NOTICE!

ALL DRAWINGS ARE LOCATED AT THE END OF THE DOCUMENT

EG&G Rocky Flats Inc
Rocky Flats Environmental Technology Site

Environmental Restoration Management
Decontamination and Decommissioning Project

Subproject Management Plan for the 886 Complex

PARSONS
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- First aid kit,
- Fire extinguisher,
- Reserve PPE,
- Emergency decontamination equipment (Kim wipes),
- Full-face respirator (for unknown/unsuspected chemical/radiological contamination), and
- Surgical gloves

9.0 HASP BRIEFING AND POTENTIAL AMENDMENTS

This task-specific HASP addresses the health and safety aspects of the work related to the sampling and characterization activities in the Building 886 Complex Personnel who perform the tasks described in Section 1 6 must be briefed on the contents of this task-specific HASP and documentation of the briefing must be maintained per the *Training User's Manual*

This HASP is based on information available at the time of preparation Unexpected conditions may arise which will require reassessment of this HASP Unplanned activities and/or changes in the hazard status may require a review of, and may result in changes to, this HASP Changes in the anticipated hazard status or unplanned activities are to be recorded as an amendment to this plan Amendments must be approved by the Project Manager with concurrence by Industrial Hygiene and Radiological Engineering

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EG&G ROCKY FLATS

EG&G ROCKY FLATS, INC
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February 7, 1995

95-RF-01543

Vern Witherill
Program Director
Environmental Restoration
DOE,RFFO

SUBMITTAL OF FINAL SUBPROJECT MANAGEMENT PLAN FOR THE BUILDING 886 COMPLEX - AET-001-95

Action None required

The attached Subproject Management Plan (SMP) for the Building 886 Complex has been completed The SMP was developed in accordance with the Rocky Flats Environmental Technology Site Decontamination and Decommissioning Implementation Plan for Environmental Restoration Management Program dated August 1994, Draft A Submittal of the final SMP satisfies milestone 130075003 in work package number 13007 (Building 886 D&D) If you have any questions on the SMP, please contact T G Bourgeois at extension 8082

A E Tome

A E Tome
Project Manager-D&D Team
Industrial Area OU Closures/D & D Team

AET mm

Attachment
As Stated

ADMIN RECORD

A-OU1 -000_19

EG&G Rocky Flats, Inc.
Rocky Flats Environmental Technology Site

Environmental Restoration Management
Decontamination and Decommissioning Project

Subproject Management Plan for the 886 Complex

Rev 0
February 2, 1995

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prepared by
Parsons Engineering Science, Inc

LIST OF ACRONYMS

ALARA	as low as reasonably achievable
APEN	Air Pollutant Emission Notice
AOCs	Areas of contamination
ARARs	Applicable, Relevant, and Appropriate Requirements
BCP	Best Control Practices
CAA	Clean Air Act
CDF	Central Decontamination Facility
CERCLA	Comprehensive Environmental Response and Compensation Liabilities Act
cfm	cubic feet per minute
CFR	Code of Federal Regulations
cm	centimeter
CML	Critical Mass Laboratory
COC	Contaminant of Concern
CWA	Clean Water Act
cx	categorically excluded
D&D	Decontamination and Decommissioning
DACs	derived air concentrations
DCG	derived concentration guides
DOE	Department of Energy
DOT	Department of Transportation
DP	Defense Programs
DP	Decommissioning planning
DQO	Data Quality Objectives
EA	Environmental Assessment
EIS	Environmental Impact Statement
EM	Environmental Management
EPA	U S Environmental Protection Agency
ER	Environmental Restoration
ERM	Environmental Restoration Management
g/L	grams per liter
HEPA	High Efficiency Particulate Air
HEUN	Highly Enriched Uranyl-Nitrate
HS&QAG	Health, Safety, and Quality Assurance Group
IAG	Interagency Agreement
IDLH	Immediately Dangerous to Life or Health
IHSS	Individual Hazardous Substances Site
LCO	Limit conditions of operation
LDR	Land Disposal Restrictions
LLW	Low Level Waste
LOE	Level of Effect
MAA	Material Access Area
NEPA	National Environmental Policy Act

NESHAPS	National Environmental Standards for Hazardous Air Pollutants
NPDES	National Pollutant Elimination System
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
OMG	Operations Management Group
OSHA	Occupational Safety and Health Administration
OSR	Occupational Safety Requirements
OU	Operable Unit
PCB	polychlorinated biphenyl
PEL	Permissible exposure level
PM	Project Manager
PPE	Personal Protective Equipment
ppm	parts per million
QA	Quality Assurance
QAP	Quality Assurance Plan
QAPD	Quality Assurance Program Description
QAPjP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QARD	Quality Assurance Requirements and Description
RADCON	Radiological Control Manual
RCA	Radiologically Controlled Area
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Clean-up Agreement
RFETS	Rocky Flats Environmental Technology Site
RFO	Rocky Flats Office
ROI	Radiological Operations Instruction
RWP	Radiation Worker Permit
SAP	Sampling Analysis Plan
SMP	Subproject Management Plan
SNM	Special Nuclear Materials
SOPs	Standard Operations Procedures
SSO	Site Safety Officer
TBD	To be determined
TRU	transuranic waste
TSCA	Toxic Substance Control Act
TSR	Technical Safety Requirements
TVL	Threshold Value Limit
WAC	Waste Acceptance Criteria
WBDE	whole body dose equivalent
WBS	Work Breakdown Structure
WIPP	Waste Isolation Pilot Project

TABLE OF CONTENTS

SUBPROJECT MANAGEMENT PLAN FOR THE 886 COMPLEX

1.0 INTRODUCTION

The Rocky Flats Environmental Technology Site (Site) is located in Jefferson County, Colorado, about 16 miles northwest of Denver, on approximately 6,550 acres of land The Site is a U S Department of Energy (DOE)-owned (managed by the Rocky Flats Office - (DOE-RFO)), contractor-operated facility, and is part of the nuclear weapons complex The Site operated from 1952 until 1992 as a nuclear weapons research, development, and production complex Its primary mission was to fabricate nuclear weapons components from plutonium, uranium, beryllium, and stainless steel The Site, like the majority of other DOE nuclear weapons complex sites, is currently in transition from production operations to waste management, facility decontamination and decommissioning (D&D), environmental restoration, and economic development

The 886 Complex is one of several facilities at the Site identified as a surplus facility, and is currently being prepared for D&D This subproject management plan will describe the proposed subproject and establish a subproject baseline against which the overall progress of the project and the effectiveness of its management can be measured

The 886 Complex is located within the Site boundaries in the northeastern quadrant of the 800 Area complex Construction of Building 886 was completed in 1964 and activities began in January 1965 The 886 Complex houses a Critical Mass Laboratory (CML) and support structures The primary mission of the facility was to perform criticality measurements on a variety of fissile material configurations in support of Site activities, and to develop nuclear safety standards for the Nuclear Regulatory Commission Over 1,600 criticality experiments were performed in Building 886 The last criticality experiment was conducted in October 1987 Routine maintenance and utility support continue in the 886 Complex Currently, 23 employees work in offices in the non-Radiologically Controlled Area (RCA) of Building 886

The 886 Complex (see Figure 1 1) includes the following five facilities Building 828, Building 875, Building 880, Building 886, and Trailer T886A Each of these facilities is further discussed in Section 1 1

1.1 History of the 886 Complex

The objective of this section is to examine the operating history of the facility and existing facility characterization data so that potential areas of contamination can be identified and a D&D approach can be selected The areas in the complex where the radioactive or hazardous materials were used will be identified The materials involved, the operations performed, and radiation and contamination levels that were typical during those operations

FIGURE 1-1 886 COMPLEX MAP

will be presented Specifically, areas where experiments were conducted, where waste was stored, or areas where inaccessible systems or equipment exist will be identified Past operational processes or occurrences (including spills, releases, or accidents) have resulted in residual radioactive contamination of the facilities These processes or occurrences could adversely affect operations during decommissioning, and will be identified Major issues will be described for each building

The sources used to develop the operating history include

- Building 886 walkdown,
- Conversations with former Rocky Flats employees,
- Conversations with EG&G personnel,
- Waste Stream Identification and Characterization, Area 2, (1987),
- Waste Stream and Residue Identification and Characterization, Building 875 (1993),
- Waste Stream and Residue Identification and Characterization, Building 880 (1993),
- Waste Stream and Residue Identification and Characterization, Building 886 (1993),
- Safety Review of the Rocky Flats Nuclear Safety Facility,
- Historical Release Report for the Rocky Flats Plant,
- 886 Complex drawings,
- Surplus Defense Nuclear Production Facilities Element,
- Pre-Turnover Review of Buildings 771, 776/777, 779, 865 and 886 Prior to Transfer from Defense Programs (DP) to Environmental Restoration and Waste Management (EM),
- Photographs, and
- Existing facility characterization information

1.1.1 Building 886

Building 886 is a single story, 10,360-square-foot building, which consists of a radiologically controlled area (RCA) (also containing a material access area [MAA]) and a non-RCA, and is used mostly for offices The RCA occupies approximately 5,000 square feet of the total area The RCA is referred to as the "hot" area and the remainder of the building is referred to as the "cold" area Outside the building on the southeastern side of Room 101 is a sea-land container A preliminary hazards assessment of Building 886 was completed in April 1994, and provides the most current operational configuration of the building

1.1.1.1 Hot Area (Radiologically Controlled Area)

As shown on Figure 1 2, there are four rooms in the RCA of Building 886 101, 102, 103, and 108 Room 101, referred to as the Assembly Room, is where all criticality experiments were performed Room 102 was used as a storage room Room 103 (referred to as the Mixing Room) was used for handling and processing uranium and plutonium Room 108 is a hallway connecting the three rooms with the office area A double-door airlock provides entry to Room 108 from the cold area

The Waste Stream Identification and Characterization Report (1987) identified several waste streams for the RCA Non-radioactive waste streams generated in the RCA include Kimwipes® and chemicals in a storage cabinet, water mixed with oil, and plastic chips contaminated with freon, solvents, and oil Solvents that may have been used on Kimwipes include methylene chloride, acetone, carbon disulfide, chloroform, and trichlorofluoromethane There is also a cabinet in Room 101 where small containers of chemicals are stored Out-of-date chemicals were dispositioned through the onsite waste management system Chemicals stored in the cabinet include paints, solvents, oil, paint thinner, paint remover, acetone, 1,1,1-trichloroethane, and other similar items It is unknown how many of the chemicals may still be present, the destination of stored chemicals is currently being investigated Wastewater mixed with oil and possibly with trichloroethylene was also generated, and collected in 55-gallon drums, and taken to Building 374 for treatment

Radioactively contaminated and mixed wastes generated in the RCA include liquid and solid laboratory wastes, and paints and solvents Liquid laboratory wastes include hydrochloric acid, nitric acid, methanol, uranyl nitrate, and sodium hydroxide The wastes were collected in 55-gallon drums filled with Raschig rings and then sent to Building 374 for treatment Solid waste generated includes latex rubber gloves, tape, paper, used lab equipment, and Kimwipes® contaminated with process chemicals This waste was placed in 55-gallon drums and stored as mixed waste Paint and solvent waste includes new and used paint and paint stripper The paint stripper contains methylene chloride, propylene dichloride, alcohols, and ammonia These wastes were placed in 55-gallon drums and stored in Building 889 Currently, no treatment capability exists for the mixed waste streams at RFETs

Room 101 - Assembly Room

The Assembly Room has 4-foot-thick concrete walls on all sides except the side connected to the cold side, which has a 5-foot-thick concrete wall The ceiling consists of a 2-foot-thick concrete slab covered with sheet metal and an overlay of tar The floor in Room 101 is a "floating" floor (poured separately from the foundation and walls) Figure 1-2 shows the layout of Room 101

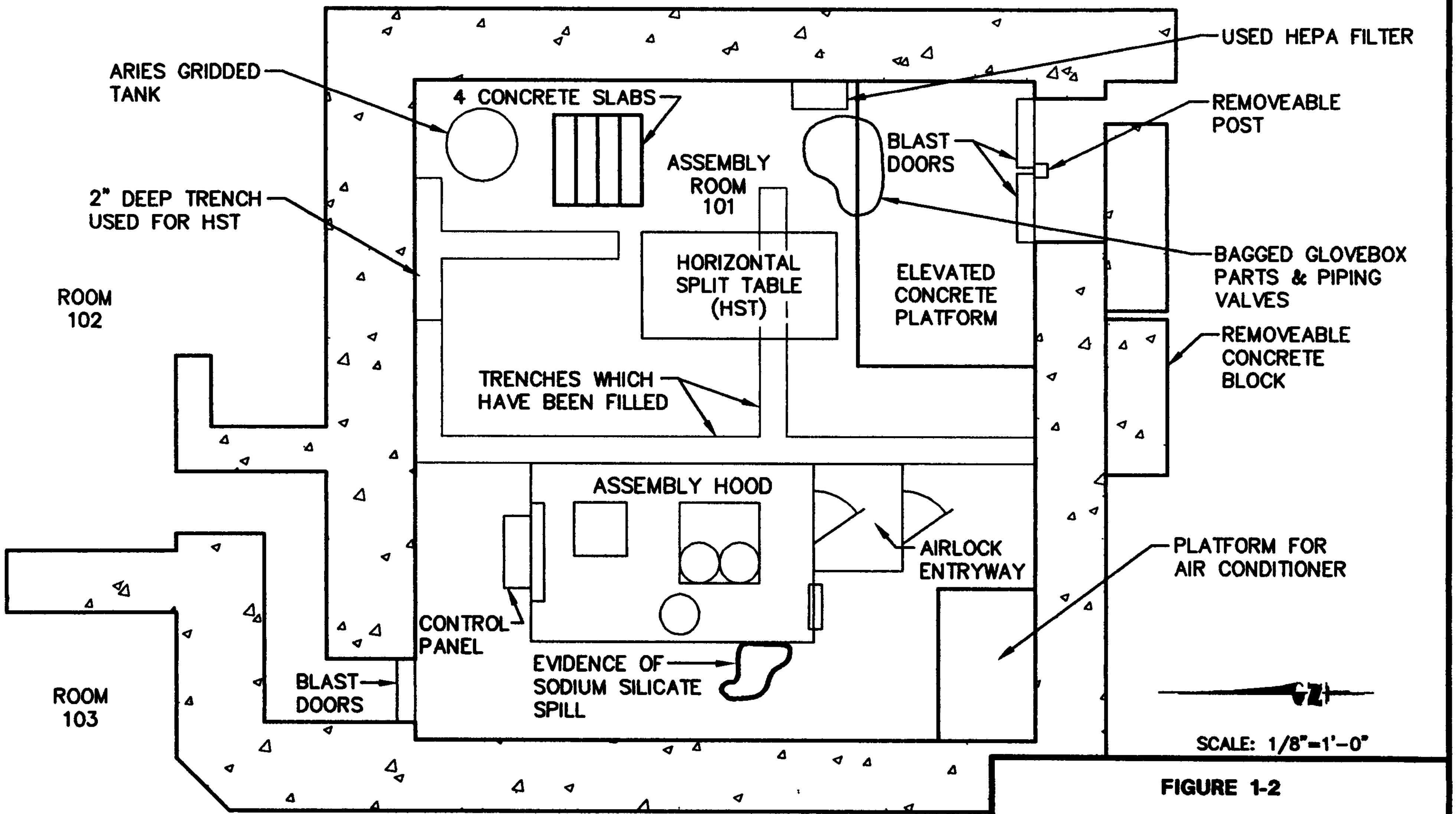

FIGURE 1-2

ROOM 101
ASSEMBLY ROOM

Denver, Colorado

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Denver, Colorado

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Uranium solution and other fissile materials, such as uranium metal and uranium oxide (and possibly plutonium), were used in experiments performed in the Assembly Room An assembly hood is located inside the Assembly Room, and consists of an open, 10-foot by 16-foot main compartment, and a 6-foot by 5-foot entryway Heavy, clear plastic windows are located on all walls of the assembly hood Air enters through filters from the Assembly Room into the hood and then exits through a plenum to the hot exhaust line Two overflow tanks and a dump tank are located in the assembly hood The interior of the assembly hood is known to be heavily contaminated with enriched uranium, and it is suspected that there are high levels of contamination under the tables and equipment inside the assembly hood

Items located in Room 101 include four concrete blocks (used as shielding walls), contaminated with uranium, used high efficiency particulate air (HEPA) filters, an Aries® gridded tank, a horizontal split table, and parts of a glove box

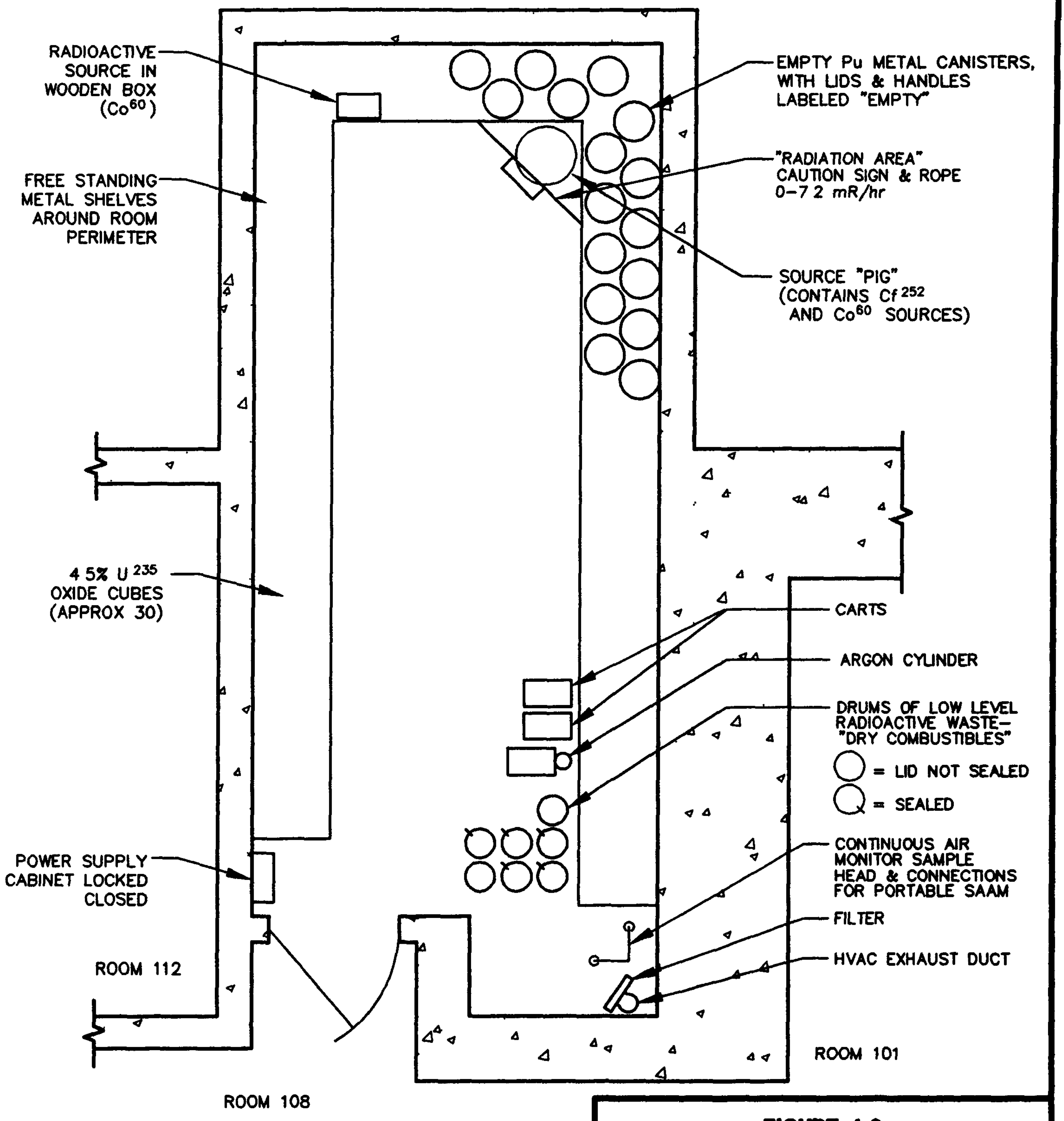
The interior and exterior wall surfaces of the Assembly Room have been painted frequently to seal cracks and joints, and possibly to affix contamination The exposed surfaces in Room 101 are known to be contaminated with enriched uranium and possibly plutonium Existing facility characterization data indicates that areas of the floors, walls, piping, equipment, and other materials in Room 101 are contaminated with uranium and its associated decay products

On November 30, 1967 a contaminated solution was forced into the exhaust ducting by air bubbles from turbulent action of solution dumping It is known that high levels of uranium salt residue exists in the exhaust ducts

Originally, Room 101 contained trenching for the wires and cables connected to experimentation equipment The trenches were 18 inches deep by 18 inches wide All trenches were partially filled with concrete During this process, the new concrete covered up previous radiological contamination Later, the trenches were completely filled in with the exception of approximately 10 feet along the north wall, covering additional contamination

Room 102 - Fissile Material Storage Room

Room 102 was originally 15 5 x 22 75 feet In the early 1980's, Room 102 was enlarged to 15 5 x 37 5 feet It is a large room lined with free-standing metal shelves Enriched uranium parts, plutonium metal cylinders, low enriched uranium oxide, and small quantities of uranium solution in plastic bottles and waste drums have been stored here awaiting further processing Figure 1-3 shows the layout of Room 102 In the southeastern corner, metal canisters about 18 inches in diameter and 12 inches high are stored The now-empty canisters were previously used to store plutonium A sign in this corner of the room states "Radiation Area, 0-7 2 Mr/hr " The sources of this radioactivity include five californium and one cobalt check source Another cobalt check source is located in a



SCALE 3/16" = 1'-0"

FIGURE 1-3

ROOM 102 FISSLE MATERIAL STORAGE ROOM

Denver, Colorado

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Denver Colorado

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wooden box on the bottom shelf in the northeastern corner On the east side of the room, seven drums are stored in front of the shelves Five of the drums are filled with low level radioactive waste The other two drums are empty and unsealed Approximately 33 percent enriched uranium oxide cubes, 4 5 percent U^{235}, (6- x 6- x 6-inches) are stored on the shelves on the north side of the room The exposed surfaces in this room may be contaminated with U^{235}

Room 103 - Mixing Room

Room 103 is a 700-square-foot fissile solution storage area Three of the walls are constructed with 16 inch reinforced concrete, the west wall is constructed of back-filled cinder blocks with rebar The mixing room floor is split on two levels to allow gravity drainage from the Assembly Room experiment vessel back to the Mixing Room storage tanks Room 103 contains two mixing tank/transfer systems System 1 has three circulating pumps, one drain pump, one calibration tank, and seven Highly Enriched Uranyl Nitrate (HEUN) storage tanks with associated piping and valving The other system has three circulating pumps and two HEUN tanks with associated piping and valving Exposed surfaces within these rooms are suspected to be slightly contaminated, and the exhaust ducts from this room may be contaminated as well Figure 1-4 shows the layout of Room 103 The three main areas in the Mixing Room which include the downdraft room, the laboratory area, and tank farm pit area These areas are discussed in more detail below

Downdraft Room

As shown on Figure 1-4, a walk-in downdraft room is located along the north wall of Room 103 The downdraft room was used for preparation of plutonium experiments The plutonium was removed and the room is now empty except for a downdraft table The downdraft room is equipped with a dry air supply and exhaust ducts both provided with HEPA filters The exhaust ducts tie into the MAA exhaust duct leading to the HVAC tunnel to Building 875 Glove boxes are located on the outside of the downdraft room A sign reading "Contamination Area" is located near one of the glove ports The glove ports have all been sealed Existing facility characterization data indicate very high levels of plutonium and uranium contamination inside the glove boxes in the downdraft room Leaks from the glove boxes may have occurred due to aging seals and poor original seal design Greasing/degreasing parts was performed in this glove box The types of degreasing agents used are unknown Located next to the glove box are three containers Two of the containers are labeled as dry combustible waste, and the third is an empty waste drum

Laboratory Area

A laboratory area is located in the northwestern area of Room 103 The laboratory area consists of an enclosed hood (B-box) with a sliding window, a laboratory bench, shelves, drawers, and cabinets Uranium contamination is known to exist under the lip of the hood The cabinets and shelves contain various laboratory equipment and containers of chemicals, some of which are known to be U^{235}-contaminated Strips of tape flutter inward into the hood indicating that air is flowing into the hood The hood ventilation passes through a HEPA filter and ties into the MAA exhaust duct leading to the HVAC tunnel and Building 875 A Contamination Area caution sign is attached to the hood window because of suspected plutonium contamination inside the hood Radiological surveys performed in July 1993 indicate high levels of contamination under the lip inside the hood Between the laboratory cabinet and the downdraft room is a 55-gallon drum full of used Raschig rings (suspect uranium contamination) It is not known if the drum contains liquid

Tank Pit Area

Figure 1-5 shows the layout of equipment in the tank pit area as of March 1994 Tanks 451, 452, and 453 were located inside the hood Tanks 441 through 447 and Tank 887 located in the tank pit area Each tank is filled with Raschig rings with the exception of Tank 887, which is a calibration tank The HEUN solutions inside the tanks provide the only nuclear safety hazard in the tank pit area The tanks are elevated on pedestals to allow space for piping and equipment below the tanks A single layer of Raschig rings is stacked vertically on the floor below the tanks where there is no walkway Radiological survey data have shown high levels of contamination on the exterior of the tanks and their associated pumps, piping, and valves

At least one incident occurred where a radioactive solutions were spilled onto the tank pit area floor In 1969, approximately 60 gallons of HEUN solution were spilled The spill was cleaned up and the floor was decontaminated to standards set at that time The floor of the tank pit area has been painted many times and the paint is suspected to contain fixed contamination

Room 108 - Hallway

Room 108 is the hallway connecting Rooms 101, 102, and 103 During a recent walkdown, low level contaminated waste was found stored in receptacles labeled "hot gloves and booties " Gloves, booties, plastic bags, and tape were found in these containers Exposed surfaces in this room may be slightly contaminated with U^{235} Figure 1-5 shows the layout of Room 108

1.1.1.2 Cold Area

The cold side of Building 886 contains Room 112 (the control room for the experiments in Room 101), a laboratory, a janitor's closet, a men's locker room, a ladies' locker room, offices, various other rooms, and a trailer connected to the eastern end of Building 886 This area of the building is believed to be "clean" with the exception of several rooms In the past, uranium has been detected on the floors of Rooms 104, 126 (hallway), and 111 This most likely resulted from moving drums of uranium The contamination was cleaned to the standards required at the time (1960's through the 1970's)

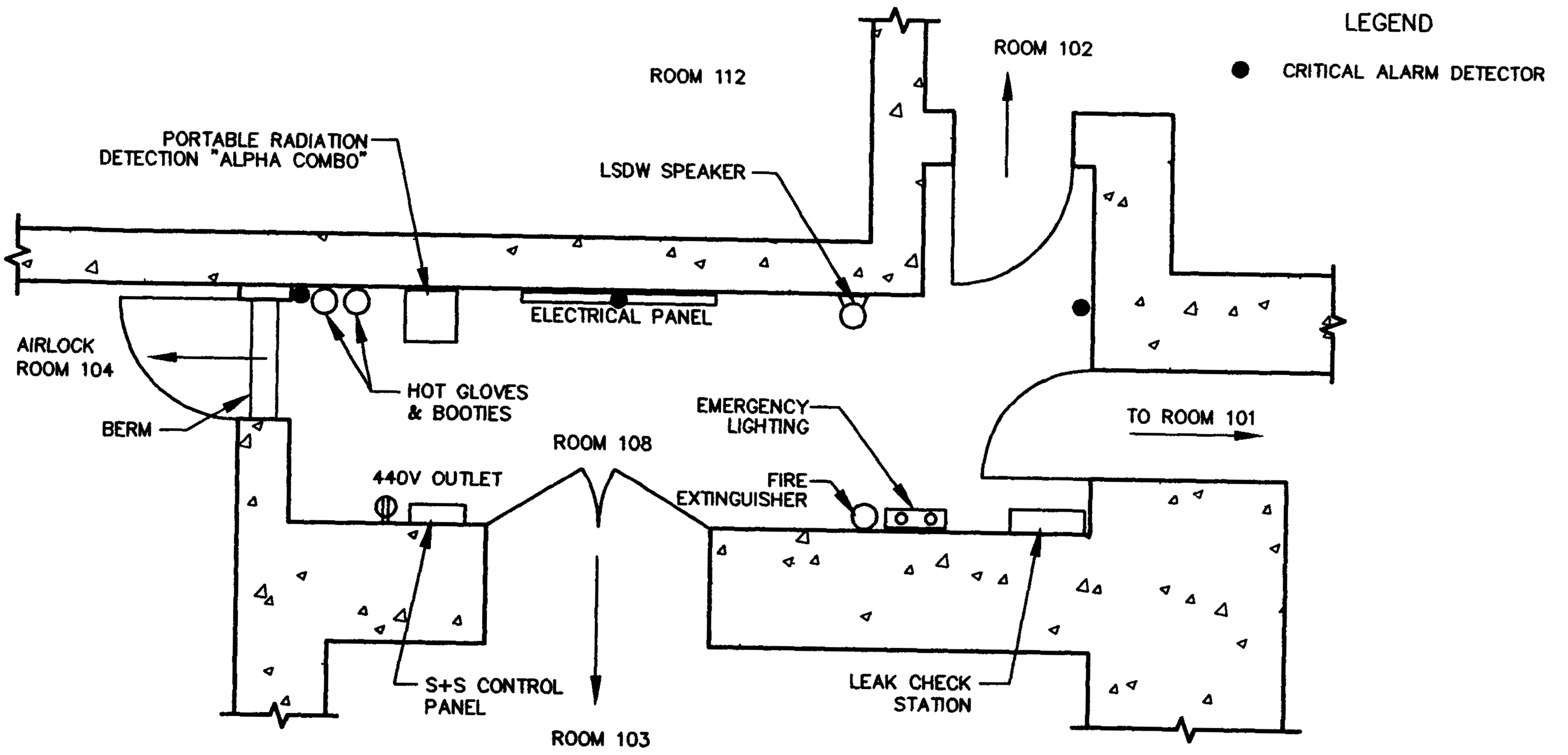

FIGURE 1-5

ROOM 108
HALLWAY

Denver, Colorado

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Denver, Colorado

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and the linoleum was removed and replaced Room 114 contained a vise which had been in contact with uranium The vise has since been removed In addition to uranium contamination in Room 111, approximately 500 pounds of cadmium oxide were handled in the northern halfof Room 111 The piping and ventilation ducts in Room 111, and possibly piping in other rooms, are insulated with asbestos Ceiling and floor tiles in the cold area may also contain asbestos Rooms 107 and 110, the men's locker room and the janitor's closet, respectively, may have low levels of contamination resulting from workers leaving the RCA and also from cleaning spills The same can be said for Room 106, where hazardous chemicals may have been stored, and Room 114, which was used as a laboratory and electronics shop may be contaminated

The pre-turnover review of Building 886 indicated that 1 pound of mercury was listed on the 1988/89 inventory of Room 106 It is not known if there were other chemicals stored in this room or if any spills occurred Wastes from Room 114 include Kimwipes®, and plastic chips contaminated with freon, solvents, and oil The solvents include methylene chloride, acetone, carbon disulfide, chloroform, and trichlorofluoromethane The storage destination of these wastes is currently being investigated by the operations and the chemical inventory program

1.1.2 Building 828

Building 828 is a 170-square-foot concrete pit located on the western side of Building 886 The floor and lower two feet of the pit walls are covered with stainless steel The pit floor is approximately 16 feet below grade Ground water and/or rainwater at various times has flooded the building at least to the 1- to 2-foot level Figure 1-6 shows the layout of Building 828

Building 828 currently contains two 500-gallon tanks, one was used for storing wastewater (Tank 440) and the other (Tank 449) was never used Wastewater placed in Tank 440 includes water from the safety shower, wastewater from the drain under the hood in Room 103, wastewater from the lab sink in Room 103, and water used as coolant in the downdraft room The maximum uranium solution concentration entering Tank 440 was approximately 3 grams per liter (g/L) Plutonium waste never entered the tank Tank 440 is currently believed to be empty Tank 440 is contaminated on the interior with uranium Both tanks may be contaminated on the exterior due to elevated ground water in the pit Process lines from the two holding tanks are connected to Room 103, however, these lines are not properly sealed Other equipment used in the pit includes an evaporator, pumps, a condenser, air compressor and receiver, filters, a condensate tank, and a concentrate tank (according to former operations personnel this equipment has been removed)

1.1.3 Building 875

Building 875 is a 3,900-square-foot building, with reinforced concrete walls Building 875 houses the Exhaust Plenum, which filters air circulated through Building 886 and 828, and releases it to the atmosphere, it also supplies air to Building 886 A tunnel containing ventilation ducts connects Building 886 with Building 875 Figure 1-7 shows the layout and equipment in Building 875

Air circulated through Building 886 is exhausted through two ducts in the tunnel to Building 875 Two separate exhaust filter systems exist one which filters air from the cold area in Building 886 and one for the RCA and Building 828 The two exhaust filter plenums in Building 875 are

- FP-501 - Exhausts the Maintenance and Storage Room 106, the Men's Room 107, the Janitor's Closet Room 110, the Mechanical Equipment Room 111, and the Ladies' Room 113

- FP-502 - Exhausts all rooms in the Hot Area, including Rooms 101, 102, 103, and 108, and Building 828 (the Waste Holding Pit)

Filter Plenum 501 consists of a two-stage HEPA filter plenum and an input fire suppression system Filter Plenum 502 consists of a four-stage HEPA filter plenum and an input fire suppression system

The third system supplies air to Building 886 and is shown on the figures as FP-503 Filter Plenum 503 consists of a three-stage HEPA filter plenum

Process equipment in Building 875 includes the filter plenums, exhaust fans and controllers, and a 1,200-gallon criticality-safe tank filled with Raschig rings (Tank 501) Tank 501 is used to collect water from the fire suppression system Filter plenum water drains connect to Tank 501

Waste streams identified for Building 875 include those generated during plenum cleanout and HEPA filter changeout which are radioactive and potentially mixed wastes, and those generated outside the plenum which are non-radioactive Wastes generated within the plenums include HEPA filters, personal protective equipment (PPE) worn during maintenance on the plenums, Kimwipes® used for cleaning, water generated from testing the fire suppression system, and sprinkler heads These wastes are packaged as low-level waste The water generated from testing is pumped into Tank 501 and is later taken to Building 374 for treatment Wastes generated outside the plenums are deposited in waste containers designated for disposal in the Site Landfill

Building 875 has enriched uranium and potential low level plutonium contamination in the ducts Areas inside the filter plenums are likely to contain the same types of contaminants as found in the ducts Areas outside the filter plenums are expected to be clean

1.1.4 Building 880

Building 880 is an 800-square-foot, pre-fabricated storage facility located on the southern side of Building 886 Figure 1-8 shows the layout of Building 880 and the surrounding areas Building 880 is currently used for storage and contains new and used equipment and materials Some items stored in Building 880 include concrete wall panels previously painted to "fix" contamination, 2-4 white drums containing stainless steel valves heavily contaminated with uranium, plastic experiment housing which is slightly contaminated with uranium, borate and mild stainless steel plates which were submerged in HEUN solution, a wooden box containing an unused annular tank, collections of unused neutron absorbing materials, used Raschig rings, used HEPA filters, and office equipment Characterization data for Building 880 indicated very little contamination on the floors

In addition to Building 880, there is a pad and sea-land storage container on the northern side of the building shown in Figure 1-8 Numerous drums are located on the pad Approximately half the drums were full, and half of these were marked indicating their contents as Greastley borate, half were not marked It is believed that the unmarked drums contain dolomite limestone Empty containers were used to repackage waste and are expected to be clean There is an awning located between the building and sea-land container Located beneath the awning are items such as a black drum, with unknown contents, a wooden crate labeled "Absorber Rods", filled with approximately 250-450 stainless steel rods that were submersed in HEUN solution, a crane used in the hot areas, and gray boxes containing plastic pieces that may have come into contact with enriched uranium oxide

The sea-land container contains files on criticality experiments, furniture, and computers These items are expected to be clean Suspended from the ceiling are conveyors used to move concrete blocks and other materials from Room 101 to Building 880 The conveyors may be slightly contaminated

1.2 SUBPROJECT SCOPE AND OBJECTIVES

The purpose of the Building 886 Complex D&D Subproject is to decommission Building 886 and its surrounding facilities without adverse impact to human health and the environment The general objectives of the D&D Subproject are

- To characterize the nature and extent of contamination throughout Building 886 and the surrounding building structures, including Buildings 875, 880, 828, and Trailer 886A,
- To evaluate new technologies and use proven technologies,
- To reduce radiological and hazardous chemical risk,

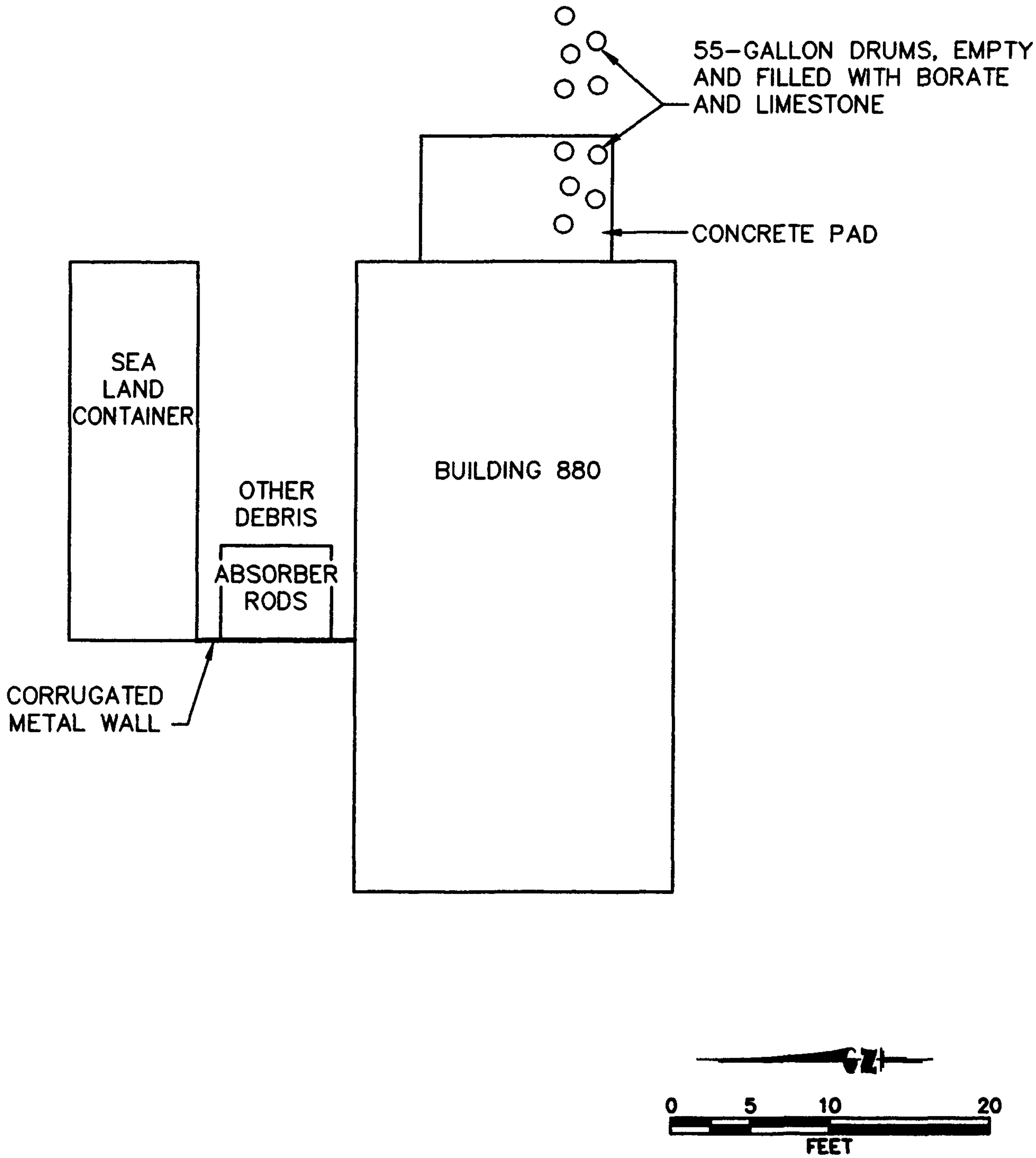

FIGURE 1-8

BUILDING 880 STORAGE FACILITY

Denver, Colorado

PARSONS ENGINEERING SCIENCE, INC.
Denver Colorado

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- To comply with regulatory agencies and obtain their concurrence for the D&D process,

- To minimize the generation of new waste requiring treatment, storage, and/or disposal,

- To develop and implement D&D activities within the scheduled milestones,

- To demonstrate the effectiveness of the D&D process, and

- To return the 886 Complex to a "Green Field" status,

The 886 Complex presents no overriding requirements for technology development Proven technologies can be used in the entire D&D process However, the 886 Complex does offer numerous opportunities for the demonstration of innovative technologies Innovative technology demonstration could be used to prove specific treatment and size reduction capabilities that could be employed at other facilities at the Site or in other DOE complex facilities

As stated by the DOE-RFFO Assistant Manager for Environmental Restoration, the goal of the D&D program is to return the Site to a "Green Field Status " The 886 Complex allows for an accelerated start to this goal Building 880 and the semi-permanent structures (886A and the sea-land containers) could be removed within the next calendar year This would eliminate an RCA, and contaminated (radiologically and potentially hazardous) equipment and structures

1.3 MANAGEMENT IMPLEMENTATION PLAN

The Management Implementation Plan for the 886 Complex is comprised of the following elements Work Breakdown Structure for the subproject, Subproject Team, Performance Measurement of the subproject, and Quality Assurance requirements for the subproject Each of these elements is further discussed below

1.3.1 Work Breakdown Structure

The work breakdown structure (WBS) ensures that the Building 886 D&D Subproject is defined and that all work elements are identifiable for planning and implementation, budgeting, performance measurement, and reporting The WBS is usually presented in a hierarchial tree format to demonstrate the logical flow of technical requirements to the work activities Figure 1 9 presents a WBS for the Building 886 D&D Subproject

Figure 1.9 Complex 886 D&D Project
Work Breakdown Structure

- 1 4 7 1 2 2 7 Complex 886
  - 1 4 7 1 2 2 7 1 Building 886
    - 1 4 7 1 2 2 7 1 x Building 886, Room x
      - 1 4 7 1 2 2 7 1 x 1 Building 886, Room x, S&M
        - 1 4 7 1 2 2 7 1 x 1 1 Building 886, Room x, S&M Plan
      - 1 4 7 1 2 2 7 1 x 2 Building 886, Room x, Pre-D&D Operations
        - 1 4 7 1 2 2 7 1 x 2 1 Building 886, Room x, Pre-D&D Operations, Project-Specific Preplanning
        - 1 4 7 1 2 2 7 1 x 2 2 Building 886, Room x, Pre-D&D Operations, Characterization
        - 1 4 7 1 2 2 7 1 x 2 3 Building 886, Room x, Pre-D&D Operations, Environmental, Safety & Health
        - 1 4 7 1 2 2 7 1 x 2 4 Building 886, Room x, Pre-D&D Operations, Engineering
      - 1 4 7 1 2 2 7 1 x 3 Building 886, Room x, D&D Operations
        - 1 4 7 1 2 2 7 1 x 3 1 Building 886, Room x, D&D Operations - Internal
        - 1 4 7 1 2 2 7 1 x 3 2 Building 886, Room x, D&D Operations - Structural
        - 1 4 7 1 2 2 7 1 x 3 3 Building 886, Room x, D&D Operations - Subgrade
      - 1 4 7 1 2 2 7 1 x 4 Building 886, Room x, Post Decontamination & Decommissioning Operations
        - 1 4 7 1 2 2 7 1 x 4 1 Building 886, Room x, D&D Closeout & Verification
  - 1 4 7 1 2 2 7 X Building 828, 875, 880, 886A - (Same as Above)

1.3.2 Subproject Team

A variety of EG&G organizations (Waste Management, Environmental Restoration, Waste Stabilization, Economic Development, SNM Management & Storage, Building Deactivation, Analytical Services, Engineering & Safety Services, Support Services, and Administrative Services) are likely to become involved in the D&D of the 886 Complex The D&D Project Manager is responsible for coordinating the activities performed by individuals assigned from these groups and for ensuring that D&D of the 886 Complex is conducted in conformance with applicable DOE and regulatory requirements Personnel who will be involved with the D&D Subproject are further described below

1.3.2.1 Project Manager

The D&D Project Manager (PM) is responsible for and has the authority for the development, execution, supervision, coordination, and integration of all aspects of the work and for the preparation and adherence to the schedule and budget for the 886 Complex D&D The PM participates with the subproject staff in development of the work plans that define the scope of each subproject task, schedule, budget, and deliverable they are required to meet Resource allocations are made from these plans by the Technical Group Lead Engineer with the agreement of the Project Manager The Project Manager for the Complex 886 D&D is responsible for performing the following specific duties

- Directing the subproject team (including the Lead Discipline Engineers and others) responsible for the execution of the 886 D&D,
- Delegating to project personnel specific responsibilities within the organization for technical criteria, reviews, and other related activities,
- Determining, with the assistance of the Lead Discipline Engineers, the detailed scope of work,
- Developing the project schedule with the Scheduling Department, Lead Discipline Engineers, and other responsible persons on the subproject team,
- Reviewing and analyzing cost control statements and taking action, as required, to maintain budgets and other financial commitments of the project,
- Maintaining a chronological record of the project history by having the minutes of meetings and telephone conversations documented, and confirming in writing all significant instructions given to the project team, and
- Implementing the project's Quality Assurance (QA) Program Plan

1.3.2.2 Lead Engineer

Specific 886 Complex D&D tasks assigned to the D&D Project Lead Engineer are

- Scope, schedule, and cost development for the 886 Complex D&D,
- Maintenance of overall schedule and cost control,
- Funding attainment for subproject implementation,
- Performance of the necessary reporting requirements, and
- Supporting development of compliance documentation

1.3.2.3 Operations Lead

Specific 886 Complex D&D tasks assigned to the D&D Operations Management Group (OMG) are

- Field operations management, schedule, cost control, regulatory compliance, and reporting, and

- Support for development of compliance documentation and subproject closeout

1.3.2.4 Regulatory Lead

The D&D Regulatory Lead is responsible for identifying, defining, and complying with applicable federal and state environmental requirements Specific 886 Complex D&D tasks assigned to the Regulatory Lead are

- Identification, definition, and strategy development for environmental compliance requirements, and

- Support Project Management and Operations groups to ensure that regulatory compliance is attained and maintained during the D&D of Complex 886

1.3.2.5 Health, Safety, and Quality Assurance Lead Engineer

The D&D Health, Safety, and Quality Assurance Lead Engineer is responsible for identifying, defining, and complying with applicable federal and state health, safety, and radiological control requirements as well as applicable QA requirements Specific tasks assigned to the Health, Safety, and Quality Assurance Lead Engineer are

- Identification, definition, and strategy development for health, safety, radiological, control, and QA compliance requirements, and

- Support Project Management and Operations groups to ensure that health, safety, radiological control, and QA compliance is attained and maintained during the D&D of Complex 886

1.3.3 Performance Measurement

The objective of performance measurement is to determine the actual project status by analyzing cost, schedule, and technical performance, considering potential problems, their impact, and alternative courses of action Although this project uses a modified project management approach, DOE Order 4700 1 provides the basis for project tracking and management

The technical performance (or progress) is normally assessed by monitoring compliance with technical requirements in the project baseline documentation The subproject schedule milestones shall be the primary tool for measuring work progress The milestones will consist of controlled milestones and established technical performance indicators for managing the subproject's accomplishments in an objective rather than subjective manner The subproject's technical objectives, functional design criteria, and design requirements (i e , project technical baseline) must be identified before the technical progress indicators may be determined It is important that the work is planned and measured on the same basis so that the progress is determined from the same objective method

The status of work accomplished for the control account/work package will directly correlate to the progress recognized for the corresponding scheduled activity To achieve this correlation, the detail of the activities scheduled must be sufficient to indicate progress on a monthly basis

1.3.4 Quality Assurance

The *Environmental Restoration Management* (ERM) *Quality Assurance Program Description* ((QAPD), March 10, 1994, in conjunction with the *Rocky Flats Site-Wide Quality Assurance Project Plan* (QAPjP) *for CERCLA Remedial Investigations/Feasibility Studies and RCRA Facility Investigations/Corrective Measures Studies Activities,* February 1, 1993, meets the intent of the DOE Environmental Restoration and Waste Management (EM) QA Requirements and Description (QARD) document requirement for a quality assurance plan (QAP) These documents also meet the requirements for a QAP listed in 10 CFR 830 120

The Building 886 Complex D&D subproject shall be conducted in accordance with the QAPjP and the QAPD in general, with the specific applicable sections of the QAPD discussed below Where required, the QAPD invokes the appropriate requirements of the QAPjP

The ERM and operating contractor organizational descriptions are described in the QAPD Section 1 1, *ERM Organization*, and are further defined in Section 1 4 of this document The responsibilities are discussed in Section 1 2, *General ERM Responsibilities* of the QAPD

Interfacing and support departments are discussed in Section 1 3, *EG&G Organizations and Departments* of the QAPD The overall quality program is discussed in Section 1 4, *Quality Assurance Program* of the QAPD The graded approach to QA program implementation shall be used as discussed in Section 1 5, *Quality Grading Approach* Cost/benefit data required from QA program implementation and maintenance will be tracked as discussed in Section 1 6, *Cost of Quality* of the QAPD

Personnel shall be trained, qualified, and certified in accordance with Section 2 0, *Personnel Training, Qualification, and Certification*, before they are allowed to perform any technical activities

The quality improvement process as described in QAPD Section 3 0, *Quality Improvement*, will be implemented Prior to data collection, including data for characterization, the *Data Quality Objectives* (QAPD Section 3 1) shall be established commensurate with the intended end use of the data Items and services, including data, found nonconforming shall be identified, segregated, reviewed, dispositioned, tracked, verified, trended, and closed in accordance with the guidance in QAPD Section 3 2 The corrective action process described in QAPD Section 3 3 shall be followed

Documents shall be identified, prepared, controlled, and reviewed as described in QAPD Section 4 0, Subsection 4 1, *Document Control* Documents that furnish evidence of the quality of items and activities are considered QA records and will be handled, recorded, classified, and retained as described in QAPD Section 4 0, Subsection 4 2, *QA Records*

QAPD Section 5 0, *Work Processes*, contains the QA program description for the control of

- Plans, Procedures, Instructions, and Drawings,
- Readiness Assessments,
- The Measurement and Data Acquisition Process,
- The Identification and Control of Items, Samples, and Data,
- Measuring and Test Equipment,
- Construction and Process Activities, and
- The Stop Work Authority

This section of the QAPD shall be implemented for all work and related processes for the Building 886 Complex D&D efforts

Design control and software QA requirements, from development through verification and validation, configuration control, security, and reporting of software deficiencies documentation, is addressed in Section 6 0 of the QAPD

Procurement activities, including the selection and evaluation of subcontractors and supplies, will follow the guidelines and meet the requirements of QAPD Section 7 0

Procurement activities, including the selection and evaluation of subcontractors and supplies, will follow the guidelines and meet the requirements of QAPD Section 7 0

Inspections of the Building 886 Complex D&D activities will be conducted and documented as described in the QAPD Section 8 1, *Inspections* Deviations from requirements shall be processed as discussed in QAPD Section 3 2, *Control of Nonconforming Items and Services*

Acceptance testing and testing in general shall be conducted in accordance with the requirements of QAPD Section 8 2, *Testing* Testing requirements, as described in this section, do not apply to equipment calibration (see Section 5 5) or analysis of environmental samples (see Section 3 1)

Management assessments and self-evaluations as discussed in Section 9 0 are to be implemented in the conduct of this subproject Independent assessments, as discussed in Section 10 0, will be conducted by the Standards, Audits, and Assurance organization

1.4 SUBPROJECT MANAGEMENT PLAN ASSUMPTIONS

The following assumptions were developed to support completion of the SMP for the 886 Complex These assumptions define organizational responsibilities between the D&D, Deactivation, and Environmental Restoration Programs with respect to the 886 Complex, and discuss the condition of the facility prior to initiating the 886 Complex D&D Subproject

- D&D of Buildings 875, 828, 880, and 886 will be initiated, on an individual basis, upon completion of deactivation activities

- Pit removal of Building 828 is within the scope of the Complex 886, with the exception of characterization activities for the tanks within Pit 828 This subelement may be entirely or partially be removed and remediated through the accelerated cleanup program or as a part of the overall OU9 cleanup

- The 886 Complex will be demolished (excluding useable equipment)

- HEUN will be removed prior to turnover to Deactivation

- Deactivation activities will include, but are not limited to, the following

    - All accountable special nuclear materials (SNM) shall be removed from the building or glove box in accordance with DOE Orders

    - All tanks, vessels, and piping shall be drained to the maximum extent practicable

- The criticality monitoring and alarm system shall be deactivated and marked appropriately following the determination by Criticality Engineering that no nuclear criticality can occur

- All loose or damaged friable asbestos, in and around the buildings, shall be encapsulated in accordance with established procedures

- The final Safety Assessment of the 886 Complex (or individual buildings) shall be reviewed and updated for deactivation status in accordance with applicable procedures

- Fissile materials in the glove box exhaust systems, including ducts, untoward areas, and plenums, will be adequately evaluated (not necessarily removed)

- Specific to Pit 828, all systems with flow routes to disposal sites shall be isolated by sealing or capping at the deactivated facility or system The outlet end of the discharge pipes shall be surveyed if appropriate

- Specific to Building 875, deactivation will include changing of HEPA filters (prior to acceptance by D&D), and removal of any equipment/materials contained in the tunnel between Buildings 875 and 886

- Specific to Building 886, all stored radioactive and mixed waste (i e , outside systems in containers such as barrels, drums, and boxes) shall be removed from inside the facility and disposed of in accordance with appropriate procedures Hazardous and radioactive material that is not removed prior to D&D shall be located, identified, quantified, and recorded as part of the shutdown/deactivation file

1.5 TECHNICAL PERFORMANCE OBJECTIVES

The 886 Complex D&D Subproject shall comply with all applicable health, safety, and environmental compliance requirements and regulations The subproject shall satisfy those requirements set forth by the governing local, state, and federal regulations and DOE Orders including relevant permits and agreements (e g , the Site Interagency Agreement [IAG] between DOE, U S Environmental Protection Agency [EPA], and the Colorado Department of Public Health and the Environment [CDPHE]) The subproject must also conform with applicable Site standards Specific regulations representing drivers for these activities are presented below

1.5.1 Waste Acceptance Criteria

Wastes shall be handled based on their individual characteristics All transuranic (TRU) waste must meet the requirements for onsite TRU storage and the Waste Isolation Pilot Project

(WIPP) Waste Acceptance Criteria (WAC) Waste that meets the definition of low level radioactive waste (LLW) must meet onsite LLW storage requirements and the Nevada Test Site Waste Acceptance Criteria (NTS WAC) All hazardous waste must be handled in a manner consistent with the requirements of the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA) All material associated with any area designated in the IAG must meet the applicable requirements of the IAG and associated procedures In addition, waste handling activities shall comply with the Site Hazardous and Radioactive Waste Requirements Manuals and associated procedures

1.5.2 Air

The 886 Complex D&D subproject shall not result in release of airborne radioactivity that will cause Site annual exposure at the site boundary from the airborne pathway to exceed 10 millirem per year (mrem/yr) (National Environmental Standards for hazardous Air Pollutants [NESHAPs] requirements) Further, applicable air release permits must be complied with and an approved Air Pollutant Emission Notice (APEN) must be obtained for this activity, if not addressed by an existing APEN

All airborne releases must comply with the requirements of DOE Order 5400 5 (and 10 CFR 834 when issued) Specifically, releases may not result in Site's public exposure exceeding 100 mrem/yr from all pathways, including releases from facilities and resuspension of radioactivity by this activity To the extent practicable, engineering controls must limit the airborne concentrations in the work environment to meet the requirements of 10 CFR 835 and DOE Order 5400 11, Radiation Protection of Occupational Workers Thus, the design shall ensure that personnel exposures are less than 5,000 mrem/yr effective whole body dose equivalent (WBDE) and that the projected exposure is less than 500 mrem/yr WBDE

1.5.3 Water

Wastewater generated during implementation of the 886 Complex D&D Subproject must comply with

- The Clean Water Act (public exposure should not exceed 4 mrem/yr from drinking water),
- Requirements established in the IAG,
- The applicable National Pollutant Discharge Elimination System (NPDES) permit or pretreatment requirements, and
- The requirements set forth in DOE Orders 5400 1, General Environmental Protection Program, and 5400 5 (also 10 CFR 834, when issued) including
    - limits for release to sanitary sewers,

- limits to comply with the Clean Water Act and DOE's public exposure limit of 100 mrem/yr, and

- criteria for the release of solutions with suspended solids

1.5.4 Free Release and Regulated Reuse of Materials

The term "free release" encompasses materials (including D&D products such as waste concrete, steel, office furniture) that are to be free-released, which includes materials recycled in an unregulated system or materials disposed of in a sanitary landfill The requirements for free release of material are provided by the following

- DOE Order 5400 5 (and 10 CFR 834, when issued),
- Criteria established by DOE Rocky Flats Office,
- Criteria established in the IAG and associated documents (e g , work plans, the Quality Assurance Project Description) and agreements,
- Applicable state and local regulations and permit requirements, and
- Applicable Site procedures

If material is to be reused/recycled in a regulated environment, then the following requirements must be met

- 10 CFR 835 and DOE Order 5480 11,
- Intended actions result in exposures that are ALARA,
- License or DOE authorization for any applicable, regulated recycler, and
- Existing Site procedures and documents

1.5.5 Radiation Exposure and Contamination Controls

The D&D of the 886 Complex shall comply with the requirements of DOE Order 5400 5, DOE Order 5480 11, 10 CFR 835, the Radiological Control (RADCON) Manual, and 10 CFR 834 (when issued) Further, any radiation exposure of the public and workers shall be ALARA The RADCON Manual, 5480 11, and 10 CFR 835 require that radiation worker exposure be limited to less than the 5,000 mrem/yr (WBDE) limit and that design result in projected yearly exposures of less than 500 mrem/yr (WBDE) This also includes the 100 mrem/yr (WBDE) limit for non-radiation workers and the public These limits are also delineated through the derived air concentrations (DACs) for workers as defined in DOE Order 5480 11 and 10 CFR 835 and the derived concentration guides (DCGs) for the public as defined in DOE Order 5400 5 and 10 CFR 834 (when issued)

All activities conducted within an RCA must meet the applicable radioactive and hazardous contamination control criteria defined in DOE Order 5480 11, 10 CFR 835, the RADCON, and the implementing standards and guidance Contamination control shall also be consistent with the requirements identified in 29 CFR 1910 120 To the extent feasible, the control of contamination shall be implemented using engineering controls (e g , containment structures, controlled ventilation, physical barriers) consistent with the requirements specified above All contamination controls shall reflect consideration of the ALARA principle

2.0 PROJECT TECHNICAL APPROACH

The primary goal of the subproject is to D&D the 886 Complex Building structures and process equipment will be characterized to determine the appropriate decontamination methods and to establish the cleanup goals Office furniture, process equipment, and utilities will be removed, for reuse or disposal, as the complex (equipment and structures) is decontaminated to the predetermined cleanup goals Secondary wastes from the decontamination effort will be treated and/or disposed of in compliance with radioactive, hazardous, and solid waste regulations The building structures will then be demolished and disposed of The general project sequence for the D&D of the 886 Complex is depicted in Attachment 1 Major elements of the project sequence are further discussed below

An expidited approach for the initiation of the field work dictates that Building 880 is the first part of the complex to be decontaminated Building 880 is a storage building, requiring relatively simple D&D activities, and is the best choice for "fast-tracking" the planning, design, and implementation of D&D activities Likewise, the waste tank vault [Building 828] can be relatively easily decontaminated and decommissioned, and will be sequenced early in the project, however, an "overlapping" remediation project, explained below, may drive the schedule for the D&D activities on the waste tank vault

2.1 PROJECT SEQUENCING CRITERIA

Three primary criteria drive the sequencing strategy for the D&D activities The first criterion is to initiate the actual D&D field activities in an expidited manner The second criterion is to maximize the potential for reuse and/or recycling of decontaminated equipment and materials, and minimize disposal costs The third criterion is to minimize the construction of specialized containment structures during the decontamination efforts

The criterion of maximizing the reuse/recycling of materials and minimizing the disposal costs dictates that noncontaminated equipment, materials, and structures be dealt with prior to those that are known or suspected to be contaminated This will aid in the elimination of the potential of spreading contamination onto previously uncontaminated equipment, materials, and structures Therefore, the office space in Building 886 will be decontaminated and decommissioned prior to the criticality laboratory and special nuclear materials storage vault (Rooms 101, 102, and 103)

The third criterion of minimizing construction of specialized containment structures dictates that Building 875 be decontaminated last Building 875 provides HEPA filtration to hot and cold areas in Building 886 that will serve as control of airborne contamination for as long as Building 875 is operational

FIGURE 2-1 D&D PROJECT SEQUENCE

2.2 FIELD OPERATIONS PROJECT SEQUENCE

There are several elements of field operations for D&D of the 886 Complex including declassification of equipment/materials, asbestos abatement, and actual decontamination and decommissioning of the buildings Each of these elements is further discussed below The D&D field activities will be coordinated with other ongoing remediation activities affecting the 886 Complex In particular, the Operable Unit (OU) 9 remediation project will involve soil contamination remediation and removal of waste tanks from the 886 Complex Field operations conducted under the D&D and ER programs will be coordinated for the benefit of both projects Prior to initiating the D&D process, the Project Manager, in coordination with Radiological Engineering, Facilities Safety Engineering, and Environmental Protection, shall integrate appropriate controls on supplementary monitoring and ventilation controls

All sampling and analysis activities will be performed as described in Section 4 4 1

2.2.1 Declassification of Equipment/Materials

To expedite all subsequent D&D activities, all classified documents, equipment, materials, and tools from all buildings in the complex will be removed A determination for the residual product in the ductwork will constitute SNM Security requirements should then be downgraded as appropriate, facilitating personnel movement into and out of the site Fences not needed for safety purposes may be taken down in the latter stages of operations, when heavy equipment is needed for demolition and hauling of waste

2.2.2 Asbestos Abatement

Due to the age of the complex, it is likely that floor tiles, ceiling tiles, and insulation on steam and hot water piping contain asbestos The Industrial Hygiene/Safety department will conduct an asbestos survey of the 886 Complex prior to initiation of D&D activity All asbestos will be removed from the Complex as part of the D&D effort Asbestos abatement will first be conducted on Building 880, then Buildings 828, 886, and finally 875 Asbestos abatement will precede other decontamination activity to prevent contamination of the asbestos with low-level radioactive or hazardous components that may become airborne during decontamination of the process equipment, utilities, or building structure

2.2.3 System Assessment

The 886 complex and its systems are approximately 30 years old and have not been operational since 1989 A condition assessment should be conducted on the systems and structure prior to commencement of D&D activities This includes a complete electrical, structural, and mechanical review Systems that require certification such as cranes, lifts, and utility distribution systems should be upgraded as required and re-certified If a system is not required for the D&D activities it should not be re-certified

Structural deficiencies shall be evaluated as to the potential risk to the D&D worker, and appropriate reinforcements, upgrades, or removal priority shall be given

2.2.4 Building 880

Building 880 is a pre-engineered steel storage building, 40 feet long by 20 feet wide, with a flat roof at a height of 12 feet The building sits on a 6-inch concrete foundation Building 880 has been selected as the first building in the complex to be decontaminated due to the simplicity (relatively small size, and prefabricated construction) of the D&D effort Debris outside (including drums and sea-land container), as well as materials stored inside the building (to be determined by walkdown), will be characterized, decontaminated, and disposed of, or reused

Temporary generators and lighting will be installed, allowing for disconnection of electrical power, and then removal and decontamination of light fixtures, conduit, and wiring

Contamination on the interior and exterior surfaces of the walls and roof will be characterized and decontaminated The walls and roof will then be dismantled, reused, stored, or disposed of

The building foundation will be core-sampled and characterized The foundation will be decontaminated, or if decontamination is not economically feasible, contaminated sections can be selectively removed (saw cut) and disposed of appropriately as hazardous or mixed waste Sections of foundation characterized as uncontaminated or successfully decontaminated will be removed and disposed of as solid waste There are no floor drains in Building 880, so it is unlikely that contamination from use or storage of equipment in the building will be found beneath the foundation, however, this assumption will be verified through characterization activities After demolition and disposal of the building foundation, the site will be reclaimed or regraded for future use Site restoration (backfill and regrading) will be coordinated with the OU14 soil remediation efforts

2.2.5 Building 828

Building 828 is an underground concrete vault containing two waste tanks and transfer pumps It is 19 feet long, 12 feet wide, and 16 feet deep (all dimensions are measured to the outsides of walls and floor) One waste tank was connected to the uranium experimental vessel in Building 886 The second tank was connected to Building 886 floor and sink drains for eye washes and personnel decontamination showers The drain system has reportedly been grouted

Building 828 has been selected as the second building in the complex for D&D (similar to Building 880) due to the relative simplicity of the D&D sequence The scope and sequence of Building 828 D&D activities may be affected by OU9 remediation project activities The waste tanks in 828 may be removed as a part of OU9 field work The D&D effort at Building 828 will be coordinated with OU9 activities Given the current uncertainties of the interface between D&D and OU9 field work, the sequence described below assumes that the D&D team will have complete responsibility for Building 828 and all equipment therein

Two issues could alter the D&D sequence strategy relative to Building 828 potential usefulness of the tanks and pumps, and proximity of Building 828 to the ventilation tunnel from Building 886 to Building 875 If the waste tanks and existing lines to process equipment in Building 886 are tight and the 828 transfer pumps are functional, the decontamination of process equipment in Building 886 should precede D&D of 828, as decontamination solutions used for Building 886 process equipment could be collected in the waste tank in Building 828, then pumped out and transferred to Building 374 for treatment

The ventilation tunnel from Building 886 to Building 875 must be functional during as much of the D&D activities at Building 886 as possible for control of airborne contamination Excavation of Building 828 should be sequenced after Building 886 D&D if excavation will adversely impact the function of the ventilation tunnel Assuming that use of the waste tanks for collection of decontamination solutions is not feasible, and that the excavation of Building 828 will not adversely impact the function of the ventilation tunnel, the D&D sequence for Building 828 is described below Clarification will be required for the closure or removal requirements of the transfer lines from 886 to 828

The waste tanks will be drained Any liquid and/or sludge removed from the tank will be characterized, treated, and/or disposed of appropriately A sump pump will then be installed in the Building 828 sump to remove any standing water from ground water infiltration or tank leaks Any water removed must be stored, characterized, and treated or disposed of appropriately Loose equipment, material, tools, and debris will be removed from Building 828 for decontamination, reuse, or disposal Drawings indicate that an evaporator, air compressor, steam generator, and a third tank have at some time been located in Building 828 Piping from Building 886 to the waste tanks will be cut and capped at vault penetrations Cut piping will be removed for decontamination, reuse, or disposal

Temporary lighting and ventilation will be installed, adequate for confined space entry activities required for D&D in Building 828 Electrical power to existing lighting (if any) and transfer pumps will be disconnected Light fixtures, power lines and conduit will be removed, decontaminated, and reused or disposed

The interior surfaces of the waste tanks, transfer pumps, and piping will be decontaminated by introducing a strong mineral acid decontaminant solution After completion of decontamination, the spent solution will be pumped, stored, and characterized, then treated and disposed of in accordance with federal and state regulations The exterior surface of the tanks, pumps, and piping will then be decontaminated The tanks, pumps, and piping will be removed for reuse, storage, or disposal (Alternatively, if space for decontamination of exterior tank surfaces is too restricted inside Building 828, the tanks, pumps, and piping could be removed, then decontaminated)

Stainless steel plating (flooring) will be characterized, decontaminated, and removed for storage, recycle, or disposal Concrete walls and floor will be core-sampled to characterize contamination Building 828 will be excavated (the excavation will be shored)

Demolition will be accomplished by saw cutting the structure into blocks The blocks will be removed and disposed of appropriately If decontamination of the concrete is deemed to provide a cost benefit (i e , less disposal cost if disposed of as solid waste rather than low level or mixed waste), the concrete will be decontaminated If the decontamination effort is determined to be not economically feasible, the concrete should be disposed appropriately, without further decontamination effort

Subgrade material and native soil may be sampled to determine contaminant levels Contaminated material and soil will be removed, treated, and/or disposed of The excavation will be backfilled with clean soil, compacted, and regraded Site restoration (backfill and regrading) will be coordinated with OU soil remediation field work (currently in OU14)

The waste streams anticipated to be generated from these D&D activities include,

- non-radioactive, non-hazardous construction debris (primarily structural concrete),
- low-level radioactive waste (primarily surfaces of concrete, piping and tanks),
- TRU waste (concentrate residues from the treatment of spent decontamination solutions)

2.2.6 D&D of Building 886

The decontamination of Building 886 involves three separate sequences due to past uses and potential contamination of various parts of the building The first sequence covers D&D of trailer T886A The second sequence covers the office area in Building 886 The third sequence covers D&D of criticality experimentation process equipment, utilities, and the structure of the RCAs of Building 886 Rooms 101, 102, and 103

Activities for Building 886 will be initiated with the D&D of trailer T886A It is not likely that the trailer will need decontamination, as its only use was office space It must be dealt with first in the overall sequence of D&D activities to prevent migration of contamination from D&D activities in the RCA into non-RCA office space

2.2.6.1 D&D of Trailer T886A

Office furniture, equipment, and miscellaneous spare parts, tools, and materials will be removed They will be characterized, decontaminated (if necessary), and reused or stored Water lines will be drained and capped Exposed piping and ventilation ductwork will be removed, characterized, decontaminated, and reused or disposed of

Electrical power will be disconnected Conduit and wiring will be removed, characterized, decontaminated, and reused or disposed of Temporary power for lighting and ventilation of further D&D activities will be installed

The trailer structure will be characterized, decontaminated in place (if necessary), then moved for reuse or put in storage until a beneficial use is identified The concrete trailer pad and subgrade material will be core-sampled, removed, decontaminated, and disposed of Site restoration (backfill and regrading) will be coordinated with OU soil remediation field work

The only waste stream anticipated to be generated from these D&D activities is non-radioactive, non-hazardous construction debris (primarily structural concrete)

2.2.6.2 D&D of Building 886 Non-RCA

Office furniture, equipment, and miscellaneous spare parts, tools, and materials will be removed They will be characterized, decontaminated (if necessary), and reused or stored

Water lines to the east-side office area will be drained and capped Exposed piping and ventilation ductwork will be removed, characterized, decontaminated, and reused or disposed of

Electrical power to the east-side office area will be disconnected Conduit and wiring will be removed, characterized, decontaminated, and reused or disposed Temporary power for lighting and ventilation of further D&D activities will be installed

The east-side office area structure will be characterized, decontaminated (if necessary), demolished, and disposed of The west-side offices and RCA rooms should be shored to ensure their structural integrity during demolition of the east side offices Water lines to the west side office area will be drained and capped Exposed piping and ventilation ductwork will be removed, characterized, decontaminated, and reused or disposed of Electrical power to the west-side office area will be disconnected Conduit and wiring will be removed, characterized, decontaminated, and reused or disposed of Temporary power for lighting and ventilation of further D&D activities will be installed

The west-side office area structure will be characterized, decontaminated (if necessary), demolished, and disposed of The RCA rooms should be shored to ensure their structural integrity during demolition of the west-side offices

The concrete foundation and subgrade material of the east- and west-side office areas will be core-sampled The foundation and subgrade material will be removed, decontaminated (if necessary), and disposed of appropriately Site restoration (backfill and regrading) will be coordinated with OU soil remediation field work

The only waste stream anticipated to be generated from these D&D activities is non-radioactive, non-hazardous construction debris (primarily structural concrete)

2.2.6.3 Building 886 Process Equipment, Process Utilities, and RCA Structure

Criticality experimentation process equipment, including glove boxes, tanks, piping, manifolds, and pumps, are located in Rooms 101 and 103 Contamination is expected in the form passivation films, and/or uranyl nitrate salts, on the wetted surfaces of process tanks, piping and equipment Surficial contamination will be encountered in the form of uranyl nitrate salts due to various spills and releases Any contamination may include fission and activation products (Cs-137, Sr-90, Np-237, Co-60) as a result of the generation of these products during criticality experiments Based upon existing survey data, there appears to be significant concentrations of Np-237 associated with the uranium Contamination may also be present (typically in the form of oxides) from the inadvertent releases of uranium and plutonium solids during handling in these materials

Upon completion of the deactivation of Building 886 remaining inventories of fissile/fissionable materials will be assessed Criticality controls will be established as appropriate based upon this assessment It is anticipated that no criticality controls will be required for decontamination of the process rooms and systems with the possible exception of the hold-up in the ventilation system If criticality concerns are identified through the assessment then appropriate criticality controls will be imposed These controls include the addition of "poisons" (e g , sodium borate for decontamination solutions) or geometrically safe accumulation containers and /or tanks, and geometrically safe configurations for solids

Decontamination (if required after the HEUN removal process) of the wetted surfaces of process equipment (i e , interior of tanks, pumps, and piping) will be accomplished by addition of a strong mineral acid decontaminant solution The normal process flow, from loading station to mixing tanks to experimental vessels to holding tanks, should be the sequence of decontamination The use of remote controls to fill tanks, and to operate pumps and valves should be maximized The interior surfaces of the water storage and acid storage tanks in the mixing room (Room 103) should be decontaminated first, since they are anticipated to be less contaminated (if at all) than the uranyl nitrate mixing tanks, experimental vessels, or holding tanks The decontaminant solution should be characterized after decontamination of the water and acid storage tanks, and prior to treatment and disposal or regeneration and reuse All piping connections to the water and acid storage tanks should be sealed after decontamination of their wetted surfaces to prevent recontamination

The interior surfaces of the uranyl nitrate mixing tanks should be decontaminated after the water and acid storage tanks As with the water and acid storage tanks, the decontaminant solution coming off the mixing tanks should be characterized prior to treatment and disposal or regeneration and reuse All piping connections should be sealed

Mixing tanks in Building 886 are filled with Raschig Rings Raschig rings may be also found under the grated floor in the mixing room Raschig rings made of borosilicate glass, used for criticality control, are 1-inch in diameter and 2-inches in length

The interior surfaces of the transfer pumps, piping, and manifolds between the mixing room tanks and experimental vessels should be decontaminated in process flow sequence, followed by the experimental vessels, and finally the holding tanks Flow sequence can be determined from existing process flow, and from piping and instrumentation diagrams Piped connections should be sealed as decontamination progresses to prevent recontamination Decontaminant solution should then be characterized, treated, and disposed of

The exterior surfaces of tanks, pumps, and piping will then be decontaminated Tanks, pumps, and piping will be dismantled and removed for reuse, storage, or disposal Glove boxes in Rooms 101 and 103 will be decontaminated, disassembled, and removed, then reused, stored, or disposed of

The decontamination of process waste floor drains and drain lines will be limited to lines which have not been previously plugged or sealed Additionally, the extent of process line decontamination will be limited to the interior of Building 886 Process drain lines (between 886 and 828) exterior to Building 886 will be dispositioned per the requirements established for OU Dye testing of drains and process waste lines may be required to ensure that all connections to Building 828 are drained, decontaminated, and sealed All dye testing will be performed in accordance with procedure 5-21000-OPS-SW 29, Dye Testing Building Drains

Process utilities (compressed air, gas, distilled water) will be drained and disconnected Exposed utility lines will be segmented, removed, decontaminated, recycled, or disposed of

The floor, walls, and ceiling of the RCA rooms will be core-sampled to identify sub-surface contamination Emphasis will be placed on areas (i e drain trenches and steps) previously identified as having been backfilled with concrete thereby "fixing" contamination Based upon characterization, the structure will be decontaminated by scabbling Material removed by scabbling will be removed from the building and disposed of appropriately (as low level or mixed waste) After decontamination, the structure will be demolished by saw cutting and removing concrete in blocks The blocks will be disposed of as solid, low level, or mixed waste The foundation and subgrade material will be core-sampled Based on characterization results, the foundation and subgrade will be decontaminated, removed, and disposed of The excavation left by removal of foundation and subgrade of both the RCA and non-RCA parts of Building 886 will be backfilled, compacted, and regraded Site restoration (backfill and regrading) will be coordinated with OU soil remediation field work

The final step of the D&D process for Building 886 involves addressing the ventilation systems Prior to initiating D&D of the ventilation system, contact Facilities Safety Engineering to verify that all applicable limiting conditions of operations (LCOs), operational safety requirements (OSRs), and technical safety requirements (TSRs) have been appropriately revised for these activities The basic D&D approach for ventilation systems is discussed in Section 2 2 6 However, the following must be performed as well Upon completing "gross" decontamination of the "exhaust" side of the ventilation system, a HEPA filter change-out is typically performed to reduce the inventory of highly-dispersible radioactive particles HEPA filter change-out is also typically performed prior to the D&D of HEPA filter system plenum It is important that the "exhaust" side of the interior ducting be D&D'd prior to the "supply" side, since the exhaust side normally contains significantly higher levels of contamination In addition, maintaining the supply side of the system will protect the supply units and ducting form 875 Highly contaminated sub-systems (i e gloveboxes and downdraft hoods) are typically D&D'd prior to the primary ventilation system Following this step it is important to isolate D&D'd portions, to the extent practicable, of the ventilation system prior to moving on to the next component Operability of the primary ventilation, or the non-D&D'd portion of the system should be maintained as long as feasible to minimize the potential for loss of control of contamination since temporary containment systems are not typically provided with the levels of redundancy as are permanent systems

The waste streams anticipated to be generated from these D&D activities include,

- non-radioactive, non-hazardous construction debris (primarily structural concrete),
- low-level radioactive waste (primarily surfaces of concrete, piping and tanks),
- TRU waste

2.2.7 Building 875

Building 875 houses the HEPA filters for non-RCA building exhaust from Building 886, RCA glove box (hot) exhaust, one waste tank, and other miscellaneous equipment Both exhaust streams pass from Building 886 to Building 875 through a tunnel

The ventilation tunnel from Building 886 to Building 875 will be vented to the atmosphere Incoming air will be filtered and adequate air changes to sustain in-tunnel D&D activities will be provided

Miscellaneous equipment, materials, tools, and debris will be removed, decontaminated, and reused or disposed of Sump pumps will be installed if standing water from ground water seepage is present Removed water will be stored, characterized, treated, and disposed of The hot waste transfer station, waste tank, waste transfer pump, piping, and sump pump in the tank pit area will be decontaminated Wetted surfaces of waste equipment will be decontaminated first, followed by decontamination of exterior surfaces The pit pumps and valve control panel will be removed and reused or disposed of The waste equipment will be removed and reused or disposed of HEPA filters will be removed from the glove box (hot) exhaust filter plenum HEPA filters will be characterized, decontaminated, and disposed of

The glove box exhaust filter plenum and glove box exhaust filter fans will be characterized, decontaminated, removed, and reused or disposed of The HEPA filters will be removed from the Building 886 (cold) exhaust filter plenum, and will be characterized, decontaminated, and disposed of

The Building 886 exhaust filter plenum, exhaust filter fans, miscellaneous equipment (local instrument control panels, condensate pumps, and motor control center), and walls, ceiling and floor will be characterized and the remaining structure will be decontaminated in place

Floor drain piping will be decontaminated Drains will be capped Temporary generators, lighting, and ventilation will be installed Electrical power will be disconnected Light fixtures and panels, conduit, and wiring will be removed, characterized, decontaminated, and reused or disposed of

The final step of the D&D process for Building 875 involves addressing the ventilation systems Prior to initiating D&D of the ventilation system, contact Facilities Safety Engineering to verify that all applicable limiting conditions of operations (LCOs), operational safety requirements (OSRs), and technical safety requirements (TSRs) have been appropriately revised for these activities The basic D&D approach for ventilation systems is discussed in Section X X However, the following must be performed as well Upon completing "gross" decontamination of the "exhaust" side of the ventilation system, a HEPA filter change-out is typically performed to reduce the inventory of highly-dispersible radioactive particles HEPA filter change-out is also typically performed prior to the D&D of HEPA filter system plenum It is important that the "exhaust" side of the system be D&D'd prior to the "supply" side, since the exhaust side is normally contains significantly higher levels of contamination In addition, maintaining the supply side of the system protects the environment from any accidental release result from a loss of flow condition in the ventilation system It is important to isolate D&D'd portions, to the extent practicable, of the ventilation system prior to moving on to the next component Operability of the primary ventilation, or the non-D&D'd portion of the system should be maintained as long as feasible to minimize the potential for loss of control of contamination since temporary containment systems are not typically provided with the levels of redundancy as are permanent systems

The Building 875 supply air filters will be removed and disposed of The Building 875 supply air plenum and building supply fan will be characterized, decontaminated, removed, and reused or disposed of The building will be demolished Rubble will be disposed of appropriately The Building 886/875 ventilation tunnel will be excavated The tunnel structure will be demolished Rubble will be disposed of appropriately The tunnel excavation will be backfilled with clean fill Surface grade will be restored Site restoration (backfill and regrading) will be coordinated with OU soil remediation field work

- non-radioactive, non-hazardous construction debris (primarily structural concrete),
- low-level radioactive waste (primarily surfaces of concrete and ductwork),
- TRU waste

2.3 CONTAMINATION CONTROL

All activities involving the D&D of Building 886 and associated areas will comply with requirements and guidance established by DOE, including the RADCON Manual, 10 CFR 835, and DOE Orders 5400 5 and 5480 11 The intent of the requirements for contamination control in 29 CFR 1910 120 will be implemented, although the implementation will follow the more formal structure for control of radiological contamination as set forth in DOE requirements and guidance This program will also implement requirements and guidance in the Health and Safety Practices Manual, the Radiological Engineering Procedures, and the Radiological Operations Instructions

As mandated by these requirements and associated guidance, contamination control will be imposed using engineering controls wherever practical to protect personnel Where engineering controls are not practical, administrative controls and PPE will be used to aid in the control of contamination and to minimize exposure of personnel to contamination The program will implement the site ALARA program Practical methods for minimizing exposure to the public, workers, and the environment will be the underlying basis for this program

All activities during this investigation will proceed based on the assumption that there is potential for radioactive contamination in the work area In some areas, contamination control may be implemented by using company-furnished coveralls and by surveying personnel (see ROI 2 1) prior to their exit from the work area

As practical, all ventilation system components will be functional and within applicable requirements, when completing this task The facility is designed so that air flows from cleaner areas to areas with a higher potential for contamination All facility airflow controls shall be followed to provide adequate control of contamination To the extent practical, personnel and the external environment will be physically isolated from the sources of contamination by engineered containment structures

Operation of the ventilation system for the glove box will be verified before attempting to obtain samples from the glove box The existing bag-in/bag-out procedures and all criticality controls will be followed when taking samples Samples from inside the glove boxes (see ROI-3 9) and other highly contaminated materials that require off-premises analyses will be packaged to control contamination and facilitate handling in the counting room All samples will be packaged and labeled in accordance with the onsite transportation manual Glove box surveys will be conducted in accordance with ROIs 3 1 and 3 9

Prior to using existing glovebox gloves, the gloves should be inspected to ensure their integrity and consistency with the Site glove management program To the extent practical, whenever an individual removes their hands from a glove/set of gloves in a glove box, the individual will conduct a contamination survey unless they immediately re-insert their hands into the same gloves

All activities involving actions with significant potential to create a surface contamination area will be completed to the extent practical in glove boxes, glovebags, B-boxes (open face-hoods), downdraft hoods, or equivalent engineered systems The Radiological Engineering representative will develop/implement appropriate Radiation Work Permits for all work areas This will include the use of step-off pad procedures to control the spread of contamination

Where liquid contamination may be present, a collection system or sufficient absorbent material will be used to prevent the inadvertent spread of the contaminated liquid To the extent practical, all contaminated liquids will be contained when outside of a glove box, glovebag, B-box, downdraft hood, or equivalent engineered system

In Building 886, it will be necessary to address the potential for alpha-, beta-, and gamma-emitting material contamination The selection of the survey instrument and field counting equipment shall reflect that these materials may be present

2.3.1 Contamination Control during Decontamination Activities

Whenever a D&D process is initiated, basic engineering judgement and operational planning needs are to be considered in finalizing the approach The technology evaluation process allows the user to consider the overall benefit of using a technology or group of technologies As already indicated, this must be coupled with engineering judgement and operational planning to ensure effective performance of the selected technologies and processes Joining these approaches should provide an effective means of selecting D&D processes which, to the extent practical

- Minimize environment, worker, and public risks (particularly the exposure to or release of radioactive contamination),
- Minimize the creation of radiologically contaminated areas,
- Minimize the technological risk of non-achievement of the required performance,
- Minimize the generation of waste, with emphasis on minimizing the amount of wastes that are difficult and costly to dispose of,
- Provide an efficient system, and
- Minimize the cost and time to do the task

while balancing these sometimes conflicting goals

The D&D activities will be planned so that the ventilation system remains functional as long as practical Once the ventilation system is shutdown or, if a supplement is needed for the existing ventilation system, a temporary ventilation system will be established to control contamination As the decontamination activities are completed, areas with little or no contamination may not require the control of contamination using ventilation Further, a wet decontamination system will be used as practical, when it does not significantly impact criticality control, to minimize the spread of contamination

Wherever practical, decontamination activities will be completed in glove boxes, glovebags, B-boxes, downdraft hoods, or equivalent engineered systems A second alternative is to remove the contaminated items and transfer them to a decontamination area for decontamination The packaged item is then bagged into a glove box (or equivalent containment) and removed from the packaging for decontamination The most effective means of decontamination of these items would be a "vat" type system, such as electropolishing, acid baths, vibratory cleaning, or ultrasonic cleaning It will be necessary to establish criticality controls for the *ex situ* decontamination system since there may be a build-up of fissile/fissionable material in the decontamination system Based on results of the decontamination evaluation, an acid bath will be an effective *ex situ* decontamination system Decontamination can be enhanced using ultrasonic cleaning in association with the acid bath This allows unattended decontamination, since no operator action is required after the material is in the tank The decontaminated item or material is then staged for re-use or, further size reduction, as needed, for packaging and disposal as either low level or construction waste

When items are decontaminated in place, containment systems (e g PERMACONs) will be used where practical, particularly when dry decontamination methods are employed Personnel protective clothing will be consistent with the decontamination method and will be identified in the radiation worker permit (RWP) To the extent practical, personnel will remain outside of the containment system A supplementary ventilation system will be needed to support the activities in the containment structure A glovebag will be used, where practical, to isolate workers from the contamination when the workers must be within the containment structure Since some portions of the facility will have been decontaminated prior to others, it will be appropriate to coat areas (particularly areas that have already been decontaminated) that could be affected by a loss of containment with strippable coatings to facilitate future decontamination, if needed (Note, the contaminated strippable coatings, due to a breach, should qualify as either low level or construction waste) Even if no loss of containment occurs during operations, the strippable coating will provide a method for minimizing the potential for re-contamination of the clean area when the containment structure/PERMACON is disassembled

Items that are not contaminated or that can be surveyed and released for uncontrolled use or disposal should not be processed through the decontamination system Containment systems and controls as described above will not be needed when addressing uncontaminated portions of the system

2.3.2 Contamination Control During Demolition Activities

Selection of demolition activities should reflect the same considerations as decontamination activities Demolition activities normally occur after the item, area, or facility has been decontaminated If demolition occurs prior to decontamination of the item, area, or facility then the step discussed for decontamination activities should also be implemented for demolition

For items, areas, or surfaces that may become contaminated during demolition, the use of strippable coating allows enhanced contamination control In addition, using a wet decontamination process or wetted surface to prevent airborne releases or exposures should be considered based on potential risks It is essential to control and contain any liquid effluent streams that may contain contamination When planning and implementing demolition activities, it is important to recognize that the containment systems of the facility are being degraded and/or breached Therefore, PERMACONs, strippable coatings, or wetted surfaces are likely to be the primary methods of contamination control It is also important to evaluate the potential for contamination generation and spread when selecting demolition methods to mitigate the potential

2.4 WASTE MINIMIZATION

Several opportunities exist to minimize waste generated during D&D of the 886 Complex Primary wastes from decontamination and decommissioning (such as process equipment, office furniture, and structural debris demolition) and secondary wastes (such as spent decontamination solutions and materials) can be minimized Waste minimization is briefly discussed in the following paragraphs

2.4.1 Characterization Activities

Prior to decontamination of process equipment, utilities, and structures, the nature and extent of contamination will be characterized Characterization is necessary to determine appropriate methods of decontamination, and the level of decontamination (cleanup goals) that can likely be obtained

Characterization is a vital element of the waste minimization effort Contamination "hot spots" on floors and walls (e g , leaks or spills near experimental vessels or in chemical mixing areas in Rooms 101 and 103) can be identified for specific decontamination efforts If "hot spots" cannot be successfully decontaminated, characterization will support removal and disposal of minimal amounts of contaminated material as radioactive waste

Characterization may also show areas or pieces of equipment that fit the definition of mixed waste (hazardous and radioactive), and may support selection of a decontamination method to remove the hazardous component, so that disposal as mixed waste would not be required Areas shown by characterization as meeting cleanup goals may be removed and disposed of without any decontamination required

A thorough characterization effort makes it possible to minimize generation of secondary wastes during decontamination activities by identifying "hot spots," and by supporting segregation of nonradioactive, nonhazardous solid waste (free release) from hazardous or radioactive waste forms (low level, TRU, mixed, or hazardous) that are more difficult and expensive to dispose of

2.4.2 Decontamination Methods

Decontamination methods can be selected that minimize generation of waste The wetted surfaces of process equipment (including mixing tanks, pumps, piping, experimental vessels, and waste tanks in Building 886, Rooms 101 and 103) can be most efficiently decontaminated by using the existing loading station, pumps, and piping to introduce a decontaminant solution

Tank decontamination can be sequenced beginning with tanks likely to be clean (the water storage and acid storage tanks), to tanks likely to be contaminated (mixing tanks, experimental vessels, and waste tanks), potentially using one "batch" of decontamination solution to clean several lightly contaminated tanks After tanks are cleaned they should be separated from the rest of the system to prevent recontamination Spent decontamination solutions should be collected in the process waste tanks, then pumped out for evaporation or precipitation/flocculation/clarification treatment onsite at Building 374 External surfaces of process equipment should be decontaminated by wiping to minimize secondary wastes, if health and safety are not at risk

2.4.3 Equipment Reuse

Upon determination that free release is appropriate, office furniture and fixtures in Building 886 should be removed and reused elsewhere at Site, or excessed until a beneficial use (onsite or offsite) is found Trailer T886A should also be removed and reused, or stored for future use It may also be possible to reuse "generic" process equipment (pumps, air compressors, blowers, storage tanks) that can be free-released The specialized plumbing associated with the mixing tanks and experimental vessels in Building 886 makes it unlikely that these tanks can be directly reused for any other application

2.4.4 Size Reduction

While size reduction is not normally considered a waste minimization technique, it is an important process in D&D activities that include demolition and final disposal of waste material Waste size minimization is critical to efficient use of disposal space, and also minimizes disposal costs It is likely that some process equipment and structural material from Building 886 will not be decontaminated to free release This equipment and material will be disposed of as hazardous or mixed waste Accurate segregation and efficient size reduction for optimal packing are essential due to costs associated with characterizing, packaging, shipping, and disposing hazardous or mixed waste In some cases, even solid wastes should be size-reduced prior to disposal, as onsite landfill space is a finite commodity that must be efficiently used

2.5 PROCESS EQUIPMENT DISPOSITION

Equipment lists for Buildings 828, 875, and 886 have been developed from review of drawings and documentation (Tables 2-1, 2-2, and 2-3) The major pieces of equipment include the following

- Two waste tanks and two transfer pumps in Building 828,
- Glove box, waste tank, and Building 886 exhaust HEPA filter systems in Building 875, and
- Criticality experimentation tanks and glove boxes in Building 886

While a significant amount of documentation is available, facility walkdowns should be conducted to confirm the existence and locations of major pieces of equipment

Drawings for Building 828 indicate the existence of the following equipment

- Critically safe steam generator and condensate receiver,
- Air compressor and receiver, and
- Evaporator

This equipment is reportedly not currently located in Building 828, but may be found in Building 880, or another surplus equipment storage area in the complex Equipment, materials, and debris stored in Building 880 will have to be determined by walkdown

Criticality experimentation process equipment is located in Building 886, Rooms 101 and 103 Process equipment includes two parallel streams, one for uranium experimentation and the other for plutonium experimentation Both the uranium and plutonium process streams include the following components

- Loading station,
- Transfer pumps,
- Mixing and storage tanks (uranium, plutonium, water, and acid),
- Experimental vessels,
- Horizontal split table,
- Vertical split table,
- Solution base,

Table 2 1
886 Complex Decontamination and Decommissioning
Equipment List – Building 828

ID NUMBER	NAME	DESCRIPTION
	Portable SST waste tank	horiz, 500–gal, 48"H (inc saddles) x 96"L
	Waste tank	vert, 7'H x 3 5'diam
	Waste tank	vert, 7'H x 3 5'diam
	Transfer pump	
	Transfer pump	
	Evaporator	removed – possibly stored in 880
	Air compressor	removed – possibly stored in 880
	Steam generator	removed – possibly stored in 880

Table 2 2
886 Complex Decontamination and Decommissioning
Equipment List – Building 875

ID NUMBER	NAME	DESCRIPTION
F–501A	Building exhaust fan	12,421 CFM, 40 hp
F–501B	Building exhaust fan	12,421 CFM, 40 hp
F–502A	Glovebox exhaust fan	5,072 CFM, 60 hp
F–502B	Glovebox exhaust fan	5,072 CFM, 60 hp
F–503	Building supply fan	7,450 CFM, 7 5 hp
FP–501	Building exhaust filter plenum	
FP–502	Glovebox exhaust filter plenum	
FP–503	Building supply filter plenum	
LCB–503	Pit pumps and valves control panel	
LP–A	Lighting panel	
LP–B	Lighting panel	
LPB–501	Local instrument control panel	
LPB–502	Local instrument control panel	
LT–A	Lighting transformer	
MCC–875	Motor control center	
P–501	Sump pump	
P–502	Transfer pump	
P–504A	Condensate pump	
P–504B	Condensate pump	
T–501	Waste holding tank	
VP–501A	Health physics vacuum pump	
VP–501B	Health physics vacuum pump	
	Eyewashes (3)	
	Hot waste transfer station	
	Monorail	

Table 2 3
886 Complex Decontamination and Decommissioning
Equipment List – Building 886

ID NUMBER	NAME	DESCRIPTION
3	Water tank	
4	Acid tank (in U area)	10 ga SST 304L, 17 5"W/30"L/27"H tygon sight gage, raschig ring filled
8	Acid tank (in Pu area)	
1	Uranium mixing and storage tank	
2	Uranium mixing and storage tank	
10	Uranium holding tank	
5	Plutonium mixing and storage tank	SST 304L, 18" diam x 48" high
6	Plutonium mixing and storage tank	
7	Plutonium mixing and storage tank	
9	Plutonium holding tank	
	Uranium experimental vessel	
	Uranium dump tank	
	Plutonium experimental vessel	
	Plutonium dump tank	
	Waste holding tank	
M–TP–1	Uranium transfer pump	
	Uranium suction header	
	Uranium discharge header	
M–TP–4	Plutonium transfer pump	
	Plutonium suction header	
	Plutonium discharge header	
TP–1	Uranium holding tank pump	
TP–2	Plutonium holding tank pump	
TP–3	Waste tank pump	
MP–5	Pump – uranium mix area	
MP–6	Pump – uranium mix area	
C–2	Poisoned reflector tank pump	
MR–2	Pu loading station glovebox	
MR–1	Glovebox – Plutonium mix area	
AR–1	Assembly room glovebox	
	Mixing room shower	
	Mixing room sink	
	Mixing room eyewash	
	Assembly hood monorail	
	Poison rod tank	
C–1	Poisoned reflector tank	10'H x 3'6"diam, 304L SST, tygon sight gage, raschig ring filled
	Rinse tank	40–gal, SST, raschig ring filled
	Rinse pump	
	Air compressors (2)	40 SCFM, 100 psig
	Distilled water system	still, condenser, 50– & 100–gal tanks, pump
	SNM vault ventilation system	1,000 CFM fan, 24x24" filter plenum, filters
	Horizontal split table	
	Vertical split table	
	Solution base	
	Water reflector apparatus	
	Elevated platform	
	Walk–in hood	
	Concrete reflector panels (8)	
	Reactor control console	
	Bridgeport mill	
	Logan lathe	
	Lektriever	

References – drawings and Surplus Defense Nuclear Production Facilities Element, Appendix A–1

- Water reflector apparatus,
- Walk-in hood
- Concrete reflector panels,
- Reactor control console,
- Dump tank, and
- Holding tank

Uranium mixing and holding tanks are vented and the vents are equipped with individual exhaust filters The experimental vessels and HEUN storage tanks are vented to the HEPA filter system in Building 875 The tanks currently contain uranyl nitrate solution and have been used in critical mass experiments The solutions have been contained in the mixing tank/experimental vessel for more than twenty years The solutions are not in an acceptable form for long-term storage of SNM Room 101 (the assembly room) houses the experimental vessels and is known to be slightly contaminated with enriched uranium, except for two areas in which the contamination is heavy Negative air pressure is maintained in Room 101 to prevent spread of contamination The instrumentation shop is equipped with a Bridgeport mill, Logan lathe, and Lektriever®

2.6 PROCESS UTILITIES DISPOSITION

Decommissioning of process utilities should be phased to optimize their usefulness during decontamination activities Process utilities are those that are directly related to mixing and experimentation equipment located in Building 886, Rooms 101 (Assembly Room), 102 (SNM Vault), 103 (Mixing Room), and Building 828 Each of these areas is further discussed below

2.6.1 Building 886 - Room 101

Water supplied to the assembly room includes domestic hot and cold water and chilled water through 1" and 1-1/2" lines Compressed air is supplied to the split table and vertical table A capped 1/2" line from the bottled gas system is also found in Room 101 Air-conditioning unit #2 is located in Room 101 Hydraulics are also supplied to Room 101

Approximately 1,700 cubic feet per minute (cfm) of ventilation air is supplied to Room 101, exhausted to the hot filter system One floor drain in Room 101 is routed to the contaminated waste system

Electrical power supplied to Room 101 includes 240- and 480-volt, 30- and 60-ampere, and 1-, 2-, 3-, and 4-phase power A welding receptacle is also located in Room 101 Twenty-four industrial fluorescent light fixtures (three 96" bulbs, 105 watts each) light Room 101

2.6.2 Building 886 - Room 102

Water, compressed air, and gas are not supplied to the SNM vault Ventilation air is supplied at 1,000 cfm and is exhausted to the hot filter system Electrical power to Room 102 consists of 120-volt, 1-phase wall plugs Room 102 is lighted with ten commercial fluorescent light fixtures (three 48" bulbs, 40 watts each)

2.6.3 Building 886 - Room 103

Water supplied to the mixing room includes domestic hot and cold water, and distilled water Domestic hot and cold water are supplied to the service sink, shower, work bench, and fume hood through 1/2", 3/4," and 1-1/2" lines Domestic cold water is also supplied to an emergency shower and eye wash station Distilled water is supplied to the work bench sink and fume hood The distilled water system includes a 100-gallon storage tank

Compressed air is available through 1/2" lines at the fume hood and work bench Bottled gas is also supplied through 1/2" lines to the fume hood and work bench

Ventilation ducts supply approximately 2,200 cfm of fresh air to Room 103 Air supply is dehumidified The room vents to the building (cold) exhaust filter plenum The glove boxes, fume hood, and plutonium solution mixing tanks vent to the hot exhaust filter plenum

The fume hood, work bench, and service sinks, shower, eye wash station, and floor drains in the mixing room are connected to the process waste drain line which drains to a tank in Building 828, and can be pumped from the tank to a lift station and onto Manhole 116

Room 103 is wired for 120-volt, 1-phase, 208-volt, 2-phase, and 480-volt, 30-amp, 3-phase power It is lighted by 20 industrial fluorescent fixtures (three 48" bulbs, 40 watts each)

2.6.4 Building 828 (waste tank pit)

Contaminated waste drain lines to Building 828 are heated Building 828 is heated by a 5-kilowatt heater and is wired for 120-volt and 240-volt power

2.7 886 COMPLEX STRUCTURE DISPOSITION

Disposition of the 886 Complex structural components will include a wide variety of media because of the number of buildings to be dispositioned The disposition of structural components for Buildings 880, 828, 875, and 886 Buildings is discussed below

2.7.1 Building 880

Buildıng 880 ıs a 20- by 40-foot prefabrıcated storage buildıng The buildıng ıs set on a lightly reınforced, 6-ınch-thıck concrete pad On the east end of the buildıng there ıs a roll-up door and a concrete ramp Dısmantlement wıll requıre removal of non-structural wall and roof panels, removal of structural steel framework, and removal of the concrete pad and ramp

Non-structural panels wıll be removed first The panels should be cut to an optımum sıze for dısposal or recycle If the panels have not been decontamınated ın place, they should be cut to optımum sıze for handlıng and decontamınatıon at a central facılıty Any cuttıng method suıted to flat sheet metal may be used Based on the weıghted rankıng presented ın Table 5-1, the shears or oxygen burner methods are recommended

Structural steel framework wıll be removed after wall and roof panels The avaılable record drawıngs of Buıldıng 880 do not show structural detaıls, but the framework can be assumed to be constructed I-beams The oxygen burner method ıs recommended for cuttıng the structural steel framework As wıth the panels, structural steel should be cut to the optımum sıze for dısposal, recycle, or handlıng and decontamınatıon

Fınally, the concrete pad and ramp must be demolıshed The floor saw method ıs recommended based on applıcabılıty to the concrete thıckness and hıgher rankıng than the alternatıve, backhoe mounted ram Shears may be requıred ıf reınforcement (#5 rebar) cannot be cut by the floor saw

2.7.2 Building 828

Buıldıng 828 ıs the waste tank pıt It currently contaıns two 500-gallon waste tanks, two transfer pumps, and assocıated pıpıng The pıt has a 10- by 17-foot footprınt, and the floor ıs 16 feet below grade The walls, floor, and roof panels are constructed of 12-ınch-thıck reınforced concrete The floor and lower part of the walls are covered wıth 16-gauge staınless steel plate

Thıs subelement may be entırely or partıally be removed and remedıated thorugh the accelerated cleanup progream or as a part of the overall OU9 cleanup The remedıatıon of the surroundıng soıls wıll be ıncorporated ınto OU14

Pumps should be recovered for reuse by unboltıng them from theır bases and from the waste pıpıng Tanks and pıpıng should be segmented usıng shears or an oxygen burner (Cırcular cutters may be used on pıpıng) After removal of tanks and pıpıng, the staınless steel floor plate should be cut wıth an oxygen burner or plasma arc cutter Work space constraınts ın the pıt may dıctate selectıon of the dısmantlement method For the safety of the dısmantlement personnel, ıt may also be advısable to make as few cuts as possıble ın the pıt, then remove the equıpment for further segmentıng

After removal of all tanks, piping, and equipment, the remaining concrete structure should be demolished A method that minimizes the necessity of personnel entry into the pit should be used to eliminate additional safety risk and the need for protective shoring It may be possible to separate and demolish the tank pit concrete from the ground surface with a backhoe mounted ram or other "wrecking" methods Containment of airborne contamination would almost certainly be required, but given the relatively small footprint of the pit, containment should not be a major issue

2.7.3 Building 886 Office Area and Trailer T886A

The office area and Trailer T886A are assumed to be uncontaminated however, this must be verified through further survey If no contamination is present, Trailer T886A should not be dismantled any more than is necessary to move and reuse (or store) the trailer The office trailer removal will require temporary removal of 2 to 3 sections of the exclusion zone fencing The office area covers approximately 5,000 square feet, and is constructed of backfilled, reinforced cinder block Assuming that all office equipment, materials, and utilities have been dispositioned, the office area should be dismantled with wall and floor saws

2.7.4 Building 886 Radiologically Controlled Area

Rooms 101 and 103 contain process equipment including mixing tanks, water and acid storage tanks, transfer pumps and associated piping, piping manifolds, experimental vessels, dump tanks, monorails, and glove boxes Virtually all process equipment is constructed of stainless steel

To the extent practical, tanks and pumps should be decontaminated and removed for reuse, however, given the highly specialized use of the mixing tanks and experimental vessels, it is unlikely that they can be reused The piping should be cut with shears or circular cutters Due to the complex geometry of tank internals, it may be necessary to use the arc saw cutting method on tanks Work space constraints may also dictate the dismantlement method ultimately selected and implemented

Similar to Building 828, it may be advantageous to make a minimum number of cuts to remove equipment from the RCA, then conduct further dismantlement in a safer location Glove boxes (and ducting to the HEPA filter system) and monorails may be cut with shears, oxygen burner, or arc saw cutter

Room 101 has a 44- by 60-foot footprint, and a 33- 1/2-foot high flat roof The concrete should be dismantled using floor and wall saws Structural steel ceiling joists should be cut with an oxygen burner Containment, air filtration, and secondary waste handling will almost certainly be required during dismantlement activities If adequate characterization information is available, it may be possible to selectively remove "hot spots" under highly controlled conditions, then dismantle the rest of the structure under less rigorous control Concrete should be cut to optimum size for handling and disposal Structural steel should be cut for disposal or recycle

Room 102, the SNM vault, has a 36- by 80-foot footprint, and a 12-foot high sloped roof The walls are constructed of 3-foot-thick reinforced concrete The concrete should be dismantled using floor and wall saws Structural steel ceiling joists should be cut with an oxygen burner Concrete should be cut to optimum size for handling and disposal Structural steel should be cut for disposal or recycle

Room 103, the mixing room, can be demolished using wall and floor saws As mentioned in the discussion of Room 101, it may be possible to remove highly contaminated spots, then reduce the contamination control requirements for the rest of the structure of Room 103

The ductwork from the RCA will require special attention due to the potential for uranium and, to a far lesser extent, plutonium contamination This ductwork must be characterized prior to dismantlement or decontamination Based upon the characterization, appropriate criticality controls, if any, must be established

Containment, air filtration, and control of secondary wastes may be required, depending on the types and concentrations of contamination encountered (and whether decontamination precedes dismantlement), in all phases of dismantlement

2.7.5 Building 875

Building 875 houses the HEPA filtration plenums and filters for the Building 886 standard ventilation, "hot" exhaust from Building 886 RCA, and ventilation for Building 875 itself, one waste tank, and ventilation controls The footprint of Building 875 is 54 5 feet by 60 5 feet, with a roof height of approximately 12 feet The foundation consists of concrete caissons and structural steel supporting a 6-inch-thick concrete floor Walls are constructed from cinder block A ventilation tunnel connects Building 886 to Building 875 The tunnel is constructed of reinforced concrete and is approximately 8 feet wide, 11 feet high, and 75 feet long

Exhaust fans should be removed for reuse Filter plenums should also be removed for reuse, if needed If the filter plenums are not needed, they may be cut into disposable (or recyclable) pieces using shears, plasma arc cutters, or oxygen burners The waste tank and pump should also be removed for reuse, if needed. If the tank is not needed, it should be cut for disposal or recycle using an oxygen burner

The roof, walls, and floor of Building 875 can be cut for disposal with wall and floor saws The tunnel between Building 886 and 875 should be demolished using a backhoe mounted ram or other wrecking equipment that can be used without personnel entry into the tunnel

2.8 CONCEPTUAL ESTIMATE

To be provided by Stoller, Inc

2.9 CONCEPTUAL SCHEDULE

To be provided by Stoller, Inc

3.0 FUNCTIONAL REQUIREMENTS AND STANDARDS

The identified requirements and standards for the 886 Complex D&D Subproject include identification and selection of cleanup standards, decontamination and dismantlement equipment, and criteria that should be considered when designing or procuring the preferred D&D equipment Each of these topics is further discussed below

3.1 CLEANUP STANDARDS

The cleanup standards applicable to D&D of the 886 Complex can be organized into two categories 1) release criteria for excess equipment and structural material, and 2) waste acceptance criteria for equipment, structural materials, and secondary waste that will be disposed of as radioactive and/or mixed waste Each of these categories is discussed below

3.1.1 Site Release Criteria

The release criteria for excess equipment and structures from D&D of the 886 Complex shall be based on DOE requirements and other appropriate guidelines, such as the IAG As discussed in the Decontamination and Decommissioning Guidance Document (DOE, 1994) and Section 1 5 4 of the SMP, the release criteria shall be developed based on guidelines found in Chapter IV of DOE Order 5400 5 (DOE, 1990), 10 CFR 834 (when issued), and criteria established by the DOE Rocky Flats Office for facilities or sites that are to be released without radiological restriction The basic public dose limits for exposure to residual radioactive material, in addition to naturally occurring "background" exposures, are 100 millirems (mrem) (1 mSv) effective dose equivalent in a year Unconditional release criteria specific to the Site can be found in the Radiological Operating Instructions Manual (EG&G, 1994), No 4-61300-ROI-03 02

In addition to requiring that radioactivity be below guideline values, DOE also requires, as a matter of policy, that residual radioactivity be reduced to ALARA levels before a site is released, regardless of the guidelines

3.1.2 Waste Acceptance Criteria

Throughout D&D of the 886 Complex, there will be excess equipment, structural material, and secondary waste generated that will be disposed of as radioactive and/or mixed waste The type and level of contamination will dictate the method of disposal of the waste The primary DOE Order which dictates disposal of radioactive waste is DOE Order 5820 2A, Radioactive Waste Management and the Site Waste Requirments Manual (4034) Additional information for management of mixed and radioactive waste can be found in the RCRA Part B Operating Permit Application for U S DOE-Rocky Flats Plant Hazardous & Radioactive Mixed Wastes (EG&G, 1994)

Solid radioactive waste is disposed of either as low level waste (LLW), TRU, or special case waste (e g , asbestos) Solid LLW is currently being stored onsite pending final disposal offsite and must meet onsite LLW storage requirements and the NTS WAC Solid TRU must meet the WIPP WAC prior to being shipped to WIPP All hazardous waste must be handled in a manner consistent with the Colorado Hazardous Waste Regulations 6 CCR 1007-3 Wastewater generated during implementation of decontamination technologies must meet pretreatment standards for Building 774

3.2 DECONTAMINATION AND DISMANTLEMENT METHODS

Decontamination and dismantlement are major decommissioning activities that may be used to accomplish several goals, such as reducing occupational exposure, reducing the potential for release and uptake of radioactive material, permitting the reuse of a component, and facilitating waste management In the decommissioning of the 886 Complex, the objectives of decontamination are

- Elimination or reduction to acceptable levels the hazards and risks associated with facility/equipment contamination to ensure worker protection during dismantlement of the 886 Complex,

- Removal of building components in phases to minimize the potential for spreading contamination and to ensure proper management of waste materials, and

- Elimination of contaminant hazards to allow excess equipment to be reused for other purposes (as much as possible)

A project goal is to reduce TRU to lowlevel wastes, mixed wastes to low-level wastes, lowlevel wastes to nonradioactive and nonhazardous wastes, preclude production of or eliminate hazardous waste, and minimize wastes requiring disposal, taking into account potential reuse and recycling of excess equipment

An engineering study was performed to identify and evaluate available methods and technologies for the decontamination and dismantlement of radiologically contaminated equipment/facilities within the 886 Complex The basis for the study was comprised of two elements

The first element involved establishing the process and basic methodology by which the study was to be conducted and the options were to be evaluated The second element was the implementation of the process, which involved development of assumptions, selection and screening of technologies, and numerical weighing and ranking of favorable technologies Decisions and valuative information were introduced throughout the process to establish, develop, and support the baseline of the study These sequential elements of the methodology and process are depicted in Figure 3-1 A detailed discussion of the identification and selection process can be found in the document *886 Complex Decontamination and Dismantlement Methods Study* (ES, 1994) The selection process contained within the *Mixed Residue Tank Systems Decontamination Methods Study* (ES, 1994a) was used as a model document for the study

3.2.1 Potential Waste Streams to be Decontaminated and/or Dismantled

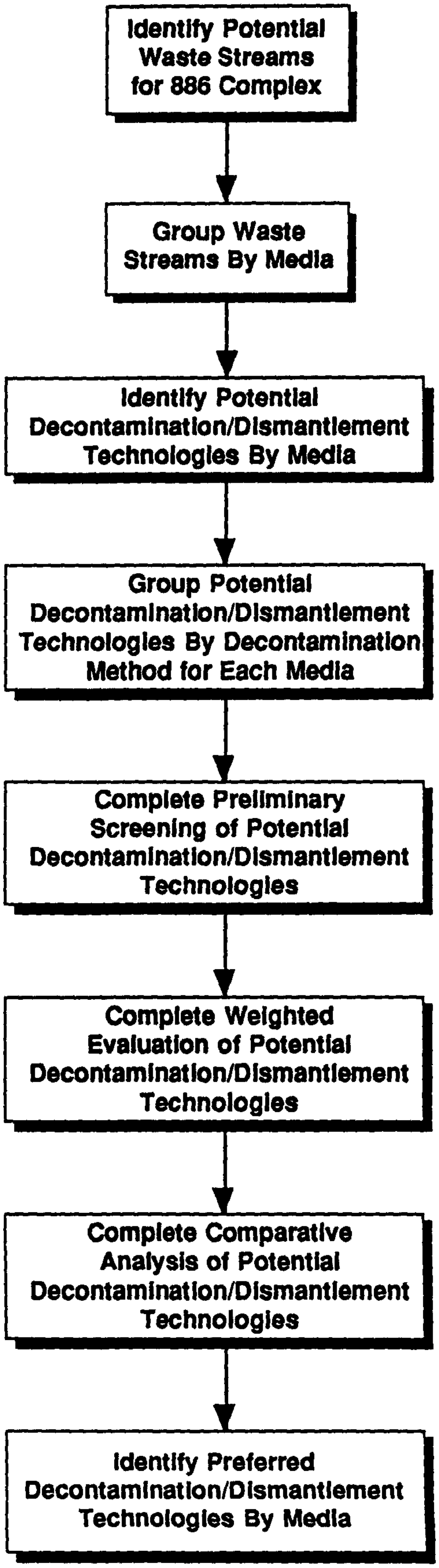
Section 2 1 1 of the Subproject Management Plan identifies several waste streams to be generated during D&D of the 886 Complex These waste streams include asbestos, concrete, exhaust plenums, glove boxes, HEPA filters, metals, miscellaneous debris and equipment, piping and conduit, pumps/blowers, Raschig rings, roofing, tanks, and wiring Of the waste streams identified, the majority of the waste generated during D&D of the 886 Complex will be concrete, metals, and piping Therefore, the scope of the evaluation focused on decontamination and dismantlement technologies for concrete, metals, and piping

3.2.2 Study Assumptions

Assumptions that used as the basis of selection of decontamination and dismantlement technologies included

- Radiological contaminants of concern include uranium, cesium, strontium, plutonium, americium, and neptunium (see Section X X)
- All accountable SNM will be removed from glove boxes and Building 886 prior to commencement of decontamination or dismantlement activities
- The residual solids/sludges encountered in any specific location (i e , tanks, vents) do not have the potential to approach criticality limits
- Both in situ and ex situ decontamination methods and technologies will be evaluated
- The nature of contamination (i e , fixed vs removable) is not considered as it relates to the potential for generating airborne contamination during the evaluation of dismantlement technologies It is assumed that any resultant health and safety considerations remain the same
- Secondary waste generated during decontamination and dismantlement efforts must meet waste acceptance criteria for onsite treatment and/or storage

Figure 3-1 - Selection of Preferred Decontamination/Dismantlement Technologies for 886 Complex



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3.2.3 Identification of Applicable Decontamination and Dismantlement Methods

Primary references used to identify technologies were the DOE Decommissioning Handbook (DOE, 1994a), the DOE EM-40 Decontamination and Decommissioning Guidance Document (DOE, 1994b), and the DOE Technology Logic Diagrams (ORNL, 1993a, ORNL, 1993b, INEL,) These sources of information aided the initial judgement of the potential applicability of certain decontamination and dismantlement methods A complete listing of the identified technologies, along with a detailed description, can be found in ES, 1994

3.2.4 Results of the Evaluation

Several types of decontamination and dismantlement technologies were selected because of the variability in materials to be encountered during decontamination operations of the 886 Complex

Recommended chemical decontamination methods were strong inorganic acids and weak acids For mechanical decontamination methods, the following technologies were recommended, with each technology representing a method for removing a particular type of contamination

- High-Pressure Water,
- Ice Blasting,
- Mechanical Scabbling, and
- Vacublast

Both mechanical and thermal techniques were recommended as dismantlement methods including

- Circular Cutters,
- Diamond Wire Cutting,
- Mechanical Saws,
- Nibblers and Shears,
- Oxygen Burners,
- Plasma Arc Cutters, and
- Wall and Floor Saws

A detailed discussion as to specific use of these technologies during decontamination and dismantlement activities of the 886 Complex is presented in ES, 1994a

3.3 DESIGN CODES AND STANDARDS

The following is a list of the regulatory requirements, design standards and guides, DOE Orders, Site procedures, and reference documents to be considered during the design and/or specification of the decontamination and dismantlement equipment for general D&D activities for the 886 Complex

3.3.1 Applicable Regulatory Requirements

- *Code of Federal Regulations Title 10*, Part 20 (10 CFR 20) Standards for Protection Against Radiation
- *Code of Federal Regulations Title 29*, Parts 1910 and 1926 (29 CFR 1910 and 1926) Occupational Exposure to Asbestos, Tremolite, Anthophylite, and Actinolite
- *Code of Federal Regulations Title 40*, Part 122 26 (40 CFR 122 26) National Pollutant Discharge Elimination System, Stormwater Discharges
- *Code of Federal Regulations Title 40*, Part 61 (40 CFR 61) Subpart M National Emission Standards for Hazardous Pollutants
- *Code of Federal Regulations Title 40*, Part 260 (40 CFR 260) Hazardous Waste Management System General
- *Code of Federal Regulations Title 40*, Part 261 (40 CFR 261) Hazardous Waste Management System Identification and Listing of Hazardous Waste
- *Code of Federal Regulations Title 40*, Part 265 (40 CFR 265) Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, July 1990
- COEM - DES - 5, Rev 4, "Specification for Procurement and Construction," 6/17/91
- COEM - DES - 12, Rev 3, "Power Distribution Systems Management," 6/17/91
- COEM - DES - 13, Rev 1, "Illumination Engineering Design and Review Procedure," 6/17/91
- COEM - DES - 19, Rev 2, "Drafting Practices," 6/17/91
- COEM - DES - 25, Rev 2, "Facility CADD System," 6/17/91
- COEM - DES - 27, Rev 3, "Operational Requirements Document," 6/17/91
- COEM - 6 1 5, Rev 0, "Title I Design Summary/Review," 4/30/92

- COEM - 6 3 6, Rev 0, "Classification of Systems Components and Parts," 7/30/93
- COEM - 6 4, Rev 0, "Design Calculations," 3/31/92
- COEM - 6 6 2, Rev 0, "Engineering Drawing Control," 1/31/92
- DOE/EH - 0256T, Radiological Control Manual, 6/92
- DOE Order 4010 1A, "Value Engineering," 5/14/92
- DOE Order 4700 1, Change 001, "Project Management System," 6/2/92
- DOE Order 5400 1, Change 001, "General Environmental Protection Program," 6/29/90
- DOE Order 5400 3, "Hazardous and Radioactive Mixed Waste Program," 2/22/89
- DOE Order 5400 4, "Comprehensive Environmental Response, Compensation, and Liability Act Requirements," 10/6/89
- DOE Order 5400 5, Change 002, "Radiation Protection of the Public and the Environment," 2/8/90
- DOE Order 5480 1B, "Environmental Safety, and Health Program for DOE Operations"
- DOE Order 5480 4, Change 004, "Environmental Protection Safety and Health Protection Standards," 1/7/93
- DOE Order 5480 5, "Safety of Nuclear Facilities," 9/23/86
- DOE Order 5480 7, "Fire Protection," 9/23/86
- DOE Order 5480 10, "Contractor Industrial Hygiene Program"
- DOE Order 5480 11, Change 003, "Radiation Protection for Occupational Workers," 6/17/92
- DOE Order 5480 22, "Technical Safety Requirements,"
- DOE Order 5700 6C, "Quality Assurance," 8/21/91

- DOE Order 5700 2D, "Cost Estimating, Analysis, and Standardization," 6/12/92

- DOE Order 5820 2A, "Radioactive Waste Management," 9/26/88

- DOE Order 6430 1A, Change 001, "General Design Criteria," 4/6/89

- DOE, *Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards,* UCRL-15910, June 1990

- EG&G Rocky Flats, Inc , *Design Criteria for Engineering and Architectural Services,* March 1985

- EG&G Rocky Flats, Inc , Environmental Restoration Technical Support Document *A NEPA Support Document for the Rocky Flats Plant,* June 1992

- EG&G Rocky Flats, Inc , *Historical Release Report for the Rocky Flats Plant,* June 1992

- EG&G Rocky Flats, Inc , Site Standard No SC-106, Standard for Equipment Qualification, June 14, 1990

- Facilities & Engineering Manual 009, *Architect-Engineer's Guide to Construction Cost Estimating for Rocky Flats Plant,* July 1992

- Federal Facility Agreement and Consent Order, USEPA Region VIII and The State of Colorado in the Matter of US DOE Rocky Flats (Colorado) Site, January 1991

- Occupational Safety and Health Administration (OSHA)

- Rocky Flats Health and Safety Practices Manual (HSP)

- State of Colorado Department of Health, *Draft Interim Final Policy and Guidance on Risk Assessment for Corrective Action at RCRA Facilities,* October 25, 1993

3.3.2 Reference Standards and Guides

<u>American National Standards Institute (ANSI)</u>

- ANSI A58 1, Building Code Requirements for Minimum Design Loads in Buildings and other Structures

- ANSI C84 1, Electric Power Systems Equipment - Voltage Ratings (60 Hz)
- ANSI N512, Protective Coatings (Paint) for the Nuclear Industry

American Nuclear Society (ANS)

- ANS 8 3, Criticality Accident Alarm System
- ANS 8 5, Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Materials
- ANS 8 6, Guide for Nuclear Criticality Safety in the Storage of Fissile Materials
- ANS 8 15, Nuclear Criticality Control of Special Actinide Elements

American Society for Mechanical Engineers (ASME)

- ASME N509, Nuclear Power Plant Air Cleaning Units and Components
- ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities
- ASME Boiler and Pressure Vessel Code

National Fire Protection Association (NFPA)

- NFPA 70, National Electric Code 1993

Uniform Building Code, 1988

Industrial Ventilation, 16th Edition

4.0 ENVIRONMENTAL, SAFETY, AND HEALTH REQUIREMENTS

Environmental, safety, and health requirements pertinent to D&D of the 886 Complex are presented below A review of relevant regulatory requirements, a completed regulatory checklist for the 886 Complex Subproject, a Sampling and Analysis Plan and Health and Safety Plan to support baseline characterization efforts, and a Preliminary Hazards Assessment for the complex are addressed in this section

4.1 REGULATORY SUMMARY BRIEF

The following sections briefly explore the regulatory drivers which need to be addressed during the planning phase of the Building 886 D&D subproject

4.1.1 Interagency Agreement

Most Site facilities and suspected areas of contamination (AOCs) to be remediated are identified in the IAG Statement of Work (Attachment 2 - Table 1) and are divided according to Operable Units (OUs) Each OU is to be remediated under EPA-lead, State of Colorado-lead, or joint EPA/CDPHE oversight Should D&D activities include an identified IHSS, the IAG requirements and schedules will be integrated during planning of the D&D Subproject

With respect to the Building 886 D&D Subproject, Building 886 spills are identified as IHSS 164 2 in the IAG Statement of Work (Attachment 2 - Table 1) This IHSS is located in OU14 which is an EPA-lead OU Although IHSS 164 2 does not specifically include the building structure, equipment, and other components which are part of the scope of work for the D&D Subproject, close coordination of the OU14 and D&D Subproject activities is required If any spill areas associated with Building 886 are to be remediated as part of the Building 886 D&D Subproject, the IAG requirements for OU14 must be followed unless specific waiver of these requirements is granted by the EPA in accordance with the modification provisions contained in the IAG Building 828 is connected to the Process Waste Line which is in the scope of OU9 The cleanup and removal of this facility will require close coordination with OU9

It should also be noted that the site mission at the time that the IAG was signed did not include closure of the Site Therefore, the need for a D&D program was neither contemplated nor included within the scope of the IAG Considering the magnitude of the D&D program and the potential for releases to the environment if D&D activities are not properly conducted, EPA may attempt to regulate the D&D program as a CERCLA response action The level of regulatory oversight for D&D activities is being considered as part of the IAG renegotiation efforts Since a determination regarding the regulatory oversight requirements for non-IAG facilities has not been finalized, it is assumed that the Building 886 Subproject can proceed without obtaining prior input and approval by the regulatory agencies However, it is advised that a letter identifying the intent to D&D these structures be provided to the agencies

4.1.2 Resource Conservation and Recovery Act

Based on a review of the Site RCRA Part A and Part B permit applications, no RCRA-regulated units contained within the Building 886 Complex and support facilities have been identified Therefore, RCRA closure requirements, including the submission of closure plans to CDPHE for approval, do not apply

Although RCRA units are not identified within the Part A and Part B permit applications, a vault containing several storage tanks exists in the Building 828 facility At this point, past use of these tanks and whether or not the tanks were used to store a regulated hazardous waste is uncertain Additional process information must be obtained to determine if the tanks should be identified as hazardous waste management units Samples of tank residues, if any, may also be collected and analyzed to determine if the residues exhibit a hazardous waste characteristic If it is determined that the tanks were used for hazardous waste management activities, the Part A permit application should be amended to identify these tanks as hazardous waste management units The tanks would then be closed in accordance with 6 CCR 1007-3, 264/265, Subparts G and J A closure plan would be needed to address these requirements and would be submitted to the CDPHE for approval prior to proceeding with closure of these tanks [NOTE The tank residues could be removed and appropriately managed without CDPHE approval]

RCRA regulations may also apply to the management of wastes that are generated As required by 6 CCR 1007-3, 262 11, a generator must determine whether his solid waste meets the definitions of a hazardous waste as described in 6 CCR 1007-3, 261 If any of the solid wastes are determined to be hazardous, the appropriate management procedures is dictated by state and federal regulations would be followed The provisions of 6 CCR 1007-3, 268 may also be applicable if the hazardous waste is determined to be a "restricted hazardous waste" (i e , exceeds a land disposal restriction (LDR) standard) Restricted hazardous waste cannot be placed into a land disposal unit unless the waste is treated or a variance is provided in accordance with the LDR provisions

4.1.3 Nuclear Regulatory Commission

NRC regulations are not directly applicable to D&D of Site facilities However, the waste management and disposal provisions specified in 10 CFR 61 may be applicable to low level D&D wastes if an offsite, NRC-licensed disposal facility were used In this case, waste acceptance criteria for the permitted receiving would be met It is probable that the waste acceptance criteria would be based on the 10 CFR 61 standards In the case of shipments to the Nevada Test Site (NTS) or the Waste Isolation Pilot Project (WIPP) waste acceptance criteria will be met

Though not directly applicable to this task, NRC regulatory and technical guidance documents may be used in support of developing and implementing the D&D activities

4.1.4 National Environmental Policy Act

A strong possibility exists that facilities to be decontaminated and decommissioned (as major or subprojects) will be Categorically Excluded (CX) under the National Environmental Policy Act (NEPA) provisions 10 CFR 1021, Subpart D - Appendix B Under the NEPA provisions 10 CFR 1021 212 and 40 CFR 1502 4(c)(3), the Building 886 D&D Subproject could be CX as a research, development, demonstration, and/or pilot project A request for NEPA determination should be prepared as soon as possible and submitted to DOE-Rocky Flats Office (who has the authority to CX projects) to obtain the necessary NEPA approval without impacting the schedule If the proposed action satisfies the requirements for a CX, DOE would prepare the necessary documentation in accordance with DOE Order 5440 1E It is assumed that an environmental amendment (EA) or environmental impact statement (EIS) will not be required

4.1.5 Toxic Substance Control Act

The Toxic Substance Control Act (TSCA) provisions will be applicable for storage and disposal of polychlorinated biphenyls (PCBs) (40 CFR 761, Subpart D) and Asbestos (40 CFR 763) This regulation establishes the requirements for treatment, storage, and disposal of these regulated substances based on their form/concentration, and includes an anti-dilution provision Specific management procedures will need to be included in the Building 886 Subproject plans if there is a potential for the generation of regulated TSCA waste materials

4.1.6 Occupational Safety and Health Administration

Although Occupational Safety and Health Act standards are not independently enforced by the Occupational Safety and Health Administration (OSHA), these health and safety provisions have been adopted and are implemented under DOE Order 5483 1A Therefore, worker safety and protection requirements need to be considered in the planning of D&D actions In particular, the industry and general construction standards contained in 29 CFR 1910 and 1926 may dictate the approach to the implementation of D&D activities The standards include requirements pursuant to Industry and Construction Standards and additional provisions for safe work practices and occupational safety relative to subproject D&D activities They also include guidance, consistent with DOE Orders 5480 14 and 5483 10, on the preparation of Health and Safety Plans

4.1.7 Radioactive Waste Management

The DOE Order 5820 2A establishes guidelines for managing radioactive and mixed waste, and contaminated facilities This DOE Order provides requirements for the management of high-level, transuranic, low level and byproduct waste to protect human health and the environment All radioactive waste generated as result of the Building 886 D&D Subproject will need to be managed in accordance with this DOE Order and approved

Site implementing policies and procedures including, the Hazardous Waste Requirements Manual and the Radioactive Waste Requirements Manual

4.2 INTEGRATION ACTIONS

The following paragraphs depict the major activities to be conducted during the initial stages of D&D planning effort Integration of regulatory drivers previously discussed is relevant to the following activities

4.2.1 Building Inventory

An inventory of structures that fall under the Building 886 D&D Subproject will be prepared The building inventory will be prepared by the D&D organization following isolation of equipment from utilities (electric, water, air), removal of drums, containers and bulk residues from equipment, piping, and salvageable equipment The remaining materials within the structure will represent the "inventory " This may include, but not be limited to, items such as duct work, piping, conduit, miscellaneous steel, concrete, asbestos-containing material, structural steel, and process equipment A material inventory of the designated facilities shall be compiled along with process knowledge information and characterization data

4.2.2 Waste Categories and Waste Management Plans

An inventory of the waste types (i e , hazardous debris, asbestos-containing material, low level radioactive waste, decontamination fluids) that are expected to be generated as result of D&D activities will be prepared A waste management plan will be prepared for each waste stream expected to be generated to identify its characterization, segregation, handling, and disposition requirements

The materials classified as non-recoverable and non-recyclable will be packaged in accordance with the Site Radioactive Waste Requirements Manual, DOT regulations, and comply with the selected receiving facility's waste acceptance criteria Disposal of hazardous waste offsite shall comply with the DOE policy entitled *Offsite Transportation, Storage, and Disposal of Non-Radioactive Hazardous Waste*

4.2.3 Free-Release Criteria and Future Use/Disposition of Buildings/Structures

The free-release of waste material, residues, structures, equipment, and other property will adhere to radiological protection requirements and guidelines described in DOE Order 5400 5 Allowable levels of residual surface contamination which can remain on the components and yet allow components to be released for reuse without further radiological restrictions are defined in DOE Order 5400 5 Release for unrestricted use is the most environmentally desirable option for the disposition of waste materials Free-release criteria can also be used to reduce the level of management required and to allow non-radioactive waste disposal facilities to be used A reasonable effort will be made to eliminate residual contamination and to achieve the acceptable surface contamination levels Written procedures and testing protocol may need to be developed to allow the free-release of specific waste streams

4.3 REGULATORY REQUIREMENTS IDENTIFICATION CHECKLISTS FOR THE 886 COMPLEX

Attachment A contains a completed Regulatory Requirements Identification Checklist for the 886 Complex D&D Subproject The objective of the checklist is to present a reference evaluation of the regulatory implications and requirements that may be relevant for D&D of the 886 Complex The purpose of the checklist is to identify environmental statutes and regulations, DOE Orders, and/or applicable requirements and how they apply to the D&D process of the 886 Complex The screening checklist serves as a mechanism to identify the regulatory drivers and waste management provisions The screening checklist is divided accordingly to address the following areas and regulatory requirements

- Resource Conservation and Recovery Act (RCRA),
- Asbestos Containing Material (ACM),
- Polychlorinated biphenyls (PCBs),
- National Environmental Policy Act (NEPA),
- Department of Energy (DOE) Orders,
- Clean Air Act (CAA),
- Clean Water Act (CWA), and
- Department of Transportation (DOT)

The screening checklist does not address the NRC provisions since the proposed action at the 886 Complex is not a CERCLA response action

The screening checklist does not address the Occupational Safety and Health Act Although OSHA standards are not considered ARARs, OSHA requirements would apply on their own merit These OSHA standards apply to federal facilities as required by the Occupational Safety and Health Act [29 USC 668] and Executive Order 12196, however, they are not independently enforced by OSHA These occupational safety requirements are adopted and implemented under DOE Order 5483 1A, which references OSHA's general construction standards contained in 29 CFR 1926 Although this regulation is not presented in detail, protection requirements should not be overlooked when preparing the implementation plans for the selected subproject D&D activities

To Be Determined (TBD) responses will be incorporated into the checklist if a definitive response cannot be provided at this point in time. Upon initiation of the D&D Subproject activities, TBD responses will be deleted and the appropriate response inserted/provided.

4.4 BASELINE CHARACTERIZATION PLAN

The Baseline Characterization Plan (BCP) for the 886 Complex D&D Subproject addresses sampling, quality assurance/quality control, health and safety requirements, and analytical requirements to identify areas where surveying information is unavailable or insufficient for the baseline characterization of Buildings 886, 828, 875, and 880 The BCP will include the establishment of data quality objectives (DQOs) to ensure that the information obtained will be of a quality to meet subproject requirements Included in the BCP will be a Sampling and Analysis Plan, a Quality Assurance Plan, and a Health and Safety Plan

4.4.1 Sampling and Analysis Plan

The purpose of the Sampling and Analysis Plan (SAP) is to identify the specific analytical needs, sampling requirements, data handling requirements, and associated quality assurance/control (QA/QC) requirements for D&D of the Building 886 Complex When completed, the contamination data acquired during the performance of this plan will supplement existing facility characterization data and will facilitate operational decisions regarding the extent of radiological controls and requirements needed for decontamination, disassembly, and disposal of the building structure and its associated equipment and materials

4.4.1.1 Objectives

There are four main objectives of the SAP for D&D of the 886 Complex

- Collect representative samples that will allow both accurate and precise measurements of the chemical and radiological contaminants in the building structures, materials, and equipment,
- Confirm the type, location, and amounts of contaminants present at the 886 Complex as previously defined by historical information, and validate results from previous radiological and nonradiological surveys
- Establish baseline conditions (i e , physical, chemical, and radiological condition of equipment/facility) of the building(s)
- Identify worker protection requirements

If the chemical measurements are sufficiently accurate and precise, they will be considered reliable estimates of the contaminants in the structure, materials, and equipment The SAP will include sampling of process equipment, floors, walls, and materials located inside the buildings Depending on the levels of hazardous waste found, further sampling and changes to this plan may be required The sampling in this plan is only for initial characterization purposes

4.4.1.2 Parameters of Analysis

Historical information, existing site characterization information, and process knowledge will be used to identify potential chemicals and wastes that were stored, processed, or generated during operation for identifying potential contaminants of concern This section identifies the potential contaminants that are likely to be found within the building structure, materials, and equipment

As discussed in Section 1 1 (Building History), Building 886 and the adjacent buildings and structures were used to perform criticality experiments and as storage facilities for certain types of waste, materials, and equipment generated Uranium and plutonium were used in performing mass criticality experiments As a result, uranium, plutonium, fission and activation products, and other radionuclide material generated during the criticality experiments are the suspected contaminants of concern for the Building 886 Complex

4.4.1.3 Surveying Approach

Equipment, floors, walls, and other materials will be surveyed to determine levels and types of contamination This information will be used to determine if sampling activities are required The current Radiological Operations Instructions and the Radiological Engineering organization should be contacted to develop the sampling an analysis plan

The types of surveys to be conducted include direct alpha and beta/gamma radiation at approximately 1 centimeter (cm) from the surface, removable alpha and beta/gamma contamination, external gamma radiation levels at a distance of 1 meter (m) from the surface, and low energy gamma and x-ray sources at least 12 inches from the source

- Direct Readings - Equipment and materials will be scanned with direct reading instruments to measure alpha, beta, and gamma contamination The guidelines discussed in EMRG, 3 1 "Direct Measurement Technique" should be followed

- Smear Survey - The amount of removable contamination per 100 cm^2 of area will be collected by wiping the equipment with a dry filter or soft absorbent paper The amount of radioactivity will be measured from the smear by appropriate radionuclide counting instruments. When objects have a surface area of less than 100 cm^2, the activity per unit area should be based on the actual area and the entire surface should be wiped for analysis The guidelines discussed in EMRG, 3 1 "Smear Technique" should be followed

- External Gamma - One external gamma radiation level will be measured at a distance of 1 meter (m) from each survey area

- Low Energy Gamma and X-ray Radiation - Each survey block will be scanned to determine the highest reading within the survey block

When contamination levels are measured above the limits in Section 3 1, "Clean-up Standards," of this document, the following approach will be followed

- Direct Reading - If a direct reading greater that the specified limits is detected, a more detailed scan survey will be performed on the spot or area to define the extent and levels of contamination This will be documented on a contamination survey form and marked on the item itself using the appropriate radiological label or tag Radiological Engineering will be notified and will assist in isotopic analysis of any surveys determined to be above the limits

- Smear Survey - If a smear survey detects contamination greater than the specified removable limits, the survey will be recounted three additional times and the average of the four counts will be computed and recorded Smears which are determined to be above the removable limits will be placed in an envelope and recounted after approximately 30 minutes If the smear sample delayed count is still above the limits and shows no indication of decay, then the sample will be re-bagged and Radiological Operations Supervision and Radiological Engineering will be notified Follow-up smear surveys of the area that the sample originated from will be performed as directed by Radiological Operations Supervision and Radiological Engineering Radiological Engineering will assist in isotopic analysis of any samples determined to be above the limits

- Low Energy Radiation - Readings in excess of background plus two times the squareroot of background should be reported to the Project Engineer and Radiological Operations

Contaminated samples exceeding the limits in Section 3 1 of the SMP will be isotopically analyzed by Radiological Engineering to validate the radionuclides present The isotopic analysis may be accomplished using Radiological Engineering Procedure (REP) 1401, "Operation of the Portable Gamma Spectroscopy System", or through other analytical methods such as laboratory alpha spectroscopy

4.4.1.4 Sample Locations

The final locations for sampling should be developed and/or approved by Radiological Engineering Using process knowledge, building history, and existing radiological surveys, areas where information is not available and deemed necessary were determined A nonstatistical approach was decided upon for completing the information The results of this finding will be used to determine if more sampling is necessary and the approach to be taken The recommended locations of sampling room surfaces and equipment are identified below

Building 886 - Room 101

Four surveys will be taken in the following locations

- One survey will be taken on top of the glove box exhaust duct surface
- Two surveys will be taken on the walls One survey will be taken on the east wall 2 feet above the floor and the other will be taken on the south wall 2 feet above the floor
- One survey will be taken on the surface of the table within the assembly hood

Building 886 - Room 102

Five surveys will be taken in the following locations

- One survey will be taken on top of the exhaust duct surface along the north side of the room
- One survey will be taken on top of the exhaust duct surface along the west side of the room
- Two surveys will be taken on the walls One survey will be taken on the east wall two feet above the floor and the other will be taken on the south wall two feet above the floor
- One survey will be taken on the surface of the table within the assembly hood

Building 886 - Room 103

Five surveys will be taken in the following locations

- One survey will be taken on top of the glove box exhaust duct surface along the north side of the room
- One survey will be taken on top of the glove box exhaust duct surface along the west side of the room

- Two surveys will be taken on the walls One surveys will be taken on the north wall 2 feet above the floor and the other will be taken on the south wall 2 feet above the floor

- One survey will be taken on the surface of the table within the downdraft room

Building 886 - Room 108

Five surveys will be taken in the following locations

- One survey will be taken on top of the exhaust duct surface

- Two surveys will be taken on the walls One survey will be taken on the east wall two feet above the floor and the other will be taken on the west wall 2 feet above the floor

- One survey will be taken on the floor surface extending 2 feet into Room 108 from Room 104 centered mid-way on the door opening

4) One survey will be taken on the floor surface extending 2 feet into Room 108 from Room 101 centered mid-way on the door opening

Building 886 - Cold Area

Surveys will not be taken in the cold area of Building 886 However, there is possible contamination under the vinyl tiles in Rooms 104, 107, 110, 111, 112, 114, and 126 The floors of these areas may require surveying after the vinyl tiles have been removed

Building 886/875 Tunnel

Four surveys will be taken on the two exhaust ducts in the following locations

- One survey will be taken on top of each of the two exhaust duct surfaces 5 feet into the tunnel from Building 886

- One survey will be taken on top of each of the two exhaust duct surfaces 5 feet into the tunnel from Building 875

Building 828

Six surveys will be taken in the following locations

- Two surveys will be taken on the walls One survey will be taken on the east wall 2 feet above the floor and the other will be taken on the west wall 2 feet above the floor

- One survey will be taken on the floor surface below tank 449

- One survey will be taken on the floor surface below tank 440

- One survey will be taken on the outside of Tank 449 in the vicinity of the piping

- One survey will be taken on the outside of Tank 440 in the vicinity of the piping

Building 875

Six surveys will be taken in the following locations

- Three surveys will be taken on the inside walls of filter plenums 501 and 502

Building 880

Nine surveys will be taken in the following locations

- Three surveys will be taken on the walls One survey will be taken on the east wall 2 feet above the floor, one will be taken on the south wall 2 feet from the floor, and one will be taken on the west wall 2 feet above the floor

- Six surveys will be taken randomly on the surface of equipment located within the building

Note Additional surveys may be necessary on the floor as equipment and other materials are moved out of the building

4.4.1.5 Data Needs

Data needs for this project include collection of sufficient information of adequate quality to meet the specific objectives of this project As described above, this includes characterization of the surfaces for radionuclides The quality requirements for the removal action are described in the data quality objectives section of the Quality Assurance Plan

4.4.1.6 Data Acquisition Documentation

It is necessary to record detailed information so that data acquisition can be easily reconstructed At a minimum, the field log notebook, field instrument data, electronically collected data records, and sample collection forms should include the following information for each data or sample point

- Field sample identification,
- Date and time of sampling/measurement,
- Sample measurement location,
- Sample measurement description,
- Sample collector,
- Parameters or analysis being reported,
- Sample depth or distance (if appropriate),
- Approximate levels, in appropriate units, of contaminants as reported by field instrumentation, and
- Chain-of-custody information

Survey results will be accurately recorded in accordance with ROI Procedures 1.03, 1 1, 1 2, 3 1, 3 02, and 7 4 Specially prepared radiological survey and property release forms approved by Radiological Engineering will be used All approved survey results will be placed in a designated location for management reviews and ongoing evaluation

4.4.1.7 Storage and Handling of Data

Survey results will be documented and submitted on a daily basis to Radiological Operations Supervision for approval in accordance with the above procedures The survey records will be periodically copied by Radiological Operations and a reviewed and approved copy will be retained as part of the Building 886 Complex operational records Copies of all related radiological documentation, including records of isotopic analysis and records of free released property, will also be retained in this file A copy of this file shall be also be maintained by the Environmental Restoration Records Center

4.4.1.8 Modifications to the Sampling and Analysis Plan

Due to unforeseen site conditions or changes in the objectives, changes to the SAP may be necessary Modifications to the required activity may be required and must be approved by the Project Manager All changes must be recorded in the logbook along with circumstances requiring the change

4.4.1.9 Quality Assurance/Quality Control

The specific Quality Assurance/Quality Control requirements for this SAP are defined and described in the Rocky Flats "Quality Assurance/Quality Control Plan" (QAP) This QAP will be followed for all QA/QC activities for this project

4.4.2 Quality Assurance/Quality Control

This section consists of the Quality Assurance Plan for the Building 886 Complex SAP The purpose of the QAP is to identify quality assurance (QA) requirements and specific measures for implementing these requirements, that are applicable to the sampling of potential hazardous material locations

4.4.2.1 Scope

This QAP addresses all quality-affecting activities described in the SAP to be performed by EG&G Rocky Flats (EG&G) Other organizations (subcontractors) will implement similar QA programs under the auspices of the DOE RFO's direction

The major actions within this SAP, to which this QAP applies, include

- Defining data quality objectives,
- Gathering of data,
- Sample collection,
- Sample handling and shipping, and
- Data analysis

4.4.2.2 Basis for Technical Activity

The work outlined in the Building 886 Complex SAP is to identify the specific analytical needs, sampling requirements, data handling requirements, and associated QA/QC requirements for the completion of the hazardous material sampling This includes the completion of generating adequate and defensible information to characterize hazardous material contamination in the Building 886 Complex The work specifically supports the verification, confirmation, and characterization of hazardous material contamination in the building

4.4.2.3 Organization and Responsibilities

The EG&G Environmental Restoration Management (ERM) D&D department is responsible for the overall coordination of the Building 886 Complex SAP project Other organizations such as the internal sampling management group and the subcontracted external laboratory will be involved with this work Responsibilities of other organizations will be assigned by the D&D department

The organization has been structured such that quality is the responsibility of those who have been assigned the responsibility of performing the work Conformance to established requirements will be verified by individuals and groups not directly responsible for performing the work The EG&G ERM organization, specifically the D&D department, is responsible for management and coordination of the EG&G resources dedicated to the project

4.4.2.4 Training

All EG&G and subcontractor personnel who perform quality-affecting activities on this project will have qualification records that document that they are qualified to perform their assigned tasks The EG&G Project Manager will identify any Site area-specific and/or specialized training requirements that are applicable to project personnel

EG&G and subcontractor personnel will also be qualified to perform the tasks they have been assigned Personnel qualifications must be documented, with documentation of qualifications verified by the EG&G Project Manager in accordance with ERM Administrative Procedures 3-21000-ADM-02 02, *Personnel Qualifications*

4.4.2.5 Quality Assurance Reports

A QA summary report will be prepared at the conclusion of the project activities by the EG&G QA Program Manager This report will include a summary of field operation and sampling oversight inspections, laboratory assessments, surveillance, and a report on data verification/validation results

4.4.2.6 Design Control

The Building 886 Complex SAP describes the general design considerations for implementing work activities, outlining sampling and analysis techniques, describing analytical requirements, and summarizing data management processes Therefore, this SAP is considered to be the environmental investigation control plan for the Building 886 Complex sampling

4.4.2.7 Standard Operating Procedures

Field and administrative Standard Operating Procedures (SOPs) are listed in Table 4-1 When deviations from the SOPs occur, or when new or nonstandard procedures are implemented, an activity logbook will be used as the primary means of documenting quality-affecting information (Analytical method changes are requested from the program chemists and documented in the case narratives)

A complete listing of operating procedures will be assembled during the Design stage Any new procedures will also be written and approved during the design stage

4.4.2.8 Data Quality Objectives

Data quality objectives (DQOs) quantitatively and qualitatively describe the uncertainty that decision makers are willing to accept in results derived from environmental data Because this is a characterization sampling investigation and does not pertain to regulatory closure criteria, DQOs and quality control sample identification requirements are not required for this SAP

4.4.2.9 Quality Assurance Monitoring

To assure the overall quality of the sampling and analysis activities associated with the SAP for the Building 886 Complex Sampling Plan, field oversite inspections will be conducted during sampling and analysis activities Field oversite inspections to be conducted by the ERM Environmental Quality Support department include

- Field inspections,
- Various intervals of audits and surveillance, and
- A minimum of one surveillance per each field activity

4.4.2.10 Control of Purchased Items and Services

Any items or materials that are purchased for use during the sampling, analysis, and other SAP activities that have the ability to affect the quality of the data should be inspected upon receipt

4.4.2.11 Inspection and Assessment

Quality-affecting activities are subject to inspection and assessments These assessments will be performed formally in accordance with EG&G procedures (e g , Procedures 3-21000-ADM-10 01 and/or -ADM-18 02), or informally as requested by line management The work place and working records will be accessible during normal working hours for verification or audit by EG&G or their representatives during the performance of this project

Any nonconformances identified during formal assessments will be documented with Non-Conformance Reports in accordance with EM Administrative Procedures 3-21000-ADM-15 01, Control of Nonconforming Items and Activities Independent audits of the project may be conducted by the ERM EQS organization in accordance with QA procedures

4.4.2.12 Survey Equipment and Technique

The survey techniques and counting methods described in Radiological Operating Instructions (ROI) 3 1, 6 01, 6 02, 6 3, 6 04, 6 5, and 6 6, should be followed to perform the survey

Surfaces will be surveyed using instruments and techniques appropriate for detecting the limits as stated in Section 3 1, "Clean-up Standards " The following instruments or equivalent instruments may be used to conduct the survey per ROI, 3 02 and 6 6

- Total Fixed plus Removable Alpha Contamination - Bicron Frisk-Tech with A-100 detector,

TABLE 4-1 FIELD AND ADMINISTRATIVE STANDARD OPERATING PROCEDURES

EG&G IDENTIFICATION NUMBER	PROCEDURE TITLE
• 5-21000-OPS-FO 3	General Equipment Decontamination
• 5-21000-OPS-FO 6	Handling of Personal Protective Equipment
• 5-21000-OPS-FO 7	Handling of Decontaminated Water and Wastewater
• 5-21000-OPS-FO 10	Receiving, Labeling, and Handling of Environmental Materials Containers
• 5-21000-OPS-FO 11	Field Communications
• 5-21000-OPS-FO 12	Decontamination Facility Operations
• 5-21000-OPS-FO 18	Environmental Sample Radioactivity Content Screening
• 2-G32-ER-ADM-08 02	Evaluation of ERM Data for Useability in Final Reports
• 5-21000-OPS-FO 16	Field Radiological Measurements
• 4-B11-ER-OPS-FO 25	Shipping Limited Quantities of Radioactive Materials in Samples
• 5-21000-OPS-FO 14	Field Data Management
• 3-21000-ADM-5 01	Document Control
• 1-50000-ADM-12 01	Control of Measuring and Test Equipment
• 5-21000-OPS-FO 02	Field Document Control
• 3-21000-ADM-17 01	Records Management
• 3-21000-ADM-18 03	Readiness Reviews

- Total Fixed plus Removable Beta/Gamma Contamination - Ludlum 31 with pancake probe, or Bicron Frisk-Tech with B-50 detector,
- Removable Alpha Contamination - Eberline SAC-4,
- Removable Beta/Gamma Contamination - Eberline BC-4,
- Gamma Exposure Rate - Victoreen 450G, and
- Low Level Gamma and X-ray Radiation - Bicron FIDLER

Equivalent instruments must have an equal or greater sensitivity for the type of radiation being measured to ensure the required radiation detection sensitivity and measurement accuracy The Health Physics Instrumentation Committee will determine if a given instrument is equivalent

4.4.2.13 Control of Survey Equipment

Instrument checks and performance tests will be performed before each day of instrument use and after replacement of batteries Visual inspections, performance tests, and operational checks will be performed as described in ROI Procedures 3 1, 6 01, 6 02, 6 3, 6 04, 6 5, and 6 6

4.4.3 Health and Safety Plan

For the sampling and analysis that is to be done within the 886 complex, the Task Specific Health and Safety Plan should cover any hazards that the workers will encounter (see Attachment C) To ensure that additional safety analysis is not required the Rocky Flats Safety Screen Evaluation Procedure, #1-C10-NSM-04 03, shall be implemented This procedure starts with filling out a Prescreen evaluation form One of three forms can be used, the titles of which are 1) Prescreen for Construction/Maintenance, 2) Prescreen for Procedures, and 3) Prescreen for Other Activities The third form shall be filled out for the sampling and analysis activities After the form is filled out it shall be approved by EG&G personnel (Facility Safety Engineering) to ensure proper compliance with the procedure If there are no 'Yes' answers on the form and the form is approved then no further action is required If there are 'Yes' answers then the Safety Evaluation Screen form is completed and sent for approval, again to EG&G Facility Safety Engineering If further action is needed after this step the Rocky Flats Unreviewed Safety Question Determination (USQD) Process (#1-91000-NSM-04 05) shall be initiated The outcome of the USQD process could led to the development of, at worst case, a Safety Analysis Report (SAR) or SAR supplement that is consistent with DOE Order 5480 23 and/or 10 CFR 830 110 It is unlikely that the USQD process will need to be implemented for the sampling and analysis activities, however, it could be for the D&D activities

5.0 REFERENCES

AEC, 1974, Termination of Operating Licenses for Nuclear Reactors, Regulatory Guide 1 86, U S Atomic Energy Commission, Washington, D C

DOE, 1990, Radiation Protection of the Public and the Environment, DOE Order 5400 5, U S Department of Energy, Washington, D C

ES, 1994, Rocky Flats Plant 886 Complex Decontamination Methods Study, Engineering-Science, Denver, CO

ES, 1994a, Mixed Residue Tank Systems Decontamination Methods Study, Engineering-Science, Denver, CO

ATTACHMENT A
REGULATORY REQUIREMENTS IDENTIFICATION CHECKLIST FOR THE 886 COMPLEX

**D&D Regulatory Requirements Identification Checklist for the 886 Complex
Resource Conservation and Recovery Act (RCRA)**

		Yes	No
1	**Does the action involve closing a RCRA permitted or interim status TSD (i.e., container storage area, tank storage/treatment) facility?**	☐	☒

If yes, comply with **6 CCR 1007-3, 264/265 Subpart G.**
[**NOTE:** If interim status follow 265 provisions, If the unit was permitted, follow 264 provisions]

No RCRA permitted or interim status TSD facilities or areas have been identified in the Building 886 Complex However, several product storage tanks do exist in the Building 886 Complex Based on a review of the Site RCRA Part A and Part B permit applications, RCRA closure requirements, including the submission of closure plans to CDPHE for approval, do not apply Hence, at this point, it is uncertain as to the usage of these tanks and whether or not the tanks were used to store a regulated hazardous waste

If it is determined that the tanks were used for hazardous waste management activities, the Part A should be amended to identify these tanks as hazardous waste management units

		Yes	No
2	**Does the action involve RCRA closure of a hazardous waste container storage area?**	☐	☒

If yes, comply with **6 CCR 1007-3, 264.178 or 265.178.**

Currently, it is assumed that there are no identified waste container storage areas in the Building 886 Complex that will have to be closed under the RCRA provisions Building 880 is currently utilized for storage and is believed to contain some hazardous materials There are numerous drums located on the pad outside the building Several drums are marked to contain borate and others remained unmarked

D&D Regulatory Requirements Identification Checklist for the 886 Complex
Resource Conservation and Recovery Act (RCRA)

		Yes	No
3	**Does the action involve RCRA closure of a tank system?**	☐	☒

If yes, comply with **6 CCR 1007-3, 264.197 or 265.197.**

If it is determined that the tanks located in the Building 886 complex were used for hazardous waste management activities, the Part A should be amended to identify these tanks as hazardous waste management units Furthermore, the Building 828 (concrete process pit) has two 1,000-liter storage tanks, one for storing uranium and the other for storing process waste The material in the tanks must be identified to ensure that the proper remedial and D&D activities will be conducted

		Yes	No
4	**Will equipment, structures, and/or soils contaminated with hazardous waste result as waste streams via closure activities?**	☒	☐

If yes, comply with **6 CCR 1007-3, 265.114.**

During the D&D activities, equipment and structures will be characterized and decontaminated for reuse and/or dismantled for disposal It is assumed that some secondary waste streams will be generated in the form of equipment These secondary waste streams may result from decontamination fluids, process waste which remains in the contaminated equipment and structures Soils in the immediate vicinity of the facilities undergoing D&D may be contaminated from past activities conducted within or around the facility in question Soils may not be addressed as part of the subproject D&D activities but addressed as part of another Operable Unit (OU) D&D activities In particular, the OU remediation project will involve soil contamination remediation

It is assumed that solvents of various types have been stored in the Building 886 Complex, but the actual storage locations are not defined If solvents and/or waste materials are found to be hazardous, they will be handled accordingly

		Yes	No
5	**Will a hazardous waste determination be required for the generated waste?**	☒	☐

If yes, comply with **6 CCR 1007-3, 261 and 262.11, respectively.**

It is assumed that solvents of various types have been stored in the Building 886 Complex, but the actual storage locations are not defined If solvents and/or waste materials are found to be hazardous, they will be handled accordingly

As required by 6 CCR 1007-3, 262 11, a generator must determine whether his solid waste meets the definitions of a hazardous waste If any of the solid waste are determined to be hazardous waste, the appropriate management procedures as specified in the cited regulation will be implemented for waste determination

		Yes	No
6	**Will any hazardous waste with concentrations in excess of the land disposal restrictions (LDRs) be identified?**	☐	☒

If yes, comply with **6 CCR 1007-3, 268 Subparts A to D**
[Note If generated waste in excess of LDR standards, the waste cannot be placed in a Land Disposal Unit Treatment, storage to facilitate treatment, recovery or disposal, placement in a Corrective Action Management Unit (CAMU), or LDR variance is required.]

If any resultant waste materials from D&D activities should be determined to be a "restricted hazardous waste" (i e , exceeds an LDR standard), then prior to disposal, the waste material will be treated or a variance will be obtained prior to ultimate disposal

D&D Regulatory Requirements Identification Checklist for the 886 Complex
Resource Conservation and Recovery Act (RCRA)

		Yes	No
6A	**Is waste determined to be hazardous waste debris?**	☐	☐

If yes, comply with **6 CCR 1007-3, 268.45,**
and employ appropriate treatment technology as listed in Table 1 of 268 45

To Be Determined (TBD).

		Yes	No
6B	**Following D&D activities, will any resulting waste material be identified as a waste residue and/or decontamination wastewater?**	☒	☐

If yes, comply with **6 CCR 1007-3, 268.41, 268.42 and 268.43** for appropriate hazardous waste code classifications

During the D&D activities, equipment and structures will be characterized, and decontaminated for reuse and/or dismantled for disposal It is assumed that some secondary waste streams will be generated in the form of equipment These secondary waste streams may result from decontamination fluids, process waste which remains in the contaminated equipment and structures Soils in the immediate vicinity of the facilities undergoing D&D may be contaminated from past activities conducted within or around the facility in question Soils may not be addressed as part of the subproject D&D activities but addressed as part of another Operable Unit (OU) D&D activities In particular, the OU 9 remediation project will involve soil contamination remediation

It is assumed that solvents of various types have been stored in the Building 886 complex, but the actual storage locations are not definitive If solvents and/or waste materials are found to be hazardous, they will be handled accordingly

		Yes	No
6C	**Can restricted hazardous waste be treated to meet LDRs?**	☐	☐

D&D Regulatory Requirements Identification Checklist for the 886 Complex
Resource Conservation and Recovery Act (RCRA)

		Yes	No
	If no, place in permitted storage and evaluate options and refer to Question 6B (i e , Treatability variance, development of treatment technologies, placement in CAMU, establish Temporary Unit, and/or petition for delisting of the waste material If yes, reference Questions 6A and 6B and address accordingly **(TBD).**		
7	**Will any hazardous waste with concentrations in excess of LDRs (restricted waste) require temporary storage onsite until treatment technologies are developed or a final disposal site is determined?** If yes, comply with **6 CCR 1007-3, 268.50(c).** **(TBD).**	☐	☐
8	**Will additional treatment and/or storage facilities need to be operated to accommodate waste streams generated from D&D and/or closure activities?** If yes, comply with **6 CCR 1007-3, 264/265 Subpart B, C and D.** **(TBD).**	☐	☐
9	**Prior to initiating D&D activities, will a closure plan need to be prepared and submitted to CDPHE?** If yes, comply with **6 CCR 1007-3, 265.112.** Based on a review of the Site RCRA Part A and Part B permit applications, RCRA closure requirements, including the submission of closure plans to CDPHE for approval, do not apply	☐	☒

		Yes	No
10	**Following RCRA closure, will any documentation to verify that closure has been completed in accordance with approved closure specifications/closure plan need to be prepared?**	☐	☐

If yes, comply with **6 CCR 1007-3, 265.115 and 265.116**

(TBD)

No RCRA permitted or interim status TSD facilities or areas have been identified in the Building 886 complex However, several product storage tanks do exist in the Building 886 complex Based on a review of the Site RCRA Part A and Part B permit applications, RCRA closure requirements, including the submission of closure plans to CDPHE for approval, do not apply Hence, at this point in time, it is uncertain as to the usage of these tanks and whether or not the tanks were used to store a regulated hazardous waste

If it is determined that the tanks were used for hazardous waste management activities, the Part A should be amended to identify these tanks as hazardous waste management units

11	**Will the D&D and/or closure activities require offsite transport of the waste to a TSD facility?**	☐	☐

If yes, comply with **49 CFR 172, Parts B to F, 49 CFR 173 Parts B to O and 49 CFR 177, and 6 CCR 1007-3, 262 Subpart B and C; 6 CCR 1007-3, 262.20, 262.30, 262.31, 262.32, 262.33, and 262.54.**

(TBD).

D&D Regulatory Requirements Identification Checklist
Asbestos Containing Material

1. **Does the facility contain any suspect asbestos-containing material?** ☒ ☐

If yes, comply with **40 CFR 763.85.**

Building 886 houses Room 112 (the control room for Room 101) and various other rooms, all of which are considered to be located in the "Cold Area " The cold area is believed to be clean with the exception of the ACM in the ceiling and floor tiles, and insulation on steam and hot water piping and ventilation ducts It should be assumed that there is ACM throughout various portions of the entire Building 886 Complex (due to the time of construction [pre-1970] of the facility/facilities)

If transite has been used for the exterior/interior walls of any of the Building 886 Complex facilities during construction, it should be assessed with the ACM currently identified

2 **Will sampling and laboratory analysis be conducted to determine if ACM is present?** ☐ ☐

If yes, comply with **40 CFR 763.86.**

(TBD). Additional ACM surveys may need to be conducted for identification and classification of any ACM which may not have been identified in the past. If ACM surveys are conducted, the Industrial Hygiene Division will accept responsibility.

3 **Has ACM been identified as a result of the bulk sampling activities and laboratory analysis?** ☐ ☐

If yes, comply with **40 CFR 763.88, 763.91 and 763.93.**

(TBD). Any additional bulk sampling which may need to be conducted will be implemented during the scoping phase and prior to subproject D&D activities The results will be incorporated with those obtained previously and presented to the ACM abatement contractor and/or DOE work force so that abatement strategies can be designed

D&D Regulatory Requirements Identification Checklist
Asbestos Containing Material

4	**Is the ACM radiologically and/or chemically contaminated?**	☒	☐

If yes, comply with **applicable provisions of 40 CFR 763.90, and RFP Standard Operating Procedures (SOPs)** for handling radioactively and/or chemically contaminated ACM [Note Also, evaluate RCRA and NRC regulatory checklist to determine additional handling requirements]

ACM which is identified to exist in radiologically contaminated areas or suspect radiologically controlled areas throughout the Building 886 Complex will be assumed to be radiologically contaminated Future ACM surveys (if required), must be conducted to determine if past facility processes caused additional radiological and/or chemical contamination of the ACM throughout other portions of the Building 886 Complex

5	**Will the response action require abatement of the ACM?**	☒	☐

If yes, comply with **40 CFR 61, Subpart M; Colorado Air Quality Control Commission (CAQCC) Regulation No. 8, 40 CFR 763.90, Occupational Safety and Health Administration (OSHA) 29 CFR 1956 and 1910, and applicable RFP SOPs for managing ACM.**

All ACM requiring abatement will be removed during the first phase of the subproject D&D activities Asbestos abatement will first be conducted on Building 880, then 828, 886 and finally 875 Asbestos abatement will precede other decontamination activity to prevent contamination of asbestos with low level radioactive or hazardous components that may become airborne during decontamination of the process equipment, utilities, or building structures The abatement will be conducted in a controlled environment (within enclosures under negative pressure) to prevent worker/personnel and public exposure, and fiber release to the environment Management activities for the abated ACM have not yet been determined The abated ACM will most likely result in temporary onsite storage of the ACM waste material until final disposition is determined

D&D Regulatory Requirements Identification Checklist
Polychlorinated Biphenyls (PCBs)

		Yes	No
1	**Are polychlorinated biphenyls (PCBs) expected to be a waste stream generated as a result of D&D and/or closure activities?**	☐	☒

If yes, comply with **40 CFR 761.**

No PCB-filled transformers have been identified in the 886 Complex Also, no PCB releases are noted in the *Hazardous Release Report* for the 886 Complex

		Yes	No
2	**Are PCBs in liquid form with concentrations less than or equal to 50 ppm (parts per million)?**	☐	☒

If yes, not regulated as PCB waste

No PCB-filled transformers have been identified in the 886 Complex Also, no PCB releases are noted in the *Hazardous Release Report* for the 886 Complex

		Yes	No
3	**Are PCBs in liquid form with concentrations greater than or equal to 50 ppm and less than 500 ppm?**	☐	☒

If yes, comply with **40 CFR 761.60(e).**
Reference Attachment B, Table 1.

No PCB-filled transformers have been identified in the 886 Complex Also, no PCB releases are noted in the *Hazardous Release Report* for the 886 Complex

		Yes	No
4	**Are PCBs in liquid form with concentrations greater than or equal to 500 ppm?**	☐	☒

If yes, comply with **40 CFR 761.70.**
Reference Attachment B, Table 1.

D&D Regulatory Requirements Identification Checklist
Polychlorinated Biphenyls (PCBs)

		Yes	No

No PCB-filled transformers have been identified in the 886 Complex Also, no PCB releases are noted in the *Hazardous Release Report* for the 886 Complex

		Yes	No
5	**Are PCBs in a non-liquid state with concentrations greater than or equal to 50 ppm?**	☐	☒

If yes, comply with **40 CFR 761.60(a)(4)**
Reference Attachment B, Table 1.

		Yes	No
6	**Are soils or sludge at the site contaminated with PCBs at concentrations greater than or equal to 50 ppm?**	☐	☒

If yes, comply with **40 CFR 761.60(a)(4)**
Reference Attachment B, Table 1.

		Yes	No
7	**Do PCB-contaminated electrical transformers and capacitors which contain greater than 500 ppm PCBs need to be addressed?**	☐	☒

If yes, comply with **40 CFR 761.60(b)(1) and 761.60(b)(4).**
Reference Attachment B, Table 1.

		Yes	No
8	**Do PCB-contaminated electrical equipment (transformers and other electrical equipment other than capacitors which contain PCBs between 50 ppm and 500 ppm) need to be addressed?**	☐	☒

If yes, comply with **40 CFR 761.60(b)(4).**
Reference Attachment B, Table 1.

D&D Regulatory Requirements Identification Checklist
Polychlorinated Biphenyls (PCBs)

		Yes	No
9	**Do PCB-contaminated articles and/or containers with PCB concentrations greater than 500 ppm need to be addressed?**	☐	☒

If yes, comply with **761.60(b)(5).**
Reference Attachment B, Table 1.

		Yes	No
10	**Will PCB waste material with concentrations greater than or equal to 50 ppm need to be stored onsite?**	☐	☒

If yes, comply with **40 CFR 761.65.**

		Yes	No
11.	**Are the PCBs mixed with a listed hazardous waste or does the PCB waste exhibit a hazardous waste characteristic?**	☐	☒

If yes, comply with **40 CFR 761.60, 761.70, 268, 268.42(a)(1), 268.42(b)** In addition to 40 CFR 761, waste treatment must also comply with 40 CFR 268 Also comply with other hazardous waste management requirements Complete hazardous waste modular of this checklist

D&D Regulatory Requirements Identification Checklist
National Environmental Policy Act

		Yes	No
1	**Will requirements of NEPA apply to the D&D of the facility/facilities?**	☒	☐

If yes, comply with **10 CFR 1021 and 40 CFR 1500-1508.** Potential environmental impacts associated with the proposed remedial action alternatives considered need to be identified per **10 CFR 1021.200 and DOE Order 5440.1E, Section 5.** The environmental checklist needs to be completed (see attachment D), and also an Actions Description Memorandum (ADM) The completed NEPA checklist and ADM is submitted to the DOE-Rocky Flats Office for a determination of the level of NEPA documentation required (i e , Category Exclusion, Environmental Assessment, or Environmental Impact Statement)

[**Note:** DOE Policy is that NEPA documentation is not required for response actions conducted pursuant to CERCLA

DOE representatives are assessing the Building 886 Complex for categorical exclusion from further NEPA documentation Additional NEPA concerns will be determined by DOE and provided in the near future

		Yes	No
2	**Will the proposed action be categorically excluded from further NEPA documentation under the NEPA process?**	☐	☐

If yes, comply with **10 CFR 1021.400, Subpart A through D.**

(TBD).

		Yes	No
3	**Will a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) be published in the Federal Register to begin the public scoping process?**	☐	☐

If yes, comply with **10 CFR 1021.311(a)(b)(c).**

		Yes	No
	(TBD).		
4	**Will preparation of an EIS Implementation Plan be required to aid in the preparation of an EIS?** If yes, comply with **1021.312.** **(TBD).**	☐	☐
5	**Will an Environmental Impact Statement (EIS) have to be prepared?** If yes, comply with **10 CFR 1021 Subpart D, Appendix D and 40 CFR 1502.1.** **(TBD).**	☐	☐
6	**Will an Environmental Assessment (EA) need to be prepared?** If yes, comply with **10 CFR 1021.321 and 1501.4(b).** **(TBD).**	☐	☐
7	**Will a Finding Of No Significant Impact (FONSI) need to be prepared?** If yes, comply with **10 CFR 1021.322.** **(TBD).**	☐	☐

D&D Regulatory Requirements Identification Checklist
National Environmental Policy Act

		Yes	No
8	**Has the FONSI been made available to the public for review and comment?**	☐	☐

If yes, comply with **10 CFR 1021.322(c) and 40 CFR 1501.4(e)(1) and 1506.6.**

(TBD).

		Yes	No
8A	**Has supplemental NEPA documentation been prepared for the D&D of the facility/facilities?**	☐	☐

If yes, comply with **10 CFR 1021.314 and 1502.9(c)(1)**

(TBD).

		Yes	No
9	**Has the NEPA Record of Decision been prepared?**	☐	☐

If yes, comply with **10 CFR 1021.315 and 40 CFR 1505.2.**

(TBD).

		Yes	No
10	**Has the Mitigation Action Plan been generated?**	☐	☐

If yes, comply with **10 CFR 1021.331**

(TBD).

D&D Regulatory Requirements Identification Checklist
Nuclear Regulatory Commission (NRC)

NRC regulations may not need to be identified initially due to their lack of applicability, because DOE imposes its own standards of control for operations involving radioactive materials The requirements that may be identified as ARARs include the radiation standards for protection of human health (10 CFR 20), radionuclide limits for effluent discharges (10 CFR 20), and other license termination requirements (i e , D&D (10 CFR 50))

D&D Regulatory Requirements Identification Checklist
Department of Energy Orders

		Yes	No
1	**Are radiation protection standards, limits and program requirements for protecting individuals from ionizing radiation from the conduct of D&D activities applicable?**	☒	☐

If yes, comply with **10 CFR 835, follow applicable Site radiological program and established ALARA requirements.**

Radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation during D&D activities have been established for the Site However, the radiological controls to be implemented during the D&D activities have not yet been determined These controls will be task-specific depending on the D&D methods chosen for each subproject

		Yes	No
2	**Does the Site radiation protection program adequately address all operational tasks to be conducted during D&D Subproject activities?**	☒	☐

If yes, comply with **Site radiation protection program.**

If no, a radiation protection program plan should be prepared in accordance with 10 CFR 835.

		Yes	No
3	**Have requirements for "as low as reasonably achievable" (ALARA) air, area, and individual radiation monitoring, including, but not limited to: access controls, record keeping, reporting, training, engineering design and radiation control, emergencies and accidents been identified for the subproject activities?**	☐	☒

		Yes	No
	If yes, comply with **the Site ALARA program.** If no, **an ALARA program should be established in accordance with 10 CFR 835, DOE Order 5480.11 and DOE Order 5400.5.**		
4	**Will materials and/or equipment be free-released from subproject-designated radiologically controlled areas?**	☒	☐
	If yes, comply with **10 CFR 835, DOE Order 5400.5 and NRC Guidance 1.86.**		

The free-release of waste material(s), residues, structures, equipment, and other property will adhere to radiological protection requirements and guidelines described in DOE Order 5400 5 Allowable levels of residual surface contamination which can remain on the components and yet be released for reuse without further radiological restrictions are defined in DOE Order 5400 5 A reasonable effort will be made to eliminate residual contamination and to achieve the acceptable surface contamination levels Written procedures and testing protocol may need to be developed to allow the free-release of specific waste streams

Upon determination that free-release is appropriate, office furniture and fixtures in Building 886 should be removed and reused elsewhere at Site, or warehoused until a beneficial use (onsite or offsite) is found It may be possible to reuse "generic" process equipment (pumps, air compressors, blowers, storage tanks) that can be free-released It is likely that some process equipment and structural materials from Building 886 will not be decontaminated for free-release This equipment and material will be disposed of as hazardous or mixed waste

D&D Regulatory Requirements Identification Checklist
Department of Energy Orders

		Yes	No
5	**Has it been determined what environmental protection program requirements, authorities and responsibilities (for ensuring that D&D activities will comply with federal, state, and local environmental protection laws and regulations) will affect the D&D Subproject activities?**	☐	☒

If yes, comply with **DOE Order 5400.1.**

If no, then the environmental protection requirements and applicable federal, state, and local environmental protection laws must be established before the D&D Subproject activities commence

		Yes	No
6	**Are DOE contractors going to perform the necessary D&D Subproject activities?**	☐	☐

If yes, comply with **DOE Order 5400.5.**

(TBD). D&D Subproject activities to be conducted by contractors other than the DOE contractors will be determined during D&D Subproject planning phase

		Yes	No
7	**Have applicable Environmental, Safety, and Health Programs to which the DOE contractors must adhere during the D&D Subproject activities been prepared or established?**	☒	☐

If yes, comply with **DOE Order 5480.1B.**

If no, these requirements must be addressed prior to the commencement of the D&D Subproject activities The DOE contractors must be properly prepared prior to initiation of D&D Subproject activities

D&D Regulatory Requirements Identification Checklist
Department of Energy Orders

		Yes	No
8	**Have waste management and minimization strategies for radioactive and mixed waste material handling techniques been established for waste material to be generated from contaminated facilities identified as components of the subproject?**	☐	☒

If yes, comply with **DOE Order 5820.2A.**

If no, the preparation of waste management and minimization plans, along with the material handling strategies should be under development concurrently with the D&D Subproject planning activities

An inventory of the waste types (i e hazardous debris, asbestos containing material, low level radioactive waste, decontamination fluids) that are expected to be generated as a result of D&D activities will be prepared A waste management plan will be prepared which will address waste streams expected to be generated The waste management plan will identify characterization, segregation, waste handling techniques, treatment and decontamination methods, and final disposition requirements

DOE Order 5820 2A establishes guidelines for managing radioactive and mixed waste, and contaminated facilities This DOE Order provides requirements for the management of high-level, transuranic, low level and byproduct waste to protect human health and the environment All radioactive waste generated as a result of the Building 886 D&D Subproject will need to be managed in accordance with this DOE Order and approved Site policies and procedures

D&D Regulatory Requirements Identification Checklist
Clean Air Act

		Yes	No
1	**Could D&D Subproject activities result in the potential release of fugitive emissions?**	☒	☐

If yes, comply with **5 CCR 1001-1 III, Part D.**

Although the potential exists for fugitive emission release, the Building 886 Complex will be subject to a variety of control measures to prevent fugitive emissions/contaminant migration The specific control measures (i e , negative pressure enclosures) will be determined during the design phase

		Yes	No
2	**Can fugitive emissions contain radionuclides?**	☒	☐

If yes, comply with **40 CFR 61, Subpart H.**

Depending upon where the D&D Subproject activities are occurring within the Building 886 Complex, fugitive emissions generated may contain radionuclides due to the high level(s) of radiological contamination Fugitive emissions may also be generated during ACM abatement These emissions may also contain radionuclides Building 875 will provide HEPA filtration to hot and cold areas in Building 886 that will serve as control of airborne contamination for as long as Building 875 is operational

Egress routes from the Building 886 Complex facilities and isolation zones established during D&D will be controlled via enclosures (i e , negative pressure enclosures) and radiation monitoring equipment All equipment and personnel leaving the controlled area will be monitored for radiological contamination prior to entering and exiting

D&D Regulatory Requirements Identification Checklist
Clean Air Act

		Yes	No
2A.	**Can potential radionuclide emissions (both fugitive and stack) from subproject(s) D&D exceed 0.1 mrem/year?**	☐	☐

If yes, a permit may be required Comply with **Colorado Air Quality Control Standards.**

(TBD). The potential is minimal to non-existent for radionuclide emissions (both fugitive and stack) to exceed 0.1 mrem/year due to proposed emission controls. The controls will be discerned during the design phase.

D&D Regulatory Requirements Identification Checklist
Clean Water Act

		Yes	No
1	**Will wastewater be generated from the D&D Subproject activities?**	☒	☐

If yes, comply with **Question(s) #1A, #2, #3, #4, #5.**

		Yes	No
1A	**Will wastewater be taken to an existing onsite facility permitted either under the CWA and/or RCRA?**	☒	☐

If yes, comply with **wastewater receiving facilities Waste Acceptance Criteria and monitoring requirements.**

The wastewaters generated as a result of the Building 886 Complex D&D activities will be treated by the onsite wastewater treatment facility (Building 374) if the wastewater meets the acceptance criteria Those wastewaters which do not meet the acceptance criteria will be drummed and stored for offsite disposal Building 774 will also provide aqueous waste treatment capability to treat wastewaters generated during D&D Subproject activities

		Yes	No
2	**Will wastewater be discharged directly to the environment?**	☐	☒

If yes, **comply with 5 CCR 1002-2 Section 6.1. Either modify the existing Site NPDES permit or obtain new NPDES permit prior to discharge.**

No wastewater from the D&D Subproject activities will be discharged directly to the environment Appropriate measures for sampling, decontaminating, and/or treating wastewater will be conducted prior to any discharge

		Yes	No
3	**Will wastewater be collected and transported offsite for treatment at permitted CWA or RCRA facility?**	☐	☒

If yes, comply with **receiving facility approved Waste Acceptance Criteria and monitoring requirements and DOT requirements.**

D&D Regulatory Requirements Identification Checklist
Clean Water Act

		Yes	No
4	**Will wastewater discharge contain toxic pollutants from specific sources identified in Site NPDES Permit?**	☐	☒

If yes, comply with **40 CFR 129.**

		Yes	No
5	**Will D&D activities conducted at Site affect any wetlands, fish, wildlife, critical habitats, threatened or endangered species, and/or flood plains?**	☐	☒

If yes, comply with **10 CFR 1022, 33 CFR 323 and CWA Section 404.**

The activities will be conducted under controlled conditions within the interior of facilities located in the Building 886 Complex The Building 886 Complex is not located in, on, or near any wetlands which will affect fish and wildlife or critical habitats or threatened and endangered species No effluent discharge to sensitive habitats or waters of the state will occur during the D&D activities Currently the Site has a NPDES permit which governs the effluent toxicity levels for all discharged wastewaters

D&D Regulatory Requirements Identification Checklist
Department of Transportation

		Yes	No
1	**Will D&D waste or radioactive materials be shipped offsite?**	☒	☐

If yes, comply with **49 CFR 172, 49 CFR 173, 49 CFR 177, DOE Orders 1540.1, 1540.2, 1540.3A, 5820.2A and 5480.3.**

It has been determined that waste materials/debris and wastewater(s) generated from the D&D Subproject activities will be decontaminated and/or treated by onsite treatment facilities established for the subproject, including but not limited to, establishment of a central decontamination facility (CDF) However, if the waste material/debris cannot be treated onsite and does not meet the acceptance criteria established for the CDF, then the waste material/debris may be containerized and prepared for offsite shipment and ultimate disposal

ATTACHMENT B
ALTERNATIVE EVALUATION

EG&G Rocky Flats, Inc.
Rocky Flats Environmental Technology Site

Environmental Restoration Management
Decontamination and Decommissioning Project

886 Complex
Critical Mass Laboratory
Decontamination and Decommissioning
Alternatives Assessment

Rev 0
February 2, 1995

prepared by
Parsons Engineering Sciences, Inc

EG&G Rocky Flats
Environmental Restoration Management

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LIST OF ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CML	Critical Mass Laboratory
D&D	Decontamination and Decommissioning
DOE	U S Department of Energy
HEPA	high-efficiency particulate air
LDRs	Land Disposal Restrictions
MAA	Material Access Area
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
SMP	Sampling Management Plan
SNM	special nuclear material
TRU	transuranic waste

1.0 SCOPE

The scope of this alternatives evaluation is to provide a brief overview of alternative decontamination and dismantlement techniques, and discuss the alternatives associated with demolition debris management The alternatives for management of demolition debris will consider recycling, waste segregation, waste treatment/decontamination, waste minimization and pollution prevention, disposal, as low as reasonably achievable (ALARA) standards, and cost minimization

2.0 OBJECTIVE

The objective of this alternative analysis is to select a demolition debris management strategy for the 886 Complex

3.0 BACKGROUND AND INTRODUCTION

The Rocky Flats Environmental Technology Site (Site) is located in Jefferson County, Colorado, about 16 miles northwest of Denver The Site operated from 1952 until 1992 as a nuclear weapons research, development, and production complex The 886 Complex is located within the Site boundaries in the northeastern quadrant of the 800 Area complex Construction of Building 886 was completed in 1964 and activities began in January 1965 The 886 complex houses a Critical Mass Laboratory (CML) and support structures The primary mission of the facility was to perform criticality measurements on a variety of fissile material configurations Over 1,600 criticality experiments were performed in Building 886

The D&D Project Organization is currently developing a Building 886 Subproject Management Plan (SMP) for the preparation of decontamination and decommissioning (D&D) activities The SMP assumes that the Site Utilization Review Board will direct the D&D Project Organization to demolish and dispose of the 886 Complex This alternatives analysis does not include alternate uses for the facility or alternate decommissioning plans (i e. entombment, safestor), but addresses the demolition debris management alternatives

4.0 STUDY ASSUMPTIONS

The following assumptions were developed to support completion of the alternatives analysis for the 886 Complex These assumptions discuss the contaminants of concern and condition of the facility prior to initiating the 886 Complex D&D Subproject

- The 886 Complex will be demolished Equipment in the facility may be reused

- All accountable special nuclear materials (SNM) will be removed from the building or glove box in accordance with U S Department of Energy (DOE) Orders

- All tanks, vessels, and piping will be drained to the maximum extent practicable and all visible and/or containerized hazardous and mixed wastes will be removed

- All loose or damaged friable asbestos, in and around the buildings, will be removed in accordance with established procedures

- Soil contamination exists beneath and surrounding the facility (based on the Historical Release Report) These soils are not in the scope of the D&D program and will be remediated as a part of the OU14 remedial actions

- Radiological contaminants of concern include uranium, cesium, strontium, plutonium, americium, and neptunium

- Both *in situ* and *ex situ* decontamination methods and technologies may be appropriate for the equipment and structure

- Secondary waste generated during decontamination and dismantlement efforts must meet waste acceptance criteria for onsite treatment and/or storage

Assumptions were based on information obtained from current and former Operations, D&D, and Radiological Engineering personnel, and on reviews of documentation applicable to the 886 Complex The radiological and hazardous characterization data currently available for Building 886 are incomplete Therefore, it is recommended that characterization (both radiological and non-radiological) of Building 886 be undertaken, either prior to or during remediation, and the results evaluated to confirm or change these governing assumptions

5.0 REGULATORY ISSUES

This section discusses regulatory issues that will affect the selection of a debris management approach Currently, Building 886 is not identified as a Resource Conservation and Recovery Act (RCRA) facility and is not included as a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remedial action Building 886 does however, reside within the boundaries of Operable Unit 14, which is suspected of being contaminated with uranium

During the conduct of preparation and cleanup for criticality experiments, chemical reagents were used which resulted in listed and characteristic wastes as defined by RCRA Several hazardous waste accumulation sites (90-day storage) were used to collect the solid and liquid waste There is no documentation of leaks or spills from these sites Several leaks and spills of radioactive solutions were reported during operation of the facility These spills (with the exception of a "leaking tank" on an exterior pad) were contained within the 886 facility and cleaned up This might, however, trigger CERCLA concerns during facility demolition

There is a possibility that both the facility and facility equipment are contaminated with hazardous and radioactive materials All of the visible mixed and hazardous waste and stored surplus chemicals will be removed during facility deactivation, however, residual contamination may remain If debris is considered contaminated with hazardous or mixed waste by volume or characteristics, it would be subject to the Land Disposal Restrictions (LDRs) and would require treatment or disposal in a RCRA-permitted landfill

6.0 DECONTAMINATION AND DISMANTLEMENTS METHODS OVERVIEW

An engineering study was performed to identify and evaluate available methods and technologies for the decontamination and dismantlement of radiologically contaminated equipment/facilities within the 886 Complex The study was based on two elements The first involved establishing the process and basic methodology by which the study was to be conducted and the options were to be evaluated The second element was implementation of the process, which involved development of assumptions, selection and screening of technologies, and numerical weighting and ranking of favorable technologies Decisions and valuative information were introduced throughout the process to establish, develop, and support the baseline of the study

This technology evaluation was conducted to provide the D&D program with insight and rationale for selection of appropriate decontamination dismantlement and size reduction technologies These technologies can be employed to reduce the hazards and risks associated with facility/equipment to acceptable levels contamination to ensure worker protection during D&D of the 886 Complex, and to minimize the potential for spreading contamination For debris and waste management, these technologies can be used selectively to meet the final objectives of waste management (free release, recycle, regulated re-use, or disposal) The following sections provide an overview of the engineering study results

6.1 Potential Waste Streams to be Decontaminated and/or Dismantled

Section 2 1 1 of the Subproject Management Plan identifies several waste streams that will be generated during D&D of the 886 Complex These waste streams include asbestos (which will be removed prior to demolition), concrete, exhaust plenums, glove boxes, high-efficiency particulate air (HEPA) filters, miscellaneous debris, piping and conduit, pumps/blowers, Raschig Rings, roofing, tanks, and wiring Of the waste streams identified, the majority of the waste generated during D&D of the 886 Complex will be concrete, structural steel, and piping Therefore, the scope of the evaluation focused on decontamination and dismantlement technologies for concrete, metals, and piping

6.2 Results of the Evaluation

The detailed engineering study, including a discussion of specific use of these technologies during decontamination and dismantlement activities of the 886 Complex, is presented in the Rocky Flats Plant 886 Complex Decontamination Methods Study, Engineering-Science, Denver, CO (ES, 1994)

Several types of decontamination and dismantlement technologies were selected because of the variability in materials to be encountered during decontamination operations of the 886 Complex Recommended chemical decontamination methods, applicable to decontamination of uranium- or plutonium-oxides on tanks, piping or ducts included use of strong inorganic acids and weak acids For mechanical decontamination methods applicable to decontamination of concrete or metal surfaces, the following technologies were recommended (each technology represents a method for removing a particular type of contamination) high-pressure water, ice blasting, mechanical scabbling, and vacublast Both mechanical and thermal techniques were recommended as dismantlement methods, including circular cutters, diamond wire cutting, mechanical saws, nibblers and shears,
oxygen burners, plasma arc cutters, and wall and floor saws

7.0 ALTERNATIVES ANALYSIS

A full range of debris management alternatives was examined (from "No Decontamination/Segregation" to "Full Decontamination/Segregation") to establish the most appropriate envelope that addresses regulatory, health and safety, schedule, and cost considerations The recommendations from this basic alternatives analysis of the D&D alternatives will be used to develop of the project sequencing (Section 2 0 of the Subproject Management Plan) and the Waste Management Plan within the Decommissioning Plan Waste minimization and pollution prevention, secondary waste generation and containment, conservation of material resources, and cost and schedule impacts of implementation are all relevant considerations for debris management alternatives The following section describes five pass/fail criteria based on health and safety, regulatory, DOE order compliance, and cost and schedule requirements to determine which alternatives merit further consideration

7.1 Waste Management Requirements

First, the alternative must protect the public, the D&D worker, and the environment Decontamination for dose reduction (at or below levels required for completion of D&D activities including waste packaging, handling, storage, and disposal activities) and to meet ALARA requirements must be completed prior to commencement of the specific D&D activity The alternative must also allow for containment of emissions to the air, soil, and ground water during demolition of the facility

Second, the D&D activities must not expose D&D workers to unreasonable industrial safety hazards Although there are inherent hazards associated with every activity, demolition, decontamination, size reduction, and waste handling, packaging and transfer activities should be evaluated based on relative risk Application of engineering controls in the D&D activities is considered superior to administrative controls

Third, the alternative must meet regulatory and DOE requirements for waste minimization, pollution prevention, and generation of mixed and transuranic (TRU) wastes The alternative should allow for reduction in waste classification from TRU to Low Level, Mixed to Low Level, and Low Level to Clean The alternative must also consider the generation of secondary waste streams and the availability of onsite systems to handle these streams.

Fourth, the alternative must minimize generation of wastes that currently do not have permitted or constructed storage or disposal facility options This specifically includes generation of TRU and mixed wastes

Finally, the alternative must consider cost and schedule impacts to the D&D project The alternative should use the best currently demonstrated and available technologies. A cost evaluation based on risk reduction should also be considered, especially when considering free release criteria

The following table illustrates the relative ability of the alternative to meet the minimum requirements A grade of A is the highest (exceeds the minimum requirements) and F is the lowest

Alternative	ALARA	Waste Minimization or Reduction	Health and Safety	Regulatory Requirements	Cost and Schedule
No Decontamination	D	D	D	D	D
No Segregation	D	D	C	D	D
Partial Decontamination and Segregation	A	B	A	A	A
Complete Decontamination and Segregation	B	A	B	A	C

7.2 The No Decontamination Alternative

The "No Decontamination" alternative generates the least amount of secondary wastes This is a significant factor, because containment of secondary liquid wastes and fugitive dusts can be difficult, time-consuming, and cost-prohibitive This alternative does not, however, meet requirements for ALARA Worker, public, and environmental exposure could be reasonably reduced through decontamination This alternative does not meet the requirements of waste minimization set forth in DOE Orders 5820 2A "Radioactive Waste Management and DOE Order 5400 3 Hazardous and Radioactive Mixed Waste Program" Demolition of the 886 Complex with no decontamination would generate significant low level, TRU, and potentially mixed wastes Decontamination would reduce toxicity and associated liabilities in each of these waste classifications Costs associated with storage, packaging, and transportation of these waste streams could be cost-prohibitive, and in some cases (TRU, TRU-Mixed) final disposal options currently do not exist This alternative would probably result in the most significant opposition from the DOE, regulators, and stakeholders

7.3 The No Segregation Alternative

The "No Segregation" alternative addresses a demolition strategy that is based on a "Wrecking Ball Approach" versus a "Selective Demolition Approach " In the "Wrecking Ball Approach," the building and its contents (assuming that salvageable office furniture and supplies have been removed) are demolished and packaged for disposal indiscriminately This alternative, however, has significant deficiencies in waste minimization, containment of contaminants, and costs associated with packaging, transportation, and disposal This option would most likely not be approved due to the TRU contaminants present in the material access area (MAA) If the TRU-contaminated material were not selectively removed prior to demolition, the bulk of the MAA debris could potentially be driven to meet the packaging and disposal requirements for TRU-contaminated waste In addition, if hazardous or mixed contamination exists, each package would be required to be tested for RCRA contaminants prior to shipment This alternative fails the cost requirements due to the cost of packaging, certifying, and storing large quantities of TRU and Mixed Wastes awaiting treatment and/or disposal options This alternative would also result in the most significant opposition from the DOE, regulators, and stakeholders

7.4 The Limited Decontamination/Segregation Alternative

This alternative uses both decontamination and segregation In this approach, selected equipment/materials are decontaminated and/or removed in sequence and evaluated separately to determine final disposition If hot spots are still present after decontamination, they are removed to reduce waste volume If low level contamination exists post-decontamination, or if decontamination is not considered feasible, the contaminated debris is segregated by the appropriate waste classification (mixed, low-level, TRU), and packaged and disposed of as required

This alternative has significant advantages associated with waste minimization and waste volume reduction over the "No Decontamination" and "No Segregation" alternatives Selectively removing contaminants through decontamination will allow for minimizing the cross-contamination or generation of greater waste volumes of the more toxic and regulated waste categories Segregation and decontamination also has the possibility of releasing material for recycle and reuse The Site is capable of treating (through evaporation) the decontamination fluid and the solids generated during decontamination at the 374 and 774 facilities This alternative would probably gain the approval of the DOE, regulators, and stakeholders

The disadvantages associated with this alternative include generation of secondary wastes, collection of secondary wastes streams, increased industrial exposure, and additional costs associated with decontamination and segregation activities The Site also does not have the ability for bulk assay of material for free release

7.5 The Full Decontamination/Segregation Alternative

This alternative would require decontamination of demolition debris to "free release" standards and segregation of debris appropriate for recycle The term "free release" encompasses materials that are to be recycled in an unregulated system or materials to be disposed of in a sanitary landfill The requirements for free release of material are provided by the following DOE Order 5400 5 (and 10 CFR 834, when issued), the Quality Assurance Project Description, applicable state and local regulations and permit requirements, and applicable Site procedures

This alternative would have significant advantages in waste minimization and pollution prevention and would be the most acceptable alternative to regulators and stakeholders from a waste management standpoint With minor exceptions, all debris from the demolition of the 886 Complex have identified recycle processes (including concrete)

The feasibility and cost of this alternative are significant disadvantages The Site does not have the technologies or resources required for decontamination for free release Significant amounts of secondary waste would be generated with currently available technologies The regulators and stakeholders would probably agree that the cost of free release of this material would not be worth the reduction of risk, especially if it resulted in other Site initiatives being not funded

8.0 CONCLUSIONS

The preferred alternative, considering ALARA, waste minimization and volume reduction, health and safety issues, regulatory and order compliance, cost and schedule impacts, and stakeholder acceptance, is the Limited Decontamination/Segregation Alternative The alternative is technically feasible, the "Full Decontamination/Segregation" alternative is currently not technically feasible and is cost prohibitive, and the "No Decontamination" or "No Segregation Alternatives" result in significantly greater regulated waste streams

The preferred alternative allows the project to reduce TRU wastes to low-level wastes, mixed wastes to low-level wastes, low-level wastes to nonradioactive where practical, and minimizes the wastes requiring disposal, taking into account potential reuse and recycling of excess equipment This alternative relies on good engineering judgement in planning and in the field to evaluate the potential effectiveness of initial and follow on decontamination to various debris This alternative also relies on engineering judgement to determine where and when to use mechanical cutters to optimize waste stream segregation Figure 2-1 of the SMP includes a waste management flow diagram which illustrates this decision making process

9.0 RECOMMENDED PROJECT SEQUENCING

The criterion of maximizing reuse/recycling and minimizing disposal cost dictates that uncontaminated equipment, materials, and structures be dealt with prior to equipment, material, and structures that are known or suspected to be contaminated This will eliminate the spread of contamination onto previously uncontaminated equipment, material, and structures This initial segregation will allow uncontaminated material to be removed and managed separately from the contaminated media

Decontamination methods can be selected to minimize generation of waste The wetted surfaces of process equipment (including mixing tanks, pumps, piping, experimental vessels, and waste tanks in Building 886, Rooms 101 and 103) can be most efficiently decontaminated by using the existing loading station, pumps, and piping to introduce a decontamination solution

Tank decontamination can be sequenced beginning with tanks likely to be clean (the water storage and acid storage tanks), to tanks likely to be contaminated (mixing tanks, experimental vessels, and waste tanks), potentially using one "batch" of decontamination solution to clean several lightly contaminated tanks Spent decontamination solutions should be collected in the process waste tanks, then pumped out for evaporation or precipitation/flocculation/clarification treatment onsite at Building 374 External surfaces of process equipment should be decontaminated by wiping to minimize secondary wastes, if health and safety are not at risk

After determining that free release is appropriate, office furniture and fixtures in Building 886 should be removed and reused elsewhere at Rocky Flats, or warehoused until a beneficial use (onsite or offsite) is found Trailer T886A should also be removed and reused, or stored until a use is found It may also be possible to reuse "generic" process equipment (pumps, air compressors, blowers, storage tanks) that can be free-released The specialized plumbing associated with the mixing tanks and experimental vessels in Building 886 makes it unlikely that these tanks can be directly reused for any other application

While size reduction is not normally considered a waste minimization technique, it is an important process in D&D activities that include demolition and final disposal of waste material Waste volume minimization is critical to efficient use of disposal space, and minimizes disposal costs It is likely that some process equipment and structural material from Building 886 will not be decontaminated to free release This equipment and material will be disposed of as hazardous or mixed waste Accurate segregation and efficient size reduction for optimal packing are essential due to costs associated with characterizing, packaging, shipping, and disposing of hazardous or mixed waste In some cases even solid wastes should be size reduced prior to disposal, because onsite landfill space is a finite commodity that must be efficiently utilized

ATTACHMENT C
HEALTH & SAFETY PLAN

TASK-SPECIFIC HEALTH AND SAFETY PLAN FOR SAMPLING AND ANALYSIS ENVIRONMENTAL RESTORATION PROGRAMS DIVISION

Phase I, D&D
Rocky Flats Environmental Technology Site
Building 886 Complex

Revision 0

February 1995

Task-Specific Health and Safety Plan
Environmental Restoration Programs Division
Phase I, D&D
Building 886 Complex

TASK-SPECIFIC HEALTH AND SAFETY PLAN REVIEW AND APPROVAL

This Task-Specific Health and Safety Plan has been prepared according to applicable requirements and reflects the health and safety measures appropriate to the tasks to be performed and their associated hazards

____
Occupational Safety Date

____
Industrial Hygiene Date

____
Radiological Engineering Date

____
Health and Safety Liaison Officer Date

____
Environmental Restoration Date
Health and Safety Officer

____
Project Manager Date

1.0 GENERAL INFORMATION

This section provides a brief overview of the tasks covered by this health and safety plan, a description of the work site, and an identification of the health and safety responsibilities of the project participants

1.1 Scope and Applicability to the Task-Specific Health and Safety Plan (HASP)

The purpose of this task-specific Health and Safety Plan (HASP) is to identify the personal protection standards and mandatory safety practices and procedures for personnel involved in the sampling and analysis for the Bldg 886 Complex (defined as Buildings 886, 875, 828, and 880) This HASP reflects the requirements for health and safety plan content which have been established by the Occupational Safety and Health Administration (OSHA) in Title 29 Code of Federal Regulations (CFR) 1910 120 This HASP is based on requirements from the *Health and Safety Practices Manual*, the 5400 series of Department of Energy Orders, 10 CFR 835, and the Rocky Flats Environmental Technology Site (RFETS) Health and Safety Program EG&G Rocky Flats implements these requirements for D&D activities in order to ensure a comprehensive health and safety program for both the project and the site personnel This plan works in conjunction with the General HASP for D&D activities The task-specific HASP is intended to identify the applicable health and safety requirements for the Phase I activities associated with the sampling and analysis activities of the Building 886 Complex These activities will involve the collection of representative samples of and the direct survey for the hazardous material and radiological contamination contained within the Building 886 Complex

If the activities covered by this task-specific HASP are performed by a subcontractor, the subcontractor has the option to follow this HASP or to prepare a separate HASP If the subcontractor elects to prepare a separate HASP, it must at a minimum include requirements that are equivalent to this HASP If the subcontractor personnel will perform the radiological monitoring tasks, the subcontractor will follow the applicable *Environmental Management Radiation Guidance Procedures*

1.2 Companion Documents

This HASP shall be used in conjunction with other safety documentation, which includes

Health and Safety Practices (HSP) Manual, Volumes 1 and 2 (applicable chapters)

Initial Characterization Sampling and Analysis Plan - Building 886 Complex

Radiological Operating Instructions (ROI) Manual

Radiological Engineering Procedures (REP) Manual

Manual 1-94700-Traffic-120, *On-Site Transportation Manual*

EMD Operating Procedures Manual, Volume 1 Field Operations

Environmental Management Radiation Guidance Procedures

1.3 Visitors

Visitors entering the work area during the conduct of field activities will receive a briefing about this HASP In addition, visitors must have received General Employee Training, Respirator Indoctrination, and must wear a dosimeter, as required by the radiological work permit Visitors will not be performing hands on work activities

1.4 Site History and Description

The Building 886 Complex, also known as the Critical Mass Laboratory, was used for experiments involving various fissile materials, uranium and plutonium The facility is no longer used for this purpose and is scheduled for decontamination and decommissioning (D&D) Before D&D activities can begin, the facility must undergo a program of sampling and characterization Those portions of the facility that are believed to be contaminated based on process knowledge will undergo the most rigorous sampling and analysis (i e Bldg 886 Rms 101, 102, and 103) The areas of the Bldg 886 Complex that are not believed to be contaminated will be sampled to confirm that these areas are not contaminated, only not as rigorously as the other areas Figure 1 shows the location of Building 886 Complex at the Rocky Flats Environmental Technology Site (RFETS) and the location of the medical facility (Bldg 122) Figure 2 shows the layout of the buildings in the Bldg 886 Complex that are to be sampled

1.5 Identification of Health and Safety (H&S) Responsibilities

The following outlines the health and safety responsibilities of the project participants

Project Manager and Field Manager A E Tome, X4072

- Responsible for the implementation of and compliance with the task-specific HASP
- Responsible for the implementation of and compliance with the Initial Characterization Sampling and Analysis Plan - Building 886 Complex
- Maintain stop work authority if unsafe work conditions develop
- Re-initiate work activities after safe conditions have been restored with concurrence from Industrial Hygiene and Radiological Engineering

Environmental Restoration Health and Safety Officer K D Anderson, X6979

- Implement and manage health and safety for all Environmental Restoration (ER) funded projects and programs
- Provide integration and coordination of field support for all ER funded projects and programs
- Maintain stop work authority if unsafe work conditions develop

Radiological Operations (RO) Foreman W W Bailey, X5649

- Provide supervision of Radiological Control Technicians (RCTs) and implement requirements of the Radiological Work Permit (RWP)

Radiological Control Technician As assigned

- Provide radiological monitoring for personnel exposure hazards
- Ensure compliance to the RWP
- Ensure personnel sign in and out on the RWP
- Ensure that appropriate actions are taken in response to radiological emergencies or contamination events
- Maintain stop work authority if unsafe work conditions develop

Radiological Engineering R W Norton, X4075

- Define the engineering, administrative, and work activity controls for identified radiological hazards
- Define personal protective equipment (PPE) requirements for radiological hazards
- Define requirements for the release of property or materials according to HSP 18 10
- Maintain stop work authority if unsafe work conditions develop

Industrial Hygiene M D Schreckengast, X6790

- Define the engineering, administrative, and work activity controls for identified chemical and physical hazards
- Define and provide air/exposure monitoring of identified chemical and physical hazards
- Define PPE requirements for identified chemical and physical hazards
- Maintain stop work authority if unsafe work conditions develop

Occupational Safety. W D Harlow, X4165

- Anticipate, recognize, and evaluate safety hazards, recommend control measures as necessary
- Perform inspections and ensure compliance with applicable standards/procedures

Sample Management Office (SMO) J R Dick, X5217

- Comply with the requirements stipulated in the task-specific HASP and the RWP
- Obtain samples in accordance with the Initial Characterization Sampling and Analysis Plan - Building 886 Complex
- Package and ship samples in accordance with the On-site Transportation Manual

Site Workers

- Comply with the task-specific HASP and applicable RFETS practices, procedures and policies

1.6 Task Description and Project Summary

Activities to be conducted under Phase I of this project will be controlled by the Project Manager and the Field Manager The following activities will be performed

1) Pre-job survey for potential radiological contamination and general area dose rate,

2) Collection of hazardous material swipe, liquid, and rinseate samples from interior surfaces and selected equipment surfaces in the Bldg 886 Complex This precludes that there will be no sampling or movement of tank contents in this facility during Phase I

3) Radiological characterization (i e , direct alpha and beta/gamma readings and smears) of interior surfaces and equipment of the Bldg 886 complex

4) Packaging and shipping the samples to an on-site laboratory or off-site vendor for analysis

The number and location of sample/survey points are outlined in the Initial Characterization Sampling and Analysis Plan - Building 886 Complex The analyses to be performed on the samples are also described in this document

Areas beneath the Building 886 Complex are addressed by the Interagency Agreement and Under Building Concern - Building 886 Complex Minimal intrusive activities (e g , excavation, drilling, soil sampling) in these under building areas will be performed on this project (related only to immediate subgrade material surrounding the foundation)

If unknown or unsuspected chemical and/or radiological contaminants are encountered, a stop work order will be issued by the Field Manager, the RO Foreman, the Radiological Engineer, the Environmental Restoration Health and Safety Officer, and/or the Industrial Hygienist, as appropriate Work will not resume until an appropriate resolution and engineering, administrative, and/or PPE requirements have been agreed upon by the Project Manager, Radiological Engineering, and Industrial Hygiene, as appropriate, and implemented Work involving contaminated equipment or chemicals will be controlled by the applicable RFETS policies, practices, or procedures

2.0 HEALTH AND SAFETY HAZARD ASSESSMENT

This section assesses the anticipated radiological, chemical, and physical hazards associated with the field activities

2.1 Task Analysis

Table 2 1-1 lists and assesses the task to be performed

2.2 Hazard Analysis

The following three subsections describe the radiological, chemical, and physical hazards anticipated to be present during the sampling and characterization activities

2.2.1 Radiological Hazards

Based on the historical building use of the Bldg 886 complex it is anticipated that uranium-235, -234, and -238, plutonium-238, -239/240, -241, and -242, neptunium-237, americium-241, and trace amounts of thorium-231 and -234, protactinium-234m, rubidium-87, strontium-90/yttrium-90, zirconium-93, technicium-99, cesium-135 and -137, and samarium-147 and -151 contamination may be present on the interior surfaces of the rooms and on and inside selected pieces of equipment To ensure that radiological conditions are consistent with the specified RWP requirements, a pre-job contamination survey will be conducted by the RCT prior to the initiation of the field sampling and characterization activities This survey will be conducted and documented according to ROI 3 1, *Performance of Surface Contamination Surveys* In addition, the general area dose rates will be monitored according to ROI 1 1, *Radiation Surveys* The collection of smear samples for radiological characterization of the gloveboxes will be performed in accordance with ROI 3 9, *Performance of Glovebox Contamination Surveys* When collecting smear samples in the gloveboxes, all personnel will follow the applicable operating procedures (e g , bag in/bag out) for working in gloveboxes

Radiation dose rates in the area are projected to be very low The primary radiological hazard will be associated with the inadvertent intake of low concentrations of radioactive material present on the building and equipment surfaces Table 2 2-2 lists the exposure limit, hazards type, physical characteristics, routes of exposure, and chronic exposure symptoms for those isotopes previously delineated

This facility contains sufficient fissile and fissionable material that a critical configuration could be established The dose rates associated with a criticality are typically at lethal levels, as discussed in the GHASP The fissile or fissionable materials associated with this task are plutonium and uranium As indicated in criticality safety training, the configuration of the fissile or fissionable material present, the moderators, reflectors, and poisons all affect the potential criticality hazards The primary risk of criticality is associated with the highly enriched uranium (dissolved in nitric acid) present in Raschig Ring Tanks 451, 452, 453, and 441 through 447 It is essential that all activities in this building comply with all of the criticality specifications and requirements It is essential that no sampling, transfers to or from these tanks, or other actions that significantly perturb this subcritical configuration (e g flooding of the area) occur The lines for transfer of the enriched uranium to the reactor vessel have been blanked so such a transfer is no longer credible If a potential for transfer to or from (of any liquids) any of these tanks or a significant leak from any of these tanks occurs, evacuate the area and notify criticality safety engineering immediately

2.2.2 Chemical Hazards

Based on site records and the historical use of Bldg 886, a variety of non-radiological chemicals may be present in the interior of the rooms and on equipment surfaces to be sampled Chemical contaminants of concern are listed in Table 2, along with the exposure limits, hazard type, physical characteristics, routes of exposure, and chronic exposure symptoms It is expected that the chemicals listed in Table 2, if present, will be present in trace quantities

2.2.3 Physical Hazards

In addition to the anticipated radiological and chemical hazards associated with the Building 886 Complex, some physical hazards or hazardous conditions are also anticipated to be present during the sampling and characterization activities These physical hazards consist of heat stress, fire caused by pyrophoric plutonium (of the most concern on this project), energized equipment, and slip, trip, and fall hazards The physical hazards associated with the sampling and characterization activities are summarized in Table 3-1, along with the control measures

TABLE 2.2-1
TASK INVENTORY AND ASSESSMENT

Task #	Task Title	Directing Document	Task Description	Task Steps
1	Pre-job Survey	*Radiological Operating Instructions (ROI) Manual*	Perform pre-job survey	1 Performance check on instrumentation 2 Don personal protective equipment (PPE), as required by the RWP 3 Perform contamination and radiation exposure surveys per the ROI 4 Perform decontamination, as appropriate
2	Field Sampling	Initial Characterization Sampling and Analysis Plan - Building 886 Complex	Collect hazardous material swipe, liquid, and rinseate samples from interior and equipment surfaces	1 Don PPE, as required by the RWP 2 Obtain samples/smears 3 Perform decontamination and packaging, as appropriate
3	Field Radiological Characterization Survey	Initial Characterization Sampling and Analysis Plan - Building 886 Complex	Perform radiological characterization survey of interior surfaces and equipment	1 Don PPE, as required by the RWP 2 Conduct survey and collect samples for analysis 3 Perform decontamination and packaging, as appropriate
4	Sample Packaging and Shipping	*On-Site Transportation Manual*, Section 5 0, Instructions	Package and ship samples to on-site laboratory or off-site vendor for analysis	1 Package and ship samples according to the *Initial Characterization Sampling and Analysis Plan* and the *On-Site Transportation Manual*, Section 5 0, Instructions

TABLE 2.2-2
RADIOLOGICAL & CHEMICAL HAZARDS POSED BY SITE CONTAMINANTS AND ROUTES OF EXPOSURE

Tasks Involving Contaminants (Tasks Defined in Table 1)	Maximum Expected Concentration	Contaminant (Synonym)	DOE DAC, OSHA PEL or ACGIH TLV (IDLH)*	Hazard Type	Physical Characteristics	Routes of Exposure	Chronic Exposure Symptoms (Target Organs)
Tasks 1, 2, and 3	Unknown	Plutonium 238, 239, 240, 241, and 242	2E-12 μCi/ml (from 10 CFR 835) 1E-10 μCi/ml for Pu-241 only (from 10 CFR 835)	Carcinogen Toxic	Green-brown-gray solid	Inhalation, Ingestion Injection	Biological damage associated with cancer - chronic exposure (bones, liver, lungs)
Tasks 1, 2, and 3	Unknown	Uranium 234, 235 and 238	2E-11 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Silver-white, malleable, ductile, lustrous solid	Inhalation, Ingestion, Injection, External γ Radiation for U-235	Biological damage associated with cancer - chronic exposure (liver, kidneys)
Tasks 1, 2, and 3	Unknown	Thorium 231 and 234	9E-8 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Grayish or silvery white Solid	Inhalation, Ingestion Injection, External γ Radiation	Biological damage associated with cancer - chronic exposure (bones, liver, lungs)
Tasks 1, 2, and 3	Unknown	Strontium 90/Yttrium 90	2E-9 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Silvery-white or yellowish solid	Inhalation, Ingestion, Injection, External β Radiation	Biological damage associated with cancer - chronic exposure (bones, lungs)
Tasks 1, 2, and 3	Unknown	Protactinium 234m	3E-6 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Shiny or gray metallic solid	Inhalation, Ingestion Injection External β, γ Radiation	Biological damage associated with cancer - chronic exposure (bones, liver, kidneys, lungs)

Tasks Involving Contaminants (Tasks Defined in Table 1)	Maximum Expected Concentration	Contaminant (Synonym)	DOE DAC, OSHA PEL or ACGIH TLV (IDLH)*	Hazard Type	Physical Characteristics	Routes of Exposure	Chronic Exposure Symptoms (Target Organs)
Tasks 1, 2, and 3	Unknown	Rubidium 87	6E-7 μCi/ml (from 10 CFR 835)	Carcinogen Toxic, Combustibl e	Silver-white solid	Inhalation Ingestion, Injection, External β Radiation	Biological damage associated with cancer - chronic exposure (bones, lungs)
Tasks 1, 2, and 3	Unknown	Samarium 147	2E-11 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	White-gray solid	Inhalation Ingestion, Injection	Biological damage associated with cancer - chronic exposure (liver, bones)
Tasks 1, 2, and 3	Unknown	Zirconium 93	1E-8 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Soft, malleable, ductile, solid or gray to gold amorphous powder	Inhalation, Ingestion, Injection	Biological damage associated with cancer - chronic exposure (bones)
Tasks 1, 2, and 3	Unknown	Technicium 99	3E-7 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Silver-gray solid	Inhalation, Ingestion, Injection, External β, γ Radiation	Biological damage associated with cancer - chronic exposure (thyroid, stomach, liver)
Tasks 1, 2 and 3	Unknown	Cesium 135 and 137	7E-8 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Silvery solid	Inhalation, Ingestion, Injection, External β γ Radiation	Biological damage associated with cancer - chronic exposure (all body tissues)
Tasks 1 2, and 3	Unknown	Samarium 151	4E-8 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	White-gray solid	Inhalation, Ingestion, Injection, External β, γ Radiation	Biological damage associated with cancer - chronic exposure (liver, bones)

Tasks Involving Contaminants (Tasks Defined in Table 1)	Maximum Expected Concentration	Contaminant (Synonym)	DOE DAC, OSHA PEL or ACGIH TLV (IDLH)*	Hazard Type	Physical Characteristics	Routes of Exposure	Chronic Exposure Symptoms (Target Organs)
Tasks 1, 2, and 3	Unknown	Neptunium-237	2E-12 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Silvery solid	Inhalation, Ingestion, Injection, External γ Radiation	Biological damage associated with cancer - chronic exposure (liver, bones, gonads)
Tasks 1, 2, and 3	Unknown	Americium 241	2E-12 μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Silvery solid	Inhalation, Ingestion Injection, External γ Radiation	Biological damage associated with cancer - chronic exposure (liver, bones, gonads)
Tasks 1, 2, and 3	Unknown	Nitric acid	2 ppm (100 ppm)	Corrosive	Colorless, yellow or red fuming liquid with an acrid, suffocating odor	Inhalation, Ingestion, Skin and/or eye contact	Irritated eyes and skin (eyes, respiratory system, skin)

* Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Immediately Dangerous to Life or Health (IDLH) concentration The most conservative value is shown for the PEL, TLV or Derived Air Concentration (10 CFR 835)

Table 3-1
Physical Hazard Identification and Control Measures

Physical Hazard	HSP Section	Control Measures
Heat Stress	Not Applicable	• Provide adequate fluids • Follow heat stress guidelines attached in Appendix A • Wear appropriate protective clothing
Fire from pyrophoric plutonium in gloveboxes	HSP 32 04 HSP 33 04 HSP 34 07	• Prior to field activities, establish a clear plan for response in the event of a fire during sampling activities • Follow procedures for glovebox bag in/bag out activities
Energized equipment	HSP 2 08	• Prior to field activities, contact the Lock Out/Tag Out Manager and verify that the equipment to be sampled/characterized in the building has been de-energized
Slip, Trip, Fall	HSP 10 01 HSP 22 05	• Identify and mark physical hazards • Use fall protection when working at heights above 6 feet

3.0 HEALTH AND SAFETY HAZARD CONTROL

This section identifies the personal protective equipment (PPE) to be worn during the field efforts and the radiological, chemical, and physical hazards monitoring and controls to be used during these activities

3.1 Personal Protective Equipment

Workers will be trained in the use, maintenance, limitations (including breakthrough time), and disposal of the PPE assigned to them, in accordance with the federal OSHA regulations in 29 CFR 1910 132 and the RFETS Respiratory Protection Program At a minimum, workers entering the Building 886 Complex exclusion zone for Task 1 will be required to wear the following PPE

- Safety shoes,
- Company provided long sleeve coveralls,
- ANSI Z87 1 Class 1 eye protection, and
- Appropriate work gloves, as specified on the RWP

It is anticipated that at a minimum, workers entering the Building 886 Complex exclusion zone for Tasks 2 and 3 will be required to wear the following PPE

- Safety shoes,
- Company provided long sleeve coveralls,
- Company provided Tyvek® or white cotton coveralls,
- Full-face respirator with HEPA filter cartridges (during sampling activities only), and
- Two pairs of surgical gloves

PPE is to be donned prior to entering the designated work site and is to be inspected by the worker prior to its use It is to be removed according to the personal radiological monitoring requirements as specified on the RWP

3.2 Engineering Controls

All sampling of the interiors of gloveboxes shall be made following the appropriate bag-in/bag-out procedures Under no circumstances shall any significant (>0 1 g) amount of fissile or fissionable material Further do not alter the configuration of any reflecting, moderating material, or the locations of criticality poisons in the vicinity of fissile and fissionable materials

3.3 Monitoring

The following three subsections describe the radiological, chemical, and physical monitoring/controls to be used during the conduct of the field activities

3.3.1 Radiological Monitoring

Monitoring for radiological exposure hazards will be conducted by the RCTs according to the RWP, *ROI Manual*, and *Health and Safety Practices Manual* Radiological surveillance date and time, survey recordkeeping requirements, radiation instrumentation performance checks and calibration requirements are detailed in the *ROI Manual*, and the *Radiological Engineering Procedures Manual* Selective Alpha Air Monitors (SAAMs) are located in the Bldg 886 Complex Criticality alarms are located in the Bldg 886 Complex In the event that a SAAM or criticality alarm sounds, all personnel are to follow the requirements of HSP 18 15, *Emergency Alarms and Response* and assemble in a safe area that is designated by the RCT

Equipment and material released from the area which are controlled for radiological concerns and all samples that are packaged and shipped shall be surveyed according to Procedure 4-61300-RO1-03 02, *Survey Requirements for Conditional and Unrestricted Use* They shall also meet the release requirements of Procedure 1-16100-HSP-18 10, *Release of Property/Waste for Conditional and Unrestricted Use*

3.3.2 Chemical Monitoring

Ambient air monitoring of organic vapors and airborne particulate concentrations will be performed by EG&G Industrial Hygiene to determine the need for upgrading or downgrading the respiratory protection levels and to detect elevations in the air contaminant levels that may result in the need for additional air sampling The *Health and Safety Practices Manual* (Chapter 13) will be followed, where applicable, based on these air monitoring results Concentrations of volatile organic compounds in the immediate breathing zone of working personnel will be monitored with a photoionization detector Airborne particulate concentrations (e g , dust) will be monitored by a real-time aerosol monitor (e g , MIE Miniram) Action levels will be based on recommendations from Industrial Hygiene When work is being carried out in confined spaces (i e the tank pit area) an oxygen monitor will be used to measure the oxygen content to ensure a safe level of oxygen is present before personnel enter the confined space

3.3.3 Physical Hazards Control

Measures which shall be utilized to control physical hazards during the sampling and characterization activities are identified in Table 3-1 As was noted in Section 2 2 3, fire, of pyrophoric materials, is the physical hazard of greatest concern on this project In order to prevent a fire during the sample collection process, special glovebox bag in/bag out and sample handling procedures (Procedure 1-82500-HSP-31 11) will be utilized by the workers In the event of a fire, special material (e g , magnesium oxide) must be used to extinguish a fire which involves pyrophoric plutonium

4.0 TRAINING REQUIREMENTS

HSP 21 03 specifies Hazardous Waste Operations and Emergency Response training requirements for hazardous waste activities The following training shall be required for this task

- 40-hour Health and Safety Hazardous Waste Site Worker Training
- Radiation Worker Level II
- General Employee Training
- Respirator Indoctrination and Respirator Fit Test (RCTs and SMO)
- Building evacuation procedures
- Fire control and response procedures
- Building access requirements
- Personal protective equipment use
- Criticality safety

In the event that the work environment changes, the training requirements will be re-evaluated by Industrial Hygiene and Radiological Engineering

All personnel will receive a site briefing to the task-specific HASP and the On-Site Transportation Manual Documentation of this briefing as well as all training will be maintained in accordance with the *Training User's Manual*

4.1 Tailgate Safety Meetings

A "tailgate" or "toolbox" safety/pre-evolution briefing will be conducted as part of the pre-work briefing that will be held as part of the activity The briefing will address hazards relevant to Phase I, sampling and characterization, of the D&D Pilot Project Additional safety briefings will be conducted as needed

5.0 MEDICAL SURVEILLANCE REQUIREMENTS

All working personnel must comply with and participate in a Medical Monitoring Program as stipulated in HSP 4 00, Medical Program, Chapters 4 02 through 4 17

6.0 SITE CONTROL MEASURES

This section describes the measures to be used to control the work site and to operate in a safe manner

6.1 Site Map

Figure 1-1 shows the 886 Complex work site within the RFETS complex

6.2 Buddy System

All personnel will follow the requirements of the "buddy system" as defined by 29 CFR 1910 120

6.3 Work Zones

Per the requirements of 29 CFR 1910 120, an exclusion zone (EZ) or Radiologically Controlled Area (RCA) will be established around the areas of contamination within the Building 886 Complex Access to the EZ or RCA will be restricted to trained and qualified personnel who require access to perform the sampling and characterization activities or other building support activities The establishment of an exclusion zone for radiological concerns will be determined by the RO Foreman and Radiological Engineer according to HSP 18 08, *Use of Step-Off Pads and H&S Barriers in Radiologically Controlled Areas* The requirements for entry to the EZ will be defined on the RWP

A support zone (SZ) and contamination reduction zone (CRZ) or the equivalent RCA step-off pads, (HSP 18 02, 18 08, and 18 09) will be established immediately adjacent to that exclusion zone These areas will be used to support work activities/personnel and maintain radiological and hazardous material control of the work area

6.4 Site Communications

Personnel will maintain visual contact with other site personnel while working in the exclusion, support, and contamination reduction zones

6.5 Confined Space Entry

A determination as to whether or not personnel are entering a confined space during the sampling and characterization activities must be made by EG&G Industrial Hygiene in accordance with HSP 6 04, *Confined Space Entry Program* Note, pits without enclosed tops may be confined spaces

6.6 Medical Assistance

Emergency Medical Assistance is available by calling extension 2911 on any plant telephone Individuals requiring emergency medical assistance shall be transported to the on-site medical facility (Building 122) per the direction from the Emergency Medical Response Personnel The location of the on-site medical facility is shown on Figure 1 Per HSP 3 03, all personnel injuries or illnesses must be reported to the Project Manager

7.0 DECONTAMINATION PLAN

Personnel shall be monitored by the RCT according to the requirements detailed in the RWP, if appropriate As a minimum, the RCT shall perform a whole body frisk for alpha and beta/gamma radiation as personnel leave the RCA

In addition to the *Environmental Operational Procedures* and the *Waste Solidification Procedures*, personnel and equipment decontamination and the handling of decontamination solutions shall be conducted according to the following

- HSP 18 12, *Radioactive Contamination Control and Decontamination*
- HSP 18 03, *Radiological Protection Signs, Labels, and Tags*
- HSP 18 10, *Release of Property/Waste for Conditional and Unrestricted Use*
- 5-21000-OPS-FO 03, *General Equipment Decontamination*
- ROI 1 1, *Radiation Surveys*
- ROI 2 1, *Personnel Contamination Monitoring*
- ROI 3 1, *Performance of Surface Contamination Surveys*
- 4-61300-ROI-03 02, *Survey Requirements for Conditional and Unrestricted Use*
- 4-61300-ROI-03 05, *Handling of Contaminated Personnel Dosimeters and Security Badges*
- ROI 3 6, *Laundry Monitoring*

Personnel shall be required to shower following the completion of the sampling and characterization tasks prior to leaving the Building 886 Complex

8.0 EMERGENCY RESPONSE

In the event of an emergency, personnel performing the tasks shall obtain emergency assistance by notifying the Foreman and/or by calling X2911 There are also fire alarms in that can be activated in an emergency The fire alarm must be activated in the event of any fire

Life threatening emergencies - Notify Shift Supervisor or call X2911 This notification will provide access to the Plant Protection Central Alarm Station, Fire Department, and Occupational Health

Non-life threatening emergencies - Notify Supervision, EG&G Project Manager, and the Field Manager

8.1 Spill Response and Control Procedures

The following procedures will be adhered to for the purpose of this project

- Procedure 1-62200-HSP-21 04, *Emergency Response and Spill Control*
- Procedure 1-C49-HWRM-04, Rev 0, *Release Response and Reporting*

If a leak or spill is associated with any tank in the Bldg 886 complex, even if it is simply an inadvertent transfer from one tank to another, evacuate the area and contact Criticality Safety Engineering for assistance in establishing an appropriate response

8.2 Evacuation Plan

In the event of an emergency, evacuate the EZ/CRZ and assemble in a safe area as designated by the RCT All personnel will comply with the requirements of HSP 18 15, *Emergency Alarms and Response* All personnel shall review the alarm signals, and the appropriate responses associated with criticality safety, in addition to the other alarm systems If any condition occurs that represents a violation of a criticality specification, terminate the activities immediately and contact Criticality Safety Engineering Do NOT attempt to restore conditions to meet the criticality specification

8.3 Emergency Equipment

PPE must be kept in reserve and maintained for emergency use This equipment may be from the same stock that is used for daily operation, provided that a portion is readily available for emergency use The follow equipment will be kept at the building

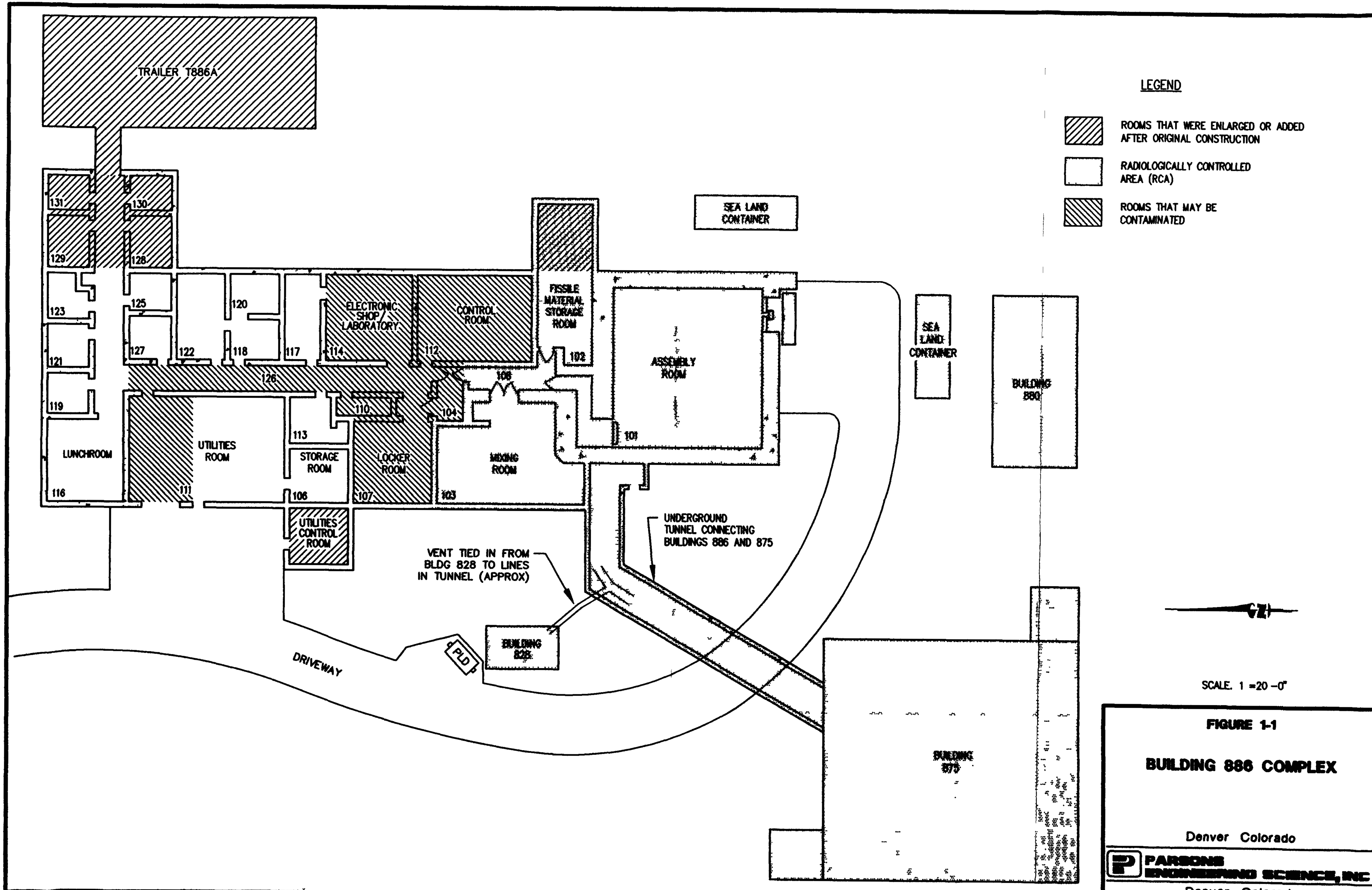


FIGURE 1-1

BUILDING 886 COMPLEX

Denver Colorado

PARSONS ENGINEERING SCIENCE, INC

Denver Colorado

K \ROCKFLAT\DEMO\94DN0784 2/1/95 at 7 05

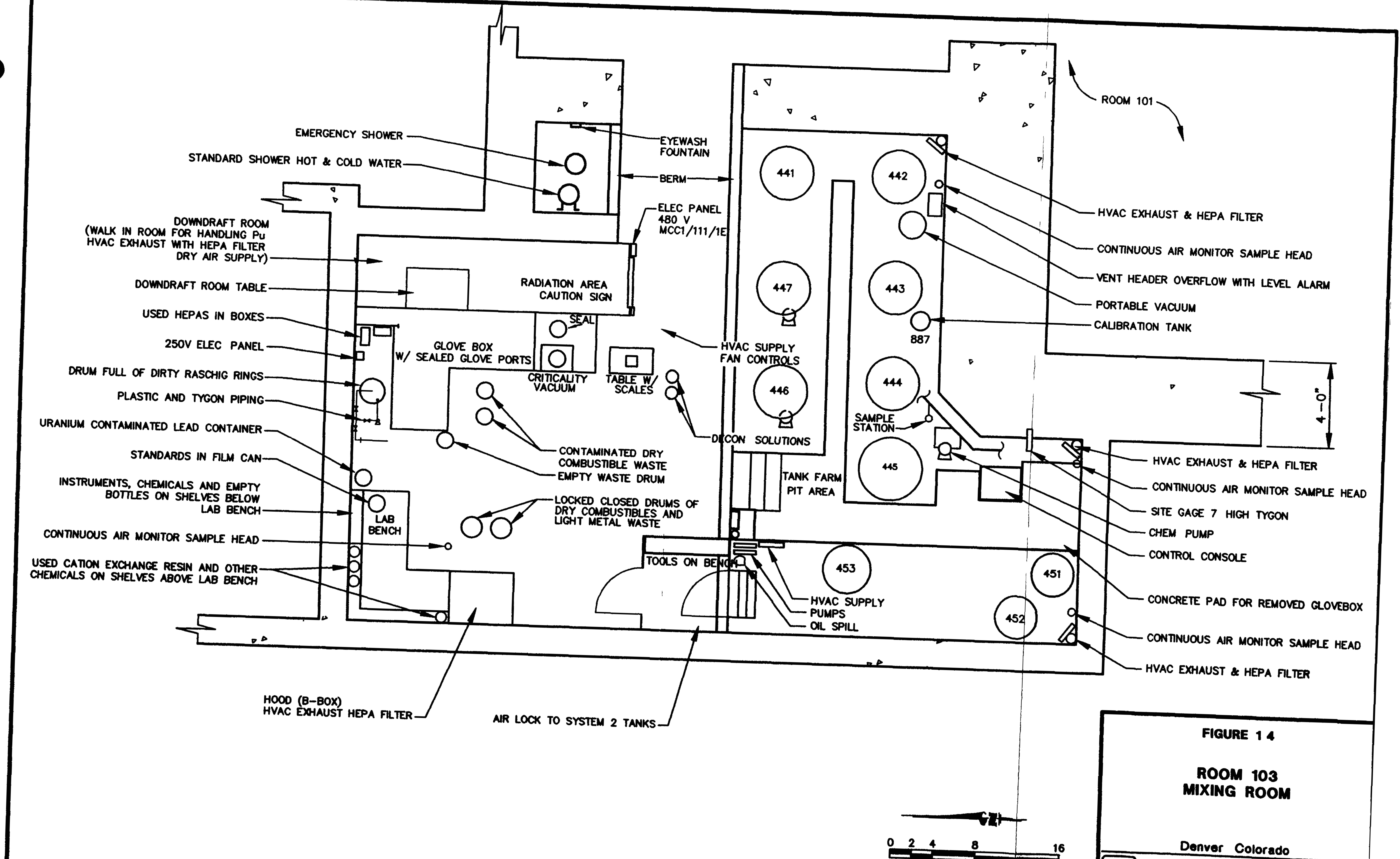


FIGURE 1 4

ROOM 103
MIXING ROOM

Denver Colorado

PARSONS ENGINEERING SCIENCE, INC
Denver Colorado

K \ROCKFLAT\DEMO\94DN0781 2/1/95 at 9:15

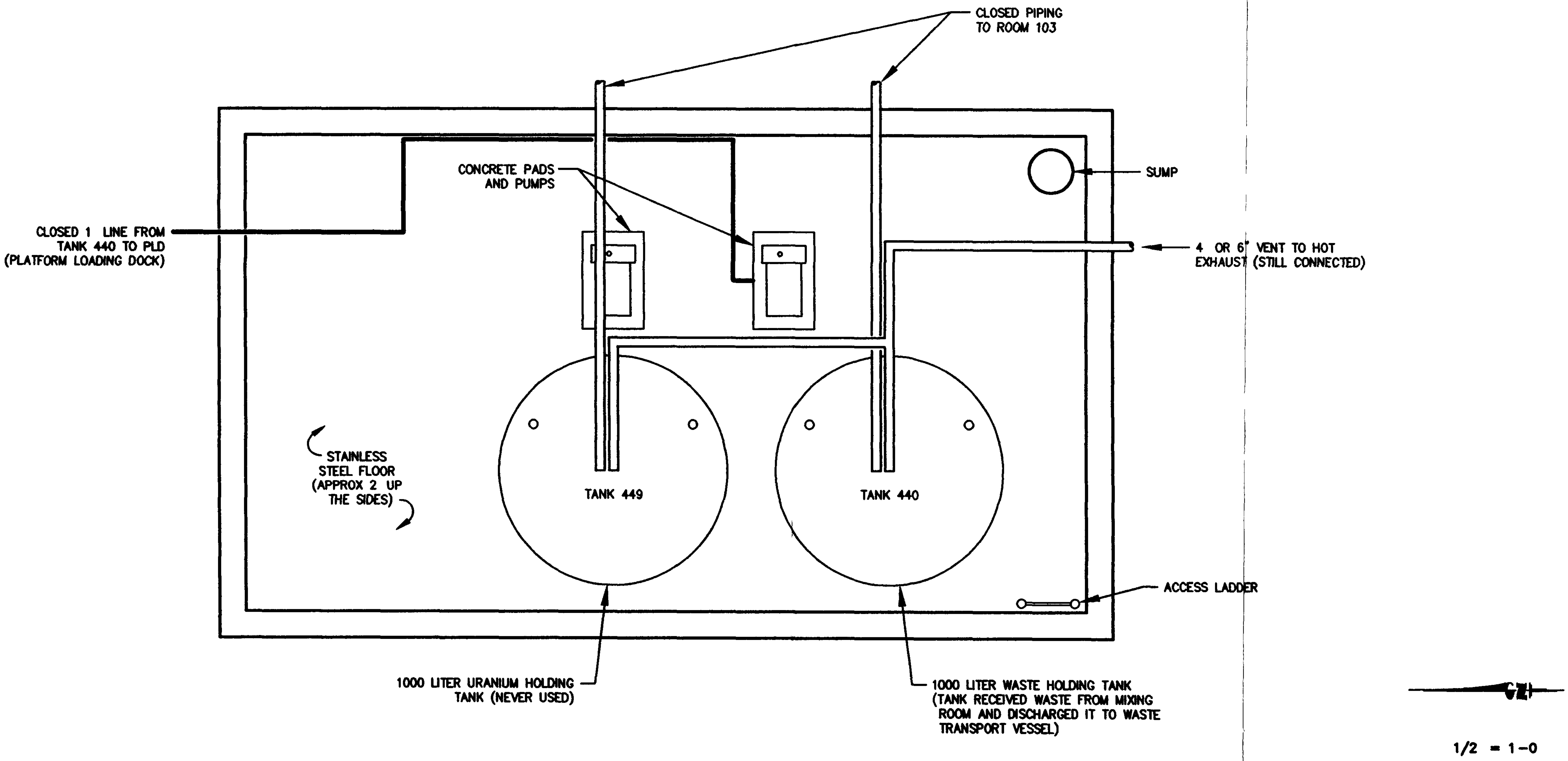


FIGURE 1-6

BUILDING 828
WASTE HOLDING PIT

Denver Colorado

PARSONS ENGINEERING SCIENCE, INC
Denver Colorado

K \ROCKFLAT\DEMO\94DN0833 2/1/95 at 9 40

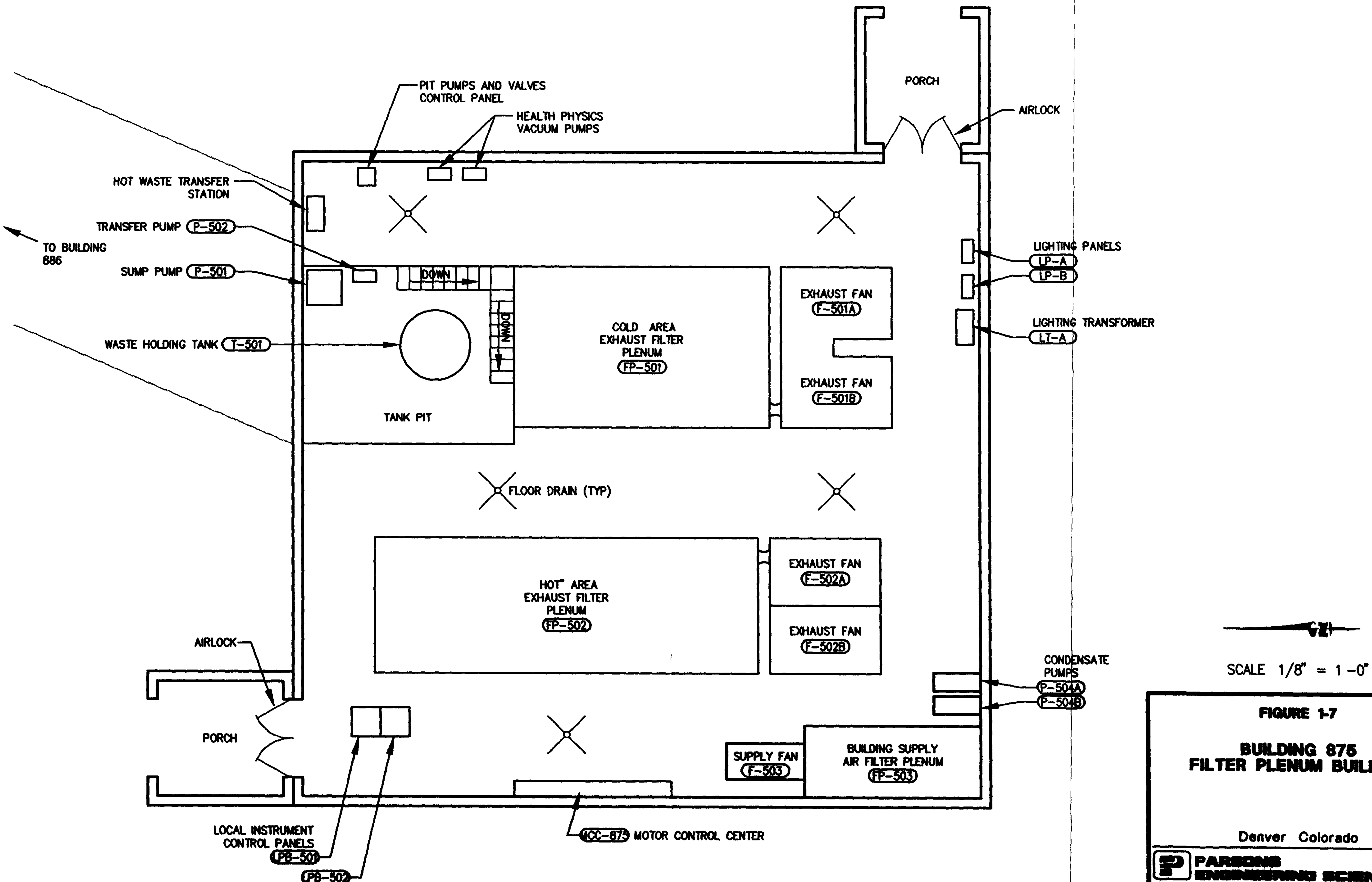


FIGURE 1-7

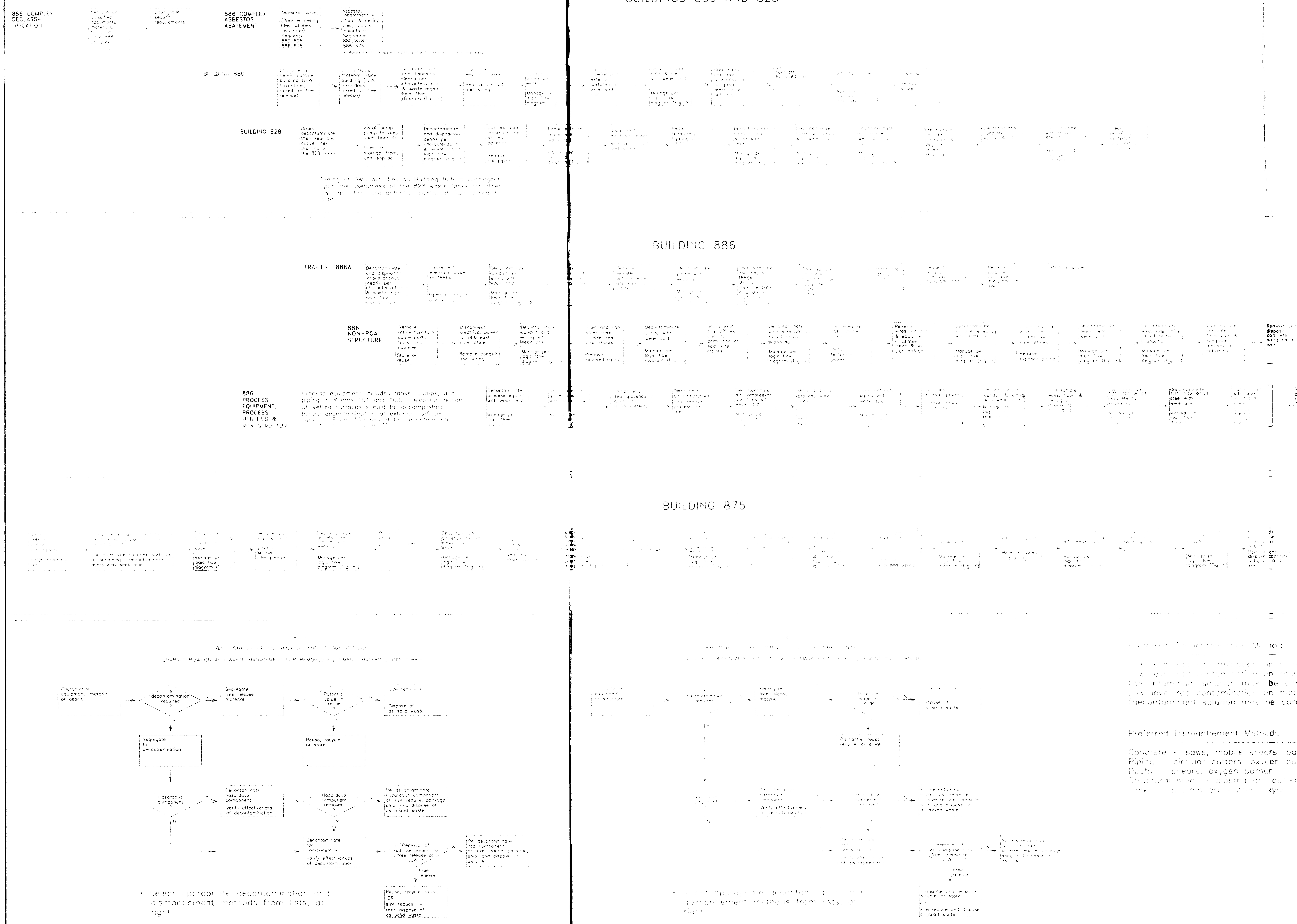
BUILDING 875
FILTER PLENUM BUILDING

Denver Colorado

PARSONS ENGINEERING SCIENCE, INC
Denver Colorado

\ROCKFLAT\DEMO\94DN0782 2/1/95 at 9 45

PROJECT SEQUENCE (FIELD OPERATIONS) FLOW DIAGRAM - 886 COMPLEX DECONTAMINATION AND DECOMMISSIONING
BUILDINGS 880 AND 828



ENGINEERING-SCIENCE, INC.

PARSONS

840N015, 9/29/94