be clearly understood that all personnel who either perform or verify work for the Decontaminating and Decommissioning Activities Program are responsible to assure that the latest revisions of the policies and procedures identified in the Quality Assurance Program Index are used in work performance.

W. H. Arnold
General Manager

WESTINGHOUSE ELECTRIC CORPORATION

ADVANCED REACTORS DIVISION

WARD-386

ARD Fuel Laboratories

QUALITY ASSURANCE PROGRAM DESCRIPTION FOR DECONTAMINATING AND DECOMMISSIONING ACTIVITIES

Revision No. : 2

Original Issued: 4/24/80

Revision Date : 5/29/81

APPROVED: J. C Cwynar DATE: 6/1/81

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APPROVED: J. J. Bastin DATE: 6/1/81

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APPROVED: W. R. Jacoby DATE: 6/1/81

W. R. Jacoby, Manager
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APPROVED: R. R. Cost DATE: 6/1/81

R. R. Cost, Manager
NFD Quality Assurance

APPROVED: W. S. Shingler DATE: 5/29/81

W. S. Shingler, Manager
Development Quality Assurance

WARD-386

ADVANCED REACTORS DIVISION
QUALITY ASSURANCE PROGRAM DESCRIPTION FOR
DECONTAMINATING AND DECOMMISSIONING (D&D) ACTIVITIES

PREFACE

Scope

This document describes the Westinghouse Advanced Reactors Division (WARD) quality assurance program for assuring that the Decontamination and Decommissioning (D&D) activities conducted at the ARD Plutonium Facilities (including the Chemistry Laboratory), located at Cheswick, Pennsylvania satisfy the applicable quality assurance requirements of 10CFR50 Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants. R-2

Applicability

This Quality Assurance Program is applicable to the decontamination, dismantling, packaging, and shipping of material and equipment in accordance with the WARD D&D Plan - Plan for Fully Decontaminating and Decommissioning The Westinghouse ARD Plutonium Laboratories Located At Cheswick, Pennsylvania. R-2

1.0 ORGANIZATION

The ARD functional organizations responsible for the implementation of the Quality Assurance Program are shown in Figure 1. The responsibilities and authority of the key management personnel who have direct responsibility for the Quality Assurance Program are detailed in the following section.

For the D&D of the Chemistry Laboratory, the quality engineering and inspection responsibilities defined in this program are delegated to the Operations Product Assurance Group within the Product Assurance Department of the Nuclear Fuel Division. The surveillance function, however, will be retained by the ARD Product Assurance organization. In addition, the operations and engineering functions for the D&D of the Chemistry Laboratory are delegated to the Plutonium Fuels Development Laboratory of the Nuclear Fuel Division. R-2

General Manager

The ARD General Manager reports to the Vice President and General Manager, Advanced Power Systems Division and is responsible for the design, development and other activities of the Division, including the D&D activities. He provides direction and guidance to the staff managers reporting to him as shown in Figure 1. He reviews progress on all activities and makes visible to senior Corporate management any problems requiring special attention.

Product Assurance

The Product Assurance Manager reports to the General Manager and is responsible to establish and assure compliance with the Division quality assurance programs to ensure that the products of Division efforts meet contractual quality assurance requirements. He is responsible, by review and approval actions, surveillance, and audits to assure that ARD suppliers have established and implemented effective quality assurance programs to meet contractual requirements.

By reporting directly to the General Manager, the Product Assurance Manager is afforded the organizational freedom to identify quality problems and initiate and evaluate solutions thereto. This organizational level provides the mechanism for the resolution of quality problems at the General Manager's level and avoids compromise of product quality due to schedule or cost.

The Product Assurance Manager has the authority to disapprove drawings, specifications and other related documents and to terminate work within the Division and at supplier locations when quality requirements are not being met.

The Product Assurance Manager is a member of the Westinghouse Nuclear Energy Systems Quality Assurance Committee and assures that applicable Corporate quality assurance policies are implemented within the Division.

Development Quality Assurance

The Manager of Development Quality Assurance is responsible to the Product Assurance Manager for assuring that the D&D activities are performed and verified in accordance with the applicable procedures. He is responsible for the review and approval of test plans, drawings, specifications, procedures and procurement documents, including supplier quality assurance program documentation, to assure that quality requirements are effectively applied. His responsibility includes the inspection and release of products at ARD and at suppliers after verifying that the specified quality requirements have been met. He is responsible to assure that the D&D activities are performed in accordance with the ARD D&D Plan. He is responsible for the surveillance of development activities relative to engineering, manufacturing, testing, inspection and shipping and for assuring that defined actions to correct deficiencies have been implemented.

The Manager of Development Quality Assurance has the authority to: a) stop any unapproved work or practices at ARD and supplier locations relating to the D&D activities pending resolution of unsatisfactory quality conditions; b) establish and release hold points beyond which work may not proceed without the determination that requirements are satisfactorily met; c) reject unsatisfactory work, parts and components and; d) contact the appropriate level of ARD management to obtain required remedial actions to resolve quality problems either at supplier locations or at ARD. R-2

The relatively limited technical scope and short duration of the D&D activities necessitate overlapping of job assignments at the technician level (but not for professionals). Decontamination, dismantling, surveillance activities and inspection operations may be performed by the same group of technicians, but with some constraints imposed. No technicians will do any inspection or surveillance which directly assesses his own performance. When a technician performs a final acceptance inspection or surveillance function, he shall be responsible to the Development Quality Assurance Manager. When performing the D&D work, the responsibility of each technician is to the ARD Cheswick Operations management.

Product Assurance Audits and Procedures

The Product Assurance Audits and Procedures activity is responsible to the Product Assurance Manager for issuing, maintaining and controlling the Quality Assurance Program Manuals, the Quality Assurance Program Descriptions and Indices, and the Division Quality Methods and Procedures (QMP's). This activity is responsible for establishing the audit program which includes the preparation and issuance of audit planning, schedules, selection of auditors, conducting audits, reporting audit findings, and follow-up of audit findings for assuring that corrective actions are defined and implemented. This activity is also responsible for audit closeouts.

Reactor Technology Manager

The Manager of Reactor Technology reports to the Division General Manager and is responsible for the implementation of the Quality Assurance Program covering the conduct of work in the Laboratories, and more specifically, the D&D program. He has the final authority on level of funding available to operate the Laboratories, the organization structure and the manpower level.

The Manager of Reactor Technology maintains, by means of review of reports and attendance at meetings, a knowledge of the progress on current work, problems, performance against objective, and provides input as the need exists. In reporting directly to the General Manager he provides the channel of communication for information to and from this Division position.

LMFBR Fuel Cycle Manager

The Manager of Fuel Cycle reports to the Manager of Reactor Technology and is responsible for assuring that the programs assigned to the ARD Fuel Laboratories are implemented. He interfaces with the Manager of the ARD Fuel Laboratories on program objectives, scope of work, funding, manpower, schedules, reports, etc. serving as a channel of communication to and from the Manager, Reactor Technology. He reviews all documents prepared by the ARD Fuel Laboratories Manager approving those under his authority to approve, and recommending disposition on those submitted to higher authority, including documents to the Customer.

ARD Fuel Laboratory Manager

The Manager of the ARD Fuel Laboratories reports to the Manager of Fuel Cycle and is responsible for the execution of programs assigned to the laboratories. He is responsible for accomplishing program objectives and meeting program milestones in accordance with established quality, NRC license and health and safety requirements. He interfaces on a continuing basis with the Manager of Fuel Cycle and Development Quality Assurance. He reviews all documents and procedures prepared for conduct of program work, approving those under his authority to approve and recommending disposition on those submitted to higher authority, including documents to the Customer.

Operations Manager

The Manager of ARD Operations reports to the Manager of Fuel Laboratories and is responsible for the day-to-day operations of the facility. He is responsible for D&D activities and maintenance of facilities in accordance with established quality, NRC license and health and safety requirements. He interfaces on a continuing basis with the Manager of Fuel Engineering and Development Quality Assurance. He reviews all documents and procedures prepared for conduct of program work, approving those under his authority to approve and recommending disposition on those submitted to higher authority.

Engineering Manager

The Manager of Engineering reports to the Manager of the ARD Fuel Laboratories and is responsible for providing the engineering required for programs conducted at the laboratories. More specifically, he is responsible for developing and qualifying the processes, facilities, and equipment required to D&D the laboratories in accordance with established quality NRC license, and health and safety requirements. He is also responsible for the identification and procurement of waste packaging and development of packaging methods to be used in the shipment of radioactive waste to the DOE Burial Site in accordance with Site and Federal regulations. He interfaces on a continuing basis with the Manager of ARD Fuel Laboratories, Operations, and Development Quality Assurance. He reviews all documents and procedures prepared for conduct of program work, approving those under his authority to approve and recommend disposition on those submitted to higher authority.

2.0 THE QUALITY ASSURANCE PROGRAM

It is ARD policy to implement quality assurance programs to assure that structures, systems, components, material and services furnished by ARD satisfy contract requirements. To that end:

- The quality assurance program applies to the D&D activities throughout the life of the project/activity.
- The program applies to quality assurance requirements delegated to suppliers by purchase order.
- The program implements verification of quality-related activities by independent surveillance and audit.

The Division General Manager has the authority and responsibility for the overall Quality Assurance Program. The authority and responsibility for implementing quality assurance activities is delegated by the General Manager to staff management personnel.

The Quality Assurance Program for the D&D activities at ARD, including the Chemistry Laboratory, is implemented by written procedures, instructions and policies issued by the Division, Projects, Technology, Product Assurance and other departments and activities as appropriate. The implementing procedures define in detail how the work is to be performed and verified and are listed in a Quality Assurance Program Index (QAPI) included in this document. | R-2

Each department or organization has the responsbility for the training and indoctrination of personnel to assure continued proficiency in the technical skills and knowledge required to either perform or verify work in accordance with applicable quality assurance requirements. | R-2

3.0 DESIGN CONTROL

The design control requirements as defined by criteria III of 10CFR50 Appendix B are not applicable to the D&D activities. The shipping containers used for transporting of radioactive material and equipment have been approved by Regulatory Agencies. The D&D activities that require ARD Design are tooling and temporary facilities which are considered outside the scope of criteria III.

4.0 PROCUREMENT DOCUMENT CONTROL

ARD has established procedures which control the preparation, review and approval of procurement documents throughout the procurement cycle. Procurement activities for structures, systems and components, including spare or replacement parts, material or services are initiated by the cognizant engineer (the requisitioner) by preparation of a purchase requisition. Instructions for the preparation of a purchase requisition require the inclusion of the following, as applicable:

- A descriptive title of the item or service desired.
- A complete list of drawings and technical specifications (including revision level).
- Codes, standards, and regulatory requirements.
- Special process requirements.
- Acceptance test and inspection requirements.
- Supplier document submittal with review and approval requirements.
- Material and component identification requirements.

When the item, for which the procurement document is being prepared is a Type A or Type B shipping container (FL-10, galvanized DOT 17-C drum or MIII bin); Westinghouse Nuclear Fuels Division (NFD) Product Assurance review of the procurement documents and participation in the vendor survey is required. R-1

Quality assurance provisions, as required, are appended to the requisition and include items such as:

- Submittal requirements pertinent to ARD review and approval of supplier quality assurance documentation.
- Reporting and disposition of deviations from requirements.
- Cleaning and handling requirements.
- Inspection and test plan submittals.
- Inspection and test procedure submittals.
- Quality record submittal and retention requirements.

After review and approval of the requisition by the required organizations, the purchasing organization requests either bids or proposals, or places an order as indicated on the requisition.

Bids or proposals are evaluated, as appropriate, by Development Quality Assurance, Engineering, Operations, and other cognizant organizations. When the requisition requested bids or proposals, a purchase order is authorized by a Purchase Requisition Change Notice (PRCN) which is initiated, reviewed and approved in the same manner as the original requisition.

Procurement prepares a purchase order either on the basis of the original requisition or an approved PRCN changing a request for proposal or bid to a request for a purchase order. The procedure requires that all applicable requirements of the requisition be made a part of the purchase order. Copies of released purchase orders are distributed to designated disciplines, including Development Quality Assurance. When the procurement is on a cost reimbursement basis, a contract, prepared in a standard format, is used in lieu of the purchase order form. The contract is distributed to the same disciplines as the purchase order. The cognizant Quality Engineer reviews either the purchase order or contract to assure that all quality requirements have been included as specified in the requisition.

After order placement, purchase order or contract revisions are initiated by the cognizant engineers' preparation of a PRCN. These documents are reviewed, approved, and processed in the same manner as described earlier for the original requisition. Procurement issues a Purchase Order Change Notice (POCN) to implement the change. When the Procurement is in the form of a contract, changes may appear as a subcontract modification rather than a POCN. Each POCN is an entity and normally does not supersede prior approved POCNs, unless so stated therein. Copies of either the POCN or subcontract modification are distributed to designated disciplines, including Development Quality Assurance, who review the document to assure that all quality requirements have been included as specified in the PRCN. The supplier is required to acknowledge receipt of the POCN or subcontract modification.

Supplier conformance to applicable ARD customer requirements is achieved by the supplier meeting the ARD specification requirements as applied in the purchase order. Confirmation that the applicable requirements are described in the supplier quality assurance programs is done by ARD review and approval of these documents. Verification of supplier conformance to the ARD-approved supplier quality assurance programs is accomplished by periodic surveillance and audits.

5.0 INSTRUCTIONS, PROCEDURES AND DRAWINGS

Activities that affect quality are prescribed by procedures. Procedures exist to cover all activities of management; procurement; product assurance; inspection; fabrication; document preparation, review and approval, distribution and control; surveillance and audit; and record collection and retention.

Each procedure is subject to review and comment by affected disciplines and interfacing activities and, after resolution of comments, is approved and issued by the cognizant manager. The Product Assurance organization approves or concurs with procedures applicable to quality assurance programs prior to issue. When issued, the procedures are mandatory for all personnel either performing or verifying quality-related activities to which the procedure is applicable.

6.0 DOCUMENT CONTROL

ARD has established and documented procedures in use to control documents which affect quality.

Controls are imposed for initial review and approval actions, release of the documents, and for distribution of the documents to designated personnel who either perform or verify quality-related work. Revisions to these documents are reviewed and approved for the applicabulity of the change by those organizations, which reviewed and approved the original document prior to release and distribution.

Control of policies and procedures which are implemented to meet the quality assurance program is delegated by the ARD General Manager to the department manager responsible for their preparation, approval, and issue. Preparation, revision, distribution, and control of procedures are established by the responsible department manager. Procedures provide for the review and approval of the original issue of a document, and revisions thereto, by department and functional organizational units which either interface with or are affected by the document.

Distribution of policy and procedures documents, and revisions, thereto, are under the control of the department manager responsible for the particular procedure series. Distribution is controlled to assure availability of the documents and revisions to these documents to all affected personnel.

7.0 CONTROL OF PURCHASED MATERIAL, EQUIPMENT AND SERVICES

ARD has established procedures for controlling purchased material, equipment and services and assuring conformance to the requirements of the purchase order.

The procedures include the following measures:

- Specification of quality requirements.
- Quality engineering review and approval.
- Acceptable source lists.
- Survey and selection of suppliers.
- Supplier surveillance and audit.
- Objective evidence of quality.
- Supplier submittal of documents such as:
  - Quality Assurance Programs
  - Quality Verification Plans
  - Inspection and Test Plans
  - Drawings
  - Process Procedures
  - Nonconformance Reports
  - Waivers
- Use of hold points to verify quality.
- Review of documentation to verify quality.
- Quality release to effect shipment.

Each of these elements is controlled by implementing procedures to assure conformance to quality requirements.

The control of purchased materials and equipment begins with selection of a supplier capable of providing acceptable quality products and services. To this end, procedures provide for use of an Acceptable Source List. The Acceptable Source List is a compilation of suppliers who either have demonstrated capability to provide quality products or services, or have been accepted based on a survey. Supplier surveys are performed at the division level and documented by a survey team consisting of procurement, engineering, operations and product assurance personnel, as appropriate, to the scope of the survey for the anticipated procurement.

The cognizant engineer is responsible for the control of purchased material, equipment, and services, and specifies the requirements needed to provide adequate control in the purchase requisition. Development

Quality Assurance involvement continues with the release of the purchase order which identifies the documentation which is required to be submitted by the supplier for review and approval action. Submittals include documents such as:

(a) Quality assurance program documentation, including the quality verification plan

(b) Inspection and test plans

(c) Inspection and test procedures

(d) Drawings

(e) Process procedures

(f) Supplier Nonconformance Reports with recommended disposition of material (i.e., either "accept as is", "repair" or "modify" indicating that purchase order requirements have not been met.

(g) Waivers

Review and approval of submitted plans and procedures by the cognizant engineer and the quality assurance engineer are mandatory, with additional review and approval by materials, operations, engineering and other disciplines as appropriate. R-2

During review of the supplier quality verification plan or inspection and test plan, procedures provide for the identification of those steps (hold points) in the process and inspection where a documented release from ARD must be obtained prior to further processing. The documented release is an inspection release form signed by a Development Quality Assurance representative. Surveillance is performed of supplier activities to assure conformance with the procedures to meet purchase order requirements. The frequency and scope of surveillance of suppliers depend upon the complexity of the parts and components being manufactured, the manufacturing stage, and the supplier performance. Safety-related components whose quality characteristics cannot be fully verified at receiving inspection are subject to verification at an earlier stage in the fabrication to assure the quality of the item.

When required by purchase order, a quality release to effect shipment of parts and components is issued by Development Quality Assurance personnel. Prior to the issuance of the quality release, Development Quality Assurance personnel review the certificate of conformance, test data and records; assure that requirements for handling, packaging and shipment have been implemented; and review the data package to confirm that the structures, systems, components and materials meet the purchase order quality requirements and that all required documentation is included.

Materials, components or systems delivered to ARD are receipt inspected in accordance with written instructions prepared and/or concurred with by the cognizant engineer and the cognizant quality engineer. Inspection plans consider equipment complexity, prior source surveillance, and intended application. Source surveillance and receipt inspection are fully documented to provide evidence that items conform to purchase requirements.

8.0 IDENTIFICATION AND CONTROL OF MATERIAL AND ITEMS

Procedures describe requirements to identify, control and maintain traceability of materials and items to the work and properties records required to assure that defective materials and items are not used.

Equipment specifications, engineering drawings and procurement documents impose on suppliers the requirements for identification of materials and items including, when applicable, the numbering system and marking method to be used. These requirements consider the location of identification marking, measures for verification of identity during processing and records traceability.

Identification and control of materials and items during receiving inspection, processing and use at ARD is performed in accordance with written procedures. Materials and items furnished to ARD from outside sources for testing purposes are similarly controlled.

Receiving inspection is performed and documented prior to release. Identification of material and items is maintained during processing in accordance with work instructions. When the work is completed all documentation traceable to the material or item is released to the cognizant engineer with the material or item.

Identification and control of materials and items at ARD during processing are performed in accordance with written instructions. These instructions identify both the work and inspection operations to be performed. When a Manufacturing and Inspection Traveler (MIT) is used for work and inspection, all operations are signed off to indicate status; and when the work is completed, the item, along with all documentation pertinent to the work and inspection is released to the cognizant engineer. R-2

Items or materials found to be nonconforming during inspection or processing are tagged with a "hold" tag to prevent inadvertent use. Materials or items that have been accepted are identified as "acceptable".

9.0 CONTROL OF SPECIAL PROCESSES

ARD procedures are established and implemented to control special processes. Procedures define methods for qualification of personnel for performance of special processes such as welding, nondestructive examination and inspection. The procedures define requirements for:

- Training of personnel
- Documented personnel qualification criteria
- Responsibility for personnel training and qualification
- Records of personnel training and qualification
- Records retention

ARD personnel performing either nondestructive examinations or verifying supplier NDE activities are qualified and certified in accordance with SNT-TC-1A.

The execution responsibility for control of special processes with respect to structures, systems, components, material or services furnished to ARD is delegated to the supplier. Procurement documents are required to identify processes for which control measures are to be defined. Additionally, purchase orders identify the procedure and personnel qualifications which require ARD review and approval.

Development Quality Assurance representatives verify the control of special processes at ARD and at suppliers by surveillance and audit.

10.0 INSPECTION

The execution of inspection activities at ARD is performed by Development Quality Assurance in accordance with procedures and instructions.

Prior to performing inspections, either an Inspection Instruction and Data Sheet (IIDS), a Quality Inspection Procedure (QIP) or a Quality Control Instruction (QCI) is prepared by the cognizant quality engineer and concurred with by Engineering. Inspection instructions consider the complexity of the item, the intended use and the importance to safety in defining the inspections to be performed. Inspection instructions are required to specify the variables or attributes to be inspected; the reference requirements documents and the acceptance criteria for the inspection. Procedures define methods by which measuring and test equipment used for inspections are calibrated and personnel performing the inspection are qualified for the examination required. R-2

ARD assures that supplier inspection activities are adequate to assure conformance to product requirements by actions, as appropriate, such as:

- Review and approval of supplier inspection and test plans
- Review and approval of supplier inspection procedures
- Establishing inspection hold points beyond which work cannot proceed without ARD verification of process and inspection activities
- Periodic surveillance and audit of supplier activities
- Quality release of item to effect shipment

Prior to the issuance of the quality release, the Development Quality Assurance representative reviews the certificate of conformance, test data and records; assures that requirements for handling, packaging and shipment have been implemented; and reviews the data package to confirm that the material, parts or components meet the quality requirements and that all required documentation is included.

11.0 TEST CONTROL

The test Control requirements as defined by Criteria XI of 10CFR50 Appendix B are not applicable to the D&D activities. The test program used to demonstrate the design adequacy of the shipping containers used for the transporting of radioactive materials and equipment has been conducted and approved by Regulatory Agencies.

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT

Procedures establish methods for the control and calibration of data acquisition and control instrumentation, measuring equipment and calibration standards. Calibration is required to be accomplished in accordance with written instructions and at intervals identified in the procedures. Applicable tolerances have been established and calibrations are traceable to either national or consensus standards. On occasion, purchase orders are issued for calibration of data acquisition and control instrumentation, and measuring and test equipment by suppliers. R-2

Standard "off-the-shelf" measuring equipment, such as rules or tapes, are not required to be calibrated when used for general shop work. When the measuring equipment is used to determine acceptability of a product, it shall be calibrated in accordance with established calibration procedures. R-2

Records are maintained on each item which identifies the calibration performed throughout the life of the item.

When recalibration determines that an item is out of tolerance, actions are prescribed to determine if the out-of-tolerance condition has adversely affected the results of any tests or examinations performed since the previous calibration.

To assure that out-of-calibration items are not inadvertently used for tests or examinations, each item is tagged to show its status and due date of next calibration.

The execution responsibility for control and calibration of test and measuring equipment by suppliers is imposed by purchase order.

Verification of implementation of controls for data acquisition and control instrumentation and measuring equipment is performed at ARD and at suppliers by surveillance and audit.

13.0 HANDLING, STORAGE, AND SHIPPING

Special handling, storage and shipping controls are implemented by specific written instructions as appropriate to the contractual requirements.

Requirements for control of handling, storage and shipping by suppliers is delegated by purchase order.

Verification of implementation of controls is through periodic audit and surveillance of ARD and supplier activities.

14.0 INSPECTION, TEST AND OPERATING STATUS

ARD has procedures in place to identify the status of materials and parts. Materials and parts, which are subject to receiving inspection, are not released until accepted by Development Quality Assurance and tagged to identify the acceptance. Acceptable materials and parts are relased for use or further processing with a Material Release or a Manufacturing and Inspection Traveler (MIT). If an item is conditionally acceptable, the conditions are stated on a "hold" tag and on the Materials Release.

When D&D activities require control during the work process, instructions document the process steps and inspection operations which must be performed. Sign-off of each process and verification operation provides a clear indication of the inspection test and operating status of the item. Upon final inspection by Development Quality Assurance personnel, the operation is signed off and an acceptance tag is attached to the material. If at any inspection point, the part is found to be nonconforming, that step is not signed off, a "hold" tag is attached to the nonconforming part and, where feasible, the part is segregated and held for disposition.

The execution responsibility for identification of inspection, test, and operating status during fabrication and test activities by suppliers, is delegated by purchase order. Procurement documents require the supplier to implement measures to indicate the inspection, test, and operating status of an item, and that nonconforming items are clearly identified to prevent inadvertent use. The supplier is required to control manufacturing and inspection status using indicators, such as tags, stamps, labels, process cards, etc.

Verification of compliance with procedures for identification and maintenance of inspection, test, and operating status, and the control of nonconforming items is done through surveillance and audit of both ARD and supplier activities.

15.0 NONCONFORMING MATERIALS

Procedures establish the means for controlling nonconforming materials. All nonconformances found at ARD are required to be identified to Development Quality Assurance (DQA). Development Quality Assurance documents all nonconformances on a Material Nonconformance Report (MNR) which is distributed to Engineering for disposition. When a Manufacturing and Inspection Traveler (MIT) is used, Product Assurance tags nonconforming items with a "hold" tag, and records the MNR number on the MIT.

If the disposition of the item is "accept", Development Quality Assurance removes and destroys the hold tag, checks and initials the MIT and releases the part for further processing.

When the disposition of the item is conditional acceptance, the conditions for acceptance, rework, repair, or modification are clearly stated on the MNR. The quality engineer releases the item for the work to satisfy the conditions. When the conditions are satisfied, Product Assurance removes the "hold" tag, signs the work instruction and releases the part for further processing.

Nonconforming items are segregated, where feasible, and maintained in a hold status until the disposition of the item has been determined and agreed upon by Engineering, and the Quality Engineer and other consultants as deemed necessary by the Engineer. Agreement is indicated by signatures on the MNR.

Development Quality Assurance maintains a log of all MNR's with number, date, item number and disposition recorded.

The execution responsibility for the identification, documentation, segregation, and disposition of nonconforming materials, parts, or components being fabricated by others is delegated to the supplier by purchase order. Purchase orders require suppliers to submit Supplier Nonconformance Reports (SNRs) to ARD when the nonconformance affects an ARD-imposed or -approved attribute. The supplier recommended disposition may be either accept-as-is, conditionally accept, modify or repair. The supplier-issued SNRs document the deviation along with the recommended disposition, the justification for the recommendation, the cause of the nonconformance, and the corrective action to preclude recurrence. The SNRs are reviewed at ARD in accordance with procedures by the cognizant engineer, Development Quality Assurance engineer and other interfacing and technical supporting organizations as necessary to disposition the nonconformance. Signatures by Development Quality Assurance personnel and the cognizant engineer provide evidence of review and concurrence with disposition action. R-2

Dispositioned nonconformance reports are documented by the supplier as part of the supplier data package which is reviewed and approved by a Development Quality Assurance engineer prior to the quality release actions. R-2

Surveillance and audits are performed at ARD and suppliers to verify that procedures concerning nonconformances are implemented.

16.0 CORRECTIVE ACTION

Procedures provide for prompt identification, documentation, and implementation of corrective action to prevent recurrence of conditions adverse to quality. Corrective actions result from deficiencies identified in one or more of the following:

- Material Nonconformance Reports
- ARD Unusual Occurrence Reports which describe unplanned events.
- Reports of audits of ARD or supplier activities.
- Requests for Corrective Action issued by Development Quality Assurance engineer to supplier or ARD organizations documenting deficiencies or noncompliances detected during surveillance actions. | R-2

Material Nonconformance Reports (MNR) are prepared by Development Quality Assurance personnel to document a nonconformance. The MNR is directed to Engineering, who, with the concurrence of the Quality Engineer, identifies the cause and, when appropriate, the corrective action to be taken to prevent recurrence. When the identified corrective action has been implemented, and verified by Development Quality Assurance, the MNR is closed.

Supplier Nonconformance Reports (SNR) are required by purchase order to be submitted to ARD when contract requirements are not met or when a procedure, specification or drawing approved by ARD has not been complied with. Nonconformance reports indicate the cause of the deficiency and the corrective action planned by the supplier to prevent recurrence. These corrective actions are reviewed and evaluated for adequacy by Development Quality Assurance before disposition of the SNR. Depending upon the nature and the frequency of the nonconformances and deficiencies, follow-up actions is performed to verify implementation of the corrective action by surveillance at the supplier facility.

Unusual Occurrence Reports are used to report, evaluate, and implement corrective action to prevent recurrence of unplanned or unusual events having programmatic significance such that it adversely affects or potentially affects performance, reliability, or safety of a facility. The identification of the cause and implementation of the corrective action is required before ARD approval of the final report.

Internal audits at ARD, and external audits of suppliers, result in reports to the management of the audited activity. The reports identify deficiencies and request a response specifying the corrective actions and the implementation of the corrective actions. The audit activities provide for follow-up of the audit response, evaluation of the corrective action for adequacy, verification of the implementation of corrective action, and formal closeout of the audit when all open items have been implemented and verified.

R-2

Requests for Corrective Action are generated by a Development Quality Assurance engineer to document and notify either responsible ARD or supplier management of deficiencies and noncompliances found during surveillance activities. The responsbile management is required to identify either the corrective action taken, or to be taken within a specified time, and return the request to Development Quality Assurance. Requests for Corrective Action are recorded, evaluated, followed, compiled, and reported in accordance with procedures.

A summary of significant deficiencies and noncompliances are identified monthly in the quality status reports along with a corrective action status summary, audit results, and adverse quality trend data as appropriate.

Execution responsibilities for identification and implementation of corrective action are also delegated to suppliers by purchase order requirements.

17.0 RECORDS

ARD controls the identification, acquisition, maintenance and retrieval of quality records through implementation of procedures. These procedures define the records necessary to document the quality of items, systems and test results as appropriate. The records are identified along with the minimum retention time period and the organization responsible for their collection, maintenance, storage and retrieval.

Procurement documents specify records which are to be supplied to ARD, delivered with products, or maintained in the suppliers' files. Records requirements are imposed on suppliers by purchase order in accordance with applicable codes, standards, and specifications. These requirements include provisions that inspection and test records contain a description of the test performed, verification of work completion for manufacturing, inspection and test result, identification and disposition of nonconformances and identification of acceptability of test results.

Records are either maintained at ARD or at supplier locations. Those records identified in the contracts to be delivered to the Customer will be transmitted to the Customer as directed.

18.0 AUDITS

Procedures are established and implemented for conducting comprehensive, planned, and periodic audits of quality-related activities at ARD and at suppliers to verify compliance with all aspects of the quality assurance program requirements, to determine the effectiveness of the program, and to assure compliance with the contractual requirements. Audit scheduling, notification, team selection, conduct of the audit, reporting, follow-up of audit responses, and closeout are the responsibility of Product Assurance Audits and Procedures. Audit teams are selected on the basis of the members' knowledge, expertise, and experience in the area to be audited. Team leaders are responsible for preparing detailed checklists against which the audit is performed. The audit team members, including the team leader, are required to have no direct responsibility for the area being audited.

Types of audits performed are related to activity, product, nondestructive examinations, and records. Audits are conducted to evaluate the implementation of procedures and practices in the areas of program activities, work practices, testing, records, and other portions of the quality assurance program as appropriate to the status of the work.

The ARD audit program shall:

- Audit the quality-related functions of ARD and suppliers on a regular basis. It is intended that some elements of the internal and supplier activities be audited at least once every two (2) years. Audits, however, are scheduled with consideration of the performance of the audited organization, the nature, scope and duration of the program activity performed, and the consequences of deficiencies therein.

- Include an annual forecast of planned audits on a calendar year basis.

- Provide quarterly schedules showing audit dates, audited activity, acceptance criteria and audit team members.

- Plan specific audits to assure documentation of the specific activities to be audited, notification of responsbile management, the preparation of audit checklists and a discussion of the audit with responsible management at the conclusion of the audit.

- Document audit results.

- Assure that management responsible for the work being audited provides and implements adequate corrective action to preclude recurrence of deficiencies.

- Verify implementation of corrective action and close audit.

Procurement documents have provisions for access of ARD personnel to supplier plants for the purpose of conducting audits. R-2

The responsibility for the execution of audits is also delegated to suppliers by procurement documents. Suppliers are responsible for auditing their own internal program and those of sub-tier suppliers.

QUALITY ASSURANCE PROGRAM INDEX (QAPI) FOR D&D ACTIVITIES
IMPLEMENTING PROCEDURES

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II Quality Assurance Program	WARD 386, Section 2.0	Quality Assurance Program Description for D&D Activities 2.0 Quality Assurance Program
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III Design Control	Not Applicable	
IV Procurement Document Control	WARD 386, Section 4.0	Quality Assurance Program Description for D&D Activities 4.0 Procurement Document Control
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	OPR 310-1	Request for Purchase
	OPR 310-2	Purchase Requisition Change Notice
	OPR 310-4	Use of CAR and PAR Documents
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IV (Cont'd)	QMP 4-6	Verification Hold Point Program
	QMP 4-10	Supplier Request for Waivers
	QMP 4-12	Product Assurance Actions on "Hold Point" Verification Activities at Suppliers Facilities
	QMP 4-13	Product Assurance Quality Release of Supplier Shipments
	QMP 4-14	Product Assurance Surveillance
	QMP 5-6	Control and Disposition of Nonconformances at ARD
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	QMP 5-13	Inspection and Test Planning
	QMP 8-3	Quality Assurance Audits of ARD Internal and ARD Supplier Activities
	QIP 3000	Receiving Inspection
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		Operating Instructions (OIs)
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	QMP 2-1	Preparation & Control of Quality Methods & Procedures (QMPs)
	QMP 2-4	Control & Distribution of Product Assurance Programs and Procedures
	QIP 1101	Processing Document Review
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VII Control of Purchased Material, Equipment and Services	WARD 386, Section 7.0	Quality Assurance Program Description for D&D Activities 7.0 Control of Purchased Materiual, Equipment & Services
	OPR 305-1	ARD Purchasing Department Manual
	OPR 310-1	Request for Purchase
	OPR 310-2	Purchase Requisition Change Notice
	OPR 310-4	Use of CAR and PAR Documents
	OPR 310-5	Use of AR's
	OPR 315-1	Cost Estimating

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VII (Cont'd)	PM 303.01	ARD Acceptable Source List
	QMP 4-1	Quality Requirements for Procurement
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	QMP 4-3	Receiving Inspection at ARD
	QMP 4-6	Verification Hold Point Program
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VIII Identification and Control of Materials, Parts and Components	WARD 386, Section 8.0	Quality Assurance Program Description for D&D Activities 8.0 Identification and Control of Materials and Items
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IX Control of Special Processes	WARD 386, Section 9.0	Quality Assurance Program Description for D&D Activities 9.0 Control of Special Processes
	QMP 4-1	Quality Requirements for Procurements
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	QMP 4-14	Product Assurance Surveillance
	QMP 5-1	Training and Qualification of Personnel (Special Processes)
	QMP 5-14	Certification of ARD Nondestructive Testing Personnel
	QMP 8-3	Quality Assurance Audits of ARD Internal and ARD Supplier Activities
	QIP 1101	Training and Examination of Development Quality Assurance Personnel
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X Inspection	WARD 386, Section 10.0	Quality Assurance Program Description for D&D Activities 10.0 Inspection
	QMP 4-1	Quality Requirements for Procurement
	QMP 4-6	Verification Hold Point Program
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X (Cont'd)	QMP 4-14	Product Assurance Surveillance
	QMP 5-1	Training and Qualification of Personnel (Special Processes)
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	QMP 8-3	Quality Assurance Audits of ARD Internal and ARD Supplier Activities
	QIP 1100	Training and Examination of Development Quality Assurance Personnel
XI Test Control	Not Applicable	
XII Control of Measuring and Test Equipment	WARD 386, Section 12.0	Quality Assurance Program Description for D&D Activities 12.0 Control of Measuring and Test Equipment
	QMP 4-1	Quality Requirements for Procurement
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	QMP 5-5	Control and Calibration of Standards and Measuring and Test Equipment
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	PFDL OP-0002	Storage and Handling of Nuclear Materials Outside the Glove Boxes
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XIV Inspection, Test and Operating Status	WARD 386, Section 14.0	Quality Assurance Program Description for D&D Activities 14.0 Inspection, Test and Operating Status
	QMP 4-1	Quality Requirements for Procurement
	QMP 4-3	Receiving Inspection at ARD
	QMP 4-14	Product Assurance Surveillance
	QMP 5-11	Material Control at ARD
	QMP 5-13	Inspection and Test Planning
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	QIP 3000	Receiving Inspection
	OI 3903	Work Request System
	OI 3911	Material Control at ARD

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XV Nonconforming Materials, Parts or Components	WARD 386, Section 15.0	Quality Assurance Program Description for D&D Activities 15.0 Nonconforming Materials
	QMP 4-1	Quality Requirements for Procurement
	QMP 4-14	Product Assurance Surveillance
	QMP 5-6	Control and Disposition of Nonconformances at ARD
	QMP 5-8	Control and Disposition of Nonconformances at Suppliers
	QMP 5-11	Material Control at ARD
	QMP 8-3	Quality Assurance Audits of ARD Internal and ARD Supplier Activities
	QIP 3000	Receiving Inspection
	OI 3911	Material Control at ARD Cheswick
XVI Corrective Action	WARD 386, Section 16.0	Quality Assurance Program Description for D&D Activities 16.0 Corrective Action
	QMP 2-6	Quality Status Reports
	QMP 2-7	Request for Corrective Action (RCA)
	QMP 2-9	Deficiency Reporting
	QMP 3-12	Reporting of Unusual Occurrences at ARD
	QMP 4-1	Quality Requirements for Procurement
	QMP 4-14	Product Assurance Surveillance
	QMP 5-6	Control and Disposition of Nonconformances at ARD
	QMP 5-8	Control and Disposition of Nonconformances at Suppliers
	QMP 8-3	Quality Assurance Audits of ARD Internal and ARD Supplier Activities

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	QMP 4-1	Quality Requirements for Procurement
	QMP 4-3	Receiving Inspection at ARD
	QIP 3000	Receiving Inspection
	OI 3900	Quality Records
	OI 3903	Work Request System ARD Fuel Laboratories Manual Manufacturing and Inspection Travelers (MITs) Batch Area Route Cards (BARCs) Process and Inspection Data Sheets (PIDs) PFDL Manual Data Forms
XVIII Audits	WARD 386, Section 18.0	Quality Assurance Program Description for D&D Activities 18.0 Audits
	QMP 8-3	Quality Assurance Audits of ARD Internal and ARD Supplier Activities