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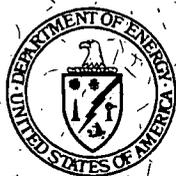
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PRS 66 (Including PRS 80/40)

Removal Plan

Final

January, 2003



Department of Energy
Miamisburg Closure Project



BWXT of Ohio, Inc.

DOCUMENT ORGANIZATION

This document is organized in a single writ to incorporate both internal and external requirements into a balanced single document. Overall, it is organized into five major sections, however, all the sections are interdependent of each other.

Section I is a short introduction series describing the MCP ER process, the regulatory framework including ARARs, and the particular PRSs this Removal Action is to address.

Section II is a collection of several project specific subject plans as directed by the requirements of the responsible group or party within the MCP Organization. The requirements of these entities are integrated to the General Removal Plan (Section IV) and the Detailed Work Package (Attachment A) as appropriate.

Section III is devoted to pre-removal site activity prerequisite for this removal, but which have been, or are in the process of, being performed under another project's work scope or general site authorization.

Section IV is a conventional large project Removal Action Plan.

Section V is reserved for the Attachments. Attachment A presents the requirements of the Removal Action Plan (including the project specific subject plans) into the site's Integrated Safety Management Procedure 1059A Detailed Work Instructions or "Field Work Package". Attachment B contains supplemental design and previously installed site run-on/run-off reference prints.

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Acronyms

| | |
|--------|--|
| ALARA | As Low As Reasonably Achievable |
| AM | Action Memorandum |
| ARAR | Applicable or Relevant and Appropriate Requirements |
| BVA | Buried Valley Aquifer |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| CO | cleanup objective |
| COC | contaminant of concern |
| D&D | decontamination and decommissioning |
| DOD | Department of Defense |
| DOE | U.S. Department of Energy |
| EE/CA | Engineering Evaluation / Cost Analysis |
| FFA | Federal Facilities Agreement |
| GRA | General Response Action |
| HASP | Health and Safety Plan |
| HI | Hazard Index |
| lcy | loose cubic yards |
| ITRD | Innovative Treatment and Remediation Demonstration |
| LLR | low-level radioactive |
| MDA | minimum detectable activity |
| MEMP | Mound Environmental Management Project |
| MMCIC | Miamisburg Mound Community Improvement Corporation |
| NCP | National Oil and Hazardous Substance Pollution Contingency Plan |
| NFA | No Further Assessment |
| NPL | National Priorities List |
| NTS | Nevada Test Site |
| OEPA | Ohio Environmental Protection Agency |
| OSC | On-Scene Coordinator |
| PCB | polychlorinated biphenyl |
| PRS | Potential Release Site |
| RA | Removal Action |
| RAGS | Risk Assessment Guidance for Superfund |
| RAO | Removal Action Objectives |
| RBGV | Risk-Based Guideline Value |
| RCRA | Resource Conservation and Recovery Act |
| RI/FS | Remedial Investigation / Feasibility Study |
| RSE | Removal Site Evaluation |
| SACM | Superfund Accelerated Cleanup Model |
| SAFER | Streamlined Approach for Environmental Restoration |
| SARA | Superfund Amendments and Reauthorization Act |
| SPHS | Single-Point Hot Spot |
| SVOC | semi-volatile organic compound |
| TBC | to be considered |
| TOC | total organic carbon |
| UCL | upper confidence level |
| USEPA | U.S. Environmental Protection Agency |
| VOC | volatile organic compound |
| VSAP | Verification Sampling and Analysis Plan |

SECTION I - PROJECT INTRODUCTION AND DESCRIPTION

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1 Introduction

This Removal Action Work Plan is for Potential Release Sites (PRSs) 66, 80, 40, 39, 38 and 398. It was prepared under the Environmental Restoration (ER) Program's "Work Plan for the Environmental Restoration of the DOE Mound Site, The Mound 2000 Approach" – Feb 1999. This was performed in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at the U.S. Department of Energy (DOE) Miamisburg Closure Project, formerly known as the Mound Plant in Miamisburg, Ohio. DOE is the designated lead agency under CERCLA and removal actions at the Miamisburg Closure Project (hereafter referred to as the MCP) are implemented as non-Superfund, federal-lead actions.

2 Action Memorandum – Engineering Evaluation / Cost Analysis

As part of the Mound 2000 process the Further Assessment (characterization) completed in 2002 fully identified a potential threat to human health, welfare, and the environment. This threat is due to the presence of the parent nuclides thorium-232, plutonium-238, actinium-227, radium-226, and cesium-137 (considered the primary Contaminants of Concern), as well as a few of their daughter products at levels above their respective cleanup objectives in the surface and subsurface soils. The cleanup objectives are the 10^{-5} Risk Based Guideline Values plus background. Other non-COC radioisotopes above their respective cleanup objectives included isolated detections of; uranium 238, uranium-235, uranium 234, uranium 233, and plutonium-239.

The depth of contamination varies from the surface to a maximum of 40 feet in four generally contiguous areas within the PRS. Concentrations of these contaminants vary from non-detects to a maximum of 12,000 pCi/g in the surface and subsurface soils. A CERCLA driven Engineering Evaluation / Cost Analysis (EE/CA) was completed with the results presented in a combined Action Memorandum - Engineering Evaluation / Cost Analysis document (AM-EE/CA)(DOE 2002a). The AM-EE/CA documents the evaluation of site conditions and analysis as to the most appropriate method to address and remediate those conditions. The recommended removal action was identified as a partial excavation and disposal using a precision excavation approach, and is the base method for this Removal Action Plan.

3 Work Scope

This Removal Action Work Plan details the technical approach, requirements, and the anticipated tasks associated with the removal and disposal of contaminated soil and debris for the PRS 66 area which included PRSs 80 and 40 (hereafter referred to simply as the PRS). It also identifies those prerequisite tasks to be done by others and provides detailed task by task work instructions for all work presented in Attachment A. Any risks or safety concerns are also noted, however, health and safety is more fully addressed in the PRS 66 Work Package (Detailed Work Instructions) and its attached HASP included within Attachment A of this document.

Once the prerequisite planning and required preparations are complete, the actual removal will be performed as an overlapping phased operation, with periodic verification and backfilling as the removal proceeds. Due to the size of the removal and the locations of the contaminants, the removal is divided into ten excavation phases. Generally speaking, each phase will be completed or at least in transition prior to starting the next, although the project retains the authority to alter the sequencing if the situation(s) warrant.

Rad Control and Site personnel will maintain strict (although constantly changing) boundaries of the control areas incorporating an appropriate buffer where applicable. In general, work will proceed north to south and down gradient (from higher to the lower elevations) within the PRS. For each 5-foot lift within a phase, the contaminated media will be removed, followed by the clean overburden and slopeback to be staged. Once the known contaminated media has been excavated for a phase and the adjacent phase has proceeded far enough to allow a reasonable buffer distance, the verification sampling process will be initiated. Upon clean verification, backfilling will begin with the clean overburden from either staged stockpiles, or when possible, another phase in the overburden excavation process. This process will continue until all phases have been excavated, verified, and backfilled to the point that stockpiled clean overburden backfill will permit. Additional backfill materials to complete backfilling operations will be with either non-PRS soils/media and/or off-site purchased backfill. Where appropriate, erosion control measures will be removed and site restoration activities will bring the area back to original grade and vegetation.

4 Applicable Or Relevant And Appropriate Requirements

CERCLA regulations require removal actions to comply with any Applicable Or Relevant And Appropriate Requirements (ARARs) only to the extent practicable; that is, to the extent that ARARs can be performed or complied with under the circumstances. The following chemical-specific, location-specific, and action-specific ARARs either are or have the potential to be applicable.

4.1 Chemical-Specific ARARs

Chemical-specific ARARs are health- or risk-based numerical values or methods that establish concentrations or discharge limits for chemical contaminants known or suspected to be in the removal action area. The following chemical-specific ARARs have been identified for this removal action:

- 40 CFR 61 Subpart H - National Emission Standards for Emissions of Hazardous Air Pollutants and Radionuclides Other Than Radon from DOE Facilities;
- 10 CFR 835 - Standards for Protection Against Radiation;
- Ohio Administrative Code (O.A.C.) 3745-17-02 (A,B,C) - Particulate Ambient Air Quality Standards;
- O.A.C. 3745-17-05 - Particulate Non-Degradation Policy;
- O.A.C. 3745-17-08 (A)(1), (A)(2), (B), (D) - Emission Restrictions for Fugitive Dust;
- National Pollutant Discharge Elimination System (NPDES) Permit No. 11O00005*HD – Total Suspended Solids

4.2 Location-Specific ARARs

Location-specific ARARs are restrictions placed on the concentrations of hazardous substances in the environment or the conduct of activities solely because they occur in special locations. The following location-specific ARAR was identified for this removal action:

- National Pollutant Discharge Elimination System (NPDES) Permit No. 11O00005*HD – permit for off-site water discharge

4.3 Action-Specific ARARs

Action-specific ARARs are usually technology- or activity-based requirements or limitations applied to specific actions. The following action-specific ARARs have been identified for this removal action:

- O.A.C. 3745-15-01 through 09 and 3745-40-01 through 09 - Requirements Include Measurement of Emissions of Air Contaminants, Scheduled Maintenance, Reporting and Malfunction of Equipment
- O.A.C. 3745-17-01 through 11 - Measurement of Ambient Air Quality and Allowable Emission Standards
- O.A.C. 3745-27-01 through 10 - Requirements Include Authorized Solid Waste Disposal Methods, Operational Requirements for Solid Waste Disposal Facilities and Closure Requirements;
- O.A.C. 3745-31-05 - Criteria for Decision by the Director
- O.A.C. 3745-54-13 - Waste Analysis Requirements Before Storage
- O.A.C. 3745-55-14 - Disposal / Decontamination of Equipment, Structures, and Soils
- O.A.C. 3745-50.44 C(4) - Additional Permit Information for Hazardous Waste Stored in Piles
- OAC 3745-52-11 – Hazardous Waste Determination
- OAC 3745-55-71 through 75 – Management of containers
- OAC 3745-56-51 through 54 – Management of wastes in piles
- OAC 3745-56-58A – Closure and post-closure care
- O.A.C. 3745-59 - Land Disposal Restrictions
- O.A.C. 3745-59-50 - Time Limits for On-site Storage of Hazardous Wastes Restricted from Land Disposal
- O.R.C. 6111 - Prohibits Pollution of Waters Within the State
- 29 CFR 1904 - OSHA Recordkeeping, Reporting, and Related Regulations
- 29 CFR 1910 - Occupational Safety and Health Act (OSHA) General Industry Standards for Worker Protection
- 29 CFR 1926 - OSHA Safety and Health Standards

- 49 CFR 171, 172, 173, and 174 Department of Transportation (DOT) - Hazardous Materials Transportation and Hazardous Material Employee Training Requirements
- DOE Order 5400.5 - Derived Concentration Guideline for Discharge of Water Effluent And Air Emissions.

4.4 Requirements To Be Considered (TBCs)

In addition to the ARARs listed above, certain "To Be Considered" (TBC) requirements are applied when no ARAR exists or to ensure protectiveness. The following TBCs have been identified:

- EPA/230/02-89/042 - Methods for Evaluating the Attainment of Cleanup Standards
- DOE Order 5400.1 Chg 1 - General Environmental Protection Program
- DOE 5400.5 Chg 2 - Radiation Protection for the Public and the Environment
- DOE 5480.4 Chg 4 - Environmental Safety and Health Protection Standards
- DOE O 435.1 Chg 1 and O 435.1-1; Chg 1 - Radioactive Waste Management Requirements

4.5 Removal Action Guidelines (Cleanup Objectives)

During the development phase of this project, Cleanup Objectives were developed and agreed upon with the regulators. A full description of the risk based guideline values and cleanup objective development was presented in the Action Memo/EE/CA. A summary of the cleanup objectives associated with the primary COCs for this Removal Action is presented In Table 1.

| TABLE 1 – PRIMARY COCs AND CLEANUP OBJECTIVES | | | |
|--|-------------------------------|---|--------------------------------------|
| COC | BACKGROUND (pCi/g) | 10⁻⁵ RBGV (pCi/g) | CLEANUP OBJECTIVE (pCi/g) |
| Actinium-227 | 0.11 | 4.5 | 4.61 |
| Cesium-137 | 0.42 | 3.4 | 3.82 |
| Radium-226 | 2.00 | 0.9 | 2.90 |
| Thorium-232 | 1.40 | 0.7 | 2.10 |
| Plutonium-238 | 0.13 | 61.0 | 55.00 |

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SECTION II - PROJECT SPECIFIC SUB-PLANS

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5 Project Specific Health and Safety Plan

Once the PRS characterization was complete and final approach for this removal action was identified, a full independent project specific Health and Safety Plan (HASP) was written. In general, a HASP reviews all the relative and appropriate data available for a project and its scope, and evaluates the risks associated with them and what actions are necessary to mitigate the risk and protect the worker. This document is included in Appendix E of the PRS 66 Work Package (Detailed Work Instructions) in Attachment A.

6 Emergency Preparedness - Emergency Response

Any site emergencies will be addressed through the Contractor Site Emergency Plan (System Manual SM-721) and/or the MCP Fire Department Fire Protection Plan (System Manual SM-911). In general, the following paragraphs address the potential emergencies that might occur during this Removal Action.

6.1 Area or Facility-Wide Emergencies

In the case of an area or facility wide emergency, the removal work shall be stopped and placed in emergency shut down mode (if possible) and the site personnel assembled and accounted for via site procedures. Project's personnel shall act in accordance with the instructions given by the Incident Commander via directive and oversight of the Crisis Management Team. All PRS site equipment (non-contaminated if possible) will be made available for any necessary emergency response deemed appropriate.

6.2 PRS Site Emergencies

PRS-site or personnel emergencies are also addressed through the Contractor Site Emergency Plan. In most cases, a call to 911 will implement an emergency response to any given situation. The most likely situation needing an emergency response would be for a medical, fire, or spill control event. However, any foreseeable hazard has been identified and mitigated through our ISM system.

6.3 Weather Emergencies – Take Shelter Requirements

The project area and the radiological control trailers located adjacent to the PRS site will serve as project trailers. The evacuation and take shelter procedures associated with these trailers apply to the PRS removal. Per procedure, Building 45 will serve as protective shelter when needed. These requirements also apply to the workers within the PRS removal area project boundaries.

7 Safeguards and Security

7.1 Security

General MCP site security systems and procedures will eliminate the majority of available access to the general public via the requirements of security's Standard Operating Procedures (SM-720). In addition, a PRS site construction perimeter fence, ropes, and warning signs will be installed around the PRS to protect non-project personnel from accidental ingress. Within the PRS, all areas will be controlled via the Project Management/Engineering, Rad Control, and Industrial Hygiene groups usually through access ropes, rad ropes, and signage.

7.2 Nuclear Safeguards

This Removal Action addresses contamination that is bound to soils and debris, and as such, no nuclear material inventory exists. Therefore, nuclear safeguard controls are not required.

8 Training

Site training at the MCP facility is an integral part of the Integrated Safety Management policies. There are two main site populations, i.e. salaried/professional personnel and hourly personnel. Each has a specific training plan for the types of duties that they perform. In addition, some specific classifications have additional training requirements and sub-plans as well.

8.1 Salaried/Professional

Radiological Control Staff:

- Environmental Restoration and Site Transition Project Training Plan for Radiation Control - S208.

Remediation Project Staff:

- Environmental Restoration and Site Transition Project Training Plan for Remediation Projects - S203.

8.2 Worker Training Requirements

All workers in MCP's Environmental Remediation projects are required, at a minimum, to have the following training:

- Rad Worker II (classroom and practical) or Radiological qualifications,
- Respirator Physical qualification and safety training (as required)
- Health Physics orientation of the site, and
- HAZWOPER Training:

In addition, specific types of workers are required to have the following additional training.

Site Workers:

- Current 40 hour Hazwopper plus three-day field experience.
- Current 24 Hazwopper hour plus one-day field experience. (incidental or occasional workers)

Supervisors:

- Current 40-hour Hazwopper with the additional 8 hour Site Supervisor training.

Subcontractors:

- Current 40 hour Hazwopper
- General Employee Radiation Training (GERT) with proper escort or Radworker II if on-site greater than two weeks
- Contractor Orientation

Driver:

- Appropriate training requirements MCP Hourly Training Plan S720:
- Forklift Operator
- Hazardous Materials – General Awareness

Heavy Duty Mechanics:

- Appropriate training requirements of MCP Hourly Training Plan S719:
- Lock-out/Tag-out
- Hearing Conservation
- Confined Space Entry
- Hazardous Waste Generator
- NTS WAC

Demolition Tech:

- Appropriate training requirements of MCP Hourly Training Plan S718:
- Overview of Demo Tech Operations
- Lockout/Tagout
- Hearing Conservation
- Confined Space Entry
- Hazardous Waste Generator
- NTS WAC

NOTE: Hourly worker's training requirements can be waived if training is not required for a given task.

9 Quality Assurance / Quality Control

Quality Assurance and Quality Control for all soil remedial projects at the MCP facility are guided by the MCP site-wide Quality Assurance Program Plan, addressed in PP 1060-A (Issue 4), as well as the Integrated Safety Management Program addressed in PP 1049.

10 Environmental Monitoring Plan

The Environmental Compliance and Analytical Services (EC&AS) group is responsible for monitoring environmental effects of all work on the MCP site. This sub-plan incorporates all of the requirements set forth in the Environmental Compliance Profile included in the project files. The following are a summarization of those requirements as applied to this Removal Action.

10.1 Surface Water and Sediment Controls

Sediment and water management controls are guided by regulatory directive as presented in the Environmental Compliance Profile developed for this project. These have been incorporated into the Sediment and Water Control design presented below, as well as illustrated in the Water and Sediment Control design drawings (included in Attachment B).

It is anticipated that there will be two primary Removal Action site watersheds for which controls are necessary. The first is the upper portion of the PRS generally described by the existing Building 29 parking lot. The second is the area surrounding the former Building 51 site and the lower end of the PRS. These areas will be managed independently.

10.1.1 PRS Site Boundary Run-on / Run-off Controls

Site personnel will install perimeter run-on control berms that are at a minimum of 2 feet high with no greater than a 1:1 slope on both sides, or as otherwise specified in the Water Management / Sediment Control Drawings. Earthen berms shall also be matted, vegetated and maintained against damage and drought for the life of the Removal Action. "Drive-over" berm sections shall be placed across any access areas, which have the potential to allow run-on from any neighboring watersheds or run-off from within the PRS area. These shall be of a permanent or semi-permanent nature capable of high load traffic (i.e. concrete, asphalt, or compactible crushed rock (with fines)).

Diverted run-on water flow shall be directed around the site and discharged into the drainage swale below the lower portion of the PRS.

10.1.2 PRS Non-excavation Surface Area(s)

The inner area of the project boundary will be managed for 100% water control. Two methods will be employed to accomplish this. The primary method is a semi-permanent (project duration) installation of sump in the lowest portion of the existing Building 29 Parking Lot. This sump will be pumped via an electric

operated auto switching pump or pumps at a capacity to handle the maximum calculated volume of water generated from a 1 inch per hour event, which by default will simultaneously have the capacity for a 25 year storm event. This is further discussed in the site de-watering section.

If necessary, a secondary method may be a shallow berm on the lower downgradient edges of the two main PRS areas installed from initial clean overburden or slopeback materials. These will function solely as an emergency run-off control structure and thus retain a portion of the water from precipitation on the RA site in the event the main sump pumping method were to temporarily fail. While this berm will not have the capacity to perform a 100% retention of a 1" per hour event during the initial phases of the RA, it will enable some retention time while emergency pumping actions or repairs to the main sump pump systems can be implemented.

Run off water from these main PRS non-excavation surfaces will be pumped directly into the asphalt lined retention basin located just north of the PRS.

10.1.3 Excavation Boundary Run-on Controls

Up-gradient edges of all excavations shall be temporarily bermed for run-on water control using portable sandbags or other techniques as approved by the EC&AS group Point of Contact.

10.1.4 Staging Stockpiles for Clean Soils – Run-Off Controls.

Excavated clean soils shall be stockpiled in any one of several areas, dependent on the most expedient material flow path from the zone of excavation. The potential and most likely clean soil staging areas are illustrated on the site drawings. Each area shall have a typical boundary silt control measures installed.

10.2 Excavation De-watering

Known Conditions:

Excavation water shall be pumped direct to the asphalt-lined pond in any of the following conditions:

- 1) while the excavation surface is exposing clean overburden or slopeback soils;
- 2) while the excavation surface is exposing known radiological only contaminated media (due to the relatively insoluble nature of the radiological contaminants any radiological contaminant can only be associated with any soil particles), and;
- 3) while the excavation surface is the clean bottom.

Uncertain Conditions:

Even though the characterization analysis indicate no levels above guideline values, there exists a small area of potential mixed waste and an area with boring logs indicating probable petroleum hydrocarbon contamination. The water management for these areas will be managed differently than the rest of the excavation. To avoid any cross contamination between phases, internal berms will be utilized to capture and segregate any accumulated water. Any retained water in these conditions will be pumped as soon as practical into polyvinyl tanks, sampled, and disposed of by directive of the EC&AS and Waste Management Point of Contacts.

10.3 Management of the Existing Asphalt Lined Retention Basin (commonly referred to as the "Asphalt Lined Pond")

PRS site water pumped to the "Asphalt Lined Pond" will be adding an additional volume not originally anticipated in its watershed-holding time calculations. As such, the management of the pond will need to be altered to accommodate this additional volume. This increased water volume may require more frequent sampling and water discharge, with a potential decrease in settling time within the pond. The pooled level (after an appropriate settling time) will be discharged to as low of level as possible, thus allowing a larger reserve capacity. The EC&AS Group manage all of retention basins on the MCP facility. Personnel from this group will monitor, sample as necessary, and control the levels and discharges of this retention basin throughout the duration of the removal project. Internal procedures will be modified to reflect any increased activities as the result of the increased volume of water from the PRS.

11 Shoring System Design

Upon the development and engineering of the approach for this removal action, it became evident that various locations would not lend themselves to conventional slopeback cave-in protection. This was due to the close proximity of necessary underground utilities and manholes, roads, and the asphalt lined retention basin berm. The shoring design was contracted out to an engineering design firm and utilizes a cantilevered soldier beam system. In this shoring system, vertical H columns (soldier beams) are placed at a specified interval, set into concrete below the anticipated excavation depth, with oak or hickory planking (lagging) placed within facing sides of the H columns.

The locations for the sections of shoring are illustrated in the general Site Layout illustration, Figure 1. Full design drawings for the shoring system are included in Attachment B. An outside contractor specializing in shoring systems (under a separate site preparation Work Package) will perform the installation of the soldier beams. As the project proceeds, lagging will be installed by the field crew during excavation as a matter of course in the appropriate areas.

12 Radiological Controls and Radiological Management Plan

This section covers the basic concepts for radiological controls during the excavation for this Removal Action. It is based on the Radiological Management Plan included as Appendix B of the PRS 66 Work Package (Detailed Work Instructions) included in this document as Attachment A. This plan includes postings, equipment monitoring and release, air monitoring, personal protective equipment (PPE), Radiation Work permits (RWP's) and the evaluation of clean soil and debris during the excavation process.

12.1 Postings

The perimeter of the site boundary will be posted as a radiological controlled area. Excavation areas within the radiological controlled area will be posted as either a Soil Contamination Area (SCA) or Contamination Area (CA) as determined by characterization and actual conditions. It is not anticipated that an Airborne Radioactivity Area (ARA) will be required during the excavation.

A Radioactive Material Area (RMA) will be maintained to store any LSA boxes or other waste containers used during the excavation. The size and location of the RMA may be adjusted as the excavation progresses. The beds of the haulers dedicated for contaminated media will be posted as a controlled area and RMA once loading of contaminated soil begins.

12.2 Radiological Work Permits

It is anticipated that three initial Radiological Work Permits will be necessary for the excavation process. These Radiological Work Permits will cover the expected excavation and related activities, decontamination activities, sampling and RCT coverage, minor maintenance on equipment, tours and inspections. Downsizing of any debris will be considered a related activity if done with a shear or the bucket of an excavator causing little potential for generating airborne radiological contamination. Any additional techniques that would add energy such as cutting with a saw or torch would require further evaluation. Containment, additional protective clothing and the need for a new RWP will be evaluated on a case by case basis.

12.2.1 Radiological Work Permit – Contaminated Areas

One RWP will be for working in contaminated areas. This will cover the majority of the excavation work performed inside any posted contamination area (CA) behind the former firehouse area (Building 98). Removable contamination was observed during the sampling process in various areas associated with higher levels of contamination in the northern Phases (Area II). This RWP will also be used in the southern Phases (Area III) based on the Pu-238 levels although removable contamination was not observed in the sampling process, it is a possibility that removable contamination may be present during the excavation.

12.2.2 Radiological Work Permit – Soil Contaminated Areas

A second RWP will be for work in any Soil Contamination Area (SCA). It will be used for workers entering the soil loading area adjacent to a contamination area or when excavating an area posted as a soil contamination area based on the characterization sampling results.

12.2.3 Radiological Work Permit - Soils with high levels of Th-232 and Ac-227

The third RWP will be for the excavation of a small shallow area south of the former firehouse (Building 98) with high levels of Th-232 and Ac-227. This RWP will be similar to the contamination area RWP in that it will require PPE and bioassay but will also require intake monitoring.

12.3 Equipment Monitoring and Release

Any material or equipment used in a posted Soil Contamination Area (SCA) or a Contamination Area will be released using MD 80043 Operation 400 "Radioactive Material Transfer and Unrestricted Release of Property/Waste" or controlled as radioactive material.

An area posted as a Soil Contamination Area (SCA) will be maintained adjacent to the contaminated excavation area to allow for loading of the haulers. No release survey will be required on the haulers unless soil is spilled during the loading process. Smears will be taken on the tires of the haulers to provide assurance that we are maintaining the loading area free of removable contamination. A FIDLER (or equivalent) or an equivalent detector will be used to periodically scan the loading area to ensure the area remains free of contaminated soil. After the soil is dumped at the Soil Staging Area a smear will be taken on the tail section of the haulers to ensure no removable contamination is present prior to returning to the excavation site.

A weekly survey will be performed on "haulers" to provide added assurance that work controls are satisfactory. Weekly surveys of the Excavator equipment will also be performed to monitor contamination levels during the excavation.

Any material/equipment entering the posted Soil Contamination Area or Contamination Area will be released using MD-80043, Operation 400 - Radioactive Material Transfer and Unrestricted Release of Property/Waste or controlled as radioactive material.

12.4 Air Monitoring

12.4.1 Areas Adjacent To The RA

A minimum of four low volume air samplers will be deployed near Building 45, ER office trailers, Building 61, and Building 22 outside the controlled area to monitor conditions in areas adjacent to the RA.

Monitoring minimally the PRS 66 primary COCs, filters will be changed out weekly with gross alpha and beta analysis being performed. Should any filter is observed with a Derived Air Concentration (DAC) value of .02 or greater, the filter will be analyzed utilizing alpha spectroscopy to determine the isotopic-specific levels. Action levels will be specified within the radiological monitoring procedures.

12.4.2 Excavation Perimeters

Low Volume and/or High Volume samplers will be used at the excavation site perimeter. The number of air samples may vary depending on the size of the excavation, the types and levels of radionuclides for the particular excavation area, the location of the workers, etc. At least one downwind sampler will be run at a minimum at all times during an excavation.

12.4.3 Operator Air Samples

When the excavator operators enter the excavation, either a low/high volume sampler or lapel sampler will be used to ensure the workers do not exceed levels that require respiratory protection. The low/high volume sampler will typically be mounted on the excavator.

12.4.4 All Personnel Entering the excavation zone in Phase VI

Breathing zone monitoring will be required of all personnel entering the area associated with the excavation of actinium-227 contaminated soils located just south of the former firehouse (Building 98). This area is zoned as Phase VI in the Removal Plan.

Note: The number and type of air samples may vary depending on the size of the excavated area(s), the levels of radionuclides at the dig location, the location of the workers etc., and will be adjusted as necessary by the Rad Engineer.

12.5 Radiological Personal Protective Equipment (PPE)

Radiological Personal Protective Equipment will be worn in all posted Contamination Areas as directed by the Radiological Work Permits. Respiratory Protection is not anticipated to be required and misting of the area will be used to maintain airborne radioactivity at a minimum. However, if monitored conditions were to indicate the need for respiratory protection the affected RWP will be modified and the upgrade implemented until monitoring indicated it was no longer necessary.

NOTE: Any other non-radiological driven PPE requirements are addressed in the project's Health and Safety Plan.

12.6 Evaluation Of Potential Clean Soil/Media During Excavation

Some of the top layers of soil and the slopeback of the excavation are anticipated to be below the clean-up criteria based upon characterization sampling results and may be acceptable for backfill. As such, field instrumentation will be utilized to detect whether indications exist that warrant follow-on confirmation sampling to determine the non-contaminated soil status. Should wet or frozen condition arise, which are outside the equipment limitations, or should the Radiological POC determine that it would be an unacceptable radiological practice to continue using the scanning instrumentation due to field conditions, alternative approaches of soil confirmation may be utilized with the concurrence of OEPA.

After contaminated soil is removed within a 5-foot lift, any contaminated/non-contaminated interface areas (areas with higher potential for contamination) will be scanned using a NaI or FIDLER prior to removing clean soil adjacent to that area. If a significant detection above background is identified during the scan, then the area will be further excavated. If the area is just slightly over background, a sample will be taken and analyzed by gamma spec prior to removing the soil and placing it in a potentially clean 20 cubic yard pile.

Areas expected to be clean, based on characterization data, will be removed and staged in approximately 20 cubic yard piles. If extreme discolored soil or debris is identified during removal of the clean soil, it will be scanned by an RCT to determine if radiological contamination is present and also PID/FID scanned as a field indicator that no chemical exists. If nothing is noted, the extreme discolored soil will be placed in a suspect pile and samples will be secured to confirm the lack of contamination prior to placing the soil in the clean backfill pile. Debris will be handled per the Acceptable Debris Backfill Plan. Areas adjacent to Th-232 areas expected to be clean, but which have limited or no characterization data available will require additional scanning with a NaI or FIDLER prior to staging in 20 cubic yard piles.

After a 20 cubic yard pile is staged, an RCT will scan the pile with a NaI detector or FIDLER to determine if there is any detected activity above background. If no elevated readings are identified, the soil will be allowed to be moved to the clean stockpile based on previous characterization data and added assurance from the scan. If elevated readings above background are found, a composite sample will be collected in the area of the elevated readings. Should the sample result be analyzed to be above the cleanup objective, the entire 20 cubic yard pile will be disposed of as contaminated soil.

Each 20 cubic yard pile that is staged around the plutonium contaminated area will have two samples taken from the pile at two symmetrical locations in addition to the FIDLER scans on "channel one" since plutonium contamination can not be seen down to the clean-up criteria with the FIDLER. Each sample will be checked with the FIDLER using channel one to determine if there is any significant Pu-238 present. The soil will also be scanned using the FIDLER on the "out channel" or a NaI detector to determine if any other contaminants are present. If no elevated contamination is detected during the scan, then the two samples will be sent to the lab for gamma spec analysis. Should the scan reveal indications above background levels, the entire 20 cubic yard pile will be disposed of as contaminated soil. The sampling may be waived in areas with the advanced concurrence of DOE, OEPA and USEPA based upon available characterization data.

13 Waste Management and Transport Plan

As part of the RA project development, waste management personnel have reviewed the known information from both site investigations and historical knowledge, and have identified the expected waste streams to be encountered during the performance of this removal action. Waste materials must be acceptable under the Envirocare Waste Profile number 8005-02 for MCP soils.

Characterization for disposal was based on PRS 66 sampling data. Radiological data for each phase of the excavation was compiled to determine the characteristics of the soils and debris to be shipped for disposal. Areas of concern for possible mixed waste generation were identified, thus indicating a potential for additional characterization during excavation. Any additional sampling will be performed using standard site sampling protocols.

The original Waste Management Plan from which this section is derived is included in Appendix A of the PRS 66 Work Package (Detailed Work Instructions) included as Attachment A of this document.

The characterization, packaging, and disposal options of identified waste streams are summarized and presented in the following sections.

13.1 Low-Level Radioactive Waste (LLW) – Soil And Debris <10”

The majority of waste generated by this removal action will be low-level radioactive waste (LLW). Soils and debris less than 10” in any single dimension can be transferred to the rail staging facility via an articulated hauler. The maximum size for any item of debris for this waste category is 10 inches by 10 feet x 10 Feet. Debris can also not occupy more that 10% by volume on average. After staging, the material will be loaded directly into gondola railcars for transport to Envirocare of Utah for disposal. Waste materials must be acceptable under the Envirocare Waste Profile 8005-02 for Mound soils. Waste Materials that are most likely to be encountered during the excavation, but are not acceptable for disposal under this waste profile include:

- 1) oversized debris (i.e., greater than 10" in any single dimension);
- 2) mixed wastes (radioactive wastes exhibiting a characteristic of a hazardous waste); and,
- 3) wastes with elevated levels of radioactive contamination (exceeding profile limits for individual radionuclides, e.g. 5,000 pCi/g Pu-238).

Total volume of low-level soil and debris for disposal is expected to be approximately 41,500 cubic yards.

13.2 Low-Level Radioactive Waste (LLW) – Oversized Debris (Greater Than 10" In Any Single Dimension)

Wastes greater than 10" in any single dimension cannot be placed directly into disposal lifts at Envirocare without downsizing. However a few options for handling and disposition of these wastes are available:

- 1) *Oversized debris can be downsized at the project site and disposed of as LLW/ <10".* This option is the anticipated course of action for the oversize materials expected. Once downsized, either on the project site or at the Rail Spur Loadout Facility, the debris would be blended into the bulk LLW soils.
- 2) *Oversized debris can be rail shipped to Envirocare,* but additional costs are incurred for downsizing at the disposal facility PRIOR to disposal. However, due to a relatively limited volume expected from this removal action, this option would not be implemented unless the volume generated became great enough to warrant it.
- 3) *Oversized debris may be packaged for disposal at Nevada Test Site (NTS)* using acceptable containers (LLW waste boxes and SeaLand containers). This option, as with option two, would only be implemented if the volume of oversize debris encountered warranted it.

13.3 Suspect Mixed Wastes: Soils / LLW Waste With Potential To Exhibit Characteristic(s) Of A Hazardous Waste

Sampling data indicate that a few isolated areas in the planned excavation have elevated levels of chromium, lead, and mercury. Soils and debris in these areas may or may not be mixed wastes, depending on the leachability of contaminants present. Suspect mixed wastes will be segregated, sampled to determine RCRA status, and staged and managed as suspect mixed waste pending receipt of analytical data.

Waste piles will be constructed as follows: tarp(s) will be placed on the parking lot or ground; waste material will be placed on the tarp; additional tarp(s) will be placed on top of the waste material, and upper and lower tarps will be rolled or otherwise joined to ensure complete containment of the wastes. Tarps sealed in this manner will contain waste materials and protect wastes from rainwater or surface flows. Covered piles will eliminate the need for leachate collection and will control wind dispersal of wastes.

Piles will be temporary. If analytical data show that piles contain mixed wastes, piles will remain in place until wastes are placed into containers suitable for transportation to a treatment and disposal facility. If the waste is not removed within 60 days, discussions shall occur with OEPA. Containers shall be in good condition and compatible with the wastes they contain. Containers in storage will be closed, and containers will not be handled in a manner, which will rupture the containers or cause them to leak. Containers will be elevated or otherwise protected from contact with accumulated liquid. Piles and containers will be inspected weekly and after storms and gusty conditions to document integrity of the pile coverage and/or enclosures.

Options for treatment and disposal of mixed wastes are limited. Envirocare of Utah and treatment and disposal facilities with broad-spectrum contracts will be considered for disposition of these wastes. Other wastes that fall into the suspect mixed category are soils with strong solvent odors, presence of unlabeled drums containing material, or other indications that a potential mixed waste issue exists.

The project's Waste Management POC will make all decisions regarding the final disposition of suspect mixed waste.

13.4 Low-level soils / debris exceeding Envirocare Waste Acceptance Criteria:

Some soils and debris may be contaminated with radionuclides exceeding the Envirocare Waste Acceptance Criteria (WAC). These wastes will be packaged and shipped to the Nevada Test Site (NTS) for disposal, in accordance with packaging and certification procedures for NTS waste.

13.5 Free Liquids

Free liquids are prohibited for disposal at both Envirocare and NTS. Free liquids may be solidified and transferred to the rail staging area, if the radiological characteristics of the solidified material meet the Envirocare WAC. The most likely source of contaminated liquids is decontamination water if it does not meet release criteria.

14 Debris Management Plan

Process knowledge, geophysical studies, and indicators within the boring logs from the characterization of this PRS indicate several types of debris will be present during the excavation. There is a very close correlation between the radiological contaminated data from the soil sampling and the various debris indicators both from the geophysical surveys and the boring log notations. This includes the reported buried contaminated flatbed truck, ducting (possible contaminated), industrial washing/laundry equipment, etc.

The other primary contaminated debris indicated by process knowledge is that of crushed drums which previously contained thorium materials. The exact condition of these drums is not known, but they are expected to be at various stages of decomposition.

Other items of debris of a smaller nature could be discovered during the excavation, however most (if not all) are expected to be located within the radiological contaminated zones. Other non-contaminated debris are also expected to be encountered. These range from simple decomposing wood (construction debris) to various earthlike materials such as concrete and brick.

Since there is a menagerie of various types of debris expected a plan had to be developed, discussed, and agreed upon by the various regulatory agencies, and the stakeholders. This led to an itemization of each of the known types of debris likely or expected to be encountered, as well as its ultimate deposition. The results of this exercise are presented Table 2 (page 29).

14.1 Low-Level Radiological (LLW) Debris

All debris that originated from within a contaminated area shall be handled and disposed of in either the LLW debris or LLW soil and debris waste streams. The WAC for the *“Low-level radioactive waste – soil and debris <10”* waste stream discussed in the Waste Management Plan requires a size limitation of 10” in any one direction. Where feasible, the LLW debris will be downsized to meet this requirement. Historical process knowledge and data gathered during the further assessment phase of this PRS indicate that the majority of the LLW Debris will consist of metals and concrete from the historical Building 15 and 15A floors and foundations, and a small amount of wood. The particular type of downsizing method employed will vary depending on the nature of the particular piece or type of debris. It is expected that metal or wood items will be sheared using a shear attachment on an excavator while non-metal/ wood items like concrete may be further broken using a conventional hammer attachment. If the debris has radiological activities exceeding that for LLW shipment to Envirocare, it is expected that it will meet, or can be made to meet, the WAC for the Nevada Test Site (NTS) and will be packaged and shipped to them for disposal.

14.2 Non-Radiological Debris

Debris encountered within the clean overburden or slopeback areas will be handled per guidelines as presented in the following table. These Guidelines have been reviewed and agreed to by the regulatory agencies (OEPA/USEPA) and allow for debris to be handled as construction and demolition debris (“clean hard fill”) and managed per guidance found under OEPA:OAC 3745-400-05. Examples of “clean hard fill” include concrete, brick, mortar, and asphalt. Additional man-made

incidental objects will be permitted within backfill soils such as bottle caps, nails, wood splinters, broken glass, nuts, bolts, staples, etc. These objects will be scanned along with the associated soils. If a pocket (larger than an excavator bucket) of such incidentals are found within the excavation, these items would be removed and treated as waste. If a pocket of metal shavings is observed, the metal shavings and the associated soils will be specifically scanned. Items not suitable for backfill material will be handled as LLW debris.

15 Oversize Debris Lifting Plan

During the execution of this removal action, some of the larger buried items (i.e. flat bed truck, etc.) may be beyond the capabilities of the excavators to lift or drag to a location for processing (scanning, downsizing, etc.). In addition, some items may need to be containerized for disposal that may require lifting as well.

Hoisting, Rigging, and Forklift operations is governed by their Technical Manual MD-10508 "Mound Hoisting, Rigging, and Forklift Program". As such, all lifts requiring a boom truck, crane, or similar equipment will be governed by this existing program and a formal project specific oversize debris lifting plan is not necessary. Key project personnel are knowledgeable of this program and its implementation.

16 Traffic Flow / Routing and Hauler Release Plan

16.1 Background

During the PRS 66 Haul Road Feasibility Study, performed in the late summer of 2001, several alternatives were evaluated. One of the goals evaluated during this study was that of minimizing traffic interference with the MMCIC occupants as well as normal site traffic. The original baseline proposed route was for the installation of a new dedicated haul road between the PRS footprint and the Soil Staging Area behind Buildings 51 and 22. Several alternatives were analyzed for cost effectiveness and their ability to minimize traffic interference. The alternative selected was the installation of a new entry roadway connecting up with the MMCIC south spine road, thus allowing vehicular access to the TFV without interference of the haulers.

Table 2 - Suitability of Debris for Backfill

| Debris Type (size independent) | Acceptable Backfill | | Comment |
|---|---------------------|----|--|
| | Yes | No | |
| Natural Rock/Stone/Cobbles | X | | No representative sampling or scanning required |
| Tree Roots / Vegetation | X | | No representative sampling or scanning required |
| Concrete | X | | MAPSSIMS-like representative scanned and potentially crushed in concrete crusher |
| Brick/Block/Mortar | X | | MAPSSIMS-like representative scanned and potentially crushed in concrete crusher |
| Asphalt | X | | MAPSSIMS-like representative scanned and potentially crushed in concrete crusher |
| Ceramic Tile | X | | Unless multiples found in contiguous zone, representative sampling required |
| Vinyl Floor Tiles | X | | Unless multiples found in contiguous zone, representative sampling required |
| Roofing Shingles | X | | Unless multiples found in contiguous zone, representative sampling required |
| Rebar | | X | Either removed from concrete crusher or loose |
| Metal Drums | | X | |
| Plastic Drums | | X | |
| Paint Cans | | X | |
| Sheetmetal | | X | |
| Steel Drainage Pipe | | X | |
| Plastic Drainage Pipe | | X | |
| Clay/Concrete Drainage Pipe | | X | |
| Electrical Conduit | | X | |
| Electrical Fixtures | | X | |
| Metal/Wood Cabinets | | X | |
| Rubber Hoses | | X | |
| Closed Containers | | X | |
| Vehicles & Appliances | | X | |
| Visual Debris Removal - Removed if visually seen; no sifting through stacks required | | | |
| Debris Type | Acceptable Backfill | | Comment |
| | Yes | No | |
| Electrical Boxes / Fittings | | X | |
| Plastic Bottles | | X | |
| Rubber/Cloth Gloves/Boots | | X | |
| Rags | | X | |
| Batteries | | X | |
| Metal Hand Tools | | X | |
| Size Dependent - Guidelines Established for Field Decisions | | | |
| Debris Type | Acceptable Backfill | | Comment |
| | Yes | No | |
| Steel Wire | X | | Less than 3 Feet in Length; no representative sampling or scanning required |
| Electrical Wire | X | | Less than 3 Feet in Length; no representative sampling or scanning required |
| Wood | X | | Less than 3 Feet in Length; no representative sampling or scanning required |
| Vinyl/Plastic Siding/Sheeting | X | | Less than 3 Feet in Length; no representative sampling or scanning required |
| Cardboard | X | | Less than 3x3 Feet; no representative sampling or scanning required |
| Incidental Objects - Not Segregated from soil but scanned with soil | | | |
| Debris Type | Acceptable Backfill | | Comment |
| | Yes | No | |
| Metal Shavings | X | | When noting a pocket, each bucket removed will be field scanned |
| Pop Bottle / Caps | X | | No representative sampling or scanning required |
| Nails | X | | No representative sampling or scanning required |
| Wood Splinters | X | | No representative sampling or scanning required |
| Crushed/Broken Glass | X | | No representative sampling or scanning required |
| Rags | X | | No representative sampling or scanning required |
| Paper | X | | No representative sampling or scanning required |
| Office Supplies | X | | No representative sampling or scanning required |
| Steel Spikes / Staples | X | | No representative sampling or scanning required |
| Nuts/Bolts | X | | No representative sampling or scanning required |
| Styrofoam Pieces | X | | No representative sampling or scanning required |

16.2 Current Haul Road

It is the current intention that haulers will not enter a radiological area during the removal and therefore, they will not require release surveys (per procedures) upon exiting the PRS footprint. A clean area will be maintained for parking the haulers while loading just outside of the posted contaminated area, therefore the tires and outside of the trucks will not become contaminated.

Radiological Control will be monitoring the hauler loading process (zero spill/slop tolerance) at all times via a RWP calling for continuous RCT coverage. If any soil is spilled on the outside of the truck or within the loading area, it will be immediately cleaned up. Smears and direct readings being taken to ensure there had been no spread of contamination. Smear counters will be in/at the work area to allow for timely counting of the smears to ensure that the haulers are below release levels. In addition, all haulers will have their loads covered during transport. RCT's will also periodically take smears of the haulers' tires and/or the loading area to confirm that there has been no spread of contamination. This approach has been used in the past with very good success while maintaining a good production rate, and ensuring that contamination is not spread outside of the work area.

During the removal excavation, three or four haulers, depending upon availability, will be hauling soils from this PRS. Additionally, two haulers will be hauling debris from the Building 38 demolition project. Slightly staggered, during the WD and HH Building demolition projects, four to six haulers will be approaching the Soils Staging/Lower TFV parking lot area generally from the roadway passing Building 19.

Due to the amount of haulers in transit during these four major projects over an extended period of over a year, there is a significant safety concern should personal and delivery vehicular access be permitted on the proposed Haul Road. As such, the sections of the haul route that use existing site roads will be limited to DOE owned and project vehicles during times while excavation is in process. No pedestrian or personal vehicles will be permitted.

17 Verification Sampling and Analysis Plan

A Verification Sampling and Analysis Plan is a separate regulatory driven document and is currently under development. This document shall be in place prior to the start of any phase's verification activities with the exception of the small surface removal associated with Phase I. Phase I verification will either await the VSAP approval or it may proceed per agreement with the regulators and documentation by letter. The plan will specify the grid interval, the final COC list, and the analyses to be taken for each phase.

18 Cost Estimate and Schedule

The costs and schedule for this removal action were developed during the final phases of the Action Memo - Engineering Evaluation/Cost Analysis and were presented in the published document.

19 Uncertainty Analysis

Even with the extensive research and investigation performed for this PRS, there are still a few potential uncertainties associated with this removal. Probabilistic contingency analyses were not performed, but instead an uncertainty analysis was performed using generic orders of magnitude estimate calculations based on the relative costs developed during the EE/CA process. Total uncertainty costs are variable depending on the conditions encountered. The various uncertainties are presented in the following sections.

19.1 Volume Of Contaminated Media

Although the characterization of this PRS was much more thorough than typical PRS characterization efforts at MCP, there are several locations with borderline results relative to the Cleanup Objectives for radiological contaminants or the Risk Based Guideline Values for various chemical contaminants. As such, some lower boundaries with borderline data, while currently meeting Cleanup Objectives, do represent an element of risk for expansion using the field screening, pre-verification, and verification *Decision Rules*. Thus the anticipated volume could increase.

To assess the probability that additional contamination would be discovered within the PRS and its adjacent boundaries, a "Smart Sampling" probabilistic modeling effort was performed through Sandia National Laboratories. Its conclusion was that the analysis suggested that there was a relatively small likelihood geologically that significant regions of contamination above the 1×10^{-5} level are likely to exist outside of the "areas" formally defined for excavation and remediation. The areas of highest probability noted in the statistical modeling were of shallow depths in the area adjacent to the northwest corner of the excavation and an area in the southeast section of the parking lot. Slopebacks from existing excavation will encounter and confirm that these areas are not contaminated. Details of the scanning and sampling techniques that will be utilized in these areas are found in Section 12.6.

A non-probabilistic contingency analysis was performed using an orders of magnitude estimate calculation based on unit costs derived from the EE/CA estimate has yielded the cost for this uncertainty at \$307 per lcy or \$307,000 per 1,000 lcy. Schedule delay with weather factors per 1,000 lcy is 0.281 months. As an example, a 10% increase in contaminated volume would amount to approximately 4,150 lcy or \$1.28 million, with a corresponding schedule impact of 1.3 months.

19.2 Volume Of Usable Backfill From Overburden and Slopeback Removal

Available debris descriptors are insufficient to evaluate the debris type until the excavation is in process. Some of the volume currently defined within the clean overburden areas may have debris fractions that may not be suitable for use as backfill. As such, the volume of the ill-suited debris would be added to the current estimated volume of PRS generated waste streams, as well as resulting in an increase in the required amount of backfill materials. Although a probabilistic contingency analysis was not performed, an uncertainty analysis using an orders of magnitude estimate calculation based on unit costs derived from the EE/CA estimate has yielded the cost for this uncertainty at \$305 per lcy or \$305,000 per 1,000 lcy. A 5% decrease in suitable backfill volume from the slopebacks and overburden soils would amount to 2,070 lcy or \$631,000. The corresponding schedule impact of would be minimal at approximately 0.25 months.

19.3 Mixed and/or Hazardous Waste Discovery

While the EE/CA estimate had assumed a very generic assumption for the possibility of either of these waste streams, the final characterization data does not support a fixed amount for either. There are no indicators present to suggest and Hazardous Waste, and only minor chemical data indicators that would suggest any potential for any Mixed Waste. Waste Management's conclusion is that Mixed Waste will not be an issue for this PRS based on the characterization data, but a few potential zones exist that will be further evaluated upon excavation (See Waste Management narrative, Section 13.3). If upon this evaluation, Mixed Waste is indeed present, costs for containerization, treatment, and disposal could be substantial. Including treatment and disposal, it is estimated to cost approximately \$1,700 per lcy to address Mixed Waste, thus if a 1,000 lcy were identified though further evaluation and analysis during excavation the cost would be approximately \$1.7 million. Schedule delays would hopefully be minimal with the use of additional manpower while the main excavations for LLW wastes continue in another location.

19.4 Subsurface Water

Site geological personnel have evaluated the existing well and boring data and have identified perched water in several areas within the fill as well as a general saturated zone along the bottom of the fill area. Pumping during excavation activities or within the active excavation will help as well as blending with drier soils in the contaminated areas for WAC requirements. This is the current plan to address the subsurface water issues. However, an uncertainty exists as to the actual groundwater flow characteristics of the fill area in general, fluctuations (if any) during storm events, as well as the amount of seepage that may be infiltrating from the side-slopes and its affects on the lower elevations of the excavations.

Mitigation of excessive waters may necessitate the installation of one or two small de-watering wells located in the lower center of the upper PRS area (the area scribed by the former building 29 parking lot) as well as an additional de-watering well located at the lower end of the PRS proper (Building 51 area). However, some areas of the fill zone are replaced silty clays and clays soils and as such their permeability

is very low and will reduced the effectiveness of pumping. It is possible that some of the groundwater investigative wells may be fitted with a submersible pump, but these wells were constructed for water analyses, not yield, and may not be a viable option. The costs for new de-watering wells are estimated at \$5,000 to 10,000 each depending on depth and diameter (including pump and lines), while the costs for conversion of existing wells would be much less. The schedule impact should be minimal assuming drier excavations are still present.

Another possible mitigation option for small area saturated soils excavation/hauling issues is to incorporate/blend an absorbent (such as Petrosorb) or similar product, that is used in the soil staging railcar loadout facility.

A third possibility for larger volume saturated soil conditions is the incorporation of a portable compression belt drying system. One limitation of this type of system is its susceptibility to damage by debris. One does exist on site, and if not being used at its current location, could be moved to the removal site and incorporated into the excavation and loading process. If this unit unavailable, the other option is to purchase another if warranted. Cost for a purchased unit is likely not less than a \$100,000.

Excessive subsurface water issues which prove to be uncontrolled by the above mitigation efforts could effect production rates and also increase the total volume of materials handled. Additional volumes cause by side-wall sloughing would be similar to section 19.2 at ~\$305 per lcy. Sloughing may have to be prevented with the installation of shoring along unstable saturated side areas. Shoring costs for this project are approximately \$35 a face foot for a large shoring system, maybe as high as \$45 a face foot for smaller systems.

If one assumes a 1,000 lcy increase upon discovering a problem area and adds the cost of shoring to mediate any additional waste being generated, costs for this uncertainty would be approximately \$305,000 for the additional waste and \$63,000 for a 75x20 foot shoring system. The total cost for this scenario, therefore would be approximately \$368,000. This scenario translates into a possibility of a 1 to 2 month increase in project duration.

As can be inferred from the above side-wall small quantity sloughing scenario, saturated side wall conditions could easily add substantial costs to the project. A 5,000 lcy scenario would amount to approximately a \$1.7 million increase.

19.5 Abnormal Weather

The schedule and estimates for this project included an average annualized weather delay of 23% above production rate driven durations. It is possible that some weather phenomenon outside of this allowance could manifest itself. Excessive delays for de-watering in the case of an extremely wet spring or fall, or while awaiting thaw from an excessively cold winter yielding frozen soils beyond the capabilities of the excavation and pumping equipment could add additional costs and delay the project. The estimated cost for either of these conditions is approximately \$4,900 per day in added duration, resulting in a two-month delay for either. Both combined would yield a 4-month delay amounting to a cost of \$436,000 (at 22 workdays/month).

19.6 Unknown and Unplanned Discoveries

While there has been a significant effort to review all historical process knowledge and an unprecedented level of effort to fully characterize this PRS area, there always remains the possibility of discovering items or contaminants not contained in the site's historical documentation, or identified in the characterization process. If manifested, these will be addressed in the most expedient and appropriate manner possible.

19.7 Uncertainty Resolution

For all aspects of the performance of this removal that either were not envisioned and thus planned, or are discovered in process, the project team will analyze the situation either in-house or by soliciting the appropriate knowledge from off-site (if necessary). The team will determine a mitigation and path forward, notify DOE and the regulators, and proceed with the project. It is anticipated that removal scope will still continue by adjusting the excavations and site activities as necessary.

SECTION III- PREREQUISITE ACTIVITIES

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20 Planning and Engineering

Planning and engineering for this removal action has been an ongoing and extensive process. The various technologies that may have been applicable to this PRS were researched and documented within the EE/CA process. Once the EE/CA process identified the most appropriate remedial approach, detailed planning and engineering efforts were accomplished resulting in the Action Memo and this Plan. Since this removal will require excavations greater than 20 feet in depth, OSHA requirements necessitate the excavation design be pre-planned and engineered by a Professional Civil Engineer including engineered shoring systems where necessary.

21 Historic Site Activities relating to PRS 66

Some activities that were part of the overall environmental restoration efforts included items that are not part of this removal action, but were in the vicinity of, or within the PRS footprint and addressed through other means. For example, the demolition of Buildings 29 and 98 was addressed through separate planning efforts and subsequent completion documents. This included various utilities that were either removed or de-energized and abandoned-in-place. Any remaining utilities that would affect this removal, will be relocated, demolished, or abandoned-in-place before the removal action is implemented.

22 Pre-Removal Site Preparation

In an effort to maintain schedule, some PRS site preparation activities received early authorization to proceed before the issuance of this removal work plan. These were accomplished under a different set of site documents, which are not part of this removal plan. Pre-removal action items prerequisite to the main removal including:

- 1) access and Security Controls (perimeter construction fencing, ropes, and signage); Erosion and Water Management Controls;
- 2) the removal and downsizing of Buildings 98 and 51 slabs and foundation walls;
- 3) the removal of the small Th-230 "hot-spot" (B234 0-5 ft); and,
- 4) the surveying in of various items necessary to the start of the removal activities, including shoring locations.

22.1 Installation of Shoring

Upon surveying the location(s) for shoring, the shoring systems will be installed by a qualified subcontracted firm per the design specified in the Shoring Plan. Excavations requiring shored boundaries may not proceed until the shoring system (soldier beams) are in place and the lagging (planks) are on site. As previously mentioned, shoring design drawings are included in Attachment B.

23 Other MCP Site Upgrade Projects Supporting the PRS Removal

In anticipation of the performance of this removal and other simultaneous activities, certain MCP site upgrades were implemented to increase the capacities of dependent functions outside of the scope of this Removal Action.

23.1 Haul Road / New MCP Access Road Construction

As discussed in the Traffic Flow / Routing and Hauler Release Plan above, the volume of materials to be transported to the MCP Site's rail spur load out facility as well as the amounts and types of other site traffic, necessitated a haul road Feasibility Study. As a result, the selected option was to dedicate a restricted access/use haul road using existing site roads. To accommodate access for MMCIC and others near the loadout facility, a new MCP Access Road was constructed tying the lower portion of the site with MMCIC newly constructed spine road.

23.2 Rail Spur and Load Out Facility Upgrade

Rail Spur and load out facility upgrades were also designed and planned to accommodate the volumes of this project as well as other concurrent ER and D&D activities. These upgrade activities are to be completed by others prior to the start of this removal's excavation.

SECTION IV - REMOVAL ACTION

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24 Removal Action

This section describes, in general, the beginning to end approach to this removal action. It incorporates the requirements of the above Radiological Control and Management Plan, the above Environmental Monitoring Plan, as well as the Waste Management Plan, all of which were provided by their respective subject matter experts for the specific arena. In addition, various specific field "Detailed Work Instructions / Work Packages", as required by MCP's Integrated Safety Management Procedure 1059A, are referenced and included in the attachments to this document.

As stated in the Work Scope (Section II, Paragraph 3.0) this removal is a multi-phased simultaneous excavation – verification – backfill process. This process is illustrated in the General Material and Logic Flow Chart further described in section 24.18.

24.1 Forms / Permits

The Project Superintendent or Project Engineer will facilitate the completion of all forms / permits prior to commencement of work pertaining to that permit. A copy of all completed paperwork will be kept with the project files and will be available at the work site for review. All required forms and permits are part of the Detailed Work Instructions/Work Packages included in the Appendices of this document.

24.2 Notifications

Notifications of various groups are necessary prior to commencement of fieldwork. The following groups have been integral to the work planning process or will be notified.

- Radiological Protection
- Environmental Compliance & Analytical Services
- Industrial Safety
- Industrial Hygiene
- Utilities Operations
- Security

- Fire Department
- Waste Management
- Authorization from Project Manager to start Fieldwork
- MMCIC

24.3 Kick off Meeting

An initial RA Kickoff Meeting involving all anticipated personnel will be held prior to the start of fieldwork. This initial Kick-off Meeting can be conducted by any or all of the senior project staff, i.e. Project Manager, Project Engineer, Project Superintendent as well as various staff from Rad Control, Health & Safety, EC&AS, Waste Management, and other involved groups. In addition, as described below, all individuals will be kept informed of the scope(s) of work to be performed and their role in the project through a series of Main Activity Pre-Job and Daily Pre-Job Safety Meetings (described in sections 24.7 and 24.8).

24.4 Mobilization

The following resources will be used and mobilized in preparation for this removal action:

24.4.1 Personnel

- Field personnel will be certified as having received required training.
- Field personnel will acknowledge having received and read the PRS 66 Work Package, HASP, and any other appropriate project documentation deemed necessary by the project team.
- All support personnel (Radiological Control, Waste Management and Industrial Hygiene; etc.) will be assigned to the task and made available as needed.

24.4.2 Equipment and Supplies

All major site heavy equipment not mobilized as part of the pre-removal activities (track excavators, front-end loaders, bulldozers, haulers, portable and project duration permanent sump pumps, hosing, connectors, generators, lighting units,

hand tools, etc) will be brought to the site and staged in the designated equipment staging area. Material storage containers will be used to store small equipment and supplies. These will be located initially per Figure 1 as appropriate, with relocation as directed by key project personnel as the removal proceeds. Some project equipment (i.e. compactor, hydro-seeding equipment etc.) will be mobilized at a later date. Where appropriate, and upon coordination with Waste Management, downsizing equipment will be staged either on-site or in the Soil Staging Load-out facility as required to prepare materials for waste acceptance.

24.4.3 Instrumentation

All necessary instrumentation required by Radiological Control, Health & Safety, and Industrial Hygiene will be procured and calibrated.

24.5 Removal Site Access Controls

Perimeter construction fencing will be installed during site pre-removal activities for the control of access to PRS removal action area. Ingress and egress will be limited to project, regulatory, or emergency personnel only.

24.6 Site Layout and Support Zones

The PRS and portions of the surrounding area will be laid out into several work and support areas. Some of these were performed as part of the pre-removal activities, but will be finalized for the activities associated with the removal proper. At a minimum, this will consist of:

- personnel support trailers
- equipment and material storage units
- clean heavy equipment laydown area
- contaminated heavy equipment laydown area
- the anticipated clean soils staging areas, waste management container area
- a RCRA or mixed temporary storage pad and containerization area
- a large debris downsizing area.

24.7 Main Activity Pre-Job Meetings

As the project advances, Main Activity Pre-job meetings will be held prior to the start of any new phase or appropriate activity at key times. In general, these will be presented by the Project Engineer, Coordinator, or Superintendent, and may include key personnel from other groups as warranted. As always, suggestions and safety concerns will be invited and addressed throughout the course of the project.

24.8 Daily Pre-Job Meeting(s)

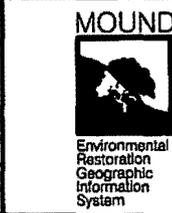
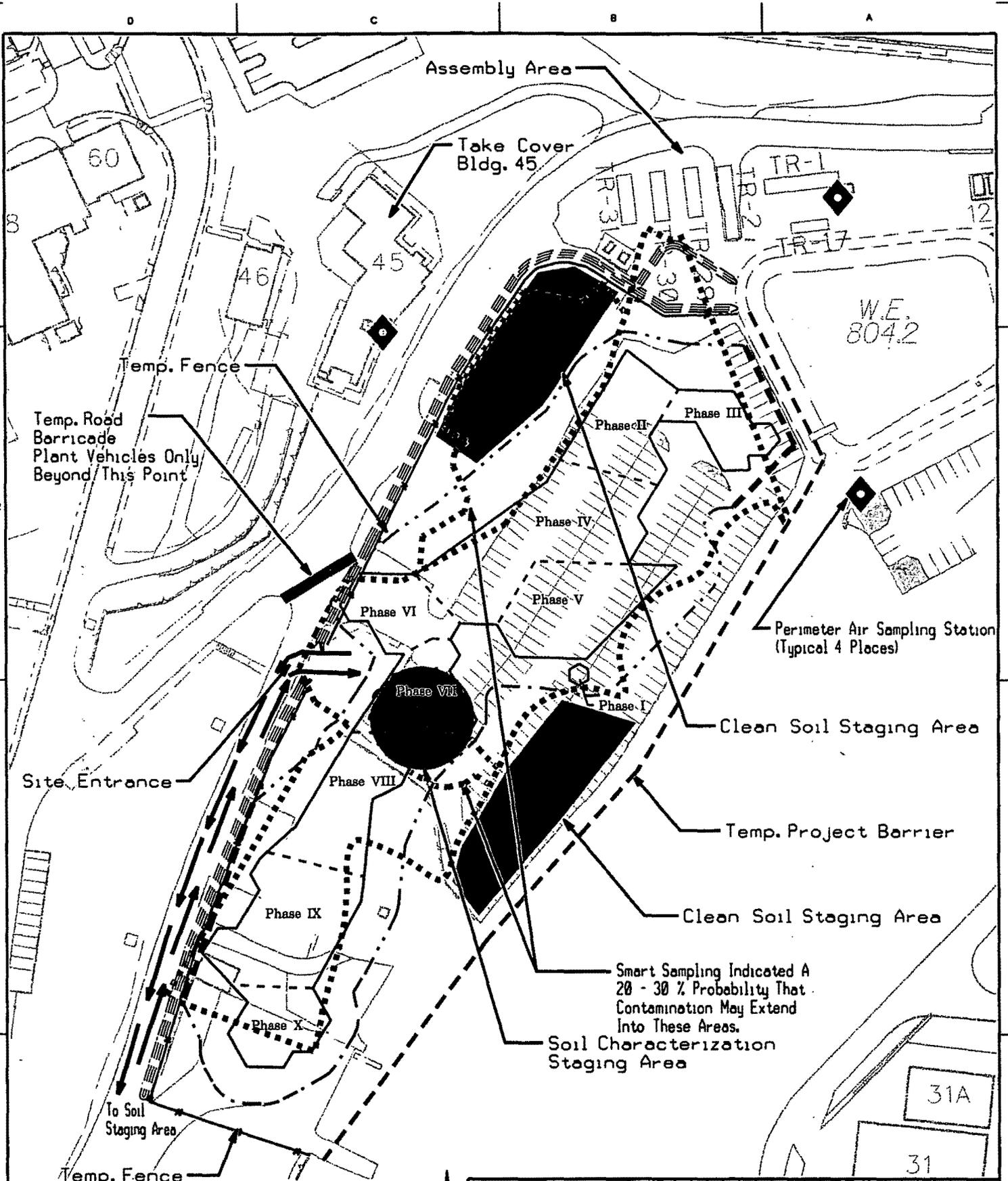
Prior to the start of each day's work activities, the project coordinator or superintendent shall hold a daily pre-job work and safety meeting/briefing tailored for the activities planned for that day. Special attention should be made to any upcoming weather conditions that warrant special attention at the end of the day's activities. Also, emphasis should be placed on the importance of pumping water out of the excavation as soon as reasonably practical to preclude any contamination migration or cross contamination with adjacent non-contaminated areas.

24.9 Installation of any Remaining Erosion Controls

All erosion, sediment, and water controls necessary for the start of this removal on the upper portion of the PRS (i.e. former Building 29 parking lot), will be installed as part of the pre-removal site preparation activities described in Section III. Erosion controls for the lower portion excavations will not need to be in place upon the start of the removal, but must be complete prior to removals associated with the PRS 66 Work Package Phases VIII through X.

24.10 Isolation of any Remaining Utilities

Although none are expected, any remaining utilities left over from the Building 29 and 98 D&D efforts and affecting or potentially affecting the performance of this removal, shall be checked for previous isolation and verified. If necessary, pursuant to site methodologies and protocols, site electricians and utility personnel shall isolate and abandon any and all affected utilities. Site electricians shall also remove the conductors (wires) of any abandoned electrical service.



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FIGURE 1
PRS 68
GENERAL SITE PLAN

| | | | | | | | | | |
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24.11 Removal of any Remaining Utilities

Although none is expected, any remaining aboveground utilities (isolated and removed as part of the D&D of buildings 29 and 98, shall be demolished using the appropriate heavy duty operators and equipment per directive of the project coordinator. Any associated debris generated shall be disposed of per the directive of Waste Management.

24.12 Surveying (Marking) Excavation Zones, and other Pertinent Locations

Each excavation zone and its anticipated associated slope back or respective shoring location will be surveyed in by site surveying personnel per the directive of the Project Engineer or the Site Coordinator. The initial boundaries (as defined by the characterization data) are presented in site layout illustration (Figure 1) and on the attached drawings.

24.13 Shoring Verification

Excavations requiring shored boundaries may not proceed until the shoring system (soldier beams) are in place and the lagging (planks) are on site. Initial soldier beams will have been in place as part of the pre-removal activity. However, lower end soldier beams may not be installed until later in the project's duration. All excavations requiring shoring per the Shoring Plan shall be verified as present and complete prior to the start of that excavation phase. An illustration of the shored locations is included in the site layout illustration (Figure 1). Design drawings are included in Attachment B.

24.14 Establishment of Radiological Control Zone(s)

Initial phase work zones using proper barricades and postings will be installed per the project's Radiological Control and Management Plan, the Radiological Work Permits, or as otherwise directed by Rad Control. As indicated previously, these boundaries will be periodically altered as necessary during the various phases as the excavation(s) proceeds.

24.15 Dust Control

The PRS 66 Removal Project will meet the substantive requirements of OAC 3745-31-05 by utilizing the air monitoring practices consistent with past soil removal projects conducted on the site. The goal of the project will be to provide in-field water misting during excavation and loading of haulers and roadway watering to minimize dust during hauling waste to the Soil Staging Area to eliminate all airborne dust at all time during the project. Other dust control measures will be in place in action throughout the duration of this removal if it is determined that visible dust still exists. These measures may include a portable misting cannon apparatus, as well as conventional surface wetting through the use of a spray/drip boom, as necessary.

24.16 Precision Excavation

This removal action is to be performed using precision excavation techniques developed during the planning and approach design phase. Based on extensive characterization data, various radiological or waste management issues, and overall size, the total excavation was divided into 10 phased excavation/rad control areas as shown in Figure 1. Detailed drawings for these phases at 5 foot intervals for the entire removal are presented in Appendix G of the PRS 66 Work Package (Detailed Work Instructions) included as Attachment A of this document.

In general, each phase will involve four major excavation actions performed in 5-foot lifts where appropriate. The first is the removal of the predefined contaminant zones to an elevation conforming to the depths suggested by the characterization data. The second, performed simultaneously with either the overburden or the contaminated excavation actions, is the removal and (if appropriate) scanning of the adjacent slopeback areas to an elevation conforming to the requirements of the adjacent excavation actions. The third will be the removal and scanning of all identified clean overburden to a depth no greater than 2 ft above any identified contamination zone below it. The fourth is a final bottom screening / excavation scenario where the removal is taken to an elevation which exhibits, upon screening, no elevated activity above the PRS Cleanup Objectives.

When a sufficient portion of a clean bottom is achieved the area will enter into verification mode and verification samples collected. Upon receipt of sample results indicating the Cleanup Objectives have been met and verified, backfill of the clean portion will begin. The actual phasing will be accomplished seamlessly while transitioning from phase to phase and will be dependent on field conditions. Site personnel will determine the phase transitioning in the field.

Abandoned-in-place underground utilities, concrete footers and pylons will be removed as part of the excavation sequence with their debris status being addressed per the Debris Management Plan.

The following sections briefly describe the anticipated phases and should be used in tandem with the Excavation Plan Set drawings (Appendix G of Attachment A). Detailed Work Instructions for each of these phases were developed per the site's ISM program as presented in PP 1059A. Precautions and Special instructions will address areas containing potential hazardous or mixed waste within the PRS 66 Work Package instructions. Unusual or unanticipated conditions (if any) will be addressed by the project team as they are uncovered, and are further discussed in the Uncertainties Analyses section of this document.

24.16.1 Contaminated Excavation Decision Rules

The following decision rules will be applied by the field team:

Decision Rule #1: All soil and fill within a previously determined contaminant zone will be excavated in 5 foot lifts and hauled to the loadout facility without field screening except as necessary for Rad Control and H&S needs. Upon reaching the bottom of the previously defined contaminant zone, excavation will continue until field screening indicate the surface radiological activities are low enough (i.e. suggesting below cleanup objectives) to implement Decision Rule Number 2.

Decision Rule #2: Upon reaching field screening readings indicative of a clean bottom on an area of sufficient size to implement a phased verification and backfill activity, pre-verification samples will be taken and analyzed for the COCs specified within the VSAP for the phase. All Pre-verification analyses will be

performed by the on-site Soil Screening Facility. Any sample location where the Cleanup Objective is not reached will be further excavated following Decision Rule 1 with subsequent pre-verification re-sampling per this Decision Rule.

Decision Rule #3: Upon reaching clean bottom as confirmed by the pre-verification sample analyses on the area selected in Decision Rule #2, final verification samples will be collected and analyzed for the COCs specified in the VSAP for the phase. If any location still shows levels above the Cleanup Objective for a COC, the excavation will be continued at that location following Decision Rules 1, and repeating Decisions 2 and 3.

Decision Rule #4: For the area selected for verification above and upon receiving verified approved laboratory analyses (from Decision Rule 3) per the VSAP), as well as permission to backfill (i.e. an "approved clean bottom"), backfilling activities can start for that area.

24.16.2 Clean Overburden Excavation Decision Rules

Decision Rule #5: After contaminated soil is removed within a 5-foot lift, any contaminated/non-contaminated interface areas (areas with higher potential for contamination) will be scanned using a NaI or FIDLER prior to removing clean soil adjacent to that area. If a significant detection above background is identified during the scan, then the area will be further excavated. If the area is just slightly over background, a sample will be taken and analyzed by gamma spec prior to removing the soil and placing it in a potentially clean 20 cubic yard pile.

Once its confirmed that the overburden soil is non-contaminated, excavation will proceed in 5-foot lifts until the depth of the defined zone is achieved (2 ft above any contaminant zone). Field screening will be utilized by scanning in small interim piles or series of bucket dumps (up to 20 loose cubic yards per pile or series) of excavated material prior to loading. If any part of the pile or series (or segmentable portion of the pile) indicates activities that would be indicative of radiological contaminants above the Cleanup Objectives, the material for that pile shall be considered contaminated and shipped as waste.

24.16.3 Clean Overburden and Slopeback Areas Debris Decision Rules

Decision Rule #6: Non-backfillable debris within the clean overburden soils that are not realistically segmentable will also cause the pile or series (or segmentable portion thereof) to be considered waste.

Decision Rule #7: Segmented debris from the clean overburden or slopeback areas that is non-backfillable per the Debris Management Plan will be handled as waste.

24.17 Ongoing Verification Sampling and Analyses

As mentioned previously, this removal action deviates from the classical MCP soil excavation removal process. Verification will not be a separate activity at the conclusion of all excavation as it has in the past. Due to the size and depth of this removal, it will be beneficial to verify on an ongoing basis as the various phases or portions of phases have their known contaminated media(s) removed.

24.17.1 Field Pre-verification

Once field screening has indicated a clean bottom area of sufficient size has been achieved (Decision Rule #1), sampling personnel will collect on-site pre-verification samples at the grid locations specified for the final verification sampling. These samples will be analyzed at on-site Soil Screening Facility. Using Decision Rule #2, any affected location that does not indicate the Cleanup Objective(s) are met, will be further excavated and the field screening and pre-verification processes repeated until Decision Rule #2 has been met.

24.17.2 Verification Sampling

Upon meeting Decision Rule 2, verification per the requirements of the VSAP will be performed on the specific phase or suitably defined area. Each phase will have specific sampling criteria and analyses specified and collected. Using Decision Rule 3, any specific location that does not indicate the Cleanup Objectives have been met, will have additional excavation performed and Decision Rules 1 through 3 repeated.

24.18 Material and Logic Flow Chart

Figure 2, found on Page 55 illustrates the processes described above, and provides an overview of the logic applied.

24.19 Excavation Phases

24.19.1 Phase I

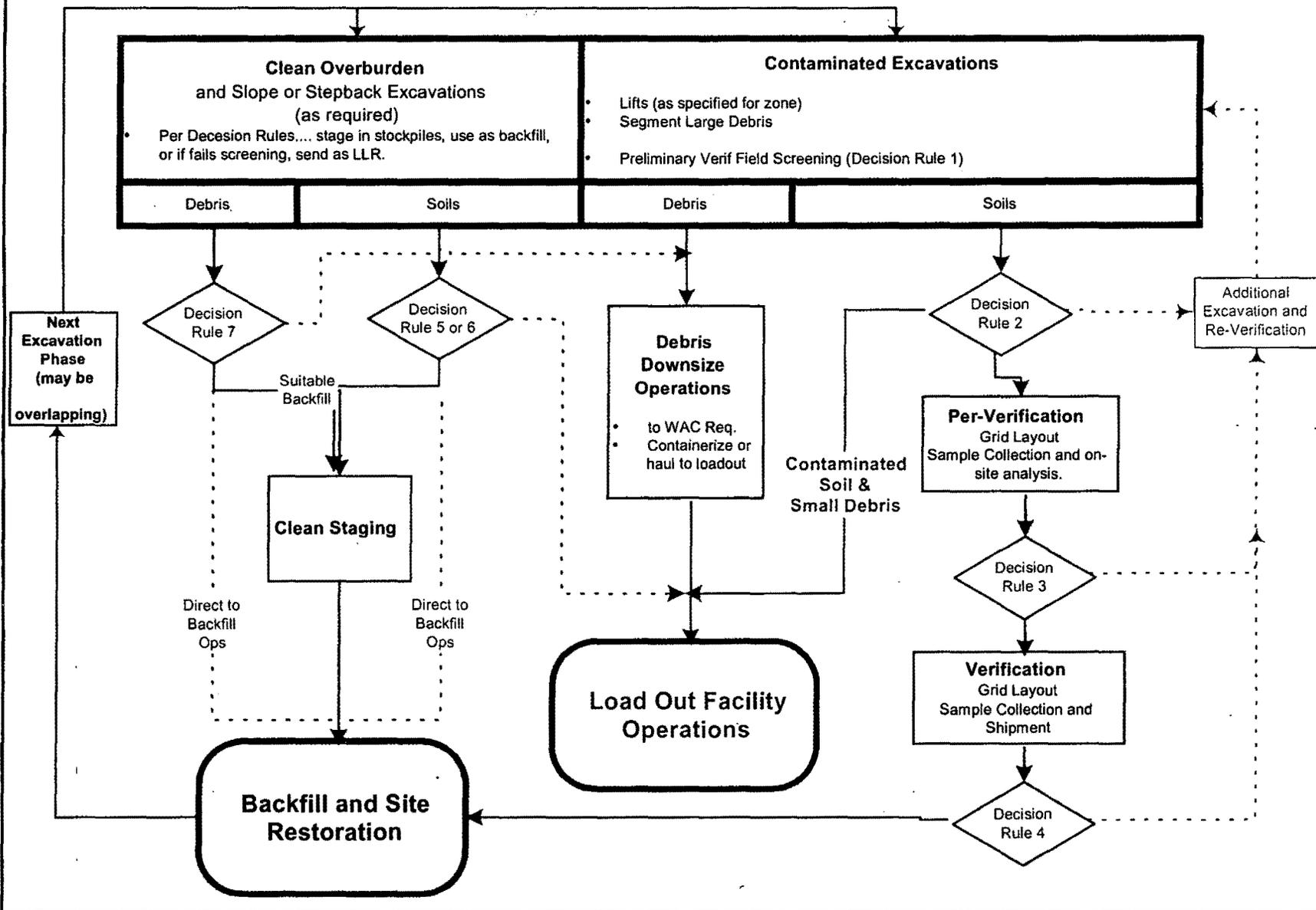
Phase I was initially excavated as part of the pre-removal activities described in section 22. It consisted of a small shallow (5-ft) thorium-230 contamination zone located along the east central edge of the PRS. Upon completing the excavation, the hole was to be roped off and tarped awaiting the VSAP approval or until DOE and the regulators concur with its verification. Upon verification, backfill and site restoration for this phase was to proceed.

During the excavation, an alpha spectroscopy analysis was conducted on the all of the samples from the adjacent boreholes and the depths of the location itself, which had previously been analyzed through Gamma Spectroscopy. This was required to verify that the one elevated gamma spectroscopy result that initiated the excavation was the only Th-230 result above the 2.8 pCi/g results, since this phase was being viewed as containing Th-230 as a COC. The alpha spectroscopy analysis revealed that contaminated levels were above 2.8 pCi/g existed in the same location as well as within a 0-5 foot borehole location northwest of the location. All other samples were below the Th-230 CO.

Upon completing the initial excavation and realizing that additional excavation was required, OEPA/USEPA/DOE concurred that the hole was roped off and tarped awaiting the removal relocation of the 36-inch storm sewer immediately below the location to facilitate the additional removal down to 15 feet. Once resumed, the additional 10 feet and the adjacent 5-foot location will be removed.

Upon final verification, backfill will be placed in lifts, and compacted until reaching 6 inches below the surrounding asphalt. The final 6 inches will be a layer of crushed gravel to allow the area to be used as part of the site's support zone.

**Figure 2
General Material and Logic Flow Chart**



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24.19.2 Phase II

Phase II is located in the northwestern corner of the PRS and is the upper end of the area identified in the EE/CA as Area II. The western edge of this phase has contamination just under the surface while the eastern edge exhibits clean overburden to a depth of 15 feet (clean excavation to 13 feet, allowing a 2 foot buffer to the contaminated zone below it). Radiological contaminant zones run to a depth of 15 feet on the northern end and to a depth of 30 feet in the midsection.

An abandoned-in-place 8" sanitary sewer (approximately 10 feet below the surface) will run across from west to east on the northern portion of this phase. In the northwestern corner lie the remnants of an abandoned septic system and drain field. The western edge slopebacks will encounter abandoned-in-place electrical duct banks (wires to have been previously pulled). In addition, an abandoned-in-place 10" storm sewer transects the southwestern corner at approximately 10 feet below the surface. All materials encountered from these abandoned utilities will become part of the debris portion of the PRS waste stream(s). As part of the Detailed Work Instructions, the status of these utilities shall be verified before excavation can begin.

24.19.3 Phase III

Phase III consists of a relatively deep contaminant area located in the northeast corner of the PRS. This phase will consist of a significant amount of clean overburden to a maximum depth of 20 feet (clean excavation to 18 feet, allowing a 2-foot buffer to the contaminated zone below it). Radiological contaminated zones below this extend to a maximum of 25 feet and will likely encounter the old ravine side-slopes. Slopebacks for this phase will also be significant.

Approximately 150 feet of shoring will be necessary along the sides on the northeast side corner to protect the integrity of the asphalt line retention basin and some of its underground discharge lines. In addition to the excavation activities for this phase, a segment of a necessary storm sewer will have to be removed.

While this phase is in operation and until it can be verified and backfilled, two temporary pumping stations will be in place to pump storm water around this phase. Once backfilling has reached the appropriate elevation, the storm sewer line will be reconstructed and placed back into service. See Utility Reroute drawings presented in Appendix G of the PRS 66 Work Package (Detailed Work Instructions) included as Attachment A of this document.

24.19.4 Phase IV

Phase IV is one of the larger phases of the removal and encompasses a large area in the west central portion of the existing parking lot. Phase IV encompasses the main subsurface anomaly identified during the geophysical investigations. Only a small amount of clean overburden is present in the northern end of the phase while contaminated media (principally thorium-232) is located throughout the balance to a depth of 35 feet at one location. The majority of the contamination for this phase will have been removed by the 25 foot depth interval with two smaller depressions reaching a depth of 30 and 35 feet respectively. Caissons from the former firehouse (Building 98) will be encountered in the slopeback area and will also require removal. Abandoned-in-place utilities for this phase are primarily located along the western side of this phase both within the primary excavation zone as well as in the slopeback areas. These consist of an 8" storm sewer, a 12" storm sewer, a 3" drinking water line, a fire alarm signal wire, and several electrical duck banks.

24.19.5 Phase V

Phase V is an area adjacent to IV and represents a differing phase due to the plutonium contaminants. Radiological analyses in this area show significant detections of Pu-238. Due to difficulties in detecting Pu-238 by field instruments, this phase will incorporate a small amount of additional sampling and monitoring to achieve a clean bottom. This area also has indicators of the potential for mixed waste. Additional information for mixed waste approaches and handling is presented in the Radiological Controls and Waste Management sections of this document.

Most of this phase is overburdened with approximately 15 feet of clean media (clean excavation to 13 feet with a 2 foot buffer), with the contaminated zone proceeding to a maximum anticipated depth of 40 feet. Although there are no utilities located within this excavation zone, there is a 36" abandoned-in-place storm sewer and an 8" abandoned-in-place sanitary sewer along the eastern side that will be encountered within the slopeback area.

24.19.6 Phase VI

Phase VI is a shallow 15 foot maximum excavation in the original PRS 80 footprint adjacent to west edge of the PRS in what is now the drive access to the existing parking lot (south of the former Building 98 footprint). This phase involves higher levels of actinium-227 and thorium-232 and will require a separate Radiological Work Permit due to it having different radiological control requirements.

Many of the same utilities encountered in Phase IV may also be encountered within the excavation zones of this phase depending on their depths. In addition, there will be large 36" abandoned-in-place storm sewer oriented across the PRS and tying into the main eastern side 36/48" storm sewer previously mentioned. This storm sewer is relatively shallow at 5 feet.

24.19.7 Phase VII

Phase VII is a transitional phase between the upper PRS main areas of excavation and the lower PRS areas of excavation and picks up some scattered isolated zones of Th-232 contamination just over the Cleanup Objectives. Most of the contamination in this phase is in the upper 5 feet, however one area around B264 has contaminants to 20 feet.

A large 36" abandoned-in-place storm sewer oriented across the PRS and tying into the main eastern side 36/48" storm sewer previously mentioned will be encountered. This storm sewer is relatively shallow at 5 feet.

24.19.8 Phase VIII

Phase VIII is the northern portion of the lower section of the PRS. Clean overburden in this phase only 5 feet (clean excavation to 3 feet with 2 foot buffer), followed by approximately 15 feet of contaminated media (17 feet with the buffer) reaching a maximum depth of 20 feet.

Utilities in this phase are reasonably extensive along the western side and across the lower portion where a main utility run has existed feeding the SMPP Hill. All underground utilities will have been abandoned-in-place, and any above ground utilities shall have been removed. Any necessary utilities will have been rerouted as necessary so as not to interfere with the removal activities (as part of pre-removal activities). Shoring will be installed running south beginning in the southwest corner.

24.19.9 Phase IX

Phase IX represents the central area of the lower section of the PRS. Clean overburden resides to a depth of 5 feet along the western edge progressing to a depth of approximately 15 feet along to eastern edge (excavations to 3 and 13 feet with buffer, respectively). Contaminated media begins at the surface on the southwestern corner and proceeds to a depth of approximately 30 feet. An abandoned 48" storm sewer (approximately 10 feet in depth) will be encountered along the eastern slopebacks. Shoring will be maintained along the western edge. As encountered, Building 51 caissons will be removed and downsized during the excavation.

24.19.10 Phase X

Phase X is the lower most and last phase of the RA. Only approximately 5 feet of clean overburden is present (clean excavation to 3 feet with buffer) with the contaminated media below it extending to a depth of 20 feet at its deepest point. As with Phase IX, an abandoned 48" storm sewer (approximately 10 feet in depth) will be encountered along the eastern slopebacks and the shoring system shall be maintained along the western edge.

24.20 Decontamination of Equipment

Decontamination of site equipment will be performed within the PRSs decontamination bay or inside a designated contamination area using high-pressure washers. Following the wash-down, a radiological survey of the equipment will be performed and, if possible, released according to the site's Radiological Control procedures. Decontamination water will be collected and either processed or handled as waste.

24.21 Site Restoration

24.21.1 Backfill of Excavated Areas

Since this is a progressive but simultaneous removal action, upon receiving verification, the verified area will be backfilled using clean overburden of either previously staged materials, current excavation material from another clean excavation zone, other MCP site materials, or purchased backfill materials as previously discussed. Back-fill operations shall be performed in lifts and compacted per the engineering specs as specified by the project's Civil Engineer.

Upon completion of back-filling a zone, the area may be incorporated into the project's support zones or fertilized and seeded as specified by the Project Engineer or the Site Coordinator. If not used as a graveled project support zone, suitable temporary ground cover may be used to prevent sheet or gully erosion while vegetative cover is under establishment. As an added precaution, silt fence may be installed per the project's Environmental Safeguards and Compliance Point of Contact directive to prevent sediment runoff.

24.21.2 Final Grading and Surface Restoration

Final grading and surface restoration is limited to re-establishing a suitable grade, adding topsoil and the establishment of a permanent vegetative cover.

24.21.3 Pre-Removal Action Parking Lot

At this time, no provision for the replacement of the existing parking lot (Building 29/98 Lot) is provided.

24.21.4 Road Repair

Roadway sections needing repair as a result of this removal action will be repaired or replaced as necessary.

25 Post-Job Conference

At the conclusion of fieldwork, all project members will attend a Post-Job Conference. The Project Superintendent will conduct this meeting. This will be an opportunity to discuss what went right and what went wrong during the course of the project. "Lessons Learned" will be captured and documented for use in future projects.

SECTION V – ATTACHMENTS

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**Attachment A – PRS 66 Work Package
(Detailed Work Instructions)**

PRS 66

(Including PRS 80/40)

Removal Work Package

FINAL

January 2003



**Department of Energy
Miamisburg Closure Project**



BWXT of Ohio, Inc.

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PRS 66 Removal Work Package

WORK PACKAGE / PRELIMINARY HAZARD ANALYSIS

The Project Engineer is responsible for completing Sections 1 through 10. On subcontractor projects, the subcontractor shall complete sections 6, 9, and 10.

1. WORK PACKAGE TITLE: PRS 66 REMOVAL WORK PACKAGE

2. WORK PACKAGE NUMBER: ER/ST-02-008

3. WORK PACKAGE SCOPE:

The scope of this PRS 66 work package is as follows: establish site controls and mobilization of the project team/equipment, identify utility removal/constraints for each work phase, removal/disposal of contaminated soils, sampling/verification of excavated areas, and backfilling/grading/vegetating the area. This work involves the removal of 40,600 cubic yards of contaminated soil for disposal away from the Miamisburg Closure Project (MCP). Utility and soil removal will be done in phases (Phase II through Phase X). The work package for Phase I was submitted previously (ER/ST-02-007). The Cleanup Objectives for the project are: Actinium-227 @ 4.61 pCi/g, Cesium-137 @ 3.82 pCi/g, Plutonium-238 @ 55.0 pCi/g, Radium-226 @ 2.9 pCi/g, and Thorium-232 @ 2.1 pCi/g. The "end state" of the area will be to backfill to existing topographical contours and vegetate to prevent soil erosion.

4. WORK PACKAGE PHASES:

1. Mobilization/Site Preparations
2. Utility Isolation/Relocations & Retaining Structures
3. Phase II Area Removal
4. Phase III Area Removal
5. Phase IV Area Removal
6. Phase V Area Removal
7. Phase VI Area Removal
8. Phase VII Area Removal
9. Phase VIII Area Removal
10. Phase IX Area Removal
11. Phase X Area Removal
12. Project Closeout

5. WORK LOCATION:

Building #: N/A

Room #: N/A

Other: PRS 66 (Former Building 29
Parking Lot)

6. SPECIAL MATERIALS AND EQUIPMENT:

1. Excavators
2. Haulers
3. Shear
4. Hoe-Ram
5. Front End Loader

Insert the proper sequence of Work Package phases for the job. A phase is a separately definable portion of the project.

7. DETAILED WORK STEPS:

1.0 Mobilization / Site Preparations (Steps may be performed in any sequence)

1.1 Personnel

- 1.1.1 Verify that field personnel have required training.
- 1.1.2 Verify that the Work Package has been signed and read by the assigned field personnel.
- 1.1.3 Notify support personnel (i.e. Radiological Operations) to be available as needed.

1.2 Equipment

- 1.2.1 Procure all equipment pertinent to the work scope (e.g. backhoes, front-end loaders, shears, concrete ram, dump trucks, hand tools, drill rigs, portable sump pumps, hosing, connectors, and generators) for use on this project.

1.3 Instrumentation

- 1.3.1 Secure and calibrate all necessary instrumentation required by the Radiation Work Permit (RWP).

1.4 Gondola Railcars

- 1.4.1 Communicate to Waste Management the projected volumes so that sufficient gondola railcars will be secured for use during the concrete removal and soil excavation activities.

NOTE: Approximately 525 cars will be required assuming 40,000 yd³ of waste will be excavated (accounts for soil swelling) and 90 tons per car.

7. DETAILED WORK STEPS (CONTINUED):

1.5 Permits

- 1.5.1 Initiate, approve, and have available at the work site all permits such as the RWP, excavation / digging permit, and HASP requirements.
- 1.5.2 Verify NESHAP's approval from USEPA or DOE prior to start of excavation.

1.6 Personal Protective Equipment

- 1.6.1 Secure and ensure that all PPE, as specified by the HASP and the RWP, will be available and in proper working order.

1.7 Soils/Rail Staging Area Activity Categorization

- 1.7.1 Ensure that an activity radiological hazard categorization, as required by 10CFR830 implementation, has been performed for the removal and rail staging area per MLM-3849.

1.8 Health and Safety Requirements

- 1.8.1 Ensure that all personnel conform to the training and qualification requirements of the Work Package.
- 1.8.2 Ensure that various types of safety equipment that will be used are inspected and are in compliance with regulations.
- 1.8.3 Barricade the excavation control zone areas, including the decontamination area, to restrict access during excavation and removal of the contaminated soils. See PRS 66 Figure # 2, General Site with Excavation Phases.
- 1.8.4 Secure and have available all air monitoring equipment and radiation instruments that will be used as specified in the RWP, or other documents, as determined by Mound Radiological Operations.

1.9 Initial Site Survey and Utility Locations/Restrictions.

- 1.9.1 Survey the proposed location for the removal action to determine the location of overhead, surface, and location and depth of subsurface utilities. **See utility details in section 2.0**

1.10 Staging Areas

- 1.10.1 Prepare the staging area that will be utilized to store miscellaneous equipment, heavy equipment, and hand tools during the removal action adjacent to the PRS 66 boundary.

1.11 Field Sampling Area/Trailer

NOTE: No field trailer will be located at the specific removal sites; the PRS 66 Field Trailer located north of the Building 61 pond will be utilized.

- 1.11.1 Locate the sampling Sealand, if available, within the control zone, at the direction of the Job Supervisor and the Radiological POC.

1.12 Storm Water Provisions

- 1.12.1 Insure berm, drainage ditch and sump installations are complete from "PRS 66 SITE PREPARATIONS AND INITIAL REMOVAL ACTIVITIES" Work Package.
- 1.12.2 Install temporary berms or use sandbags as necessary to prevent run-on into excavation areas.
- 1.12.3 Temporarily install fabric and other silt prevention measures over the current drain in the parking lot until soils are stabilized.
- 1.12.4 Install silt fence down-gradient of excavation areas per the guidance of the EC&AS POC until soils are stabilized.

NOTE: The site EC&AS POC has the authority to deviate from the planned approach should the need arise to add additional erosion control measures.

1.13 Clearing

- 1.13.1 Clear the area as required to facilitate the soil removal actions.

PRS 66 Removal Work Package

6. DETAILED WORK STEPS (CONTINUED):

1.14 Dust Control

- 1.14.1 Dust will be controlled during excavation and loading with misted water, as required to assure no visible fugitive dust. A self-contained unit, with water holding tank, gasoline motor and pump, and fine mist spray nozzles may be used to spray the area during soil handling. Use of the nearby potable water hydrant is permissible if a back-flow preventer is incorporated at the takeoff to protect the potable water system. Roadways will also be watered to assure no visible fugitive dust during movement to the Railroad Soils Staging Area. Haulers will be covered when transporting contaminated soil to the Railroad Soils Staging Area.

2.0 Utility Isolation / Relocations & Retaining Structures

General Note: See PRS 66 Work Plan Figure # 1, Site Utilities

2.1 Phase II Area

- 2.1.1 Electrical – The electrical ductbank on the western border of the area must be de-energized before digging can start. All electrical feeds are to be disconnected and cabling removed from the ducts prior to any digging activities. **VERIFY THIS HAS BEEN DONE.**
- 2.1.2 ADP - The ADP ductbank on the western border of the area must be de-activated before digging can start. All ADP feeds are to be disconnected and cabling removed from the ducts prior to any digging activities. **VERIFY THIS HAS BEEN DONE.**
- 2.1.3 Telephone signal - No signal lines affect the digging or layback area.
- 2.1.4 Sanitary Sewer - A new sanitary drain line will be installed by "others" in the roadway which will receive the sanitary waste generated from the Building 45 area. Upon completion of this line, the 8" vitrified clay lines running on the north and west sides of the dig site will be abandoned in place. **VERIFY THIS HAS BEEN DONE.**

NOTE: If the new line is not installed, the project engineer may approve an appropriate "work around" solution.

- 2.1.5 Storm Sewer - A 10" vitrified clay line is located in the southwest corner of the dig site. This line served the run-off from Building 29. This line is currently not in service and abandoned. **VERIFY THE BERM, DRAINAGE DITCH AND SUMP INSTALLATION FROM "PRS 66 SITE PREPARATIONS AND INITIAL REMOVAL ACTIVITIES" WORK PACKAGE HAS BEEN DONE.**
- 2.1.6 Retaining Structure - No retaining structures are required for this area.
- 2.1.7 Miscellaneous - Abandoned utility stanchions run on the western edge of the dig and lay back site. The pipes and stanchions have been removed but concrete supports below grade may be encountered. An abandoned septic tank and leachfield is located on the west side of the area. If liquids or drainage is encountered during excavation, the job superintendent and EC&AS POC shall be notified for possible samples.

2.2 Phase III Area

- 2.2.1 Electrical – A set of overhead electrical lines originally passed over the north end of the area. All of these lines should have been re-routed (new high voltage feed for F-substation and new electrical feed to sampler at the pond outfall). **VERIFY NO OVERHEAD LINES EXIST.**
- 2.2.2 ADP - No ADP lines affect the digging or layback area.
- 2.2.3 Telephone signal - A set of telephone wires was suspended on the pole line, which carried the high voltage electrical lines. **VERIFY THIS LINE WAS REMOVED WITH THE HIGH VOLTAGE LINES.**
- 2.2.4 Sanitary Sewer - A new sanitary drain line will be installed by "others" in the roadway which will receive the sanitary waste generated from the Building 45 area. Upon completion of this line, the manhole and 8" vitrified clay line, running through the dig site, will be abandoned in place. **VERIFY NEW SANITARY LINE IS COMPLETE AND FUNCTIONING.**
- 2.2.5 Storm Sewer - A 30" reinforced concrete line is located in the north side of the dig site. This line will be removed with the excavation of the area. **Work around:** A set of pumps will be placed in the manhole near the backside of the F substation and in a manhole near the gas pumps.

7. DETAILED WORK STEPS (CONTINUED):

The temporary discharge lines from these manholes will go around the new retaining wall to the manhole at the northeast corner of the parking lot. These installations will be identical to the parking lot sump installation in the "PRS 66 SITE PREPARATIONS AND INTIAL REMOVAL ACTIVITIES" WORK PACKAGE. Upon completion of the excavation work, sampling, and backfilling; the 30" line will be re-installed by "others". VERIFY "WORK AROUND" PUMP STATION IS FUNCTIONING.

2.2.6 Retaining Structure- A new retaining structure must be installed on the north and east sides of the area. This involves the installation of "soldier pilings" at intervals of 8 feet by "others". As the area is excavated, 4.5" thick wood lagging walls are placed between the "soldier pilings". This provides the required support to stabilize the soil outside of the excavation area. The maximum height of the retaining wall is 20 feet. See civil/structural engineer for specific instructions for lag wall attachment to soldier pilings.

2.2.7 Miscellaneous - No miscellaneous items affect the digging or lay back area.

2.3 Phase IV Area

2.3.1 Electrical - The electrical ductbank on the western border of the area was disconnected and verified during Phase II.

2.3.2 ADP - The ADP ductbank on the western border of the area was disconnected and verified during Phase II.

2.3.3 Telephone signal - No signal lines affect the digging or layback area.

2.3.4 Sanitary Sewer - No sanitary sewer lines affect the digging or layback area.

2.3.5 Storm Sewer -The storm sewer lines (10" &12") and the drain located in the parking lot are to be abandoned in place. An 8" PVC line runs along the western edge of the dig and lay back site. This line is abandoned.

2.3.6 Retaining Structure- No retaining structures are required in this area.

2.3.7 Drinking water- A 3" cast iron pipe drinking water line enters the lay back area and turns south. This line is "abandoned" but needs a blank installed at the shut-off valve.

2.3.8 Miscellaneous- An abandoned utility stanchion run on the western edge of the dig and lay back site. The pipes and stanchions have been removed but concrete supports below grade may be encountered.

2.4 Phase V Area

2.4.1 Electrical - No electrical items affect the digging or layback area.

2.4.2 ADP - No ADP lines affect the digging or layback area.

2.4.3 Telephone signal - No signal lines affect the digging or layback area.

2.4.4 Sanitary Sewer - A new sanitary drain line will be installed by "others" on the east side of the site. This is an 8" line reroute from the manhole near the asphalt retention pond to the manhole near Building 22. Upon completion of this line, the 8" vitrified clay line running through the layback area will be abandoned in place. VERIFY NEW SANITARY LINE IS COMPLETE AND FUNCTIONING.

2.4.5 Storm Sewer - A new storm sewer line will be installed by "others" on the east side of the site. This is a 36"/48" line reroute from the manhole near the asphalt retention pond to the manhole near Building 22. Upon completion of this line, the 36" and 48" corrugated metal pipe running through the layback area will be abandoned in place. VERIFY: The new storm sewer line is installed and functioning prior to any digging activities. NOTE: If the new line is not installed, the project engineer may approve an appropriate "work around" solution.

2.4.6 Retaining Structure- No retaining structures are required in this area.

2.4.7 Miscellaneous- No miscellaneous items affect the digging or lay back area.

2.5 Phase VI Area

2.5.1 Electrical - The electrical ductbank on the eastern border of the area was disconnected during Phase II.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

- 2.5.2 ADP - The ADP ductbank on the eastern border of the area was disconnected during Phase II. A signal line duct on the western edge of the dig site is abandoned.
- 2.5.3 Telephone signal - No signal lines affect the digging or layback area.
- 2.5.4 Sanitary Sewer - No sanitary sewer lines affect the digging or layback area.
- 2.5.5 Storm Sewer - A new storm sewer line will be installed by "others" in the roadway that receives the storm water generated from the Building 45 area. VERIFY: The new storm sewer line is installed and functioning prior to digging in the area. Upon completion of this line, the storm sewer lines (33", 36", 8" & 12") and the drain located in the parking lot are to be abandoned.
- 2.5.6 Retaining Structure - No retaining structures are required in this area.
- 2.5.7 Drinking water - A 3" cast iron pipe drinking water line passes through the dig site. This line is "abandoned".
- 2.5.8 Miscellaneous - An abandoned utility stanchion runs through the dig site. The pipes and stanchions have been removed but concrete supports below grade may be encountered.

2.6 Phase VII Area

- 2.6.1 Electrical - The electrical ductbank on the western border of the area was disconnected and verified during Phase II.
- 2.6.2 ADP - The ADP ductbank on the western border of the area was disconnected and verified during Phase II.
- 2.6.3 Telephone signal - No signal lines affect the digging or layback area.
- 2.6.4 Sanitary Sewer - No sanitary sewer lines affect the digging or layback area.
- 2.6.5 Storm Sewer - The storm sewer line (36") located in the parking lot are to be abandoned. A 3" line runs along the western edge of the dig and lay back site. This line is abandoned.
- 2.6.6 Retaining Structure - No retaining structures are required in this area.
- 2.6.7 Drinking water - A 3" cast iron pipe drinking water line passes through the dig site. This line is "abandoned".
- 2.6.8 Miscellaneous - An abandoned utility stanchion runs along the western edge of the lay back site. The remaining pipes and stanchions must be removed prior digging in the area. Pipe insulation needs to be checked for asbestos.

2.7 Phase VIII Area

- 2.7.1 Electrical - The electrical ductbank on the western border of the area was disconnected and verified during Phase II. Verify electrical in manhole has been disconnected and cabling removed. The electrical in the ductbank leading toward SM/PP should be disconnected and cabling removed. Verify cable removal. A set of overhead electrical lines originally passed over the area. All of these lines should be removed (new high voltage feed for F-substation and removal of SM/PP high voltage feeder). The street light circuit will be removed from service. VERIFY NO OVERHEAD LINES EXIST.
- 2.7.2 ADP - The ADP ductbank on the western border of the area was disconnected and verified during Phase II. Verify ADP in manhole has been disconnected and cabling removed. The ADP in the ductbank leading toward SM/PP should be disconnected and cabling removed.
- 2.7.3 Telephone signal - Three primary cables to the SM/PP hill to be removed from power poles. VERIFY NO OVERHEAD LINES EXIST.
- 2.7.4 Signal lines - A set of 4 cables bundled together follow the telephone cables to the SM/PP hill. These were security lines, which have been abandoned. VERIFY NO OVERHEAD LINES EXIST.
- 2.7.5 Sanitary Sewer - A 4" sanitary sewer line runs through the digging or layback area. This line is abandoned.
- 2.7.6 Storm Sewer - A 4" line runs along the western edge and middle of the dig and lay back site. This line is abandoned.

7. DETAILED WORK STEPS (CONTINUED):

- 2.7.7 Retaining Structure- A retaining structure will affect the southwest layback area. This involves the installation of "soldier pilings" at intervals of 8 feet by "others". As the area is excavated, 4.5" thick wood lagging walls are placed between the "soldier pilings". This provides the required support to stabilize the soil outside of the excavation area. The maximum height of the retaining wall is 20 feet. See civil/structural engineer for specific instructions for lag wall attachment to soldier pilings.
- 2.7.8 Drinking water - A 3" cast iron pipe drinking water line passes through the dig site. This line is "abandoned".
- 2.7.9 Miscellaneous - An abandoned utility stanchion runs along the western edge of the lay back site. The remaining pipes and stanchions are to be removed prior digging in the area. The Waste Management POC will direct the method of debris disposal. The primary stanchion lines, which supported natural gas, steam, condensate, breathing air, compressed air and Molan signal lines runs through the area. All services are abandoned. **VERIFY ISOLATION OF LINES.** The remaining pipes and stanchions are to be removed prior digging in the area. The stanchions are to be removed from the " X " bracing (bracing to remain) stanchion at the "tie-in" to the east side of the lay back area. This would be the stanchion nearest the sanitary manhole. The Waste Management POC will direct the method of debris disposal.

2.8 Phase IX Area

- 2.8.1 Electrical - A set of overhead electrical lines originally passed over the south end of the area. These lines are for the streetlights which originally supported Building 51 and should be gone. **VERIFY NO OVERHEAD LINES EXIST.**
- 2.8.2 ADP - An abandoned set of ADP lines enter underground on the west side which will affect the layback area.
- 2.8.3 Telephone signal - No signal lines affect the digging or layback area.
- 2.8.4 Sanitary Sewer - An abandoned 6" sanitary drain line enters the east side. This line is abandoned and will be within the lay back area.
- 2.8.5 Storm Sewer - A primary 48" corrugated metal pipe line is located in the west side of the dig site in the lay back area. This line will **not** be removed and **extreme caution** must be used while excavating this area. An abandoned 12" concrete line is located in the dig and layback site.
- 2.8.6 Retaining Structure - A new retaining structure must be installed on the western side of the area. This involves the installation of "soldier pilings" at intervals of 8 feet by "others". As the area is excavated, 4.5" thick wood lagging walls are placed between the "soldier pilings". This provides the required support to stabilize the soil outside of the excavation area. The maximum height of the retaining wall is 20 feet. See civil/structural engineer for specific instructions for lag wall attachment to soldier pilings.
- 2.8.7 Miscellaneous - No miscellaneous items affect the digging or lay back area.

2.9 Phase X Area

- 2.9.1 Electrical - A set of overhead electrical lines originally passed through the area. These lines supported the gas pumps and should be gone. **VERIFY NO OVERHEAD LINES EXIST.**
- 2.9.2 ADP - No ADP lines affect the digging or layback area.
- 2.9.3 Telephone signal - No signal lines affect the digging or layback area.
- 2.9.4 Sanitary Sewer - No sanitary lines affect the digging or layback area.
- 2.9.5 Storm Sewer - A 6" vitrified clay pipe, which supported the gas tanks is located in the west side of the dig site in the lay back area. This line is abandoned. If liquids or drainage is encountered during excavation of the line, the job superintendent and EC&AS POC shall be notified for possible samples.
- 2.9.6 Retaining Structure - A new retaining structure must be installed on the western side of the area. This involves the installation of "soldier pilings" at intervals of 8 feet by "others". As the area is excavated, 4.5" thick wood lagging walls are placed between the "soldier pilings". This provides the required support to stabilize the soil outside of the excavation area. The maximum height of the retaining wall is 20 feet. See civil/structural engineer for specific instructions for lag wall attachment to soldier pilings.
- 2.9.7 Miscellaneous - No miscellaneous items affect the digging or lay back area.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

3.0 PHASE II AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

3.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.1 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area.

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5 foot lifts

GENERAL: The following are the radiological constituents of concern for Phase II with sample number, maximum quantity, and depth of sample.

| <u>Isotope</u> | <u>Boring #</u> | <u>Max. Quantity (pCi/g)</u> | <u>Depth (feet)</u> |
|----------------|-----------------|------------------------------|---------------------|
| Actinium-227 | B012 | 6.78 | 0-5 |
| Cesium-137 | B035 | 34.12 | 5-10 |
| Radium-226 | B036 | 4.19 | 10-15 |
| Thorium-232 | B026 | 11.6 | 10-15 |

3.1.1 Survey and surface mark Phase II perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

3.1.2 Remove parking lot asphalt from Phase II removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

3.1.3 Excavate and remove 5 feet of contaminated soils in the locations as specified in Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman.

3.1.4 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

NOTE: Equipment leaving remediation site will be evaluated or surveyed by radiological controls group.

3.1.5 Scan the excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

3.1.6 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by Excavation Plan Drawing.

7. DETAILED WORK STEPS (CONTINUED):

- 3.1.7 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.
- 3.1.8 Remove unacceptable debris from clean soils in accordance with Appendix F, PRS 66 Debris Backfill Guidelines.
- 3.1.9 Load and transport clean soils to clean soil stockpile area.
- 3.1.10 Repeat Steps 3.1.1 through 3.1.9 in 5 foot lifts until bottom of excavation is reached and contaminated soil is removed.
- 3.1.11 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

NOTE: Can proceed with next Phase of excavation while proceeding with the remaining steps of Phase II with job supervisor approval.

3.2 SOIL SCANNING AND VERIFICATION (Perform steps in order provided unless approved by Job Supervisor).

- 3.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 3.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 3.2.3 Mark the pre-verification sample locations as determined from approved Verification Sampling Analysis Plan.
- 3.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 3.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 3.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 3.2.7 Secure final verification samples utilizing locations as determined from approved Verification Sampling Analysis Plan.
- 3.2.8 Send all final verification samples for analysis as specified by Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of the sampling data per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

3.3 BACKFILL EXCAVATED AREA

- 3.3.1 Backfill all excavated holes with approved backfill material to the original elevations or per the direction of the project engineer.
- 3.3.2 Grade the area such that existing removal/backfill area blends into the original elevation level.

3.4 SITE RESTORATION

- 3.4.1 Spread a layer of purchased topsoil over the excavated area.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

- 3.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 3.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

4.0 PHASE III AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

4.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.2 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area."

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5 foot lifts

NOTE: Retaining structure required for this phase. As the area is excavated, 4.5" thick wood lagging walls are placed between the "soldier pilings". This provides the required support to stabilize the soil outside of the excavation area. The maximum height of the retaining wall is 20 feet. See civil/structural engineer for specific instructions for lag wall attachment to soldier pilings.

GENERAL: The following are the radiological constituents of concern for Phase III with sample number, maximum quantity, and depth of sample.

| <u>Isotope</u> | <u>Boring #</u> | <u>Max. Quantity (pCi/g)</u> | <u>Depth (feet)</u> |
|----------------|-----------------|------------------------------|---------------------|
| Actinium-227 | B032 | 6.04 | 20-25 |
| Thorium-232 | B064 | 4.09 | 15-20 |

4.1.1 Survey and surface mark Phase III perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

4.1.2 Remove parking lot asphalt from Phase III removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

4.1.3 Excavate and remove 5 feet of contaminated soils in the locations as specified in Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman.

4.1.4 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

NOTE: Equipment leaving remediation site will be evaluated or surveyed by radiological controls group.

4.1.5 Scan the excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

4.1.6 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by Excavation Plan Drawing.

7. DETAILED WORK STEPS (CONTINUED):

- 4.1.7 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.
- 4.1.8 Remove unacceptable debris from clean soils in accordance with Appendix F, PRS 66 Debris Backfill Guidelines.
- 4.1.9 Load and transport clean soils to clean soil stockpile area.
- 4.1.10 Repeat Steps 4.1.1 through 4.1.9 in 5 foot until bottom of excavation is reached and contaminated soil is removed.
- 4.1.11 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

NOTE: Can proceed with next Phase of excavation while proceeding with the remaining steps of Phase III with job supervisor approval.

4.2 SOIL SCANNING AND VERIFICATION (Perform steps in order provided unless Approved by Job Supervisor).

- 4.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 4.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 4.2.3 Mark the pre-verification sample locations as determined from the approved Verification Sampling Analysis Plan.
- 4.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 4.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 4.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 4.2.7 Secure final verification samples utilizing locations as determined from the approved Verification Sampling Analysis Plan.
- 4.2.8 Send all final verification samples for analysis as specified by the Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of the sampling data per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

4.3 BACKFILL EXCAVATED AREA

- 4.3.1 Backfill all excavated holes with approved backfill material to the original elevations or per the direction of the project engineer.
- 4.3.2 Grade the area such that existing removal/backfill area blends into the original elevation level.

4.4 SITE RESTORATION

- 4.4.1 Spread a layer of purchased top soil over the excavated area.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

- 4.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 4.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

5.0 PHASE IV AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

5.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.3 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area.

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5 foot lifts

GENERAL: The following are the radiological constituents of concern for Phase IV with sample number, maximum quantity, and depth of sample.

| <u>Isotope</u> | <u>Boring #</u> | <u>Max. Quantity (pCi/g)</u> | <u>Depth (feet)</u> |
|----------------|-----------------|------------------------------|---------------------|
| Actinium-277 | B109 | 13.0 | 25-30 |
| Plutonium-238 | B148 | 60.4 | 15-20 |
| Radium-226 | B143 | 5.97 | 5-10 |
| Thorium-232 | B129 | 315.75 | 5-10 |

5.1.1 Survey and surface mark Phase IV perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

5.1.2 Remove parking lot asphalt from Phase IV removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

5.1.3 Excavate and remove 5 feet of contaminated soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman.

5.1.4 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

NOTE: Equipment leaving remediation site will be evaluated or surveyed by radiological controls group.

5.1.5 Scan excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

5.1.6 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by the Excavation Plan Drawings.

7. DETAILED WORK STEPS (CONTINUED):

- 5.1.7 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.
- 5.1.8 Remove unacceptable debris from clean soils in accordance with Appendix F, PRS 66 Debris Backfill Guidelines.
- 5.1.9 Load and transport clean soils to clean soil stockpile area.
- 5.1.10 Repeat Steps 5.1.1 through 5.1.9 in 5 foot lifts until the bottom of excavation is reached and contaminated soil is removed.
- 5.1.11 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

NOTE: Can proceed with next Phase of excavation while proceeding with the remaining steps of Phase IV with job supervisor approval.

5.2 SOIL SCANNING AND VERIFICATION (Perform steps in order provided unless Approved by Job Supervisor).

- 5.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 5.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 5.2.3 Mark the pre-verification sample locations as determined from the approved Verification Sampling Analysis Plan.
- 5.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 5.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 5.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 5.2.7 Secure final verification samples utilizing locations as determined from the approved Verification Sampling Analysis Plan.
- 5.2.8 Send all final verification samples for analysis as specified by the Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of the sampling data per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

5.3 BACKFILL EXCAVATED AREA

- 5.3.1 Backfill all excavated holes with approved backfill material to the original elevations or per the direction of the project engineer.
- 5.3.2 Grade the area such that existing removal/backfill area blends into the original elevation level.

5.4 SITE RESTORATION

- 5.4.1 Spread a layer of purchased topsoil over the excavated area.

NOTE: The topsoil layer will conform to the minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

- 5.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 5.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

6.0 PHASE V AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

6.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.4 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area. **Maintain a temporary internal berm separating "VOC" and "RAD" areas within the Phase IV excavation at all times. All water collected in the excavation must be pumped to plastic tanks and sampled prior to discharge.**

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5-foot lifts.

GENERAL: The following are the radiological constituents of concern for Phase V with sample number, maximum quantity, and depth of sample.

| <u>Isotope</u> | <u>Boring #</u> | <u>Max. Quantity (pCi/g)</u> | <u>Depth (feet)</u> |
|----------------|-----------------|------------------------------|---------------------|
| Plutonium-238 | B171 | 12,000 | 20-25 |
| Thorium-232 | B196 | 2.11 | 10-15 |

6.1.1 Survey and surface mark Phase V perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

6.1.2 Remove parking lot asphalt from Phase V removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

6.1.3 Excavate and remove 5 feet of contaminated soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman.

6.1.4 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

NOTE: Equipment leaving remediation site will be evaluated or surveyed by radiological controls group.

6.1.5 Scan the excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

6.1.6 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by the Excavation Plan Drawings.

7. DETAILED WORK STEPS (CONTINUED):

- 6.1.7 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.
- 6.1.8 Remove unacceptable debris from clean soils in accordance with Appendix F, PRS 66 Debris Backfill Guidelines.
- 6.1.9 Load and transport clean soils to clean soil stockpile area.
- 6.1.10 Repeat Steps 6.1.1 through 6.1.9 in 5 foot lifts until bottom of excavation is reached and contaminated soil is removed.
- 6.1.11 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

NOTE: Can proceed with next Phase of excavation while proceeding with the remaining steps of Phase V with job supervisor approval.

6.2 FINAL FIELD SCANNING (Perform steps in order provided unless Approved by Job Supervisor).

- 6.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 6.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 6.2.3 Mark the pre-verification sample locations as determined from the approved Verification Sampling Analysis Plan.
- 6.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 6.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 6.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 6.2.7 Secure final verification samples utilizing locations as determined from the approved Verification Sampling Analysis Plan.
- 6.2.8 Send all final verification samples for analysis as specified by Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of the sampling data results per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

6.3 BACKFILL EXCAVATED AREA

- 6.3.1 Backfill all excavated holes with approved backfill material to the original elevations or per the direction of the project engineer.
- 6.3.2 Grade the area such that existing removal/backfill area blends into the original elevation level.

6.4 SITE RESTORATION

- 6.4.1 Spread a layer of purchased top soil over the excavated area.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

- 6.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 6.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

7.0 PHASE VI AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

7.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.5 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area.

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5 foot lifts.

GENERAL: The following are the radiological constituents of concern for Phase VI with sample number, maximum quantity, and depth of sample.

| <u>Isotope</u> | <u>Boring #</u> | <u>Max. Quantity (pCi/g)</u> | <u>Depth (feet)</u> |
|----------------|-----------------|------------------------------|---------------------|
| Actinium-277 | B426 | 274 | 0-5 |
| Thorium-232 | B426 | 1985 | 0-5 |

7.1.1 Survey and surface mark Phase VI perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

7.1.2 Remove parking lot asphalt from Phase VI removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

7.1.3 Excavate and remove 5 feet of contaminated soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman.

7.1.4 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

NOTE: Equipment leaving remediation site will be evaluated or surveyed by radiological controls group.

7.1.5 Scan the excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

7.1.6 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by the Excavation Plan Drawings.

7.1.7 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

7. DETAILED WORK STEPS (CONTINUED):

- 7.1.8 Remove unacceptable debris from clean soils in accordance with Appendix F, PRS 66 Debris Backfill Guidelines.
- 7.1.9 Load and transport clean soils to clean soil stockpile area.
- 7.1.10 Repeat Steps 7.1.1 through 7.1.9 in 5 foot lifts until bottom of excavation is reached and contaminated soil is removed.
- 7.1.11 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

NOTE: Can proceed with next Phase of excavation while proceeding with the remaining steps of Phase VI with job supervisor approval.

7.2 FINAL FIELD SCANNING (Perform steps in order provided unless Approved by Job Supervisor).

- 7.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 7.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 7.2.3 Mark the pre-verification sample locations as determined from the approved Verification Sampling Analysis Plan.
- 7.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 7.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 7.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 7.2.7 Secure final verification samples utilizing locations as determined from the approved Verification Sampling Analysis Plan.
- 7.2.8 Send all final verification samples for analysis as specified by Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of the sampling data results per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

7.3 BACKFILL EXCAVATED AREA

- 7.3.1 Backfill all excavated holes with approved backfill material to the original elevations or per the direction of the project engineer.
- 7.3.2 Grade the area such that existing removal/backfill area blends into the original elevation level.

7.4 SITE RESTORATION

- 7.4.1 Spread a layer of purchased top soil over the excavated area.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

- 7.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 7.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

8.0 PHASE VII AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

8.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.6 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area.

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5 foot lifts.

GENERAL: The following are the radiological constituents of concern for Phase VII with sample number, maximum quantity, and depth of sample.

| <u>Isotope</u> | <u>Boring #</u> | <u>Max. Quantity (pCi/g)</u> | <u>Depth (feet)</u> |
|----------------|-----------------|------------------------------|---------------------|
| Thorium-232 | B252 | 5.5 | 15-20 |

8.1.2 Survey and surface mark Phase VII perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

8.1.3 Remove parking lot asphalt from Phase VII removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

8.1.4 Excavate and remove 5 feet of contaminated soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman.

8.1.5 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

NOTE: Equipment leaving remediation site will be evaluated or surveyed by radiological controls group.

8.1.6 Scan the excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

8.1.7 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by the Excavation Plan Drawings.

8.1.8 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

7. DETAILED WORK STEPS (CONTINUED):

- 8.1.9 Remove unacceptable debris from clean soils in accordance with Appendix F, PRS 66 Debris Backfill Guidelines.
- 8.1.10 Load and transport clean soils to clean soil stockpile area.
- 8.1.11 Repeat Steps 8.1.1 through 8.1.9 in 5 foot lifts until bottom of excavation is reached and contaminated soil is removed.
- 8.1.12 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

NOTE: Can proceed with next Phase of excavation while proceeding with the remaining steps of Phase VII with job supervisor approval.

8.2 SOIL SCANNING AND VERIFICATION (Perform steps in order provided unless Approved by Job Supervisor).

- 8.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 8.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 8.2.3 Mark the pre-verification sample locations as determined from the approved Verification Sampling Analysis Plan.
- 8.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 8.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 8.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 8.2.7 Secure final verification samples utilizing locations as determined from the approved Verification Sampling Analysis Plan.
- 8.2.8 Send all final verification samples for analysis as specified by Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of the sampling data results per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

8.3 BACKFILL EXCAVATED AREA

- 8.3.1 Backfill and compact all excavated holes with approved backfill material to the original elevations or per the direction of the project engineer.
- 8.3.2 Grade the area such that existing removal/backfill area blends into the original elevation level.

8.4 SITE RESTORATION

- 8.4.1 Spread a layer of purchased top soil over the excavated area.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.
- 8.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 8.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

9.0 PHASE VIII AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

9.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.7 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area.

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5 foot lifts.

NOTE: Retaining structure required for this phase. As the area is excavated, "4.5 thick wood lagging walls are placed between the "soldier pilings". This provides the required support to stabilize the soil outside of the excavation area. The maximum height of the retaining wall is 20 feet. See civil/structural engineer for specific instructions for lag wall attachment to soldier pilings.

GENERAL: The following are the radiological constituents of concern for Phase VIII with sample number, maximum quantity, and depth of sample.

| <u>Isotope</u> | <u>Boring #</u> | <u>Max. Quantity (pCi/g)</u> | <u>Depth (feet)</u> |
|----------------|-----------------|------------------------------|---------------------|
| Plutonium-238 | B343 | 470.8 | 10-15 |
| Thorium-232 | B279 | 9.67 | 5-10 |

9.1.1 Survey and surface mark Phase VIII perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

9.1.2 Remove parking lot asphalt from Phase VIII removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

9.1.3 Excavate and remove 5 feet of contaminated soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman.

9.1.4 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

NOTE: Equipment leaving remediation site will be evaluated or surveyed by radiological controls group.

9.1.5 Scan the excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

9.1.6 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

7. DETAILED WORK STEPS (CONTINUED):

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by the Excavation Plan Drawings.

- 9.1.7 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.
- 9.1.8 Remove unacceptable debris from clean soils in accordance with Appendix F, PRS 66 Debris Backfill Guidelines.
- 9.1.9 Load and transport clean soils to clean soil stockpile area.
- 9.1.10 Repeat Steps 9.1.1 through 9.1.9 in 5 foot lifts until bottom of excavation is reached and contaminated soil is removed.
- 9.1.11 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

NOTE: Can proceed with next Phase of excavation while proceeding with the remaining steps of Phase VIII with job supervisor approval.

9.2 FINAL FIELD SCANNING (Perform steps in order provided unless Approved by Job Supervisor).

- 9.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 9.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 9.2.3 Mark the pre-verification sample locations as determined from approved Verification Sampling Analysis Plan.
- 9.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 9.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 9.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 9.2.7 Secure final verification samples utilizing locations as determined from approved Verification Sampling Analysis Plan.
- 9.2.8 Send all final verification samples for analysis as specified by Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of the sampling data results per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

9.3 BACKFILL EXCAVATED AREA

- 9.3.1 Backfill all excavated holes with approved backfill material to the original elevations or per the direction of the project engineer.
- 9.3.2 Grade the area such that existing/backfill area blends into the original elevation level.

9.4 SITE RESTORATION

- 9.4.1 Spread a layer of purchased top soil over the excavated area.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

- 9.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 9.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

10.0 PHASE IX AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

10.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.8 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area.

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5 foot lifts.

NOTE: Retaining structure required for this phase. As the area is excavated, "4.5 thick wood lagging walls are placed between the "soldier pilings". This provides the required support to stabilize the soil outside of the excavation area. The maximum height of the retaining wall is 20 feet. See civil/structural engineer for specific instructions for lag wall attachment to soldier pilings.

GENERAL: The following are the radiological constituents of concern for Phase IX with sample number, maximum quantity, and depth of sample.

| <u>Isotope</u> | <u>Boring #</u> | <u>Max. Quantity (pCi/g)</u> | <u>Depth (feet)</u> |
|----------------|-----------------|------------------------------|---------------------|
| Actinium-277 | B388 | 108 | 20-25 |
| Plutonium-238 | B390 | 581 | 5-10 |
| Radium-226 | B366 | 3.73 | 10-15 |
| Thorium-232 | B388 | 67.1 | 20-25 |

10.1.1 Survey and surface mark Phase IX perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

10.1.2 Remove parking lot asphalt from Phase IX removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

10.1.3 Excavate and remove 5 feet of contaminated soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman.

10.1.4 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

10.1.5 Scan the excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

10.1.6 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

7. DETAILED WORK STEPS (CONTINUED):

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by the Excavation Plan Drawings.

- 10.1.7 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.
- 10.1.8 Remove unacceptable debris from clean soils in accordance with Appendix F, PRS 66 Debris Backfill Guidelines.
- 10.1.9 Load and transport clean soils to clean soil stockpile area.
- 10.1.10 Repeat Steps 10.1.1 through 10.1.9 in 5 foot lifts until bottom of excavation is reached and contaminated soil is removed.
- 10.1.11 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

NOTE: Can proceed with next Phase of excavation while proceeding with the remaining steps of Phase IX with job supervisor approval.

10.2 FINAL FIELD SCANNING (Perform steps in order provided unless Approved by Job Supervisor).

- 10.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 10.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 10.2.3 Mark the pre-verification sample locations as determined from approved Verification Sampling Analysis Plan.
- 10.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 10.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 10.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 10.2.7 Secure final verification samples utilizing locations as determined from approved Verification Sampling Analysis Plan
- 10.2.8 Send all final verification samples for analysis as specified by Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of sampling data per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

10.3 BACKFILL EXCAVATED AREA

- 10.3.1 Backfill all excavated holes with approved backfill material to the original elevations or per the direction of the project engineer.
- 10.3.2 Grade the area such that existing removal/backfill area blends into the original elevation level.

10.4 SITE RESTORATION

- 10.4.1 Spread a layer of purchased top soil over the excavated area.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

- 10.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 10.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

PRS 66 Removal Work Package

7. DETAILED WORK STEPS (CONTINUED):

11.0 PHASE X AREA REMOVAL (Perform phases in order provided unless Approved by Project Engineer)

11.1 EXCAVATION (PERFORM STEPS IN ORDER PROVIDED UNLESS APPROVED BY JOB SUPERVISOR).

HOLD POINT: Verify utility isolations per Section 2.9 for area and insure Excavation Permit has been authorized.

(Job Supervisor)

Date

NOTE: All work will comply with Appendix A, PRS 66 Waste Management Plan.

NOTE: All work will comply with Appendix B, PRS 66 Radiological Management Plan.

NOTE: When unexpected or abnormal conditions are encountered during excavation (e.g. evidence of chemical contamination such as discoloration or solvent odor) contact the Project Engineer or Waste Management Coordinator for guidance on need for additional sampling and/or special packaging (refer to Waste Management Plan). Also contact the EC & AS Coordinator for guidance concerning pump discharge requirements when "de-watering the excavation area.

NOTE: Debris encountered during excavation activities will be visibly evaluated as to disposition per Appendix F (Debris Guidelines) and Appendix B (Radiological Management Plan). Downsizing will be accomplished "in-place" utilizing an excavator shear or an excavator impact hammer.

NOTE: Excavations will be performed in 5 foot lifts.

NOTE: Retaining structure required for this phase. As the area is excavated, "4.5 thick wood lagging walls are placed between the "soldier pilings". This provides the required support to stabilize the soil outside of the excavation area. The maximum height of the retaining wall is 20 feet. See civil/structural engineer for specific instructions for lag wall attachment to soldier pilings.

GENERAL: The following are the radiological constituents of concern for Phase X with sample number, maximum quantity, and depth of sample.

| Isotope | Boring # | Max. Quantity (pCi/g) | Depth (feet) |
|---------------|----------|-----------------------|--------------|
| Cesium-137 | 0433 | 22 | 0-5 |
| Plutonium-238 | B522 | 2433 | 10-15 |
| Radium-226 | B409 | 7.37 | 5-10 |
| Thorium-232 | 0433 | 15.8 | 0-5 |

11.1.1 Survey and surface mark Phase X perimeter boundaries and slope-back areas as per PRS 66 Work Plan Figure # 2 or as directed by Project Engineer or Superintendent/Foreman.

11.1.2 Remove parking lot asphalt from Phase X removal area, scan asphalt with approved radiological instrumentation. Take representative smears to determine if clean, and move to clean staging area.

Caution

Maintain at a minimum 1.5:1 slope-backs on excavations at all times or as directed by the site certified Civil Engineer. Backfilling activities can not encroach upon the unverified buffer zone.

11.1.3 Excavate and remove 5 feet of contaminated soils in the locations as specified in the Excavation Plan.

11.1.4 Load and transport contaminated soils to Rail Loading Facility as per directive of Superintendent/Foreman.

11.1.5 Scan the excavation and the contaminated/clean interface per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.

11.1.6 Excavate and remove 5 feet of clean soils in the locations as specified in the Excavation Plan Drawings or per directive of Project Engineer or Superintendent/Foreman. Stage in 20 cubic yard pile.

NOTE: Stop clean soil excavation 2 feet above each contaminated soil elevation as identified by the Excavation Plan Drawings.

7. DETAILED WORK STEPS (CONTINUED):

- 11.1.7 Scan clean soil per the scanning procedure contained in Appendix B, PRS 66 Radiological Management Plan.
- 11.1.8 Remove unacceptable debris from clean soils utilizing the acceptable debris backfill plan in Appendix F, PRS 66 Debris Backfill Guidelines.
- 11.1.9 Load and transport clean soils to clean soil stockpile area.
- 11.1.10 Repeat Steps 11.1.1 through 11.1.9 in 5 foot lifts until bottom of excavation is reached and contaminated soil is removed.
- 11.1.11 Install earthen berm to insure cross-contamination will not occur between areas.

NOTE: General Fidler (or equivalent) survey of area completes excavation phase of work.

11.2 SOIL SCANNING AND VERIFICATION (Perform steps in order provided unless approved by Job Supervisor).

- 11.2.1 Rescan the entire excavation area (walkover survey) with a Fidler (or equivalent) as an indicator to determine whether the surface is considered clean (gamma spectroscopy will verify that the area is below the cleanup standards at a later time).
- 11.2.2 Remove any additional contaminated areas found during the prior step and perform additional Fidler (or equivalent) scanning to ensure that no indication of contamination remains.
- 11.2.3 Mark the pre-verification sample locations as determined from approved Verification Sampling Analysis Plan.
- 11.2.4 Collect a pre-verification sample as directed by the Radiological POC or his designee.
- 11.2.5 Perform pre-verification on-site analysis on all secured samples and evaluate results as directed by the Radiological POC or his designee.
- 11.2.6 Remove any additional contamination found during the on-site pre-verification analysis, perform additional Fidler (or equivalent) scanning and perform another pre-verification analysis to ensure that no indication of contamination remains.
- 11.2.7 Secure final verification samples utilizing locations as determined from approved Verification Sampling Analysis Plan.
- 11.2.8 Send all final verification samples for analysis as specified by Verification Sampling Analysis Plan.

HOLD POINT: Backfill can not proceed without approval of the sampling data per the Verification Sampling and Analysis Plan or specific guidance approval for this excavation.

11.3 BACKFILL EXCAVATED AREA

- 11.3.1 Backfill all excavated holes with approved backfill material to the original elevations or the direction of the project engineer.
- 11.3.2 Grade the area such that existing removal/backfill area blends into the original elevation level.

11.4 SITE RESTORATION

- 11.4.1 Spread a layer of purchased top soil over the excavated area.

NOTE: The topsoil layer will have a minimum thickness (4-8 inches) to support vegetation. The topsoil must meet current requirements for procured topsoil prior to bringing it on-site.

- 11.4.2 Seed restored remediation area and install matting to prevent soil erosion.
- 11.4.3 Install a silt fence in specified areas to prevent sediment run-off, if required, per Environmental Compliance.

7. DETAILED WORK STEPS (CONTINUED):

12.0 PROJECT CLOSEOUT

12.1 POST-JOB CONFERENCE

- 12.1.1 Conduct a Post-Job Conference at the conclusion of the project, documenting what went right and what went wrong during the course of the project.
- 12.1.2 Document Lessons Learned for future projects.

Insert the activities to be performed during the job. Describe the specific methods of accomplishing these activities. Activities listed must be grouped under the Work Package phases listed in item 4.

8. Note: Comments, to identify activities/hazards that are common to multiple phases of the project. Identification of these items will facilitate the option of addressing the items once in the pre-job briefing, as opposed to redundantly listing them in the JSHAs for different phases. **COMMENTS:**

The primary hazard associated with this removal action is that of radioactive contamination, which will be mitigated through means specified within the RWP. The other predominant hazard associated with this removal action involves excavation to depths of up to 40 feet below grade. The use of "slope-back" (1.5 to 1) or "engineered" retaining walls will be utilized during the excavation. Extended reaches beyond the capability of the excavator will be avoided. Deviation from the work plan will be permitted, if required, to allow for the excavator to notch out and build a bench within the hillside to facilitate improved stability and reaching capability. Depending upon the temperatures at the time of excavation, heat and cold stress could be a hazard, which will be monitored through weather forecasts and worker rotation.

Daily pre-job meetings will address the potential hazards associated with the scheduled daily activities, as well as any lessons learned from the prior day's activities.

Lessons learned have been researched for the scope of work of this project and they will be reviewed at the pre-job meetings. Pertinent Lessons Learned include: Unreliability of CAMS when operated off of portable generators; excavation procedure violations; work in unprotected trenches (concepts); soil sampling activities resulting in twisted knee; diesel generator fuel spill; near miss involving horseplay; slope stability good work practice; the inclusion of hazard control mechanisms into the work package; backing a vehicle is inherently risky, and close call upper hill road.

Enter any review comment or issues in this section and/or information generated as a result of completing detailed work steps.

9. REVIEW SIGNATURES:

| | |
|--|--|
| Written by (Project Engineer): <u>Stephen D. Roberts</u> | Date: <u>02106103</u> Phone: <u>4167</u> |
| Job Supervisor: <u>Mark DeGlenning</u> | Date: <u>01106103</u> Phone: <u>3444</u> |
| Superintendent/Foreman: <u>[Signature]</u> | Date: <u>02106103</u> Phone: <u>4154</u> |
| Industrial Safety & Hygiene: <u>John M. Schreiner</u> | Date: <u>116103</u> Phone: <u>4891</u> |
| Rad. Controls: <u>[Signature]</u> | Date: <u>116103</u> Phone: <u>4527</u> |
| EC&AS: <u>[Signature]</u> | Date: <u>116103</u> Phone: <u>3243</u> |
| Waste Mgmt: <u>Willen Nansen</u> | Date: <u>116103</u> Phone: <u>5515</u> |
| Bldg. Mgmt: <u>Mark DeGlenning</u> | Date: <u>01106103</u> Phone: <u>3444</u> |
| Other: (Civil Engineer) <u>Will Thomas</u> | Date: <u>116103</u> Phone: <u>3858</u> |
| Other: (Soils Facility Mgr.) <u>Ross Henderson</u> | Date: <u>116103</u> Phone: <u>4242</u> |

10. USQ SCREEN / DETERMINATION REQUIRED? YES NO
 Brief Explanation MAINTAINED PER MLM-3549 AS BELOW CAT-5 PER PHASED DIS.

USQ Trained Person: Ross Henderson USQCF Date: 116103 Phone: 4242

10. AUTHORIZATION SIGNATURE:
 Project Manager: [Signature] Date: 116103 Phone: 4595

11. WORK PACKAGE CLOSURE:
 Job Supervisor: _____ Date: 1 1 Phone: _____
 Project Manager: _____ Date: 1 1 Phone: _____

RETURN PHA TO IS&H AT JOB COMPLETION.

APPENDIX A

**PRS 66
WASTE MANAGEMENT
PLAN**

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PRS 66 Waste Management Plan

Introduction

The purpose of this waste management plan is to identify waste streams expected to be encountered during excavation and disposal of soil and contaminated debris from PRS 66. Characterization of waste streams will be summarized, and packaging and disposal options will be discussed.

Low-level radioactive waste – soil and debris <10”

The majority of waste generated by the project will be low-level radioactive waste. Soils and debris less than 10” in one dimension can be transferred to the rail staging facility via articulated hauler, and loaded directly into gondola railcars for transport to Envirocare of Utah for disposal. Maximum debris size is 10 foot x 10 foot x 10 inches.

Waste materials must be acceptable under the Envirocare Waste Profile 8005-02 for Mound soils. Materials likely to be encountered during the excavation, but not acceptable for disposal under this waste profile include oversized debris (i.e., greater than 10” in any one dimension), mixed wastes (radioactive wastes exhibiting a characteristic of a hazardous waste), and wastes with elevated levels of radioactive contamination (exceeding profile limits for individual radionuclides, e.g. 5000 pCi/g Pu-238).

Characterization for disposal will be based on PRS66 sampling data. Radiological data for each phase of the excavation will be compiled to determine the characteristics of the soils and debris to be shipped for disposal. Areas of concern for possible mixed waste generation will be identified for additional characterization.

Total volume of low-level soil and debris for disposal is expected to be approximately 41,500 cubic yards.

Low-level radioactive waste – oversized debris (greater than 10” in any one dimension)

Wastes greater than 10” in any one dimension cannot be placed directly into disposal lifts at Envirocare without downsizing. There are a few options for handling and disposition of these wastes:

- Oversized debris can be shipped to Envirocare, but additional costs are incurred for downsizing at the disposal facility prior to disposal.
- Oversized debris can be downsized at the project site and disposed of as LLW/ <10”
- Oversized debris may be packaged for disposal at Nevada Test Site (NTS). Acceptable containers include LLW boxes and SeaLand containers.

Suspect mixed wastes: Soils / LLW with potential to exhibit characteristic(s) of a hazardous waste

Sampling data indicate that a few isolated areas in the planned excavation have elevated levels of chromium, lead, and mercury. Soils and debris in these areas may or may not be mixed wastes, depending on the leachability of contaminants present. Suspect mixed wastes will be segregated, sampled to determine RCRA status, and staged and managed as suspect mixed waste pending receipt of analytical data.

Waste piles will be constructed as follows: tarp(s) will be placed on the parking lot or ground; waste material will be placed on the tarp; additional tarp(s) will be placed on top of the waste material, and upper and lower tarps will be rolled or otherwise joined to ensure complete containment of the wastes. Tarps sealed in this manner will contain waste materials and protect wastes from rainwater or surface flows. Covered piles will eliminate the need for leachate collection and will control wind dispersal of wastes.

Piles will be temporary. If analytical data show that piles contain mixed wastes, piles will remain in place until wastes are placed into containers suitable for transportation to a treatment and disposal facility. If the waste is not removed within 60 days, discussions shall occur with OEPA. Containers shall be in good condition and compatible with the wastes they contain. Containers in storage will be closed, and containers will not be handled in a manner, which will rupture the containers or cause them to leak. Containers will be elevated or otherwise protected from contact with accumulated liquid.

Piles and containers will be inspected weekly and after storms and gusty conditions to document integrity of the pile coverage and/or enclosures.

Low-level soils / debris exceeding Envirocare Waste Acceptance Criteria:

Some soils and debris may be contaminated with radionuclides exceeding the Envirocare Waste Acceptance Criteria (WAC). These wastes will be packaged and shipped to the Nevada Test Site (NTS) for disposal, in accordance with packaging and certification procedures for NTS waste.

Free liquids:

Free liquids are prohibited for disposal at both Envirocare and NTS. Free liquids may be solidified and transferred to the rail staging area, if the radiological characteristics of the solidified material meet the Envirocare WAC.

The most likely source of contaminated liquids is decontamination water that does not meet release criteria.

APPENDIX B

**PRS 66
RADIOLOGICAL MANAGEMENT
PLAN**

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PRS 66 Radiological Management Plan

The PRS 66 Radiological Management Plan will cover the basic concepts intended for radiological controls during the excavation at PRS 66. These will include postings, Radiation Work Permits (RWPs), equipment monitoring and release, air monitoring, personal protective equipment (PPE), and evaluation of clean soils and debris during the excavation process. The work package instructions will periodically reference the details of this plan.

POSTINGS

The perimeter of the site boundary will be posted as a radiological controlled area. Excavation areas within the radiological controlled area will be posted as either a Soil Contamination Area (SCA) or Contamination Area (CA) as determined by radiological characterization and actual radiological conditions being observed during the course of the project. It is not anticipated that an Airborne Radioactivity Area (ARA) will be required during the excavation.

A Radioactive Material Area will be maintained to store any LSA boxes or other waste containers used during the excavation. The size and location of the Radioactive Material Area may be adjusted as the excavation progresses. The bed of the "haulers" will be posted as a controlled area and Radioactive Material Area once loading of contaminated soil begins.

RWP's

Initially there will be three RWP's for the excavation process. These RWP's will cover excavation and related activities, decon, sampling and RCT coverage, minor maintenance on equipment, tours and inspections. Downsizing of any debris will be considered a related activity if done with a shear or the bucket of an excavator causing little potential for generating airborne radioactivity. Any additional techniques that would add energy such as cutting with a saw or torch would require further evaluation and the potential for supplemental containment, additional protective clothing and a new RWP will be evaluated on a case by case basis.

RWP #1 - One RWP will be utilized for working within contaminated areas. This RWP will cover the majority of the excavation work inside the posted contamination area (CA) behind the Building 98 area. Most of the boreholes in this area had removable contamination on equipment during the characterization sampling process. This RWP will also be used if removable contamination is identified within the Building 51 areas that had higher levels of contamination. Although removable contamination was not observed within this area during the characterization sampling process, the possibility of encountering removable contamination does exist based on the observed Pu-238 levels encountered in this area.

RWP #2 - The second RWP will be for work in a soil contamination area (SCA). It will be used for workers entering the soil loading area adjacent to the contamination area and also while excavating an area that is posted as a soil contamination area based upon the characterization sampling results.

RWP #3 - The third RWP will be for the excavation of the small area south of Building 98 which has high levels of Th-232 and Ac-227 (~ 0-2 feet) based upon the characterization sampling results. This RWP will be similar to the contamination area RWP in that it will require PPE and bioassay, but it will also require intake monitoring.

Equipment Monitoring and Release

An area posted as a Soil Contamination Area (SCA) will be maintained adjacent to the excavation area to allow for loading of the "haulers". No release survey will be required on the "haulers" unless soil is spilled during the loading process. Smears will be taken on the tires of the "haulers" to provide assurance that the loading area is being maintained and free of removable contamination. Using a FIDLER or equivalent detector, periodic scans of the loading area will also be performed to ensure the area remains non-contaminated. After the soil is dumped at the Soil Staging Area a smear will be taken on the tailgate section of the "hauler" to ensure that no removable contamination is present prior to the "hauler" returning to PRS 66 excavation site.

A weekly survey will be performed on "haulers" to provide added assurance that work controls are satisfactory. Weekly surveys of the Excavator equipment will also be performed to monitor contamination levels during the excavation.

Any material/equipment entering the posted Soil Contamination Area or Contamination Area will be released using MD-80043, Operation 400 - Radioactive Material Transfer and Unrestricted Release of Property/Waste or controlled as radioactive material.

Air Monitoring

There will be four low volume air samplers set up outside of the controlled area to monitor conditions in adjacent areas. Monitoring minimally the PRS 66 primary COCs, they will be changed out weekly. Action levels will be specified within the project RWPs or through other radiological monitoring control logs. They will be located near the following locations and:

- Building 45
- ER office trailers
- Building 61
- Building 22 (Upwind Sampler)

Low Volume and/or High Volume samplers will be used at the excavation site perimeter. The number of air samples may vary depending on the size of the excavation, the types and levels of radionuclides for the particular excavation area, the location of the workers, etc. At least one downwind sampler will be run at a minimum at all times during an excavation.

When the excavator operators enter the excavation, either a low/high volume sampler or lapel sampler will be used to ensure the workers do not exceed levels that require respiratory protection. The low/high volume sampler will typically be mounted on the excavator.

When removing the hot spot south of where Building 98 once stood, intake monitoring will also be performed using a lapel sampler or low volume sampler for workers entering the area.

Radiological PPE

Radiological PPE will be worn in the posted Contamination Areas (CAs) as directed by the RWP. No Respiratory Protection is anticipated to be required. Misting of the area will be used to maintain airborne radioactivity at a minimum.

Evaluation of Potential Clean Soil During Excavation

Some of the top layers of soil and the slopeback of the excavation are anticipated to be below the clean-up criteria based upon characterization sampling results and may be acceptable for backfill. As such, field instrumentation will be utilized to detect whether indications exist that warrant follow-on confirmation sampling to determine the non-contaminated soil status. Should wet or frozen condition arise, which are outside the equipment limitations, or should the Radiological POC determine that it would be an unacceptable radiological practice to continue using the scanning instrumentation due to field conditions, alternative approaches of soil confirmation may be utilized with the concurrence of OEPA.

After contaminated soil is removed within a 5-foot lift, any contaminated/non-contaminated interface areas (areas with higher potential for contamination) will be scanned using a NaI or FIDLER prior to removing clean soil adjacent to that area. If a significant detection above background is identified during the scan, then the area will be further excavated. If the area is just slightly over background, a sample will be taken and analyzed by gamma spec prior to removing the soil and placing it in a potentially clean 20 cubic yard pile.

Areas expected to be clean, based on characterization data, will be removed and staged in approximately 20 cubic yard piles. If extreme discolored soil or debris is identified during removal of the clean soil, it will be scanned by an RCT to determine if radiological contamination is present. If nothing is noted, the extreme discolored soil will be placed in a suspect pile and samples will be secured to confirm the lack of contamination prior to placing the soil in the clean backfill pile. Debris will be handled per the Acceptable Debris Backfill Plan. Areas adjacent to Th-232 areas expected to be clean, but which have limited or no characterization data available will require additional scanning with a NaI or FIDLER prior to staging in 20 cubic yard piles.

After a 20 cubic yard pile is staged, an RCT will scan the pile with a NaI detector or FIDLER to determine if there is any detected activity above background. If no elevated readings are identified, the soil will be allowed to be moved to the clean stockpile based on previous characterization data and added assurance from the scan. If elevated readings above background are found, a composite sample will be collected in the area of the elevated readings. Should the sample result be analyzed to be above the cleanup objective, the entire 20 cubic yard pile will be disposed of as contaminated soil.

Each 20 cubic yard pile that is staged around the plutonium contaminated area will have two samples taken from the pile at two symmetrical locations in addition to the FIDLER scans on "channel one" since plutonium contamination can not be seen down to the clean-up criteria with the FIDLER. Each sample will be checked with the FIDLER using channel one to determine if there is any significant Pu-238 present. The soil will also be scanned using the FIDLER on the "out channel" or a NaI detector to determine if any other contaminants are present. If no elevated contamination is detected during the scan, then the two samples will be sent to the lab for gamma spec analysis. Should the scan reveal indications above background levels, the entire 20 cubic yard pile will be disposed of as contaminated soil. The sampling may be waived in areas with the advanced concurrence of DOE, OEPA and USEPA based upon available characterization data.

Debris

Debris that is acceptable for backfill will be discussed in detail within the Removal Plan's Debris Management Plan. Debris that is segregated from the soil and which is acceptable for backfill, will be surveyed using an alpha/beta count rate meter and smears. The survey will be performed using MD-80043, Operation 400 - Radioactive Material Transfer and Unrestricted Release of Property/Waste and MD-80036, Operation 30030 - Operation of the Ludlum 2360 Scaler/Ratemeter with Ludlum 43-89 Alpha/Beta Scintillators. Items with contamination levels greater than Table 2-2 values will be controlled as radioactive material.

APPENDIX C

**PRS 66
PRELIMINARY HAZARD ASSESSMENT
(PHA)**

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PRS 66 Removal Work Package

PRELIMINARY HAZARD ANALYSIS (PHA) FOR WORK PACKAGE ACTIVITIES

SECTION A, INDUSTRIAL SAFETY - TO BE COMPLETED BY THE INDUSTRIAL SAFETY AND HEALTH REPRESENTATIVE
Identify engineering/administrative controls or PPE as required, keyed to the following checklist items. Insert any required and/or other special actions to be taken because of the particular hazard (i.e. lead compliance plans, confined space plans, hearing conservation programs, etc.). Including any notations for future Hazard Analyses. Additionally, identify any activities which DOE prescribed Occupational Safety and Health standards, that require protective measures be designed, inspected, or approved by a professional engineer or other competent person. (Use Section D if additional space is needed.)

| Item | Exist | Work Package Phase* | Comments, Controls, Methods of Compliance |
|---|-------|---------------------|--|
| Blockage of exits or means of egress | No | | [EGRESS] |
| Blockages/obstructions (Identify) | Yes | ALL | The roadway between the entrance to the 29 parking lot to the rail spur will be either blocked or maintained as a single lane when excavating areas. Notify appropriate personnel. |
| Burning, welding, hot-work (Fire Watch) | Yes | ALL | Heaters/ steam cleaners |
| Chemical compatibility of corrosives/flammables | No | | |
| Chemical process safety | No | | |
| Compressed gas cylinders | No | | |
| Confined space entry | No | | [CONFINE] |
| Crane operations, overhead or mobile | No | | |
| Critical lifts (heavy or high value loads) | No | | [CLIFT] |
| Electrical hazards | No | | Will be removed prior |
| Elevated work/fall protection | No | | [ELEV] |
| Emergency eyewash/shower available | No | | [EWASH] |
| Emergency alarms or evacuation plans required | Yes | | {EMERG} Field radios and/or cell phones will be utilized to communicate emergency evacuation and take shelter circumstances. |
| Explosive/flammable atmosphere | No | | |
| Explosives | No | | |
| Fire protection system/equipment outage | No | | [FIRE/EFIRE] |
| Fire Hazards Analysis Required of Demolition | No | | [FHA/ADJA] |
| Flammable liquids/gases | Yes | | [FLAM] Gasoline and diesel fuel oil will be stored at the job site in safety cans or containers. |
| Forklifts, aerial lifts or material handling equipment | Yes | | Required to move LSA boxes & sealand containers. |
| Grounding of electrical equipment | No | | |
| Hazards due to condition of facility or terrain (Identify) | Yes | All | The terrain within the excavation zone is steep. |
| Hoisting and rigging | No | | [HOIST] |
| Lighting/illumination/adequacy | Yes | All | [MLITE] Portable lighting will be used during any early hour excavation |
| * Work Package Phase within the PHA refers back to those phases as designated within Section 4 of the Work Package. | | | |

PRS 66 Removal Work Package

SECTION A, INDUSTRIAL SAFETY - TO BE COMPLETED BY THE SAFETY AND HEALTH REPRESENTATIVE

Identify engineering/administrative controls or PPE as required, keyed to the following checklist items. Insert any required and/or other special actions to be taken because of the particular hazard (i.e. lead compliance plans, confined space plans, hearing conservation programs, etc.). Including any notations for future Job Safety and Health Analysis(JSHA). Additionally, identify any activities which DOE prescribed Occupational Safety and Health standards that require protective measures be designed, inspected, or approved by a professional engineer or other competent person. (Use Section D if additional space is needed.)

| Item | Exist | Work Package Phase | Comments, Controls, Methods of Compliance |
|--|-------|--------------------|--|
| Lockout/tagout of hazardous sources: | No | | [LOTO/ISO] Verify services have been disconnected or removed |
| <input type="checkbox"/> Electrical | No | | Verify services have been disconnected or removed |
| <input type="checkbox"/> Mechanical (steam, hydraulic, pneumatic) | No | | Verify services have been disconnected or removed |
| <input type="checkbox"/> Interlocks | No | | [ILOCK] |
| <input type="checkbox"/> Chemical | No | | |
| <input type="checkbox"/> Radiological | No | | |
| Machine guards | No | | |
| Modification to Fire Wall/Door | No | | [FIREWAL] |
| Obstruction of fire protection equipment (pull boxes, hydrants, fire department connections, control panels, fire extinguishers, etc.) | Yes | All | The Fire Department will be notified during any timeframes that the roadway from 29 parking lot to rail spur is closed with assurances being made that alternative means of transportation is available for any emergency vehicles needing to get to the Test Fire Area/Rail Spur. |
| Off-shift work | No | | |
| Outages of the plant public announcement (PA) system or the emergency notification system | No | | [OUTAGE] |
| Overhead or underground utilities (Identify) | No | | All utilities to be removed prior to start of phase. Verify disconnection or removal |
| Penetrations into walls, floors, etc. | No | | [PENETR] |
| Plastic sheeting or wood framing/enclosures | No | | |
| Powder-actuated tools | No | | |
| Public utilities (Identify) | No | | [WATER] |
| Repetitive work | No | | [ERGO] |
| Structural Modification | No | | [STRUCT] |
| Special Fire Protection Equipment Required | No | | [FIREQU] |
| Trenching/Shoring | Yes | All | 1.5 to 1 slope to dig. Shoring as specified by the site civil engineer at the north and south ends of the site. Areas greater than 20 feet require release by the site civil engineer. |
| Temporary heating facilities | No | | |
| Temporary/portable buildings or structures | Yes | All | [FACIL] An open-ended Sealand container may be utilized during verification sampling for preparing samples for shipment. |
| Temporary service hook-ups (Identify) | Yes | All | Temporary electricity will be utilized in the open-ended Sealand container utilized during verification sampling for preparing samples for shipment. |
| Traffic control/flagman | Yes | All | [TRAFFIC] During periods of excavation or hauling, the road will be closed to normal vehicular traffic. |
| Work in attics, ceilings, chases, or crawlspaces | No | | |
| Work impacting adjacent normally occupied areas | No | | [ADJAC/BMAPP/SIGNS/NOTIF] |
| Work Requiring Scaffolding, construction and inspection | No | | [SCAFF] |
| Other (Specify) | No | | |

PRS 66 Removal Work Package

SECTION B, INDUSTRIAL HYGIENE - TO BE COMPLETED BY INDUSTRIAL HYGIENE REPRESENTATIVE

Identify engineering/administrative controls or PPE as required, keyed to the following checklist items. Insert any required and/or other special actions to be taken because of the particular hazard (i.e. lead compliance plans, confined space plans, hearing conservation programs, etc.). Including any notations for future Job Safety and Health Analysis (JSHA). Additionally, identify any activities which DOE prescribed Occupational Safety and Health standards that require protective measures be designed, inspected, or approved by a professional engineer or other competent person. (Use Section D if additional space is needed.)

| Item | Exist | Work Package Phase | Comments, Controls, Methods of Compliance |
|--|-------|--------------------|--|
| Abrasive blast (MSDS available)* | No | | |
| Asbestos | No | | [ASBEST] |
| Beryllium | Yes | | Trace in soil, negligible airborne emissions, no controls required, std. PPE for Radiation protection in the area is adequate. |
| Blood-borne pathogens* | No | | |
| Cadmium | Yes | | Trace in soil, negligible airborne emissions, no controls required, std. PPE for Radiation protection in the area is adequate. |
| Carcinogens (MSDS available)* | Yes | | Trace amount in soil, no controls required, std. PPE for Radiation protection in the area is adequate. |
| Chemicals/solvents (MSDS available)* | Yes | | Benzenes present, strong smell expected in Phase V area, will monitor with Sapphire or Dragger instruments. MSDS available |
| Chlorofluorocarbon (CFC) | No | | [CFC] |
| Coal, tar or asphalt products | No | | |
| Coating/painting (MSDS available)* | No | | |
| Corrosives/acids/caustics (MSDS available)* | No | | |
| Dusty operations | Yes | All | [POWDER] Misting techniques will be utilized as a form of dust control during the excavation and on the roadway as required. |
| Hazardous Waste Operations (HAZWOPER)* | No | | |
| High Pressure systems | No | | [HIPRES] |
| Insulation/man-made mineral fibers (MSDS available)* | No | | |
| Lasers | No | | |
| Lead | Yes | | Trace in soil, negligible airborne emissions, no controls required, std. PPE for Radiation protection in the area is adequate. |
| Foam in Place Operations | No | | |
| Mercury | Yes | | Trace in soil, negligible airborne emissions, no controls required, std. PPE for Radiation protection in the area is adequate. |
| Noise in excess of 85 dBA | Yes | All | [NOISE] Personnel in close proximity to Heavy Duty equipment will wear ear plugs. Noise levels around the equipment will dictate support personnel hearing protection. |
| Polychlorinated biphenyls (PCBs) | Yes | | Trace in soil, negligible airborne emissions, no controls required, std. PPE for Radiation protection in the area is adequate. |
| Removal of ceiling tiles* | No | | |
| Spraying/generation of mists* | No | | |
| Temperature extremes (heat or cold stress) | Yes | All Phases | [CRYRO/COLD/HEAT] The project will adhere to heat and cold stress monitoring utilizing a worker rotation, buddy system and if necessary WBGT monitoring. |
| Ventilation or Air Monitoring requirements | No | | [VENTIL/IH] |
| Welding, brazing, or thermal cutting operations | No | | [BURN] No steel debris would require downsizing via thermal cutting operations. |
| Other (specify) | No | | |

*NOTE: Requires a description of the materials involved which present a hazard. Identify the physical location of the MSDS.

PRS 66 Removal Work Package

SECTION C, RADIOLOGICAL PROTECTION - TO BE COMPLETED BY RADIOLOGICAL CONTROLS REPRESENTATIVE

Identify engineering/administrative controls or PPE as required, keyed to the following checklist items. Insert any required and/or other special actions to be taken because of the particular hazard (i.e. RWP, ALARA Plan, etc.). Additionally, identify any activities which DOE prescribed Occupational Safety and Health standards that require protective measures be designed, inspected, or approved by a professional engineer or other competent person. (Use Section D if additional space is needed.)

| Item | Exist | Work Package Phase | Comments, Controls, Methods of Compliance |
|---|-------|--------------------|---|
| <i>Location:</i> Controlled Area | Yes | All | The excavation boundaries will be marked as a CA area. |
| Contamination Area | Yes | All | [STP] Based upon observed removable contamination encountered during characterization sampling, phases of the PRS 66 excavation area is anticipated to be treated as a CA. This will occur as the phase requires it. |
| High Contamination Area | No | | [STP] |
| Radioactive Materials Storage Area | Yes | All | Required for LSA boxes for PPE and the decontamination area. |
| Airborne Radioactivity Area (STP or OBT) | No | | |
| Radiation Area | No | | |
| High Radiation Area | No | | |
| Very High Radiation Area | No | | |
| Other (Specify) | No | | |
| <i>Activities:</i> Criticality Safety Concerns | No | | |
| Digging/Soil Removal | Yes | All | [DIG] An excavation permit will be required to initiate the project. |
| Surface destruction of radioactively contaminated materials or equipment? | No | | [SURFAC] |
| Welding, burning, or grinding? | No | | [SURFAC] Steel debris, which would require downsizing via shear cutting operations. |
| Hammering, chipping or scraping? | Yes | | An excavator mounted hydraulic ram may be used for downsizing, water misting will be used at "clear distance" |
| Abrasive blasting? | No | | [SURFAC] |
| Dust-collecting equipment or systems? | No | | |
| Decontamination and clean-up? | Yes | All | Equipment decontamination will be necessary with all decontamination water captured and disposed of according to Waste Management practices. |
| Rad Waste Storage and Disposal Required | Yes | All | [RWSTOR/WASTE/CHAR] Contaminated radiological waste will be shipped to Envirocare via railcar or to the Nevada Test Site. Although not anticipated, any mixed waste will be packaged and handled per Waste Management guidance. |
| Other (Specify) | Yes | All | Environmental and Radiological Controls will evaluate the anticipated fugitive dust issues and assist in determining the locations of High Volume Continuous Air Monitors, which will be incorporated into the project to monitor airborne contaminated dusts |
| <i>Sources:</i> X-Ray machine/generator | No | | [XRAY] |
| Sealed radioactive sources | No | | |
| Unsealed radioactive sources | No | | |
| <i>Controls:</i> Radiological Work Permit | Yes | All | [RWP/RWP=JS/RWP=N/R/RPGEN] A job-specific RWP will be required in some areas. |
| ALARA Plan | No | | [ALARA] Levels of radiological contamination do not dictate that an ALARA Plan be required. |

PRS 66 Removal Work Package

| SECTION C, RADIOLOGICAL PROTECTION - TO BE COMPLETED BY RADIOLOGICAL CONTROLS REPRESENTATIVE (Continued) | | | |
|---|-------|--------------------|---|
| <i>Identify engineering/administrative controls or PPE as required, keyed to the following checklist items. Insert any required and/or other special actions to be taken because of the particular hazard (i.e. RWP, ALARA Plan, etc.). Additionally, identify any activities which DOE prescribed Occupational Safety and Health standards that require protective measures be designed, inspected, or approved by a professional engineer or other competent person. (Use Section D if additional space is needed.)</i> | | | |
| Item | Exist | Work Package Phase | Comments, Controls, Methods of Compliance |
| Air Flow Studies | No | | [AIRFLOW/CAM] Locations of high volume continuous air monitors will be determined routinely in the field based upon wind directions as evaluated by observing a field wind indicator. |
| <i>Controls:</i> Urinalysis program | Yes | All | As required and stipulated within the RWP. |
| Preliminary or in-process characterization | Yes | All | [SURVPS/SURVIP] Characterization data has been obtained to bound the excavation area. In-field characterization will occur to validate that the clean-up objectives are being met prior to final validation sampling. |
| Anti-contamination clothing | Yes | All | As required and stipulated within the RWP. |
| Respiratory protection | No | | [RESP] If field conditions change requiring respirators, the RWP will be modified with respiratory protection requirements being stipulated within the RWP. |
| Needs Analysis Evaluation | Yes | All | As required to support the RWP development process. |
| Hazards Analysis | Yes | All | Appropriate analysis is performed in the process of preparing the RWP. |
| Engineering Controls | Yes | All | Continuous high volume air monitoring will be located at the perimeters of the excavation area. |
| Administrative Controls | Yes | All | Such as radiological postings, RWP instructions, etc. |
| Supplemental dosimetry | No | | TLD's may be required; if so, indicated on the RWP. |
| Shielding | No | | |
| Personnel monitoring (frisking) | Yes | All | Workers will be frisked upon leaving the contamination control area per radiological procedures. |

| SECTION D - OTHER CONDITIONS, CONCERNS, OR SUPPLEMENTAL INFORMATION FROM SECTIONS A THROUGH C |
|---|
| <p>Identify Assembly Points: The project and radiological control trailers located adjacent to the PRS 66 site will serve as the project trailers. All evacuation and take shelter procedures associated with these trailers will be adhered to for workers within the field. As always with outside work activities, should immediate imminent conditions occur due to tornado conditions, workers will look for and take shelter in the lowest ditch area within the excavation area.</p> |

PRS 66 Removal Work Package

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APPENDIX D

**PRS 66
PROJECT REVISION
FORMS**

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PRS 66 Removal Work Package

WORK PACKAGE REVISION FORM

| Work Package Revision Form | | | |
|---|---|------------------|-------------|
| Work Package No. <i>ER/ST - 02 - 008</i> | Revision No. <p style="text-align: center; font-size: 1.2em;">0</p> | | |
| Revision Description: (attach page revisions to form) | | | |
| | Name | Signature | Date |
| PREPARED BY: | | | |
| Revision Preparer: | | | |
| REVIEWED BY: | | | |
| Job Supervisor: | | | |
| Project Superintendent/ Foreman: | | | |
| Industrial Safety & Hygiene P o C: | | | |
| Radiological Point of Contact: | | | |
| Environmental Safeguards & Compliance P o C: | | | |
| Waste Management PoC: | | | |
| Building Manager: | | | |
| Other: | | | |
| Other: | | | |
| USQ Trained Person | | | |
| USQ SCREEN / DETERMINATION REQUIRED? <input type="checkbox"/> YES <input type="checkbox"/> NO Brief Explanation _____ _____ _____ | | | |
| APPROVED BY: | | | |
| Project Manager: | | | |

APPENDIX E

**PRS 66
HEALTH AND SAFETY PLAN
(HASP)**

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PRS 66 Removal Work Package

Revision No.: _____

Revision Date: _____

SITE SPECIFIC HEALTH AND SAFETY PLAN

FOR

Project Name: **PRS 66 Removal (includes PRSs 80, 40, 38 & 39)**

Prepared by: _____
Project Engineer (Signature) (Date)

Reviewed by: _____
Radiological Engineering (Signature) (Date)

Reviewed by: _____
Safety Point of Contact (Signature) (Date)

Reviewed by: _____
Project Superintendent (Signature) (Date)

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Revision Date: _____

1.0 WORK SCOPE AND SITE DESCRIPTION

The objective of the PRS 66 Remediation is to remove contaminated back fill to standard industrial level due to the presence of radiological contamination.

2.0 SITE HISTORY

PRS 66 has an extensive history that dates to 1947, with the construction of the original buildings and the temporary wooden warehouses used to support plant construction. Use of this area for a variety of purposes followed. Besides the warehouses and the back filled area to construct these warehouses, this area has been used for back filling with debris, waste materials and soil. Other uses have included uses of the area currently designated as PRS 66 for building sites. In addition to wooden warehouses once located in the northern areas of the PRS 66 area, Building 66 which has been dismantled and sold, and Buildings 51 and 98 which were recently demolished and removed from the PRS 66 area.

3.0 SITE CONTROL

The Superintendent / Foreman or Designate will strictly enforce the following at all times:

- a two-man Buddy system;
- documented daily pre-job briefs;
- mark and barricade site as work area;
- brief workers on and maintain effective communication;
- controlled point of access.

Describe Communication Methods:

Internal: Communications will be verbal or line of site.

External: Communications will be by radio, cell phone or verbal

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Revision Date: _____

4.0 HEALTH AND SAFETY SITE EVALUATION

Place an X in each () to indicate presence of hazard.

4.1 Physical Hazards

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> Heat Stress | <input checked="" type="checkbox"/> Cold Stress | <input checked="" type="checkbox"/> Noise |
| <input type="checkbox"/> Confined Space | <input type="checkbox"/> Enclosed Space | <input checked="" type="checkbox"/> Heavy Lifting |
| <input checked="" type="checkbox"/> Tripping/Falling | <input checked="" type="checkbox"/> Electrical | <input type="checkbox"/> High Pressure Water |
| <input type="checkbox"/> Oxygen Deficient | <input checked="" type="checkbox"/> Explosive/Flammable | <input checked="" type="checkbox"/> Vibration |

4.2 Construction Hazards

- | | | |
|-------------------------------------|--|---|
| <input type="checkbox"/> Trenching | <input checked="" type="checkbox"/> Excavating | <input checked="" type="checkbox"/> Heavy Equipment Op. |
| <input type="checkbox"/> Demolition | <input type="checkbox"/> High Work | <input type="checkbox"/> Welding/cutting |
| <input type="checkbox"/> Ladders | <input checked="" type="checkbox"/> Hand Digging | |

4.3 Chemical Hazards

- | | | |
|--|---|--|
| <input checked="" type="checkbox"/> Organic Chemical | <input type="checkbox"/> Inorganic Chemical | <input type="checkbox"/> Carcinogen |
| <input type="checkbox"/> Corrosive | <input type="checkbox"/> Reactive | <input type="checkbox"/> OSHA Specific |
| <input type="checkbox"/> Mutagen | <input type="checkbox"/> Teratogen | |

4.4 Ionizing Radiological Hazards

- | | |
|---|---|
| <input checked="" type="checkbox"/> Internal Exposure | <input checked="" type="checkbox"/> External Exposure |
|---|---|

4.5 Non-Ionizing Radiological Hazards

- | | | |
|--|-----------------------------|------------------------------------|
| <input checked="" type="checkbox"/> UV | <input type="checkbox"/> RF | <input type="checkbox"/> Microwave |
| <input type="checkbox"/> Laser | | |

4.6 Biological/Vector Hazards

- | | | |
|--|--|--|
| <input checked="" type="checkbox"/> Wildlife | <input checked="" type="checkbox"/> Plants | <input type="checkbox"/> Medical Waste |
| <input type="checkbox"/> Bacterial | <input type="checkbox"/> Parasites | |

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5.0 PREVIOUS SAMPLING RESULTS

Source (water, sediment, contaminant sludge, soil, air, etc.), quantity or concentrations)

See PRS Sample Data Package

6.0 CONTAMINANTS (MSDS are a valuable source of information and are available from Industrial Health & Safety (IS&H) and should be kept at the job site.)

| | |
|--|-----------------------------|
| 6.1 Chemical Name: Benzene | |
| Route of Exposure: Inhalation, ingestion, absorption, Skin/eye contact | |
| Symptoms of Exposure: Irritate eyes, skin nose, respiratory system; giddiness, headache, nausea, staggered gait, fatigue, anorexia, weakness, exhaustion, dermatitis, effects bone marrow, potential occupational carcinogen | Special Medical Monitoring: |
| PEL/TLV*: 0.5 ppm | IDLH: 500 ppm |
| STEL: 2.5 ppm | LEL: 1.2% |
| Other: | |

* OSHA or ACGIH Standard, whichever is most restrictive

| | |
|--|-----------------------------|
| 6.2 Chemical Name: Chlorobenzene | |
| Route of Exposure: Inhalation. Ingestion, eye/skin contact | |
| Symptoms of Exposure: Irritate eyes, skin & nose; drowsiness, incoordination, affects central nervous system | Special Medical Monitoring: |
| PEL/TLV*: 10 ppm | IDLH: 1000 ppm |
| STEL: | LEL: 1.3% |
| Other: | |

* OSHA or ACGIH Standard, whichever is most restrictive

PRS 66 Removal Work Package

Revision No.: _____

Revision Date: _____

| | |
|--|-----------------------------|
| 6.3 Chemical Name: 1,2 Dichlorbenzene | |
| Route of Exposure: Inhalation, ingestion, absorption, Skin/eye contact | |
| Symptoms of Exposure: Irritate eyes, nose; damage liver, kidney, skin blisters | Special Medical Monitoring: |
| PEL/TLV*: 25 ppm | IDLH: 200 ppm |
| STEL: 50 ppm | LEL: 2.2% |
| Other: | |

* OSHA or ACGIH Standard, whichever is most restrictive

| | |
|--|-----------------------------|
| 6.4 Chemical Name: Naphthalene | |
| Route of Exposure: Inhalation, ingestion, absorption, skin/eye contact | |
| Symptoms of Exposure: Irritate eyes; headache, confusion, excitement, vague feeling of discomfort, nausea, vomiting, abdominal pain; irritate bladder, profuse sweating, jaundice; blood in urine, hemoglobinuria, renal shutdown; dermatitis, optical neuritis, cornea damage | Special Medical Monitoring: |
| PEL/TLV*: 10 ppm | IDLH: 250 ppm |
| STEL: 15 ppm | LEL: 0.9% |
| Other: | |

* OSHA or ACGIH Standard, whichever is most restrictive

| | |
|---|-----------------------------|
| 6.5 Chemical Name: Isophorone | |
| Route of Exposure: Inhalation, ingestion, absorption, skin/eye contact | |
| Symptoms of Exposure: Irritate eyes, skin, respiratory system, chest tight, breathing difficulty, cough, sore throat, bronchitis, wheezing, pulmonary edema | Special Medical Monitoring: |
| PEL/TLV*: 4 ppm | IDLH: 200 ppm |
| STEL: 5 ppm | LEL: 0.8 |
| Other: | |

* OSHA or ACGIH Standard, whichever is most restrictive

PRS 66 Removal Work Package

Revision No.: _____

Revision Date: _____

7.0 INDUSTRIAL HYGIENE AIR MONITORING

| Chemical Name | Frequency of Monitoring | Instrument Reading Action Level | Action |
|-------------------------|---|---|--|
| Benzenes | Beginning when known depth achieved or personnel entry into excavation equal to or greater than 4 feet in phase IV. | >0.25 ppm sustained in the breathing zone | Stop work. Recheck in approximately 30 minutes and consult with the Project Engineer |
| Organic gasses & vapors | Whenever soil discoloration or smells dictates and personnel entry in 4 feet or greater excavations. | 50 ppm in the breathing zone | Perform periodic air monitoring if levels exceed the action level. Stop work. Consult Project Engineer |

Standard Operating Procedures (ER Program):

7.1 - Health and Safety Monitoring of Combustible Gas Levels

7.2 - Health and Safety Monitoring of Organic Vapors with a Photoionization Detector

FID/PID Monitoring - Air monitoring and Calibration conducted with the TVA-1000 or equivalent

PID/FID shall be conducted in accordance with the Manufacturer Guidelines.

Draeger - Air monitoring using Draeger Detector Tubes shall be conducted according to the Manufacturer Guidelines.

Note: All instruments (excluding the Draeger Pump) are calibrated prior to each use. Required calibrations are recorded on the air monitoring data sheet.

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Revision Date: _____

8.0 TASK BREAKDOWN

8.1 Description of Task:

| Breakdown of Basic Task Steps | Potential Hazards | Proposed Actions or Procedures (Permits, etc.) |
|---|---|---|
| A. Common Activities | | |
| 1. Working near motorized equipment or compressed air. | 1. Noise-Temporary/Permanent loss of hearing Lighting | 1. Wear earplugs or other hearing protection. If noise is expected to exceed 85 dBA (OSHA Action Level). Work area should be monitored if noise levels are questionable. Mound IS&H will perform monitoring as necessary (i.e. MD-10286 D9) Portable lighting, when necessary |
| 2. Working outdoors where severe weather changes cause hazards. | 2. Inclement weather-Increased physical hazards (i.e. slips, trips, falls: struck by lightning) | 2. Monitor changes in weather conditions. Suspend outdoor activities during thunderstorms or ice storms (see attached weather policy dated 5/30/02). |
| 3. Working in hot/cold climate conditions, possibly with PPE | 3. Heat/cold stress | 3. Monitor personnel, adjust work schedule. (i.e. MD-10286 D13 and D16 Section 9.1) |
| 4. Lifting or moving heavy objects | 4. Cuts, pinching, crushing, muscle and joint injuries. | 4. Inspect objects for contact hazards. Use mechanical equipment to assist when possible. Work within appropriate handling/lifting capacities. Consider the conditions and constraints of the area. Use proper lifting techniques. (i.e. MD 10286 D17) |
| 5. Working in a controlled access area. | 5. Accidental injury or exposure to worker and visitor due to unauthorized entry or inadequate delineation. | 5. Clearly delineate work zone and access points with physical barriers and signs. Perform and document daily pre-job safety meeting. Maintain line of sight supervision when possible. (i.e. MD 10286 M10) |
| 6. Working near overhead/underground utility lines. | 6. Physical injury, shock, electrocution, disruption of services. | 6. Excavation permit will be issued and all utilities will be verified as deactivated prior to performing work in phase zones with a hold point for job supervisor's or designates verification signature. The abandon utilities will be removed if within the removal guidelines |
| 7. Working on an uneven or sloped working | 7. Slips, trips, and falls | 7. Use caution when maneuvering on unlevel and sloped |

PRS 66 Removal Work Package

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Revision Date: _____

| Breakdown of Basic Task Steps | Potential Hazards | Proposed Actions or Procedures (Permits, etc.) |
|--|---|---|
| surface. | | surfaces. |
| 8. Working with hand and power tools. | 8. Physical trauma, electrocution, fires. | 8. All guards and safety devices must be in place during operation. Electric powered tools must be double insulated or grounded. GFCI required for all outdoor operation of hand held power tools. Equipment and cords are to be inspected prior to use. Operator will not wear loose or frayed clothing, lose long hair, dangling jewelry, etc. Electric power tools, electrical cords and the operator must be clear of standing water. (i.e. MD-10444) All hand digging tools will be operated using proper techniques to prevent physical trauma. |
| 9. Working with or near flammable liquids. | 9. Fire, explosion | 9. Store flammable liquids in approved, labeled safety cans away from heat, sparks, or flames. (i.e. MD-10286) |
| 10. Working with or near potentially contaminated soils or other media. | 10. Potential contact or inhalation hazard. | 10. Maintain at least a minimum level of protective equipment. Mist work area if dust creates an airborne exposure potential. IS&H Monitoring when personnel entry into excavation of greater than or equal to 4 feet or as dictated by soil discoloration or smells. |
| 11. Entry into excavation | 11. Engulfment (Cave in) | 11. 1 ½:1 foot slope, benching 1:1 foot slope with 3 ½' maximum vertical side less than 12 feet deep or combination of both sloping and benching are required on all excavations less than or equal to 20 feet. All excavations greater than 20 feet shall have the protective system (sloping, benching, shoring or combination of all) designed by a registered professional engineer. |
| 12. Operation of Heavy Duty Equipment (Hoe Rams, Shears, Excavators, Loaders, Haulers) | 12. Struck by equipment and Physical Trauma | 12. Proceed with caution when walking around Heavy-Duty equipment. Always wear a reflective vest when within 50 feet of operating Heavy-Duty equipment. |

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| | | |
|---|--|---|
| | | Stay 75 feet from operating hoe ram or shear Be sure to get the attention of the operator before approaching the equipment. No personnel will work downhill of any operating Heavy-Duty equipment. Whole Body Vibration letter dated 9/27/01 |
| Breakdown of Basic Task Steps | Potential Hazards | Proposed Actions or Procedures (Permits, etc.) |
| 13. Decontamination of Heavy Duty equipment | 13. Contact with contaminations of concern | 13. All Heavy Duty equipment which has contacted potential contaminated material must be surveyed and released by Rad POC. |
| | | |

| Level of Personal Protective Equipment: | | Primary (X) | Contingency () |
|---|-------------|--|-----------------|
| | Primary | (Write type Here,,:) | Contingency |
| | Y () N (X) | | Y () N () |
| Respiratory Protection: | Y () N (X) | Defer to RWP/IH monitoring | Y () N () |
| Protective Clothing: | Y (X) N () | Defer to RWP | Y () N () |
| Head Protection: | Y (X) N () | Hard Hat | Y () N () |
| Eye Protection: | Y (X) N () | Safety Glasses with sideshields | Y () N () |
| Foot Protection: | Y (X) N () | Safety Shoes | Y () N () |
| Hand Protection: | Y (X) N () | Work Gloves | Y () N () |
| Hearing Protection: | Y (X) N () | During Heavy Duty Equipment use | Y () N () |
| Tape-up Required: | Y () N (X) | Defer to RWP | Y () N () |
| Other PPE Requirements | Y (X) N () | Reflective vests when within 50 feet of operating Heavy Duty equipment | Y () N () |

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9.0 HAZARD ANALYSIS

9.1 Chemicals (Contact Waste Coordinator at ext #3515 for disposal instructions.)

Task(s): ALL

Specific labeling requirements of site-generated waste: NOT APPLICABLE

Chemical-specific disposal requirements:

9.2 Fire/Explosion

Task(s): ALL

Are flammable liquids present? Yes / No

Description: Diesel and Gasoline

Location: Heavy Equipment and Generator(s)

Quantity: 100 gallons max per piece of heavy duty equipment, generator max = 5 gallons

Containment/Storage method: Within equipment tanks

For welding, cutting, or brazing a Hot Work Permit is required.

9.3 Confined/Enclosed Spaces

(see Confined Space Entry Procedures, MD-10286, Operation # M-11)

Tasks: NONE, all entries NA

Confined/enclosed space entry required? Yes/No

Confined Space Entry Permit issued? Yes/No

Hazard Class: A B C

Reason for Hazard Class selection:

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9.4 Ionizing Radiation

Task Number(s): Excavating and Sampling

Is a Radiation Work Permit (RWP) required? Yes/No

(If yes, then attach RWP to this SS-HASP.)

Primary potential contaminating isotope(s) Pu-238 Th-232 Th-228

Location on site PRS 66

Contamination

BULK

<11,400 pCi/g Pu-238
Isotope

<1985 pCi/g Th-232
Isotope

<1985 pCi/g Th-228
Isotope

<274 pCi/g Ac-227
Isotope

< 35 pCi/g Cs-137
Isotope

< 41 pCi/g Ra-226
Isotope

< 500 pCi/g Th-230
Isotope

< 76 pCi/g Pu-239
Isotope

SURFACE

limits for release of material are in MD-80036, Operation 90014

<400 expected dpm/100cm⁵ alpha removable

<100 expected dpm/100cm⁵ alpha total

<2000 expected dpm/100cm⁵ beta/gamma removable

<5000 expected dpm/100cm⁵ beta/gamma total

Airborne Sampling Required Yes/No

Health Physics coverage Yes/No (If yes, then specify requirements on RWP.)

Special task operation requirements

- Soil Disturbance
- Grinding/chipping
- Hydraulic/air hammer operation
- Dusty conditions (sweeping, vacuuming, etc.)
- Equipment decontamination/free release
- Welding/cutting/brazing

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9.5 Electrical Hazards

Tasks All

Electrical shock Hazard? Yes/No

Answer YES if any of the below are checked:

- Over head power lines within 10 feet.
- Underground electrical lines.
- Concealed lines in walls, conduits, ceilings, etc.
- Electrically powered tools being used outdoors or near standing water.
- Power tools being used near recognized grounding surfaces, such as metal tanks, pipelines, or grounded floors.
- Portable generators being used.
- High-Voltage (>100 Kv) electrical transmission lines nearby

Location of Hazard: _____

Voltage

Abatement:

- N/A Have appropriate scans been performed?
- Are Ground Fault Circuit Interrupters (GFCI) in use with work involving portable hand tools, outdoor work, or with portable generators?
- Have portable generators been properly grounded?
- N/A Have procedures been implemented to assure that equipment or materials do not come within 10 feet of overhead power lines?

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9.6 Temperature Extremes

- A. **HEAT STRESS:** Weather reports will be monitored prior to starting work. Worker rotation will be utilized. The buddy system will be used. If necessary to control a WBGT will be used. To adjust work schedule:

| Work--Rest Regimen each Hour | Work Load | | |
|---------------------------------|-----------|-----------|-----------|
| | Light | Moderate | Heavy |
| Continuous work | 30.0 (86) | 26.7 (80) | 25.0 (77) |
| 75% -- 25 % | 30.6 (87) | 28.0 (82) | 25.9 (78) |
| 50% -- 50% | 31.4 (89) | 29.4 (85) | 27.9 (82) |
| 25% -- 75% | 32.2 (90) | 31.1 (88) | 30.0 (86) |

Values given in °C (°F) Wet Bulb Globe Temperature

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B. COLD STRESS: Threshold Limit Values Work/Warm-up Schedule for a Four-Hour Shift

| Air Temp—Sunny Sky | | No Noticeable Wind | | 5 MPH Wind | | 10 MPH Wind | | 15 MPH Wind | | 20 MPH Wind | |
|--------------------|----------------|---------------------------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
| °C (approx) | °F (approx) | Max. Work Period | No. of Breaks | Max. Work Period | No. of Breaks | Max. Work Period | No. of Breaks | Max. Work Period | No. of Breaks | Max. Work Period | No. of Breaks |
| -26 to -28 | -15 to -19 | Norm | 1 | Norm | 1 | 75 min | 2 | 55 min | 3 | 40 min | 4 |
| -29 to -31 | -20 to -24 | Norm | 1 | 75 min | 2 | 55 min | 3 | 40 min | 4 | 30 min | 5 |
| -32 to -34 | -25 to -29 | 75 min | 2 | 55 min | 3 | 40 min | 4 | 30 min | 5 | | |
| -35 to -37 | -30 to -34 | 55 min | 3 | 40 min | 4 | 30 min | 5 | | | | |
| -38 to -39 | -35 to -39 | 40 min | 4 | 30 min | 5 | | | | | | |
| -40 to -42 | -40 to -44 | 30 min | 5 | | | | | | | | |
| -43 & below | -45 & below | NON-EMERGENCY WORK SHALL CEASE | | | | | | | | | |

1. Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up periods of ten (10) minutes in a warm location and with an extended break (e.g., lunch) at the end of the 4-hour work period in a warm location. For light-to-moderate work (limited physical movement); apply the schedule one step lower. For example, at -35E (-30EF) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).

2. The following is suggested as a guide for estimating wind velocity if accurate information is not available; 5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.

3. If only the wind chill cooling rate is available, a rough rule-of-thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/m²; 2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m². In general, the warm-up schedule provided above slightly under compensates for a wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder range because windy conditions rarely prevail at extremely low temperatures.

4. TLVs apply only for workers in dry clothing.

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9.7 Noise

Tasks ALL

Noise Extremes? Yes/No

Sound level: Heavy Equipment previously monitored

Noise source(s): Heavy Duty Equipment

Hearing protection is required for Noise Levels above 85 dB(A).

Precautions(specify): Wear earplugs when working near operating Heavy Duty Equipment

9.8 Sanitation

Tasks: ALL

Potable Water Required? Yes/No

Non-Potable Water Used? Yes/No

Eating, drinking, and smoking permitted? Yes/No

Toilet facilities required? Yes/No

Location and number: One at Trailer 31A

Washing facilities required? Yes/No

Location: Trailer 31A

Change rooms required? Yes/No

9.9 Biological Hazards

Evaluate the work site, do any of the following conditions exist?

Poisonous Plants? Yes/No

Insects? Yes/No

Snakes? Yes/No

Animals? Yes/No

Workers known to be allergic to any of the above? Yes/No

Any evidence of Medical Waste present? Yes/No

Sewage outlets present? Yes/No

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10.0 MEDICAL SURVEILLANCE

OFF-SITE CONTRACTORS AND PERSONNEL:

Documentation is needed prior to a contractor being assigned work with possible exposure to hazardous material. A written opinion from the contractor's examining physician is required as regards their employee's fitness and include the following:

1. Any medical condition that would place the employee at increased risk.
2. Recommend any limitations upon employee's assigned work.
3. Results of the medical examination and tests.
4. A statement that the employee has been informed by the examining physician of the results of the medical examination signed by the employee and physician.

The written opinion shall not contain any specific finding of a diagnosis unrelated to the occupational exposures.

Are these documents attached as an appendix to this SS-HASP? Yes/No

If not state the reasons why? No contractors assigned

Have these documents been turned into Mound's Occupational Medicine Department? Yes/No

11.0 WORKER TRAINING REQUIREMENTS

Rad Worker II (classroom and practical) or Radiological qualification,
Respirator Physical qualification and safety training (as required)
Health Physics orientation of the site, and
HAZWOPER Training:

- Site Workers: Current 40 hour plus three-day field experience.
Incidental Workers - Current 24 hour plus one-day field experience.
(see HAZWOPER Coord.)
- Supervisors: Current 40-hour with the additional 8 hour Site Supervisor training.
- Subcontractors: Current 40 hour
Note: General Employee Radiation Training (GERT) with proper escort or
Radworker II if on-site greater than two weeks
Contractor Orientation

12.0 DECONTAMINATION

Excavating Equipment Decontamination

Equipment used for excavating will be washed and rinsed in decontamination station using portable water.
Decontamination water will be containerized and characterized for disposal.

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13.0 EMERGENCY PREPAREDNESS

From the SITE MAP (Appendix G, Figure 2, General Site with Excavation Phases): be familiar with the site work zones, evacuation routes, and safe refuges for workers in case of emergencies.

The Assembly Area will be the project trailers, which are located adjacent to the PRS 66.

The Take Shelter area will be Building 45 which is the current take shelter for the project trailers. If conditions prevent getting to the assigned take shelter area look for and take shelter in the lowest ditch area within the excavation.

Note: If Building 45 is no longer the take shelter area, the current take shelter area for the project trailers will serve as projects take shelter area.

PERSONAL ROLES AND RESPONSIBILITIES

| <u>Name</u> | <u>Role</u> | <u>Phone</u> |
|---------------------|----------------------------------|--------------|
| Stephen D. Rohrig | Project Engineer | 937-865-4167 |
| Mark A. Daubenmire | Project Superintendent | 937-865-3444 |
| John M. Schneider | Site Health & Safety Coordinator | 937-865-4891 |
| Chuck D. Finkenbine | Mound Radiological Engineering | 937-865-4527 |
| Bill R. Naumann | Mound Waste Management | 937-865-3515 |

EMERGENCY CONTACTS: All emergency services ON-SITE call **911**, Cell Phone **865-4040**.
Other emergency services may be reached at the telephone numbers shown below.

Security Police (865)-3118

Medical Clinic (865)-3414

Ambulance (865)-3313

Doctor (865)-3414

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14.0 RECORD KEEPING REQUIREMENTS

(Mark with an X as appropriate) Required

Required

Hazardous Chemicals

Area monitoring X
Personnel monitoring X

Oxygen Level Measurements NA

Flammability Measurements NA

Ionizing Radiation

Worker dose NA
Contamination levels X
Airborne contamination level X

Non-Ionizing Radiation

UV level measurements NA
Microwave level measurements NA
Laser power level measurements NA

Biological

Personnel exposure monitoring NA

Electrical

Tag-out records X

Noise

Area monitoring X
Personnel monitoring X

Illumination

Area foot-candle measurements NA

Personnel Medical Monitoring

X

Safety Incidents

OSHA accident records X
Accident/incident reports X

Personal Protection Equipment

Inspection of:

Clothing NA
Respirators NA
Gloves NA
Boots NA

Waste Disposal Manifests X

Spill Incident Reports NA

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Confined Space Permit NA

Hot Work Permit X

Excavation Permits X

Radiation Work Permit X

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15.0 SIGN-IN SHEET AND TRAINING REQUIREMENTS

SIGNATURE AFFIRMS THAT THE WORKER HAS BEEN BRIEFED OR HAS READ THE SS-HASP AND UNDERSTANDS THE HAZARDS AND INFORMATION CONTAINED WITHIN. ALL ON-SITE WORKERS AND VISITORS MUST READ AND SIGN THIS SHEET BEFORE SITE ENTRY CAN BE PERMITTED. THE SITE SUPERVISOR MUST VERIFY THAT THE TRAINING REQUIREMENTS HAVE BEEN MET AS OUTLINED IN SECTION 11.0 OF THIS DOCUMENT!

| | <u>NAME</u> | <u>Date</u> | <u>HP # or SS #</u> |
|-----|-------------|-------------|---------------------|
| 1. | _____ | _____ | _____ |
| 2. | _____ | _____ | _____ |
| 3. | _____ | _____ | _____ |
| 4. | _____ | _____ | _____ |
| 5. | _____ | _____ | _____ |
| 6. | _____ | _____ | _____ |
| 7. | _____ | _____ | _____ |
| 8. | _____ | _____ | _____ |
| 9. | _____ | _____ | _____ |
| 10. | _____ | _____ | _____ |
| 11. | _____ | _____ | _____ |
| 12. | _____ | _____ | _____ |

| | <u>NAME</u> | <u>Date</u> | <u>HP # or SS #</u> |
|-----|-------------|-------------|---------------------|
| 13. | _____ | _____ | _____ |
| 14. | _____ | _____ | _____ |
| 15. | _____ | _____ | _____ |
| 16. | _____ | _____ | _____ |
| 17. | _____ | _____ | _____ |
| 18. | _____ | _____ | _____ |
| 19. | _____ | _____ | _____ |
| 20. | _____ | _____ | _____ |
| 21. | _____ | _____ | _____ |
| 22. | _____ | _____ | _____ |
| 23. | _____ | _____ | _____ |
| 24. | _____ | _____ | _____ |

| | | | |
|---------------------------------------|---|---|--|
| MATERIAL SAFETY DATA SHEET |  | ASHLAND CHEMICAL, INC. Subsidiary Of Ashland Oil, Inc. P.O. BOX 2219 COLUMBUS, OHIO 43216 (614) 889-3333 | 24-HOUR Emergency Telephone 1(800) 274-5263 or 1(800) ASHLAND |
|---------------------------------------|---|---|--|

002659

ISOPHORONE

Page: 1

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

Product Name: ISOPHORONE
 CAS NUMBER: 78-59-1

ASTRO CHEMICALS, INC.
 P.O. BOX 2248
 SPRINGFIELD MA 01101

05 50 074 0469180

Data Sheet No: 0004322-005.007
 Prepared: 01/17/95
 Supersedes: 11/21/94
 Print Date: 01/28/95

PRODUCT: 3510000
 INVOICE: 123932
 INVOICE DATE: 01/23/95
 TO: ASTRO CHEMICALS, INC.
 64-70 SHAW'S LANE
 SPRINGFIELD MA 01104

ATTN: PLANT MGR./SAFETY DIR.

SECTION I - PRODUCT IDENTIFICATION

General or Generic ID: KETONE

SECTION II - COMPONENTS

IF PRESENT, IARC, NTP AND OSHA CARCINOGENS AND CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III SECTION 313 ARE IDENTIFIED IN THIS SECTION. SEE DEFINITION PAGE FOR CLARIFICATION.

| INGREDIENT | Percent | PEL | TLV | Note |
|------------------------------|---------|-------|-----------------|------|
| ISOPHORONE CAS #: 78-59-1 | 100 | 4 PPM | 5 PPM - CEILING | (1) |

Notes:

(1) TLV IS CEILING VALUE

SECTION III - PHYSICAL DATA

| | | |
|------------------------|---------------|---|
| Boiling Point | for PRODUCT | 419.00 Deg F (215.00 Deg C) @ 760.00 mm Hg |
| Vapor Pressure | for PRODUCT | < 1.00 mm Hg @ 68.00 Deg F (20.00 Deg C) |
| Specific Vapor Density | AIR = 1 | 4.77 |
| Specific Gravity | | .922 @ 68.00 Deg F (20.00 Deg C) |
| Percent Volatiles | | 100.00% |
| Evaporation Rate | (N BU AC = 1) | .03 |

SECTION IV - FIRE AND EXPLOSION INFORMATION

FLASH POINT 179.0 Deg F (81.7 Deg C)

EXPLOSIVE LIMIT (PRODUCT) LOWER - .8%

EXTINGUISHING MEDIA: REGULAR FOAM OR WATER FOG OR CARBON DIOXIDE OR DRY CHEMICAL

HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS: CARBON DIOXIDE AND CARBON MONOXIDE, ETC.

FIREFIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND MODE WHEN FIGHTING FIRES.

SPECIAL FIRE & EXPLOSION HAZARDS: VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG THE GROUND OR BE MOVED BY VENTILATION AND IGNITED BY HEAT, PILOT LIGHTS, OTHER FLAMES AND IGNITION SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINT.

NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

ALL FIVE GALLON PAILS AND LARGER METAL CONTAINERS INCLUDING TANK CARS AND TANK TRUCKS SHOULD BE GROUNDED AND/OR BONDED WHEN MATERIAL IS TRANSFERRED.

NFPA CODES: HEALTH- 2 FLAMMABILITY- 2 REACTIVITY- 0

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL 4 PPM
 THRESHOLD LIMIT VALUE 5 PPM - CEILING

EFFECTS OF ACUTE OVEREXPOSURE:

EYES - EXPOSURE CAUSES EYE IRRITATION. SYMPTOMS MAY INCLUDE STINGING, TEARING, REDNESS, AND SWELLING.
 SKIN - EXPOSURE MAY CAUSE MILD SKIN IRRITATION. SYMPTOMS MAY INCLUDE REDNESS AND BURNING.
 SKIN ABSORPTION IS POSSIBLE, AND MAY CONTRIBUTE TO SYMPTOMS OF TOXICITY FROM OTHER ROUTES OF EXPOSURE.
 BREATHING - EXPOSURE TO VAPOR OR MIST IS POSSIBLE.
 SHORT-TERM INHALATION TOXICITY IS LOW. BREATHING SMALL AMOUNTS DURING NORMAL HANDLING IS NOT LIKELY TO CAUSE HARMFUL EFFECTS. BREATHING LARGE AMOUNTS MAY BE HARMFUL.
 SYMPTOMS MAY INCLUDE:
 - IRRITATION (NOSE, THROAT, RESPIRATORY TRACT)- PRE-EXISTING LUNG DISORDERS, E.G. ASTHMA-LIKE CONDITIONS, MAY BE AGGRAVATED BY EXPOSURE TO THIS MATERIAL.

| | | | |
|---------------------------------------|---|---|--|
| MATERIAL SAFETY DATA SHEET |  | ASHLAND CHEMICAL, INC. Subsidiary of Ashland Oil, Inc. P.O. BOX 2219 COLUMBUS, OHIO 43216 (614) 889-3333 | 24-HOUR Emergency Telephone 1(800) 274-5263 or 1(800) ASHLAND |
|---------------------------------------|---|---|--|

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ISOPHORONE

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SECTION V-HEALTH HAZARD DATA (Continued)

-CENTRAL NERVOUS SYSTEM DEPRESSION (DIZZINESS, DROWSINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE, UNCONSCIOUSNESS)-

-AND DEATH

SWALLOWING - SINGLE DOSE ORAL TOXICITY IS LOW. SWALLOWING SMALL AMOUNTS DURING NORMAL HANDLING IS NOT LIKELY TO CAUSE HARMFUL EFFECTS; SWALLOWING LARGE AMOUNTS MAY BE HARMFUL.

SYMPTOMS MAY INCLUDE:

-GASTROINTESTINAL IRRITATION (NAUSEA, VOMITING, DIARRHEA)-

FIRST AID:

IF ON SKIN: REMOVE CONTAMINATED CLOTHING. WASH EXPOSED AREA WITH SOAP AND WATER. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION. LAUNDRY CLOTHING BEFORE REUSE.

IF IN EYES: IF SYMPTOMS DEVELOP, IMMEDIATELY MOVE INDIVIDUAL AWAY FROM EXPOSURE AND INTO FRESH AIR. FLUSH EYES GENTLY WITH WATER FOR AT LEAST 15 MINUTES WHILE HOLDING EYELIDS APART; SEEK IMMEDIATE MEDICAL ATTENTION.

IF SWALLOWED: DO NOT INDUCE VOMITING. KEEP PERSON WARM, QUIET, AND GET MEDICAL ATTENTION. ASPIRATION OF MATERIAL INTO THE LUNGS DUE TO VOMITING CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.

IF BREATHED: IF SYMPTOMS DEVELOP, IMMEDIATELY MOVE INDIVIDUAL AWAY FROM EXPOSURE AND INTO FRESH AIR. SEEK IMMEDIATE MEDICAL ATTENTION; KEEP PERSON WARM AND QUIET. IF PERSON IS NOT BREATHING, BEGIN ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN.

PRIMARY ROUTE(S) OF ENTRY:

INHALATION, SKIN CONTACT.

EFFECTS OF CHRONIC OVEREXPOSURE:

INTERIM REPORTS OF A TWO YEAR TOXICOLOGY STUDY OF ISOPHORONE BY THE NTP INDICATES THAT ISOPHORONE SHOWS SOME INCIDENCE OF CARCINOGENICITY IN ANIMALS AT HIGH DOSES. THIS FINDING IS OF QUESTIONABLE SIGNIFICANCE FOR HUMANS.

OVEREXPOSURE TO THIS MATERIAL (OR ITS COMPONENTS) HAS BEEN SUGGESTED AS A CAUSE OF THE FOLLOWING EFFECTS IN LABORATORY ANIMALS, AND MAY AGGRAVATE PRE-EXISTING DISORDERS OF THESE ORGANS IN HUMANS: ANEMIA, LIVER ABNORMALITIES, KIDNEY DAMAGE, EYE DAMAGE, LUNG DAMAGE

SECTION VI-REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CANNOT OCCUR

STABILITY: STABLE

INCOMPATIBILITY: AVOID CONTACT WITH: STRONG ALKALIES, STRONG OXIDIZING AGENTS, AMINES

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

SMALL SPILL: ABSORB LIQUID ON VERMICULITE, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND TRANSFER TO HOOD.

LARGE SPILL: ELIMINATE ALL IGNITION SOURCES (FLARES, FLAMES INCLUDING PILOT LIGHTS, ELECTRICAL SPARKS). PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE. PREVENT FROM ENTERING DRAINS, SEWERS, STREAMS OR OTHER BODIES OF WATER. PREVENT FROM SPREADING. IF RUNOFF OCCURS, NOTIFY AUTHORITIES AS REQUIRED. PUMP OR VACUUM TRANSFER SPILLED PRODUCT TO CLEAN CONTAINERS FOR RECOVERY. ABSORB UNRECOVERABLE PRODUCT. TRANSFER CONTAMINATED ABSORBENT, SOIL AND OTHER MATERIALS TO CONTAINERS FOR DISPOSAL.

PREVENT RUN-OFF TO SEWERS, STREAMS OR OTHER BODIES OF WATER. IF RUN-OFF OCCURS, NOTIFY PROPER AUTHORITIES AS REQUIRED, THAT A SPILL HAS OCCURRED.

WASTE DISPOSAL METHOD:

SMALL SPILL: DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

LARGE SPILL: DISPOSE OF IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE SECTION II), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR INDUSTRIAL HYGIENIST). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

VENTILATION: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

PROTECTIVE GLOVES: WEAR RESISTANT GLOVES SUCH AS: POLYVINYL CHLORIDE

EYE PROTECTION: CHEMICAL SPLASH GOGGLES IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. CONSULT YOUR SAFETY REPRESENTATIVE.

OTHER PROTECTIVE EQUIPMENT: TO PREVENT REPEATED OR PROLONGED SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

| | | | |
|---------------------------------------|---|--|---|
| <p>MATERIAL SAFETY DATA SHEET</p> |  | <p>ASHLAND CHEMICAL, INC. Subsidiary of Ashland Oil, Inc. P.O. BOX 2219 COLUMBUS, OHIO 43216 (614) 889-3333</p> | <p>24-HOUR Emergency Telephone 1(800) 274-5263 or 1(800) ASHLAND</p> |
|---------------------------------------|---|--|---|

DEFINITIONS

This definition page is intended for use with Material Safety Data Sheets supplied by the Ashland Chemical Company. Recipients of these data sheets should consult the OSHA Safety and Health Standards (29 CFR 1910), particularly subpart G - Occupational Health and Environmental Control, and subpart I - Personal Protective Equipment, for general guidance on control of potential Occupational Health and Safety Hazards.

SECTION I

PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID: Chemical family or product description.

DOT HAZARD CLASSIFICATION: Product meets DOT criteria for hazards listed.

SECTION II
COMPONENTS

Components are listed in this section if they present a physical or health hazard and are present at or above 1% in the mixture. If a component is identified as a CARCINOGEN by NTP, IARC, or OSHA as of the date on the MSDS, it will be listed and footnoted in this section when present at or above 0.1% in the product. Negative conclusions concerning carcinogenicity are not reported. Additional health information may be found in Section V. Components subject to the reporting requirements of Section 313 of SARA Title III are identified in the footnotes in this section, along with typical percentages. Other components may be listed if deemed appropriate.

Exposure recommendations are for components. OSHA Permissible Exposure Limits (PELS) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) appear on the line with the component identification. Other recommendations appear as footnotes.

SECTION III
PHYSICAL DATA

BOILING POINT: Of product if known. The lowest value of the components is listed for mixtures.

VAPOR PRESSURE: Of product if known. The highest value of the components is listed for mixtures.

SPECIFIC VAPOR DENSITY: Compared to AIR = 1. If the Specific Vapor Density of a product is not known, the value is expressed as lighter or greater than air.

SPECIFIC GRAVITY: Compared to WATER = 1. If Specific Gravity of product is not known, the value is expressed as less than or greater than water.

pH: If applicable.

PERCENT VOLATILES: Percentage of material with initial boiling point below 425 degrees Fahrenheit and vapor pressure above 0.1mm Hg at 68 F.

EVAPORATION RATE: Indicated as faster or slower than ETHYL ETHER, unless otherwise stated.

SECTION IV
FIRE AND EXPLOSION DATA

FLASH POINT: Method identified.

EXPLOSION LIMITS: For product if known. The lowest value of the components is listed for mixtures.

HAZARDOUS DECOMPOSITION PRODUCTS: Known or expected hazardous products resulting from heating, burning or other reactions.

SECTION IV (cont.)

EXTINGUISHING MEDIA: Following National Fire Protection Association criteria.

FIREFIGHTING PROCEDURES: Minimum equipment to protect firefighters from toxic products of vaporization, combustion or decomposition in fire situations. Other firefighting hazards may also be indicated.

SPECIAL FIRE AND EXPLOSION HAZARDS: States hazards not covered by other sections.

NFPA CODES: Hazard ratings assigned by the National Fire Protection Association.

SECTION V
HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMIT: For product

THRESHOLD LIMIT VALUE: For product

EFFECTS OF ACUTE OVEREXPOSURE: Potential local and systemic effects due to single or short term overexposure to the eyes and skin or through inhalation or ingestion.

EFFECTS OF CHRONIC OVEREXPOSURE: Potential local and systemic effects due to repeated or long term overexposure to the eyes and skin or through inhalation or ingestion.

FIRST AID: Procedures to be followed when dealing with accidental overexposure.

PRIMARY ROUTE OF ENTRY: Based on properties and expected use.

SECTION VI
REACTIVITY DATA

HAZARDOUS POLYMERIZATION: Conditions to avoid to prevent hazardous polymerization resulting in a large release of energy.

STABILITY: Conditions to avoid to prevent hazardous or violent decomposition.

INCOMPATIBILITY: Materials and conditions to avoid to prevent hazardous reactions.

SECTION VII
SPILL OR LEAK PROCEDURES

Reasonable precautions to be taken and methods of containment, clean-up and disposal. Consult federal, state and local regulations for accepted procedures and any reporting or notification requirements.

SECTION VIII
PROTECTIVE EQUIPMENT TO BE USED

Protective equipment which may be needed when handling the product.

SECTION IX
SPECIAL PRECAUTIONS OR OTHER COMMENTS

Covers any relevant points not previously mentioned.

ADDITIONAL COMMENTS

Containers should be either reconditioned by CERTIFIED firms or properly disposed of by APPROVED firms. Disposal of containers should be in accordance with applicable laws and regulations. "EMPTY" drums should not be given to individuals. Serious accidents have resulted from the misuse of "EMPTIED" containers (drums, pails, etc.). Refer to Sections IV and IX.

Date : September 27, 2001

Subject: Whole³Body Vibration using trackhoes, backhoes and end loaders with attachments

To whom it may concern:

The 2001 ACGIH Threshold Limit Values (TLVs) for chemical substances and Physical agents and Biological Exposure Indices (BEIs) addresses whole body vibrations. Bullet number 10 of the Whole-Body Vibration section pertains to our operation and states as follows:

"Whole-Body Vibration controls may include the use of "air-ride" suspended seats, suspended cabs, maintenance of vehicle suspension systems, proper tire inflation, and remote control of vibrating processes. Seats with arm rests, lumbar support, an adjustable seat back, and an adjustable seat pan are also useful."

The trackhoes in use have iso-mounted (rubber) cabs with a spring cushioned seat. The backhoes and end loaders in use have a spring cushioned seat. Heavy Duty Mechanics perform preventative maintenance daily noting any deficiencies. The operator will be working two hours or less at a time and not be constantly operating attachments.

In a discussion with the operators, who have used the equipment with attachments, they stated that the vibration in the cab is very moderate except for bucket clean out.

The topic of Whole-Body Vibration will be discussed at the pre-job meeting and this letter will be posted in the work trailer. The following Whole-Body Vibrations symptoms will be discussed at the pre-job meeting:

| | |
|---|--------------------|
| Difficulty in reading instruments or print | General discomfort |
| Interference with fine manipulative movements | Irritability |

If any of these symptoms develop inform the site supervisor of the project, stop work, and report to medical.

The supervisor will contact the safety representative for vibration monitoring of the equipment.



Mark A. Daubenmire, Field Superintendent



John M. Schneider, Safety Point of Contact



Monte A. Williams, Project Manager



BWXT of Ohio, Inc.

Interoffice Correspondence

Date : May 30, 2002

Subject : Weather related electrical disturbance outdoor shutdown policy for Environmental Restoration Project.

To whom it may concern:

The following is the guidelines to be used by the Remediation Project and Site Yards and Grounds group for weather-related electrical disturbances affecting outside activities.

Upon the first sight or sound of lightning or thunder immediately place your equipment in a safe configuration and take shelter.

Make a mental note of the last sight or sound of an electrical storm. Wait for a half-hour before returning to outside activities after that last noted sign.

This policy is required of all mound personnel and subcontractors working under the direction of the Environmental Remediation project.

Handwritten signature of Mark A. Daubenmire in cursive script.

Mark A. Daubenmire, Field Superintendent

Handwritten signature of John M. Schneider in cursive script.

John M. Schneider, Safety Point of Contact

Handwritten signature of Monte A. Williams in cursive script.

Monte A. Williams, Project Manager

MSDS for BENZENE

- PRODUCT IDENTIFICATION

PRODUCT NAME: BENZENE
FORMULA: C6H6
FORMULA WT: 78.10
CAS NO.: 71-43-2
NIOSH/RTECS NO.: CY1400000
COMMON SYNONYMS: BENZOL; PHENYL HYDRIDE; COAL NAPHTHA
PRODUCT CODES: 9156,9256,9153,9154,9155,B717,9149
EFFECTIVE: 01/22/87
REVISION #04

PRECAUTIONARY LABELLING

HAZARD IDENTIFICATION SYSTEM
HEALTH - 4 EXTREME (CANCER CAUSING)
FLAMMABILITY - 3 SEVERE (FLAMMABLE)
REACTIVITY - 0 NONE
CORROSIVITY - 1 SLIGHT
(HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD)).

LABORATORY PROTECTIVE EQUIPMENT
GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
EXTREMELY FLAMMABLE
CAUTION: CONTAINS BENZENE. CANCER HAZARD
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN
EXCEPTIONAL HEALTH HAZARD - READ MATERIAL SAFETY DATA SHEET

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

HAZARD IDENTIFICATION SYSTEM STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

- HAZARDOUS COMPONENTS

COMPONENT % CAS NO.
BENZENE 90-100 71-43-2

- PHYSICAL DATA

BOILING POINT: 80 C (176 F) VAPOR PRESSURE(MM HG): 74.6
MELTING POINT: 6 C (43 F) VAPOR DENSITY(AIR=1): 2.77
SPECIFIC GRAVITY: 0.88 EVAPORATION RATE: N/A
(H2O=1) (BUTYL ACETATE=1)
SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100
APPEARANCE & ODOR: CLEAR COLORLESS LIQUID HAVING CHARACTERISTIC AROMATIC ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): -11 C (12 F) NFPA 704M RATING: 2-3-0
FLAMMABLE LIMITS: UPPER - 8.0 % LOWER - 1.3 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE. (WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

5 - HEALTH HAZARD DATA

THIS SUBSTANCE IS LISTED AS ACGIH SUSPECT HUMAN CARCINOGEN, NTP HUMAN CARCINOGEN, IARC HUMAN CARCINOGEN (GROUP 1). ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN EIGHT-HOUR SHIFT = 50 PPM FOR 10 MINUTES: (PEL) CEILING = 25 PPM.

THRESHOLD LIMIT VALUE (TLV/TWA): 30 MG/M3 (10 PPM)
SHORT-TERM EXPOSURE LIMIT (STEL): 75 MG/M3 (25 PPM)
PERMISSIBLE EXPOSURE LIMIT (PEL): 30 MG/M3 (10 PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 4894
LD50 (ORAL-MOUSE)(MG/KG) - 4700
LD50 (IPR-RAT)(MG/KG) - 2.9
LC50 (INHL-MOUSE-7H) (PPM) - 9980

CARCINOGENICITY: NTP: YES IARC: YES Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, SUFFOCATION, LOWER

BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION.
INHALATION OF VAPORS MAY CAUSE SEVERE IRRITATION OR BURNS OF THE RESPIRATORY SYSTEM,
PULMONARY EDEMA, OR LUNG INFLAMMATION.

LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE
CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS. GASTRO-INTESTINAL IRRITATION,
BLURRED VISION, LOWERING OF BLOOD PRESSURE.
IRREVERSIBLE INJURY TO BLOOD FORMING TISSUE MAY RESULT FROM CHRONIC LOW LEVEL EXPOSURE.

TARGET ORGANS

BLOOD, CENTRAL NERVOUS SYSTEM, EYES, SKIN, BONE MARROW, RESPIRATORY SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY

INGESTION, INHALATION, EYE CONTACT, SKIN CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS
DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, SULFURIC ACID, NITRIC ACID

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

SHUT OFF IGNITION SOURCES: NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO
WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE
ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL
REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U019 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 10 PPM, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME BENZENE (BENZOL)

HAZARD CLASS FLAMMABLE LIQUID

UN/NA UN1114

LABELS FLAMMABLE LIQUID

REPORTABLE QUANTITY 1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME BENZENE

HAZARD CLASS 3.2

UN/NA UN1114

LABELS FLAMMABLE LIQUID

MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 800-858-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 813-998-6644

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National
Response Center emergency numbers to be
used only in the event of chemical emergencies
involving a spill, leak, fire, exposure or accident
involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-562-2537) for assistance.

CHLOROBENZENE

MSDS Number: C2475 — Effective Date: 04/04/00

1. Product Identification

Synonyms: Monochlorobenzene; Chlorobenzol; Phenyl chloride; Benzene chloride

CAS No.: 108-90-7

Molecular Weight: 112.56

Chemical Formula: C₆H₅Cl

Product Codes:

J.T. Baker: 9179

Mallinckrodt: 4419, 4426

2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---------------|----------|-----------|-----------|
| Chlorobenzene | 108-90-7 | 99 - 100% | Yes |

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate

Flammability Rating: 3 - Severe (Flammable)

Reactivity Rating: 1 - Slight

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER.

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Affects central nervous system causing dizziness, incoordination and unconsciousness.

Ingestion:

Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Toxic! May cause systemic poisoning with symptoms paralleling those of inhalation.

Skin Contact:

Causes irritation to skin. Symptoms include redness, itching, and pain. May be slowly absorbed through the skin with possible systemic effects.

Eye Contact:

Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

Chronic Exposure:

Prolonged or repeated skin exposure may cause dermatitis or skin burns. Prolonged or repeated exposure may cause liver, kidney, or lung damage.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin, eye or central nervous system disorders, or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this substance.

4. First Aid Measures**Inhalation:**

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 28C (82F) CC

Autoignition temperature: 593C (1099F)

Flammable limits in air % by volume:

lcl: 1.3; ucl: 9.6

Flammable Liquid

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Reactions with incompatibles may pose an explosion hazard. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool; dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition. Combustion by-products include phosgene and hydrogen chloride gases.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(R) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Containers should be bonded and grounded for transfers to avoid static sparks. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
75 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
10 ppm (TWA)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Faint, almond like odor.

Solubility:

Insoluble in water.

Specific Gravity:

1.11 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

132C (270F)

Melting Point:

-45C (-49F)

Vapor Density (Air=1):

3.9

Vapor Pressure (mm Hg):

11.8 @ 25C (77F)

Evaporation Rate (BuAc=1):

1.1

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Oxidizing agents, dimethyl sulfoxide, silver perchlorate, silver chromate.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

For Chlorobenzene: Oral rat LD50: 1110 mg/kg; Inhalation rat LC50: 2965 ppm. Investigated as a tumorigen, mutagen, reproductive effector.

| Ingredient | ---NTP Carcinogen--- | | IARC Category |
|--------------------------|----------------------|-------------|---------------|
| | Known | Anticipated | |
| Chlorobenzene (108-90-7) | No | No | None |

12. Ecological Information

Environmental Fate:

When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life of less than 1 day. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, CHLOROBENZENE

Hazard Class: 3

UN/NA: UN1134

Packing Group: III

Information reported for product/size: 52L

International (Water, I.M.O.)

Proper Shipping Name: CHLOROBENZENE
Hazard Class: 3
UN/NA: UN1134
Packing Group: III
Information reported for product/size: 52L

International (Air, I.C.A.O.)

Proper Shipping Name: CHLOROBENZENE
Hazard Class: 3
UN/NA: UN1134
Packing Group: III
Information reported for product/size: 52L

15. Regulatory Information

-----\Chemical Inventory Status - Part 1-----
 Ingredient TSCA EC Japan Australia

 Chlorobenzene (108-90-7) Yes Yes Yes Yes

-----\Chemical Inventory Status - Part 2-----
 -----Canada-----
 Ingredient Korea DSL NDSL Phil.

 Chlorobenzene (108-90-7) Yes Yes No Yes

-----\Federal, State & International Regulations - Part 1\-----
 -----SARA 302----- SARA 313-----
 Ingredient EO TPQ List Chemical Catg.

 Chlorobenzene (108-90-7) No No Yes No

-----\Federal, State & International Regulations - Part 2\-----
 -----RCRA----- -TSCA-
 Ingredient CERCLA 261.33 8(d)

 Chlorobenzene (108-90-7) 100 U037 Yes

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
 SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
 Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2Y

Poison Schedule: No information found.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products

Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 3 Reactivity: 0.

Label Hazard Warning:

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

Label Precautions:

- Keep away from heat, sparks and flame.
- Avoid breathing vapor.
- Keep container closed.
- Wash thoroughly after handling.
- Avoid contact with eyes, skin and clothing.
- Use only with adequate ventilation.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 4, 11, 14, 16.

Disclaimer:

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Prepared by: Environmental & Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

CONTINENTAL CHEMICAL -- NAPHTHALENE, TECHNICAL

MATERIAL SAFETY DATA SHEET

FSC: 6810

NIIN: 002866018

Manufacturer's CAGE: 23894

Part No. Indicator: A

Part Number/Trade Name: NAPHTHALENE, TECHNICAL

=====
General Information
=====

Company's Name: CONTINENTAL CHEMICAL CORP.

Company's Emerg Ph #: 812-235-8035

Record No. For Safety Entry: 001

For Safety Entries This Stk#: 003

Date MSDS Prepared: 01JAN85

Safety Data Review Date: 03OCT84

MSDS Serial Number: BDTWH

Specification Number: R-N-91

Hazard Characteristic Code: J1
=====

Ingredients/Identity Information
=====

Proprietary: NO

Ingredient: NAPHTHALENE (SARA III)

Ingredient Sequence Number: 01

Percent: 100

NIOSH (RTECS) Number: QJ0525000

CAS Number: 91-20-3

OSHA PEL: 10 PPM/15 STEL

ACGIH TLV: 10 PPM/15 STEL; 9192

=====
Physical/Chemical Characteristics
=====

Appearance And Odor: WHITE FLAKE

Boiling Point: 218F,103C

Specific Gravity: 1.1450

Solubility In Water: INSOLUBLE
=====

Fire and Explosion Hazard Data
=====

Flash Point: 176F,80C

Extinguishing Media: CO*2 OR DRY CHEMICAL

Special Fire Fighting Proc: NONE

Unusual Fire And Expl Hazrds: NONE
=====

Reactivity Data
=====

Stability: YES

Cond To Avoid (Stability): HEAT & SPARKS

Materials To Avoid: NONE

Hazardous Decomp Products: NONE

Hazardous Poly Occur: NO
=====

Health Hazard Data

=====
Signs/Symptoms Of Overexp: INH/ING: MALAISE, HDCH, VOMIT, PERSPIRATION,

COMA & CONVULSION. EYES/SKIN: IRRIT, VISUAL DISTURBANCES.

Emergency/First Aid Proc: EYES/SKIN: FLUSH W/ COLD WATER 15 MINS. IF IRRIT

PERSISTS CALL MD. ING: INDUCE VOMITING. TRANSPORT TO EMERGENCY HEALTH CARE FACILITY. INH: MOVE TO FRESH AIR. TREAT SYMPTOMS.

=====
Precautions for Safe Handling and Use

=====
Steps If Matl Released/Spill: VACUUM OR SWEEP SPILLED POWDER.

Waste Disposal Method: INCINERATE IN ACCORDANCE W/ LOCAL, STATE & FEDERAL REGULATIONS.

Precautions-Handling/Storing: DO NOT STORE OVER 100F. 38C.

=====
Control Measures

Respiratory Protection: NIOSH/MSHA APPRVD DUST RESP (CLOTH OR CHEMICAL)

Ventilation: LOCAL EXHAUST PREFERABLE

Protective Gloves: RUBBER/PLASTIC

Eye Protection: GOGGLES

Suppl. Safety & Health Data: CONFORMS TO R-N-91. CL B. CONTAINER SIZE: 1 LB BOX.

=====
Transportation Data

Trans Data Review Date: 84328

DOT Proper Shipping Name: UNDER REVIEW

IMO PSN Code: KIT

IMO Proper Shipping Name: NAPHTHALENE, CRUDE OR REFINED

IMO Regulations Page Number: 4158

IMO UN Number: 1334

IMO UN Class: 4.1

IMO Subsidiary Risk Label: -

IATA PSN Code: ROD

IATA UN ID Number: 1334

IATA Proper Shipping Name: NAPHTHALENE, CRUDE

IATA UN Class: 4.1

IATA Label: FLAMMABLE SOLID

AFI PSN Code: ROD

AFI Prop. Shipping Name: NAPHTHALENE, CRUDE OR REFINED

AFI Class: 4.1

AFI ID Number: UN1334

AFI Pack Group: III

AFI Label: FLAMMABLE SOLID

AFI Special Prov: A1

AFI Basic Pac Ref: 8-7

=====
Disposal Data

=====
Disposal Data Review Date: 88084

Rec # For This Disp Entry: 01

Tot Disp Entries Per NSN: 002

Landfill Ban Item: YES

Disposal Supplemental Data: CONFORMS TO R-N-91, CL B. CONTAINER SIZE: 1 LB

BOX. STORE/ACCUMULATE SOLVENTS FOR RECLAMATION AS PER FACILITY'S USED

SOLVENT ELIMINATION (USE) PROGRAM.

1st EPA Haz Wst Code New: U165

1st EPA Haz Wst Name New: NAPHTHALENE

1st EPA Haz Wst Char New: TOXIC (T)

1st EPA Acute Hazard New: NO

Label Data

Label Required: YES

Label Status: G

Common Name: NAPHTHALENE, TECHNICAL

Special Hazard Precautions: INH ING: MALAISE, HDCH, VOMIT, PERSPIRATION,

COMA & CONVULSION, EYES SKIN: IRRIT, VISUAL DISTURBANCES.

Label Name: CONTINENTAL CHEMICAL CORP.

Label Emergency Number: 812-235-8035

MATERIAL SAFETY DATA SHEET (MSDS)[Click here for the French version / Appuyez ici pour la version française](#)

Material Safety Data Sheet

Section 1. Product and Company Identification

| | | | |
|---------------------|--|-----------------------|-------------------|
| Product Name | 1,2-Dichlorobenzene | Product Code | DX0685 |
| Manufacturer | EM Science A Division of EM Industries P.O. Box 70 480 Democrat Road Gibbstown, N.J. 08027 | Effective Date | 10/29/2001 |

For More Information Call
856-423-6300 Technical Service
Monday-Friday: 8:00 AM - 5:00 PM

In Case of Emergency Call
800-424-9300 CHEMTREC (USA)
613-996-6666 CANUTEC (Canada)
24 Hours/Day: 7 Days/Week

| | |
|------------------------|----------------------|
| Synonym | 1,2-dichlorobenzene |
| Material Uses | Analytical reagent. |
| Chemical Family | Chlorinated Aromatic |

Section 2. Composition and Information on Ingredients

| Component | CAS # | % by Weight |
|-------------------|--------------|--------------------|
| O-DICHLOROBENZENE | 95-50-1 | 100 |

Section 3. Hazards Identification

Physical State and Appearance Liquid.

Emergency Overview WARNING!
HARMFUL IF INHALED, ABSORBED THROUGH SKIN OR SWALLOWED.
CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: KIDNEYS, LIVER, MUCOUS MEMBRANES, RESPIRATORY TRACT, SKIN, EYES, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA
COMBUSTIBLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FIRE.
VERY TOXIC TO AQUATIC ORGANISMS.
MAY BE HARMFUL TO ENVIRONMENT IF RELEASED IN LARGE AMOUNTS.

Routes of Entry Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Potential Acute Health Effects

Eyes Hazardous in case of eye contact (irritant). Inflammation of the eye is characterized by redness, watering, and itching.

Skin Hazardous in case of skin contact (permeator, irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Inhalation Hazardous in case of inhalation (lung irritant).

Ingestion Hazardous in case of ingestion. Ingestion can cause nausea and vomiting. Aspiration hazard if swallowed- can enter lungs and cause damage.

Potential Chronic Health Effects

Carcinogenic Effects This material is not known to cause cancer in animals or humans

Additional information See Toxicological Information (section 11)

Medical Conditions Aggravated by Overexposure: Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4. First Aid Measures

Eye Contact Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

Skin Contact In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Inhalation If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Section 5. Fire Fighting Measures

| | |
|------------------------------------|---------------------|
| Flammability of the Product | Combustible. |
| Auto-ignition Temperature | 647.82°C (1198.1°F) |

| | |
|--|---|
| Flash Points | CLOSED CUP: 65.9°C (150.6°F). |
| Flammable Limits | LOWER: 2.2% UPPER: 9.2% |
| Products of Combustion | These products are carbon oxides (CO, CO ₂), halogenated compounds. |
| Fire Hazards in Presence of Various Substances | Flammable in presence of open flames, sparks and static discharge, of heat, of oxidizing materials. |
| Explosion Hazards in Presence of Various Substances | Risks of explosion of the product in presence of static discharge: Flammable in presence of open flames, sparks and static discharge. Explosive in presence of open flames, sparks and static discharge. |
| Fire Fighting Media and Instructions | Risks of explosion of the product in presence of mechanical impact: No. SMALL FIRE: Use DRY chemical powder. |
| Protective Clothing (Fire) | LARGE FIRE: Use water spray, fog or foam. Do not use water jet. |
| Special Remarks on Fire Hazards | Be sure to use an approved/certified respirator or equivalent. |
| Special Remarks on Explosion Hazards | Vapor may travel considerable distance to source of ignition and flash back. Not available. |

Section 6. Accidental Release Measures

| | |
|------------------------------|---|
| Small Spill and Leak | Absorb with an inert material and put the spilled material in an appropriate waste disposal. |
| Large Spill and Leak | Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities. |
| Spill Kit Information | No specific spill kit required for this product |

Section 7. Handling and Storage

| | |
|-----------------|--|
| Handling | Keep away from heat, sparks and flame. Keep container closed: Avoid breathing vapors or spray mists. Do not get in eyes, on skin, or on clothing. Do not ingest. |
| Storage | Keep container in a cool, well-ventilated area. |

Section 8. Exposure Controls/Personal Protection

| | |
|---|--|
| Engineering Controls | Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location. |
| Personal Protection | <ul style="list-style-type: none"> Eyes Splash goggles. Body Lab coat. Respiratory Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Hands Gloves. Feet Not applicable. |
| Personal Protection in Case of a Large Spill | Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. |

| | |
|--------------------------|--|
| Product Name | Exposure Limits |
| O-DICHLOROBENZENE | AUVA (Austria, 1995). Skin PEAK: 600 mg/m ³ 4 times per shift, Period: 30 minute(s). MAK: 100 ppm 4 times per shift, Period: 30 minute(s). MAK: 300 mg/m ³ MAK: 50 ppm Belgium Minister of Labour (Belgium, 1998). VCD: 305 mg/m ³ VCD: 50 ppm VL: 152 mg/m ³ VL: 25 ppm BAUA (Germany, 1997). Skin PEAK: 1200 mg/m ³ PEAK: 200 ppm MAK: 300 mg/m ³ MAK: 50 ppm DK-Arbejdstilsynet (Denmark, 1996). GV: 150 mg/m ³ GV: 25 ppm Tyterveyslaitos (Finland, 1998). STEL: 300 mg/m ³ STEL: 50 ppm TWA: 61 mg/m ³ TWA: 10 ppm INRS (France, 1996). VLE: 300 mg/m ³ |

VLE: 50 ppm
 National Authority for Occupational Safety/Health (Ireland, 1999).
 STEL: 300 mg/m³
 STEL: 50 ppm
 Arbeidsinspectie (Netherlands, 1999).
 TGG 15 min: 300 mg/m³
 TGG 15 min: 50 ppm
 TGG 8 uur: 150 mg/m³
 TGG 8 uur: 25 ppm
 N-Arbeidstilsynet (Norway, 1996).
 AN: 150 mg/m³
 AN: 25 ppm
 AFS (Sweden, 1996).
 KTV: 300 mg/m³
 KTV: 50 ppm
 EH40-OES (United Kingdom (UK), 1997).
 STEL: 306 mg/m³
 STEL: 50 ppm
 ACGIH (United States, 1996).
 STEL: 301 mg/m³
 STEL: 50 ppm
 TWA: 150 mg/m³
 TWA: 25 ppm
 NIOSH REL (United States, 1994).
 CEIL: 300 mg/m³
 CEIL: 50 ppm
 OSHA Final Rule (United States, 1989).
 CEIL: 300 mg/m³
 CEIL: 50 ppm

Section 9. Physical and Chemical Properties

| | |
|-------------------------------|--|
| Odor | Aromatic. |
| Color | Clear. |
| Physical State and Appearance | Liquid. |
| Molecular Weight | 147 g/mole |
| Molecular Formula | C ₆ H ₄ -Cl ₂ |
| H | Not applicable |
| Boiling/Condensation Point | 180.4°C (356.7°F) |
| Melting/Freezing Point | -17.1°C (1.2°F) |
| Specific Gravity | 1.3059 (Water = 1) |
| Vapor Pressure | Not available. |
| Vapor Density | 5.05 (Air = 1) |
| Odor Threshold | Not available. |
| Evaporation Rate | 0.165 compared to (n-BUTYL ACETATE=1) |
| LogKow | Not available. |
| Solubility | Insoluble in water |

Section 10. Stability and Reactivity

| | |
|---|---|
| Stability and Reactivity | The product is stable |
| Conditions of Instability | Not available. |
| Incompatibility with Various Substances | Reactive with oxidizing agents, acids, alkalis. |
| Rem/Incompatibility | Not available. |
| Hazardous Decomposition Products | These products are halogenated compounds. |
| Hazardous Polymerization | Will not occur. |

Section 11. Toxicological Information

| | | |
|---------------------------------------|---|-----------|
| RTECS Number: | o-Dichlorobenzene | CZ4500000 |
| Toxicity | Acute oral toxicity (LD50): 500 mg/kg [Rabbit]. | |
| Chronic Effects on Humans | Not available. | |
| Acute Effects on Humans | Hazardous in case of eye contact (irritant). Inflammation of the eye is characterized by redness, watering, and itching. Hazardous in case of skin contact (permeator, irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Hazardous in case of inhalation (lung irritant). Hazardous in case of ingestion. | |
| Synergetic Products (Toxicologically) | Not available. | |
| Irritancy | Draize Test (Rabbit): Eye: 100mg/30s. Reaction: Mild. | |
| Sensitization | Not available | |

| | |
|--|---|
| Carcinogenic Effects | This material is not known to cause cancer in animals or humans. |
| Toxicity to Reproductive System | Tests on laboratory animals for reproductive effects are cited in Registry of Toxic Effects on Chemical Substances (RTECS). |
| Teratogenic Effects | Not available. |
| Mutagenic Effects | Tests on laboratory animals for mutagenic effects are cited in Registry of Toxic Effects of Chemical Substances (RTECS). |

Section 12. Ecological Information

| | |
|---|---|
| Ecotoxicity | Not available. |
| BOD5 and COD | Not available. |
| Toxicity of the Products of Biodegradation | The products of degradation are as toxic as the product itself. |

Section 13. Disposal Considerations

| | |
|-------------------------|---|
| EPA Waste Number | U070 |
| Treatment | Specified Technology - Contact your local permitted waste disposal site (TSD) for permissible treatment sites. Always contact a permitted waste disposal (TSD) to assure compliance with all current local, state, and Federal Regulations. |

Section 14. Transport Information

| | |
|---------------------------------|----------------|
| DOT Classification | Not available. |
| TDG Classification | Not available. |
| IMDG Classification | Not available. |
| ICAO/IATA Classification | Not available. |

Section 15. Regulatory Information

| | |
|----------------------------------|--|
| U.S. Federal Regulations | TSCA 4(a) final test rules: O-DICHLOROBENZENE TSCA 8(a) PAIR: O-DICHLOROBENZENE TSCA 8(b) inventory: O-DICHLOROBENZENE TSCA 8(d) H and S data reporting: O-DICHLOROBENZENE: 1982 SARA 302/304/311/312 extremely hazardous substances: No products were found. SARA 302/304 emergency planning and notification: No products were found SARA 302/304/311/312 hazardous chemicals: O-DICHLOROBENZENE SARA 311/312 MSDS distribution - chemical inventory - hazard identification: O-DICHLOROBENZENE: Fire Hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard SARA 313 toxic chemical notification and release reporting: O-DICHLOROBENZENE Clean Water Act (CWA) 307: O-DICHLOROBENZENE Clean Water Act (CWA) 311: No products were found. Clean air act (CAA) 112 accidental release prevention: No products were found. Clean air act (CAA) 112 regulated flammable substances: No products were found. Clean air act (CAA) 112 regulated toxic substances: No products were found. |
| WHMIS (Canada) | CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). Class D-1B: Material causing immediate and serious toxic effects (TOXIC). Class D-2B: Material causing other toxic effects (TOXIC). CEPA DSL: O-DICHLOROBENZENE |
| International Regulations | |
| EINECS | O-DICHLOROBENZENE 202-425-9 |
| DSCL (EEC) | R22- Harmful if swallowed. R36/37/38- Irritating to eyes, respiratory system and skin. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment |
| International Lists | Australia (NICNAS): O-DICHLOROBENZENE Japan (MITI): O-DICHLOROBENZENE Korea (TCCL): O-DICHLOROBENZENE Philippines (RA6969): O-DICHLOROBENZENE China: No products were found. |
| State Regulations | Pennsylvania RTK: O-DICHLOROBENZENE: (environmental hazard, generic environmental hazard) Massachusetts RTK: O-DICHLOROBENZENE New Jersey: O-DICHLOROBENZENE California prop. 65: No products were found. |

Section 16. Other Information

| | | | |
|--|---------------|----------|----------------------------|
| National Fire Protection Association (U.S.A.) | Health | 2 | Fire Hazard |
| | | 2 | 0 Reactivity |

Specific Hazard

Changed Since Last Revision +

Notice to Reader.

The statements contained herein are based upon technical data that EM Industries believes to be reliable, are offered for information purposes only and as a guide to the appropriate precautionary and emergency handling of the material by a properly trained person having the necessary technical skills. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use, storage and disposal of these materials and the safety and health of employees and customers and the protection of the environment. EM INDUSTRIES MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, WITH RESPECT TO THE INFORMATION HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

APPENDIX F

**PRS 66
DEBRIS BACKFILL
GUIDELINES**

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PRS 66 Slopeback/Overburden Area Acceptable Debris Backfill

Size Independent

| Debris Type | Acceptable Backfill | | Comment |
|-----------------------------|---------------------|----|---|
| | Yes | No | |
| Natural Rock/Stone/Cobbles | X | | No representative sampling or scanning required |
| Tree Roots / Vegetation | X | | No representative sampling or scanning required |
| Concrete | X | | MARSSIMS-like representative scanned and potentially crushed in concrete crusher |
| Brick/Block/Mortar | X | | MARSSIMS-like representative scanned and potentially crushed in concrete crusher |
| Asphalt | X | | MARSSIMS-like representative scanned and potentially crushed in concrete crusher, |
| Ceramic Tile | X | | Unless multiples found in contiguous zone; representative sampling required |
| Vinyl Floor Tiles | X | | Unless multiples found in contiguous zone; representative sampling required |
| Roofing Shingles | X | | Unless multiples found in contiguous zone; representative sampling required |
| Rebar | | X | Either removed from concrete crusher or loose |
| Metal Drums | | X | |
| Plastic Drums | | X | |
| Paint Cans | | X | |
| Sheetmetal | | X | |
| Steel Drainage Pipe | | X | |
| Plastic Drainage Pipe | | X | |
| Clay/Concrete Drainage Pipe | | X | |
| Electrical Conduit | | X | |
| Electrical Fixtures | | X | |
| Metal/Wood Cabinets | | X | |
| Rubber Hoses | | X | |
| Closed Containers | | X | |
| Vehicles & Appliances | | X | |

PRS 66 Removal Work Package

PRS 66 Slopeback/Overburden Area Acceptable Debris Backfill

Visual Debris Removal - Removed if visually seen; no sifting through stacks required

| Debris Type | Acceptable Backfill | | Comment |
|-----------------------------|---------------------|----|---------|
| | Yes | No | |
| Electrical Boxes / Fittings | | X | |
| Plastic Bottles | | X | |
| Rubber/Cloth Gloves/Boots | | X | |
| Rags | | X | |
| Batteries | | X | |
| Metal Hand Tools | | X | |

Size Dependent - Guidelines Established for Field Decisions

| Debris Type | Acceptable Backfill | | Comment |
|-------------------------------|---------------------|----|---|
| | Yes | No | |
| Steel Wire | X | | Less than 3 Feet in Length; no representative sampling or scanning required |
| Electrical Wire | X | | Less than 3 Feet in Length; no representative sampling or scanning required |
| Wood | X | | Less than 3 Feet in Length; no representative sampling or scanning required |
| Vinyl/Plastic Siding/Sheeting | X | | Less than 3 Feet in Length; no representative sampling or scanning required |
| Cardboard | X | | Less than 3x3 Feet; no representative sampling or scanning required |

Incidental Objects - Not Segregated from soil but scanned with soil.

| Debris Type | Acceptable Backfill | | Comment |
|------------------------|---------------------|----|---|
| | Yes | No | |
| Metal Shavings | X | | When noting a pocket, each bucket removed will be field scanned |
| Pop Bottle / Caps | X | | No representative sampling or scanning required |
| Nails | X | | No representative sampling or scanning required |
| Wood Splinters | X | | No representative sampling or scanning required |
| Crushed/Broken Glass | X | | No representative sampling or scanning required |
| Paper | X | | No representative sampling or scanning required |
| Office Supplies | X | | No representative sampling or scanning required |
| Steel Spikes / Staples | X | | No representative sampling or scanning required |
| Nuts/Bolts | X | | No representative sampling or scanning required |
| Styrofoam Pieces | X | | No representative sampling or scanning required |

APPENDIX G

PRS 66

DRAWINGS

EXCAVATION PLAN SET (DATE 10/23/02)

FIGURE 1 SITE UTILITIES

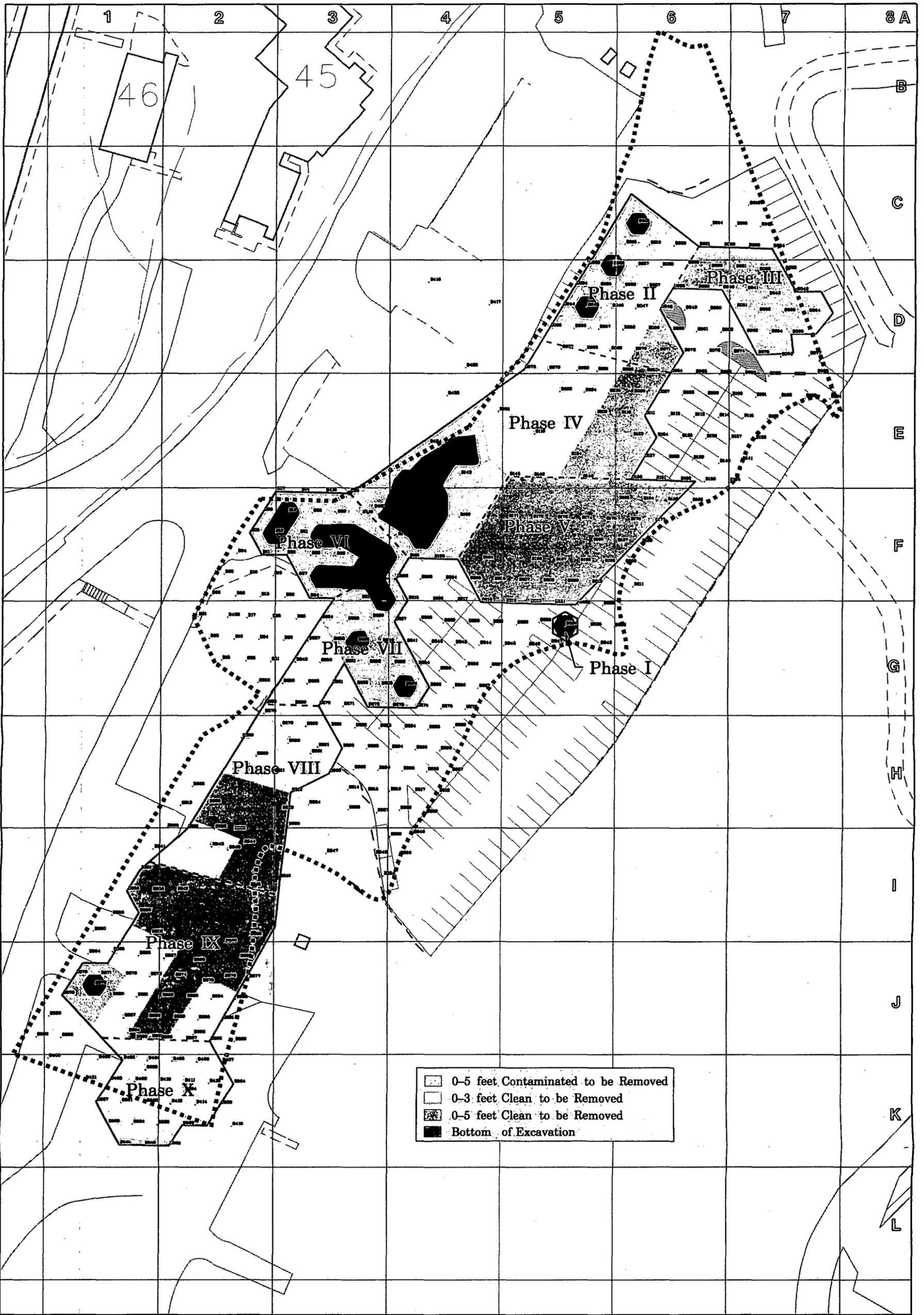
FIGURE 2 GENERAL SITE WITH EXCAVATION PHASES

PRS 66 Removal Work Package

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Attachment B – Drawings

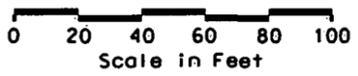
- 1) Erosion Control and Water Management Drawings
- 2) Shoring Plan / Design Drawings



0-5 feet Contaminated to be Removed
 0-3 feet Clean to be Removed
 0-5 feet Clean to be Removed
 Bottom of Excavation

Legend

- B416 Boring Location
- Tentative Excavation Boundary
- Area Boundary
- RAD Contaminated Area
- VOC Contaminated Area



| | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|---|---|---|----|----|----|----|----|----|-----------------|----|------------------|----|--------------|----|--------------|----|--|----|----|----|--|
| SHEET | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | |
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| SHEET | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | | | | | | |
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| PART CLASSIFICATION | | | | | | | | | | | | | | | | | | | | | | |
| DRAWING CLASSIFICATION | | | | | | | | | | SIZE | | DRAWING NUMBER | | | | | | JOB NUMBER | | | | |
| UNCLASSIFIED | | | | | | | | | | D | | excavplanmap.dgn | | | | | | PR68040 Excavation Plan (0-5 Feet) | | | | |
| DWG TYPE | | | | | | | | | | PR68 | | CA0C | | SCALE | | SHEET 1 OF 6 | | | | | | |
| STATUS | | | | | | | | | | MD-REL-05/16/02 | | ORIG | | MSTATION / J | | | | | | | | |

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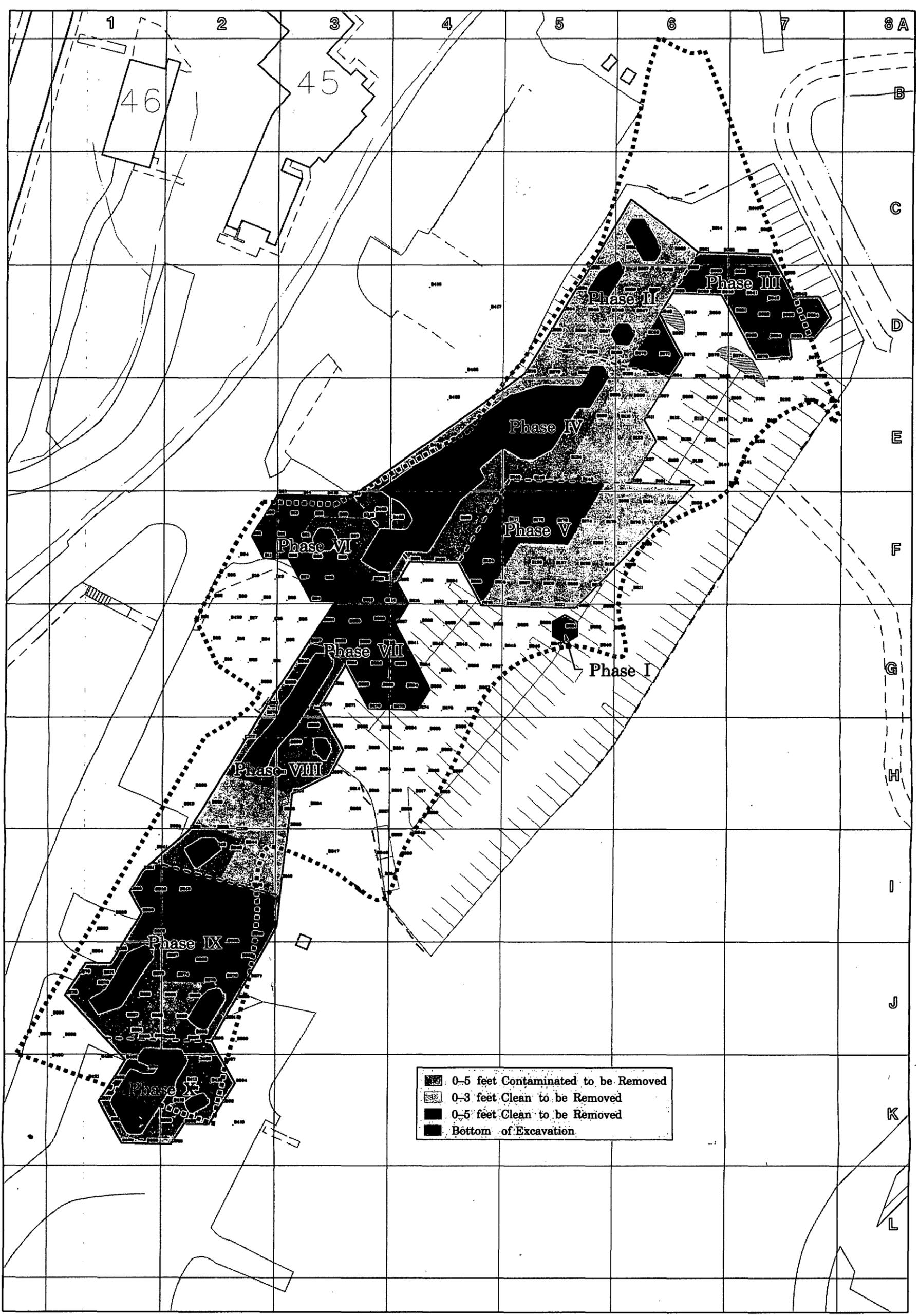
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J

K

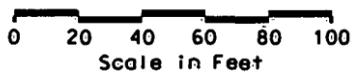
L



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|--|-------------------------------------|
| | 0-5 feet Contaminated to be Removed |
| | 0-3 feet Clean to be Removed |
| | 0-5 feet Clean to be Removed |
| | Bottom of Excavation |

Legend

- B116 Boring Location
- Tentative Excavation Boundary
- Area Boundary
- RAD Contaminated Area
- VOC Contaminated Area



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| 10/23/02 | | | SSP | | |
| ISS | DATE | REVISION | BY | CHKR | ENG M |

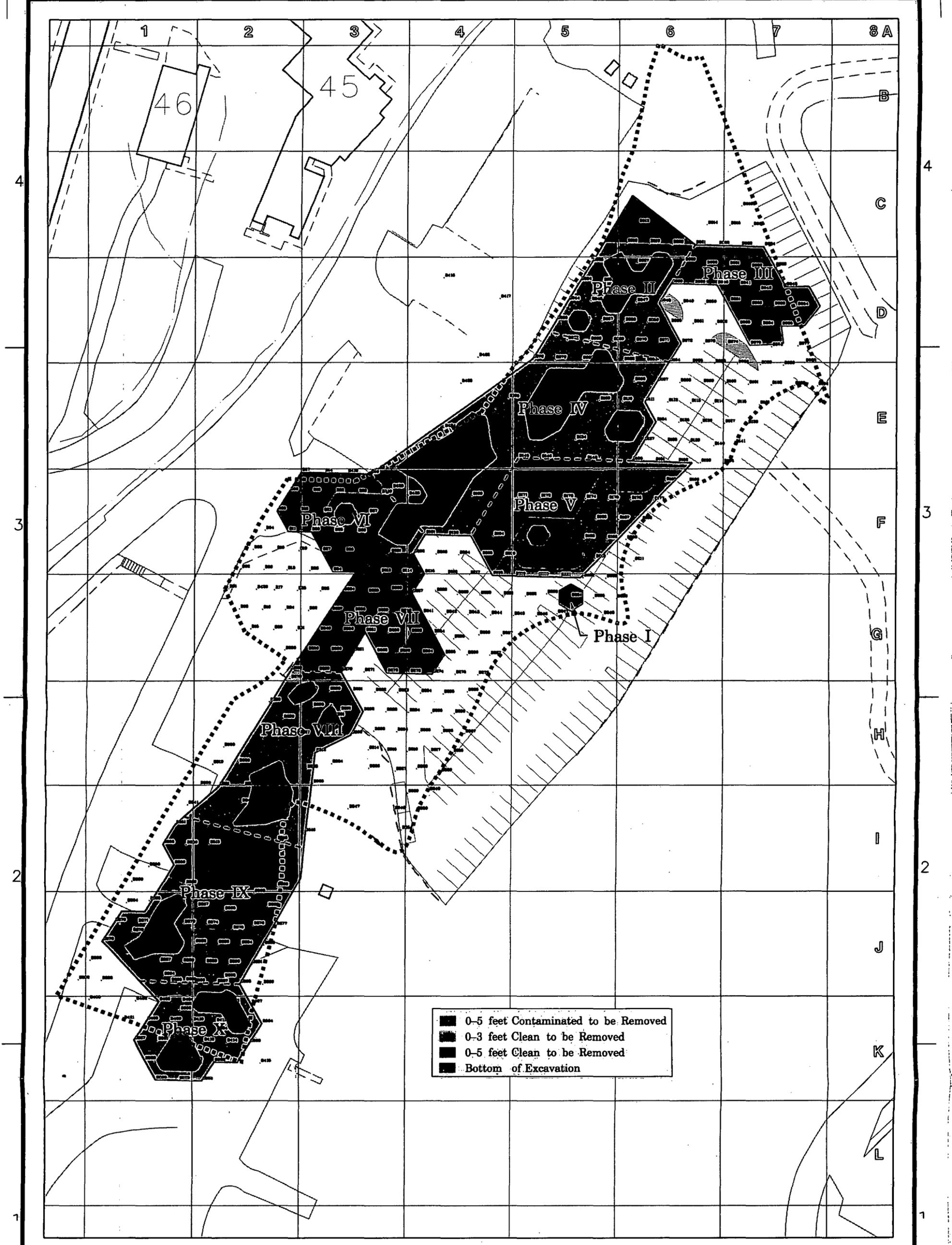
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| DRAWING CLASSIFICATION | | | | | | | | | | SIZE | DRAWING NUMBER | | | | | | | | | | JOB NUMBER | |
| UNCLASSIFIED | | | | | | | | | | D | excavplanmap.dgn | | | | | | | | | | | |
| DWG TYPE | | | | | PRAC | | | | | CAOEC | | | | | SCALE | | | | | SHEET 1 OF * | | |
| STATUS MD-REL-05/16/02 | | | | | | | | | | ORIGIN MSTATION / J | | | | | | | | | | | | |

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■ 0-5 feet Contaminated to be Removed
 ■ 0-3 feet Clean to be Removed
 ■ 0-5 feet Clean to be Removed
 ■ Bottom of Excavation

Legend

- B416 Boring Location
- Tentative Excavation Boundary
- Area Boundary
- RAD Contaminated Area
- VOC Contaminated Area

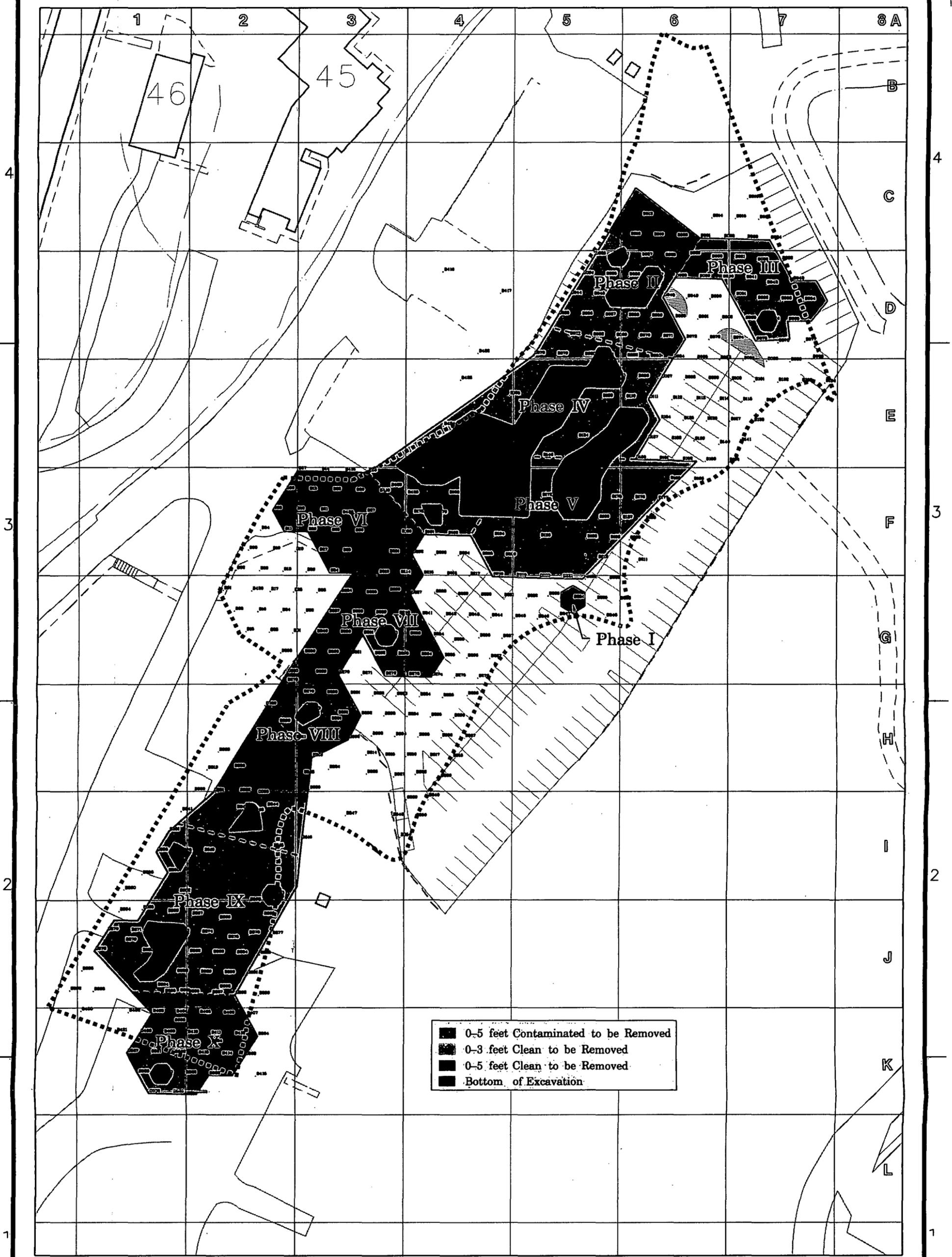


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| DRAWING CLASSIFICATION | | | | | | | | | | | | | | | SIZE | DRAWING NUMBER | | JOB NUMBER | | | | |
| UNCLASSIFIED | | | | | | | | | | | | | | | D | excavplanmap.dgn | | | | | | |
| DWG TYPE | | PRNG | | CAQEC | | SCALE | | SHEET 1 OF * | | | | | | | | | | | | | | |
| STATUS MD-REL-05/16/02 | | | | | | | | | | ORIGN | | MSTATION / J | | | | | | | | | | |

PRS 6680/40
Excavation Plan
(10-15 Feet)

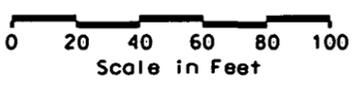
A B C D



■ 0-5 feet Contaminated to be Removed
 ■ 0-3 feet Clean to be Removed
 ■ 0-5 feet Clean to be Removed
 ■ Bottom of Excavation

Legend

- B416 Boring Location
- Tentative Excavation Boundary
- Area Boundary
- RAD Contaminated Area
- VOC Contaminated Area



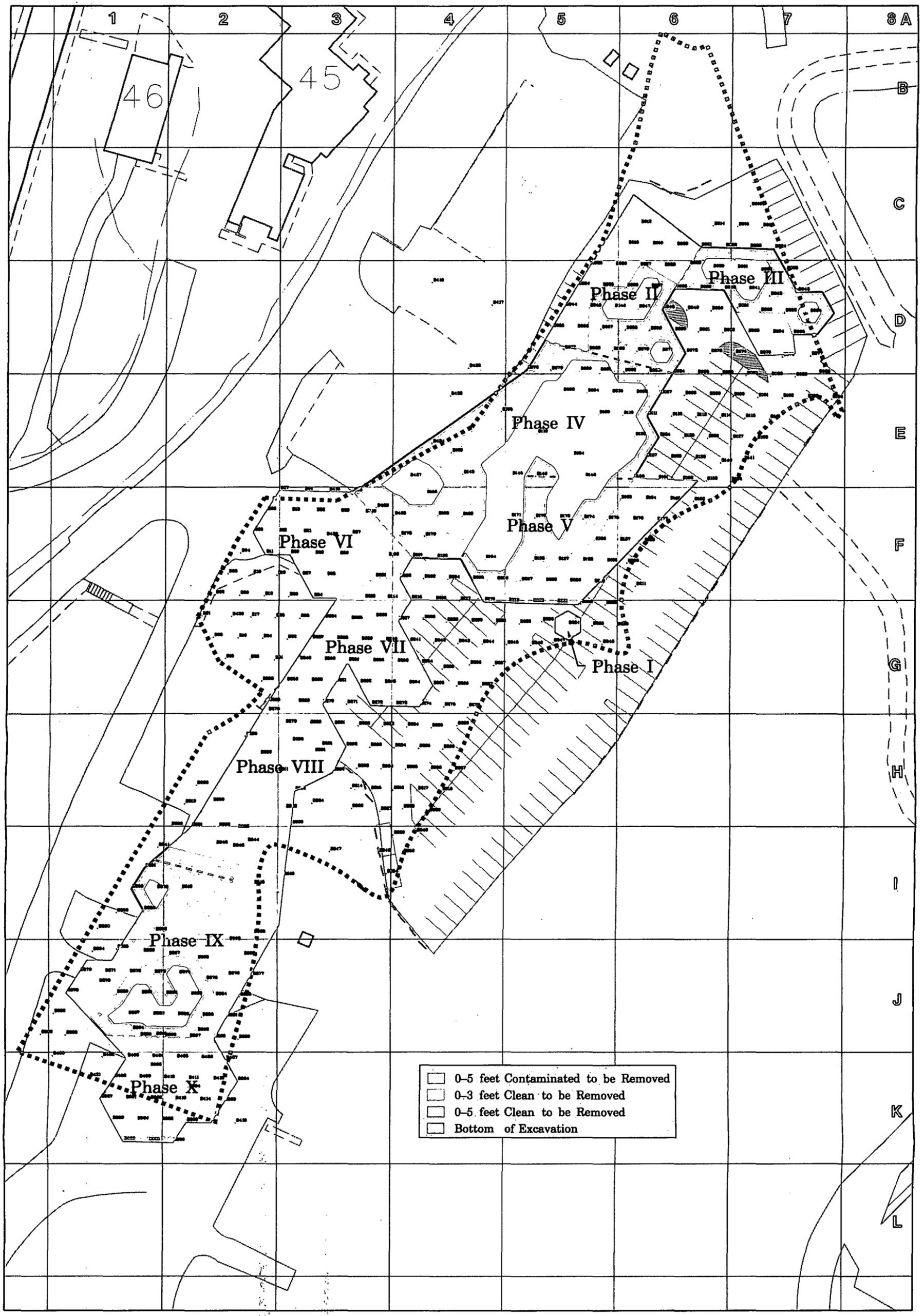
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| UNCLASSIFIED | | | | | | | | | | D | excavplanmap.dgn | | | | | | | | | | | |
| DWG TYPE | | PRMG | | CAQEC | | SCALE | | SHEET 1 OF # | | | | | | | | | | | | | | |
| STATUS | | MD-REL-05/16/02 | | ORIGN | | MSTATION / J | | | | | | | | | | | | | | | | |

PRS 6680/40
Excavation Plan
(15-20 Feet)

A B C D

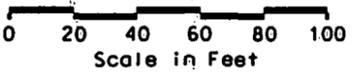
A B C D



- 0-5 feet Contaminated to be Removed
- 0-3 feet Clean to be Removed
- 0-5 feet Clean to be Removed
- Bottom of Excavation

Legend

- B416 Boring Location
- Tentative Excavation Boundary
- Area Boundary
- RAD Contaminated Area
- VOC Contaminated Area



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| UNCLASSIFIED | | | | | | | | | | | | D | excavplanmap.dgn | | | | | | | | | |
| DWC TYPE | | PRNG | | CAGC | | SCALE | | SHEET 1 OF * | | | | | | | | | | | | | | |
| STATUS MD-REL-05/16/02 | | | | | | | | | | | | ORIGN | | MSTATION / J | | | | | | | | |

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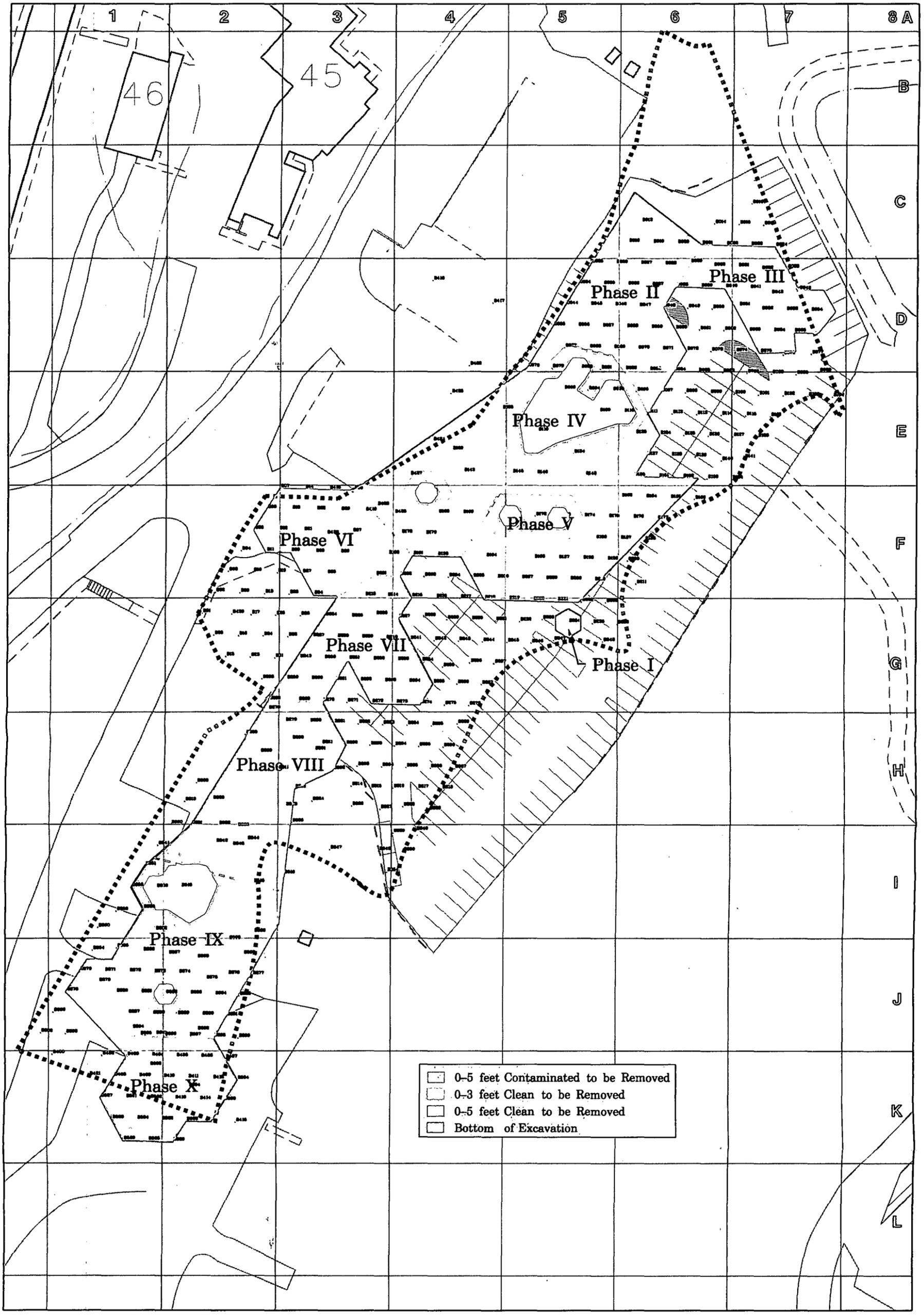
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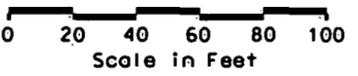
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- 0-5 feet Contaminated to be Removed
- 0-3 feet Clean to be Removed
- 0-5 feet Clean to be Removed
- Bottom of Excavation

Legend

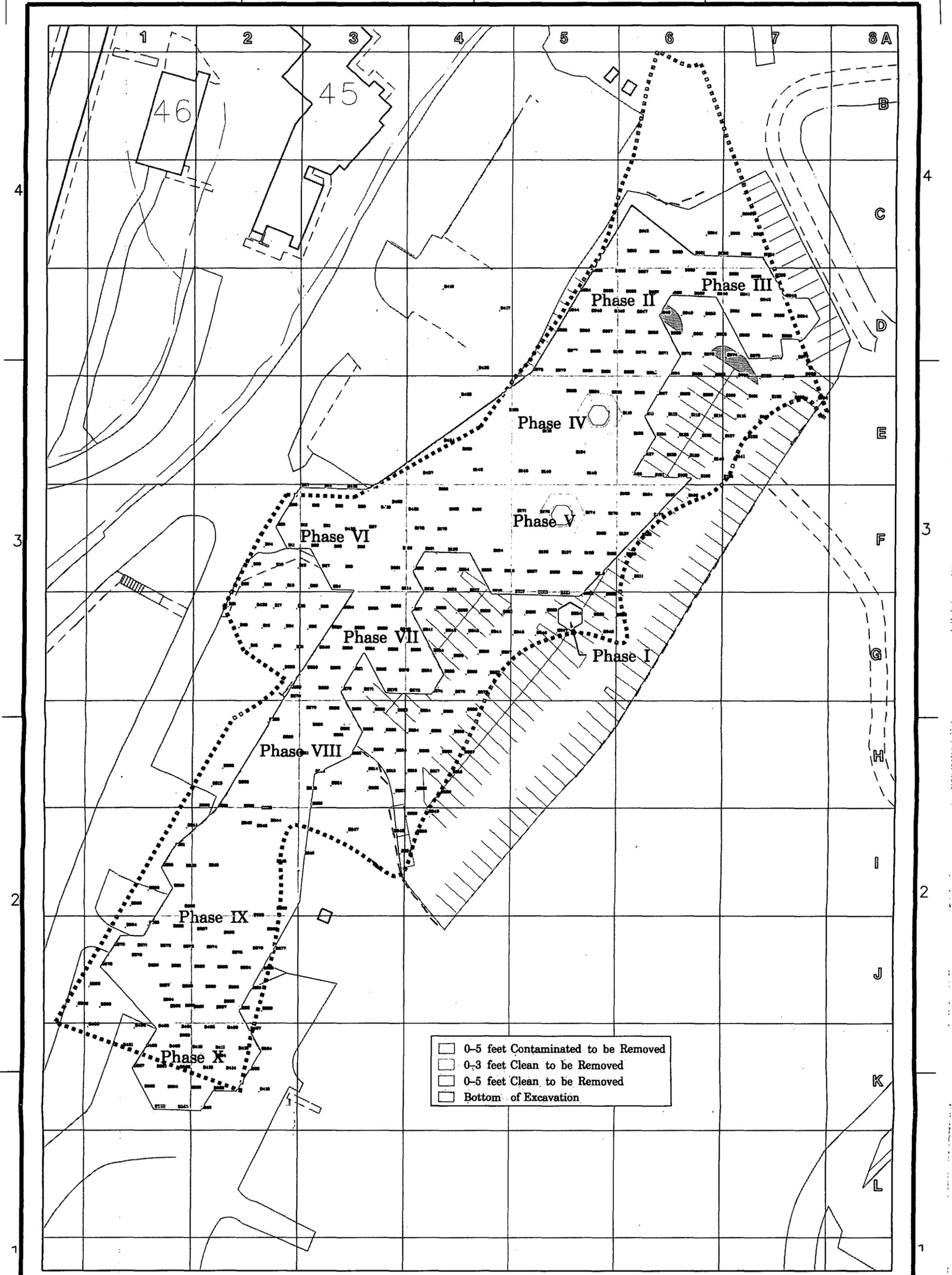
- B416 Boring Location
- Tentative Excavation Boundary
- Area Boundary
- RAD Contaminated Area
- VOC Contaminated Area



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| | 10/23/02 | | SSP | | | |

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| DRG TYPE | | PRNG | | CAGEC | | SCALE | | SHEET 1 OF * | | | | | | | | | | | | | | |
| STATUS | | MD-REL-05/16/02 | | ORIGN | | MSTATION | | / J | | | | | | | | | | | | | | |

A B C D



Legend

- B416 Boring Location
- Tentative Excavation Boundary
- Area Boundary
- RAD Contaminated Area
- VOC Contaminated Area

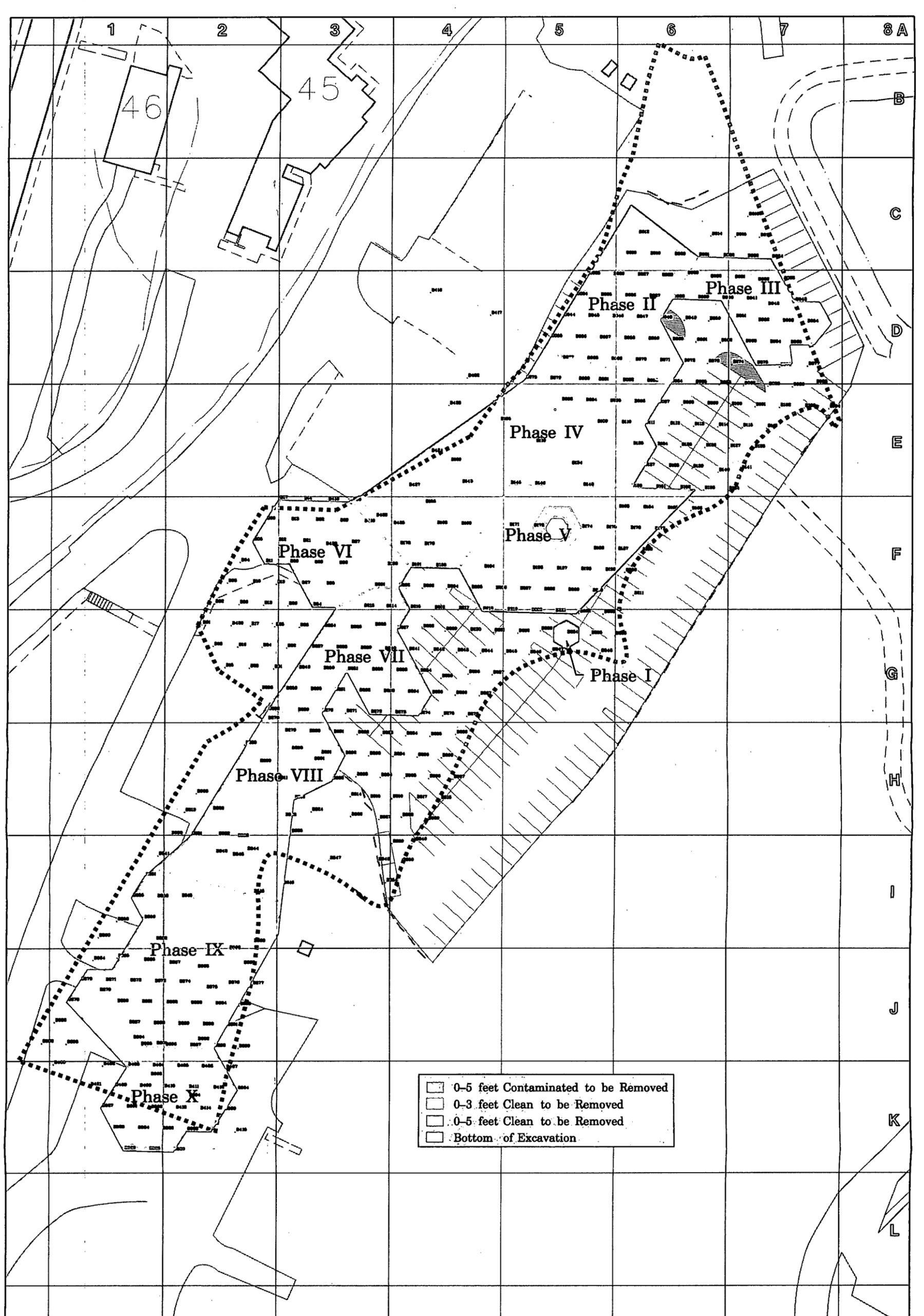
0 20 40 60 80 100
Scale in Feet

| | | | |
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| 10/23/02 | | SSP | |
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MOUND
Environmental Restoration Geographic Information System

| | | | | | | | | | | | | | | | | | | | | | |
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| PRS 6680/40 Excavation Plan (30-35 Feet) | | | | | | | | | | | | | | | | | | | | | |
| DRAWING CLASSIFICATION | | SIZE | | DRAWING NUMBER | | | | | | | | | | JOB NUMBER | | | | | | | |
| UNCLASSIFIED | | D | | excavplanmap.dgn | | | | | | | | | | | | | | | | | |
| DWG TYPE | | PRNG | | CAEC | | SCALE | | SHEET 1 OF * | | | | | | | | | | | | | |
| STATUS | | MD-REL-05/16/02 | | ORIGIN | | MSTATION / J | | | | | | | | | | | | | | | |

A B C D



0-5 feet Contaminated to be Removed
 0-3 feet Clean to be Removed
 0-5 feet Clean to be Removed
 Bottom of Excavation

Legend

- .B416 Boring Location
- Tentative Excavation Boundary
- Area Boundary
- RAD Contaminated Area
- VOC Contaminated Area

Scale in Feet: 0 20 40 60 80 100

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| ISS | DATE | REVISION | BY | CHKR | ENG | M |
| | 10/23/02 | | SSP | | | |



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| DRAWING CLASSIFICATION | | | | | | | | | | SIZE | DRAWING NUMBER | | | | | | | | | | JOB NUMBER | |
| UNCLASSIFIED | | | | | | | | | | D | excavplanmap.dgn | | | | | | | | | | | |
| DWG TYPE | | | | | | | | | | PRNG | CAGEC | | | | | SCALE | | | | | SHEET 1 OF # | |
| STATUS | | | | | | | | | | MD-REL-05/16/02 | | | | | ORIGIN | | | | | MSTATION / J | | |

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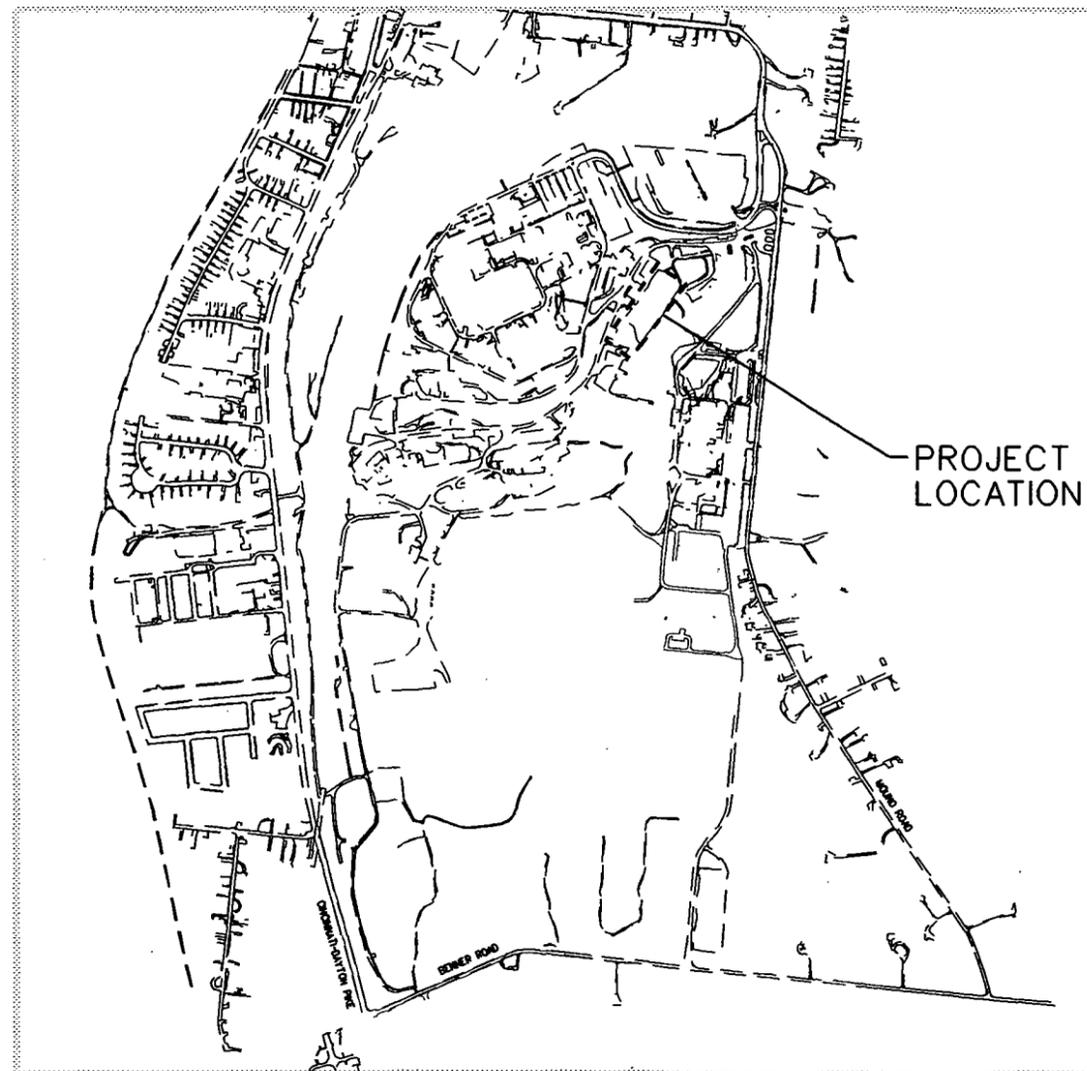
MIAMISBURG MOUND SHORING FOR PRS-66 CH2M HILL MOUND, INC.

CITY OF MIAMISBURG, MONTGOMERY COUNTY, OHIO
JANUARY 13, 2003

BWSC
ENGINEERS ARCHITECTS AND SURVEYORS PLANNERS
BARGE WAGGONER & SUMNER & CANNON, INC.
8280 Yankee Street, Dayton, Ohio 45424-1806
Phone: (937) 438-0378 Fax: (937) 438-0379

INDEX OF DRAWINGS

- G0.01 TITLE SHEET
- C1.01 PLAN VIEW - "NORTH" WALL
- C1.02 DETAILS "NORTH" WALL
- C1.03 SPECIFICATIONS "NORTH" WALL
- C1.04 PLAN VIEW - "SOUTH" WALL
- C1.05 DETAILS "SOUTH" WALL
- C1.06 SPECIFICATIONS "SOUTH" WALL



LOCATION MAP

TITLE SHEET

SHORING FOR PRS-66
CH2M HILL MOUND, INC.
MIAMISBURG, OHIO

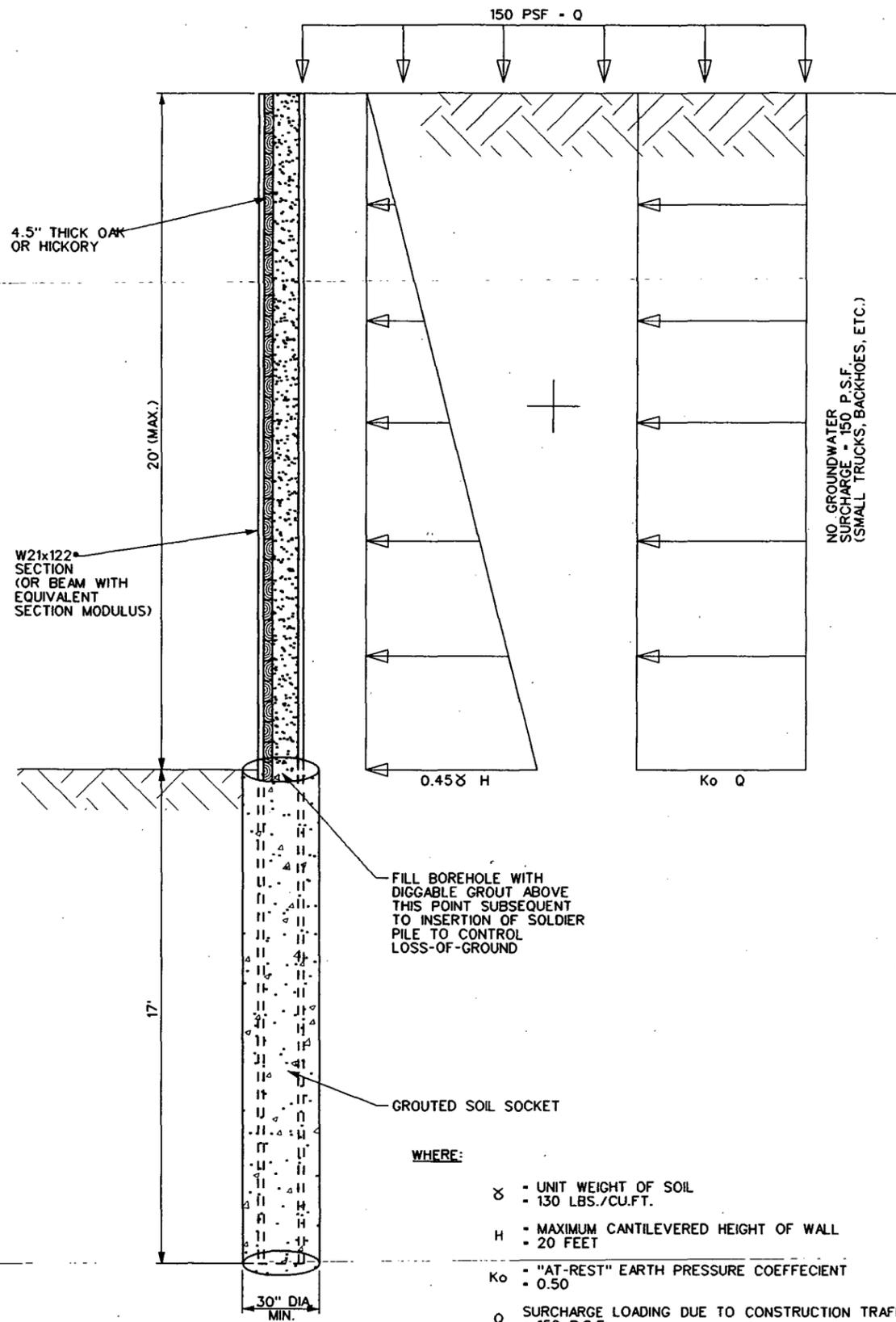
UNDERGROUND UTILITIES
TWO WORKING DAYS
BEFORE YOU DIG
CALL 1-800-362-2764 (TOLL FREE)
OHIO UTILITIES PROTECTION SERVICE
NON-MEMBERS
MUST BE CALLED DIRECTLY

BWSC BARGE WAGGONER & SUMNER & CANNON, INC.
ENGINEERS ARCHITECTS AND SURVEYORS PLANNERS
8280 Yankee Street, Dayton, Ohio 45424-1806
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| DR. | CHK. | DATE | DESCRIPTION |
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G0.01

FILE NO. 18375-00

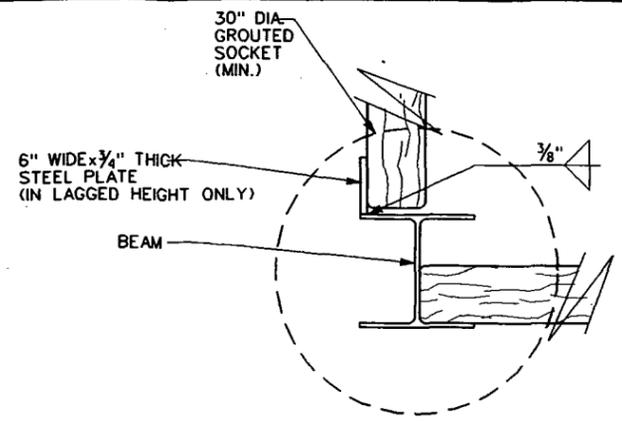


EARTH PRESSURE AND SURCHARGE DIAGRAM

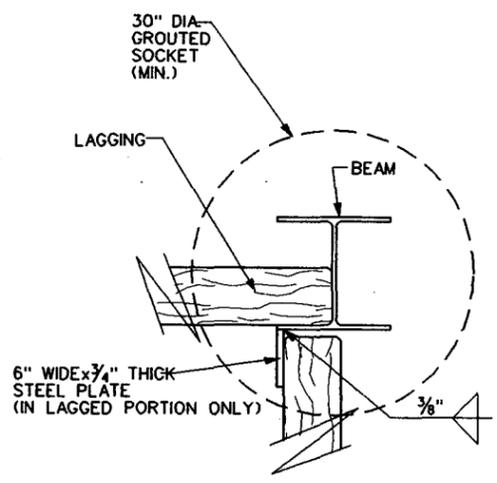
WHERE:

- γ = UNIT WEIGHT OF SOIL = 130 LBS./CU.FT.
- H = MAXIMUM CANTILEVERED HEIGHT OF WALL = 20 FEET
- K_0 = "AT-REST" EARTH PRESSURE COEFFICIENT = 0.50
- Q SURCHARGE LOADING DUE TO CONSTRUCTION TRAFFIC = 150 P.S.F.

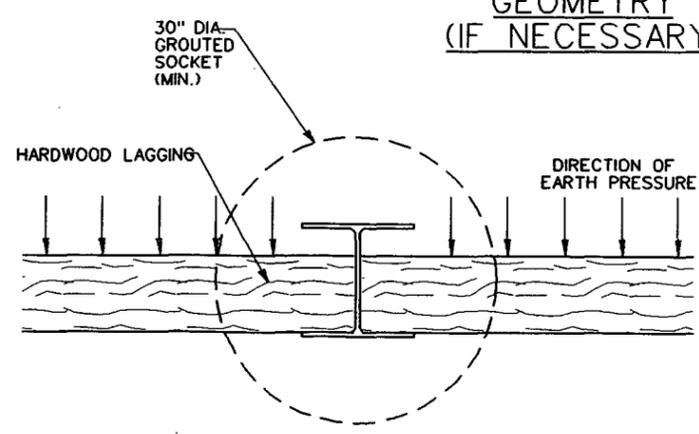
NO GROUNDWATER SURCHARGE = 150 P.S.F. (SMALL TRUCKS, BACKHOES, ETC.)



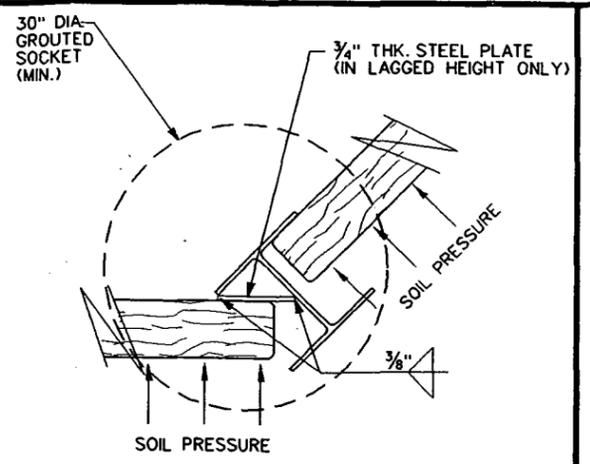
OUTSIDE CORNER GEOMETRY (IF NECESSARY)



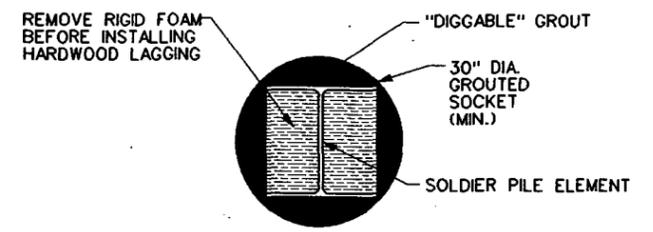
INSIDE CORNER GEOMETRY (IF NECESSARY)



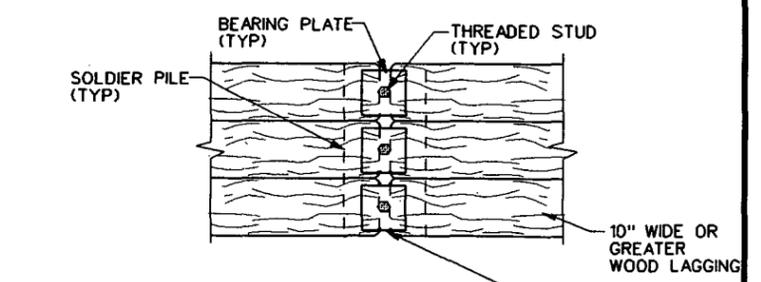
TYPICAL LAGGING ATTACHMENT METHODOLOGY



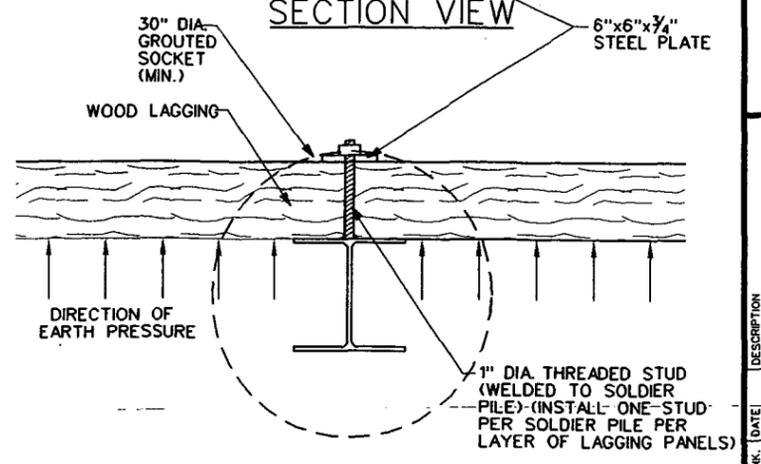
ANGLED CORNER GEOMETRY (IF NECESSARY)



DETAIL OF SOLDIER PILE IN "DIGGABLE" GROUT ZONE



SECTION VIEW



ALTERNATE LAGGING ATTACHMENT METHODOLOGY

BWSC
BARBE WAGBONER & BUNNION, INC.
 ENGINEERS ARCHITECTS PLANNERS
 AND SURVEYORS
 680 Torrey Street, Dayton Ohio 45426-8006
 Phone: 937-433-0318 Fax: 937-433-0379

DETAILS
 SHORING FOR PRS-66
 CH2M HILL MOUND, INC.
 MAMISEBURG, OHIO

| DR. | CHK. | DATE | DESCRIPTION |
|-----|------|---------|----------------|
| DNA | BSC | 1-13-03 | ORIGINAL ISSUE |
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| | | | |

C1.02

TEMPORARY CANTILEVERED SOLDIER PILE AND LAGGING RETAINING WALL SPECIFICATIONS ("NORTH WALL")

1.0 PURPOSE

THE PURPOSE OF THE PROPOSED "NORTH" TEMPORARY CANTILEVERED RETAINING WALL IS TO STABILIZE THE EXISTING INSITU SOIL MASS SUCH THAT EXCAVATION CAN BE PERFORMED ADJACENT TO AN EXISTING DETENTION BASIN AT THE MOUND PLANT LOCATED IN MIAMISBURG, OHIO TO ALLOW FOR THE REMOVAL AND REMEDIATION OF RADIOACTIVE CONTAMINATION. PLEASE NOTE THAT DISTURBANCE TO THE EXISTING AREAS LOCATED UPSLOPE OF THE TEMPORARY WALL AND EXISTING UTILITIES AND ROADWAYS ARE TO BE MINIMIZED DURING CONSTRUCTION ACTIVITIES.

2.0 DESCRIPTION OF WORK

THE PROPOSED "NORTH" CANTILEVERED RETAINING WALL IS TO BE LOCATED AS SHOWN ON THE CONSTRUCTION DRAWINGS. THE LENGTH OF THE CANTILEVERED "NORTH" WALL IS 155 FEET. THE WALL SHALL CONSIST OF A MINIMUM OF (21) SOLDIER PILES PLACED ON ABOUT 8 FOOT CENTERS WITH WIDE FLANGE ROLLED STEEL SECTIONS AND WILL HAVE A MAXIMUM CANTILEVERED HEIGHT OF 20 FEET EACH.

THE CANTILEVERED RETAINING WALL SHALL BE CONSTRUCTED AS DESCRIBED BELOW:

- 2.1 THE RETAINING WALL SHALL BE CONSTRUCTED AT THE LOCATION DESIGNATED ON THE CONSTRUCTION DRAWINGS.
- 2.2 THE PROPOSED RETAINING WALL SHALL BE CONSTRUCTED OF THE SOLDIER PILE AND LAGGING USING WIDE FLANGE ROLLED-STEEL SOLDIER PILES AND HARDWOOD LAGGING AS SHOWN ON THE CONSTRUCTION DRAWINGS.

3.0 SOLDIER PILE INSTALLATION

- 3.1 CONSTRUCT THE SOLDIER PILE AND LAGGING RETAINING WALL USING WIDE FLANGE ROLLED STEEL SOLDIER PILE SECTIONS AS SHOWN ON THE CONSTRUCTION DRAWINGS.
- 3.2 THE SOLDIER PILES SHALL CONSIST OF W21x122 • SECTIONS (OR STEEL MEMBERS WITH AN EQUIVALENT OR LARGER SECTION MODULUS) THAT ARE EMPLACED WITHIN 30 INCH DIAMETER (MINIMUM) PREDRILLED SHAFTS THAT EXTEND TO A DEPTH OF AT LEAST 17 FEET BENEATH THE PROPOSED MAXIMUM EXCAVATION DEPTH (I.E., 20.0 FEET) AS SHOWN ON THE CONSTRUCTION DRAWINGS. IF EXCESSIVELY SOFT SOILS ARE EXCAVATED (AS DETERMINED BY THE ON-SITE SOIL INSPECTOR) IN THE SOCKETS, THEN THE SOCKETED LENGTH MAY BE REQUIRED TO BE INCREASED. DRILLED SHAFTS SHALL BE TEMPORARILY CASED (AS NECESSARY) TO PRECLUDE "CAVE-INS" OF THE BORE HOLE. ALL STEEL ELEMENTS UTILIZED FOR THIS PROJECT SHALL BE AT LEAST GRADE A36. BECAUSE OF THE INSITU GEOLOGY OF THE PROJECT SITE, IT IS HIGHLY PROBABLE THAT NUMEROUS HARD LIMESTONE "FLOATERS" AND/OR BOULDERS WILL BE ENCOUNTERED DURING THE DRILLING PROCESS. AS A CONSEQUENCE, IT MAY BE NECESSARY TO EMPLOY SPECIALIZED DRILLING TECHNIQUES IN ORDER TO CLEAR AND/OR "BREAK UP" THESE LARGE TABULAR SECTIONS OF HARD LIMESTONE (WHICH ARE COMMON AT THE PROJECT SITE). THE SOLDIER PILES SHALL BE PLACED ON 8-FOOT CENTERS UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS.
- 3.3 THE SOLDIER PILES SHALL BE LOCATED WITHIN 6.0 INCHES OF THE PLANNED INSTALLATION LOCATION. THE SOLDIER PILES SHALL MAINTAIN A MAXIMUM PLUMBNESS DEVIATION OF 1.0 INCH IN 10 FEET OF VERTICAL HEIGHT.
- 3.4 ONCE THE W21x122 • (OR SIMILAR) STEEL SECTION IS INSTALLED IN THE PREDRILLED SHAFT, THE PREDRILLED SHAFT SHALL BE BACKFILLED WITH CONCRETE TO THE BOTTOM OF LAGGING ELEVATION. THIS CONCRETE SHALL HAVE A 3,000 P.S.I. COMPRESSIVE STRENGTH AT 28 DAYS WITH NO AIR ENTRAINMENT AND A MAXIMUM SLUMP EQUAL TO BUT NOT GREATER THAN 5.0 INCHES AND SHALL BE PLACED USING THE "FREE FALL" METHOD. THE PREDRILLED SHAFT BASE SHALL BE CLEARED OF DEBRIS AND A MAXIMUM 2 INCHES OF GROUND WATER SHALL BE ALLOWED IN THE SOCKET PRIOR TO CONCRETE PLACEMENT. PILE EMBEDMENT CONCRETE SHALL BE PLACED ON THE SAME DAY OF SOLDIER PILE SHAFT COMPLETION.
- 3.5 TO ALLOW REMOVAL OF SOLDIER PILE SHAFT CONCRETE (WITHIN THE LAGGED PORTION OF THE WALL) FOR INSTALLATION OF LAGGING TIMBERS, 500 P.S.I. CONCRETE (I.E., "DIGGABLE" CONCRETE) SHALL BE SUBSTITUTED FOR THE 3000 P.S.I. CONCRETE ABOVE THE BOTTOM OF THE LAGGED ZONE OF THE WALL. RIGID FOAM INSULATION CAN ALSO BE USED BETWEEN THE FLANGES OF THE PILES TO EXPEDITE THE GROUT REMOVAL PROCESS IN THE LAGGED ZONE OF THE WALLS AS SHOWN ON THE CONSTRUCTION DRAWINGS.
- 3.6 THE CONTRACTOR SHALL MAINTAIN A RECORD OF EACH SOLDIER PILE SHAFT INSTALLATION WHICH WILL INCLUDE AS A MINIMUM:
 - SOLDIER PILE NUMBER AND COORDINATES;
 - SOLDIER PILE BASAL TIP ELEVATION;
 - SOLDIER PILE LENGTH;
 - ELEVATION OF THE TOP SURFACE OF THE 3,000 P.S.I. PILE EMBEDMENT CONCRETE;
 - TOP ELEVATION OF THE 500 P.S.I. "DIGGABLE" CONCRETE ZONE;
 - ACTUAL SOCKET LENGTH INTO THE SOIL MASS;
 - DATE DRILLED;
 - DATE COMPLETED;
 - AND, WEATHER CONDITIONS.

4.0 LAGGING INSTALLATION

- 4.1 LAGGING TIMBERS SHALL CONSIST OF HARDWOOD OAK OR HICKORY TIMBERS (WHICH POSSESSES A MODULUS OF RUPTURE OF AT LEAST 1.7 ksi.) THAT MEASURE AT LEAST 4.5 INCHES IN THICKNESS AND AT LEAST 10.0 INCHES IN HEIGHT EACH. ALL LAGGING TIMBERS SHALL HAVE AT LEAST 3 INCHES BEARING AGAINST EACH SOLDIER PILE TO PRECLUDE STRESS CONCENTRATIONS. EXCAVATION FOR THE LAGGING EMPLACEMENT CAN PROCEED ONCE THE GROUTED ANNULUS AROUND THE PILES HAS ADEQUATELY CURED.
- 4.2 THE HARDWOOD LAGGING SHALL EXTEND A MINIMUM OF 1.0 FOOT BELOW PROPOSED GRADE ON THE DOWNSLOPE SIDE OF THE WALL.
- 4.3 THE WOODEN LAGGING CAN BE ATTACHED TO THE SOLDIER PILES USING EITHER THE METHODS ILLUSTRATED ON SHEET C1.02 OF THE CONSTRUCTION DRAWINGS. THE HARDWOOD LAGGING SHOULD BEGIN AT THE TOP PORTION OF THE WALL AND SHOULD BE EMPLACED DOWN THE WALL IN SMALL INCREMENTAL STEPS.
- 4.4 THE SOIL MATERIAL SITUATED DOWNSLOPE OF THE TEMPORARY WALL SHOULD BE EXCAVATED IN 1 TO 2 FOOT "SLICES" TO ALLOW FOR THE WOODEN LAGGING TO BE ATTACHED INCREMENTALLY TO THE SOLDIER PILES AS THE EXCAVATION PROCEEDS.
- 4.5 ANY VOIDS WHICH ARE MANIFEST BEHIND THE RETAINING WALL SHOULD BE FILLED WITH GRANULAR MATERIAL SUCH AS ODOT NO. 304 MATERIAL AS SOON AS POSSIBLE TO PRECLUDE THE LOSS-OF-GROUND FROM BEHIND THE WALL (WHICH COULD RESULT IN DAMAGE OR DISTRESS TO NEARBY ROADWAYS OR UTILITIES).
- 4.6 THE WOODEN LAGGING SHOULD BE INSTALLED TO THE BOTTOM OF THE PROPOSED EXCAVATION AND SHOULD EXTEND AT LEAST ONE (1) FOOT BELOW PROPOSED GRADE ON THE DOWNSLOPE SIDE OF THE WALL.
- 4.7 ANY GROUND WATER SEEPS WHICH ARE NOTED TO BE MANIFEST THROUGH THE SEAMS SITUATED BETWEEN THE ADJACENT WOODEN LAGGING TIMBERS SHOULD BE FILTERED USING A NON-WOVEN GEOTEXTILE MATERIAL. THIS MATERIAL CAN BE NAILED TO THE WOODEN LAGGING TO PRECLUDE FINES FROM MIGRATING OUT FROM BEHIND THE PROPOSED WALL (WHICH COULD RESULT IN A LOSS-OF-GROUND).
- 4.8 ALL MATERIALS LOCATED DOWNSLOPE OF THE NEW TEMPORARY RETAINING WALLS MAY BE REMOVED TO A MAXIMUM DEPTH OF APPROXIMATELY 20 FEET BENEATH THE EXISTING SITE GRADE. IT MUST BE EMPHASIZED THAT NO EXCAVATIONS SHALL EXTEND BENEATH THIS DEPTH TO ENSURE AN ADEQUATE FACTOR OF SAFETY RELATIVE TO STABILITY OF THE RETAINING WALL SYSTEM. IF EXCAVATIONS ARE REQUIRED TO EXTEND TO DEEPER DEPTHS, ADDED STRUCTURAL ELEMENTS (SUCH AS TIE BACKS OR STRUTS) WILL BE NECESSARY.
- 4.9 THE CANTILEVERED WALLS SHALL BE MONITORED VIA SURVEYING TECHNIQUES AND VISUAL OBSERVATIONS ON A DAILY BASIS TO ENSURE THAT NO DETRIMENTAL MOVEMENT, FAILURE OF THE SOIL MEDIUM OR STRUCTURAL DISTRESS ARE MANIFEST. IF MOVEMENT IS NOTED, THEN NOTIFY ONSITE CH2M HILL ENGINEER AS SOON AS POSSIBLE TO REVIEW THE DATA.

BWSC
ENGINEERS ARCHITECTS AND SURVEYORS

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820 Lakes Street, Dayton, Ohio 45404-0006
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SPECIFICATIONS

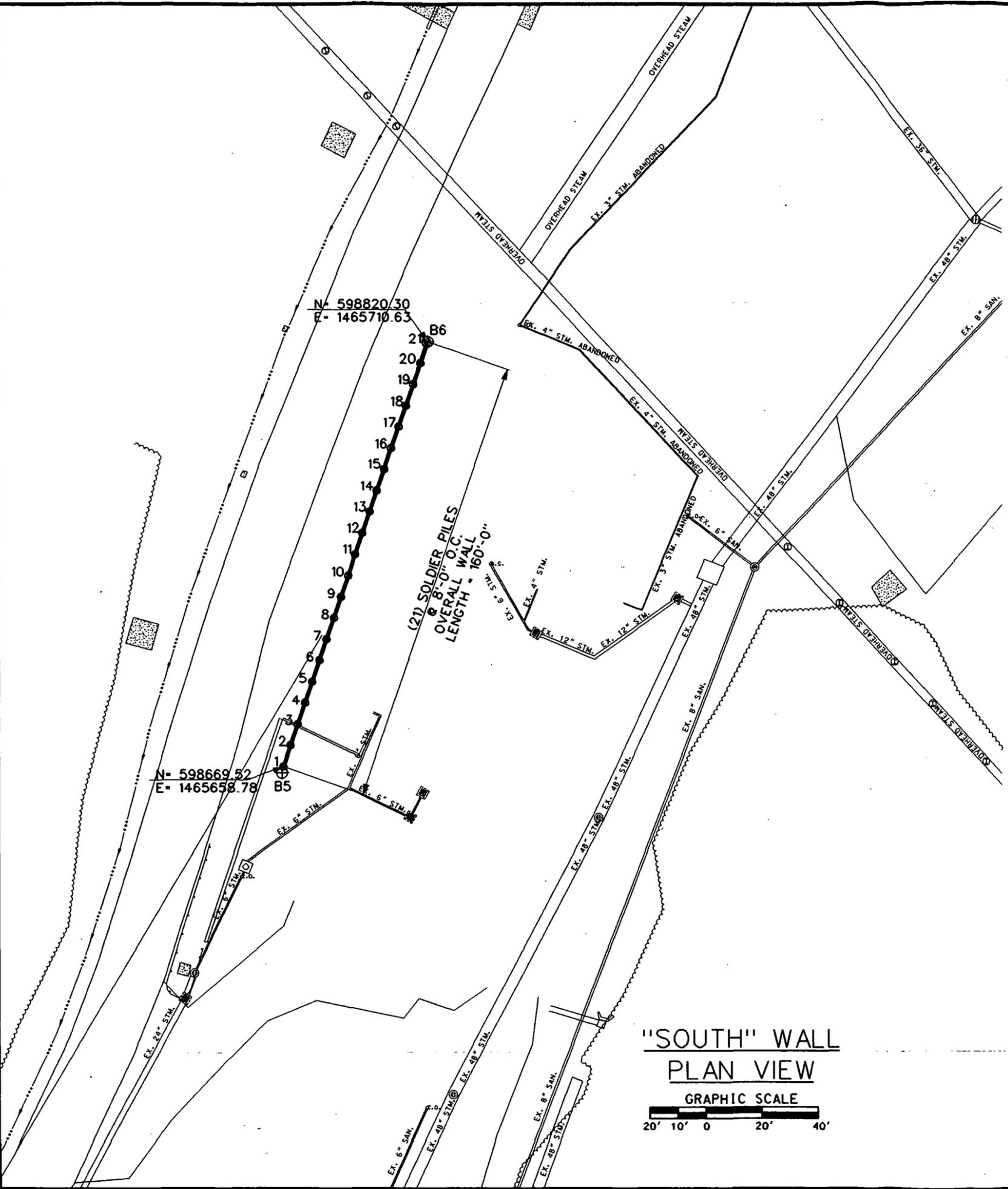
SHORING FOR PRS-66
CH2M HILL MOUND, INC.
MIAMISBURG, OHIO

| DR. | CHK. | DATE | DESCRIPTION |
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"SOUTH WALL" SOLDIER PILE COORDINATES

| SOLDIER PILE No. | Northing, Feet | Easting, Feet |
|------------------|----------------|---------------|
| 1 | 598669.52 | 1465658.78 |
| 2 | 598677.05 | 1465661.37 |
| 3 | 598684.59 | 1465663.97 |
| 4 | 598692.13 | 1465666.56 |
| 5 | 598699.67 | 1465669.15 |
| 6 | 598707.21 | 1465671.74 |
| 7 | 598714.75 | 1465674.34 |
| 8 | 598722.29 | 1465676.93 |
| 9 | 598729.83 | 1465679.52 |
| 10 | 598737.37 | 1465682.11 |
| 11 | 598744.91 | 1465684.71 |
| 12 | 598752.45 | 1465687.30 |
| 13 | 598759.99 | 1465689.89 |
| 14 | 598767.53 | 1465692.49 |
| 15 | 598775.07 | 1465695.08 |
| 16 | 598782.61 | 1465697.67 |
| 17 | 598790.14 | 1465700.26 |
| 18 | 598797.68 | 1465702.86 |
| 19 | 598805.22 | 1465705.45 |
| 20 | 598812.76 | 1465708.04 |
| 21 | 598820.30 | 1465710.63 |



NOTES:

- 1) GOOD WORKMANSHIP SHALL BE EXHIBITED IN CONSTRUCTION OF THIS WALL SYSTEM TO PRECLUDE THE LOSS-OF-GROUND. FAILURE TO DO SO CAN RESULT IN DISTRESS TO NEARBY UTILITIES AND STRUCTURES.
- 2) ALL LAGGING SHALL HAVE AT LEAST 3 INCHES BEARING AGAINST EACH SOLDIER PILE FLANGE TO PRECLUDE STRESS CONCENTRATIONS.
- 3) ALL VOIDS WHICH FORM BEHIND RETAINING WALL MUST BE FILLED WITH SAND OR FLOWABLE FILL AS SOON AS POSSIBLE TO PRECLUDE FURTHER LOSS-OF-GROUND.
- 4) PLEASE SEE THE CBC ENGINEERS AND ASSOCIATES DESIGN REPORT FOR OTHER CRITERIA RELATIVE TO THE CONSTRUCTION OF THIS WALL SYSTEM.
- 5) PLEASE NOTE THAT ALL STRUCTURAL STEEL TO BE USED FOR THIS PROJECT IS GRADE A36 OR ASTM A992.
- 6) PLEASE NOTE THAT ALL WOOD LAGGING SHALL BE HICKORY OR OAK (LAGGING GRADE WITH NO STRUCTURAL DEFECTS & A MODULUS OF RUPTURE OF AT LEAST 1.7 ksi).

LEGEND

- B5 ⊕ - TEST BORING LOCATION
- 12 ⊙ - SOLDIER PILE LOCATION
- - HARDWOOD LAGGING

**"SOUTH" WALL
PLAN VIEW**



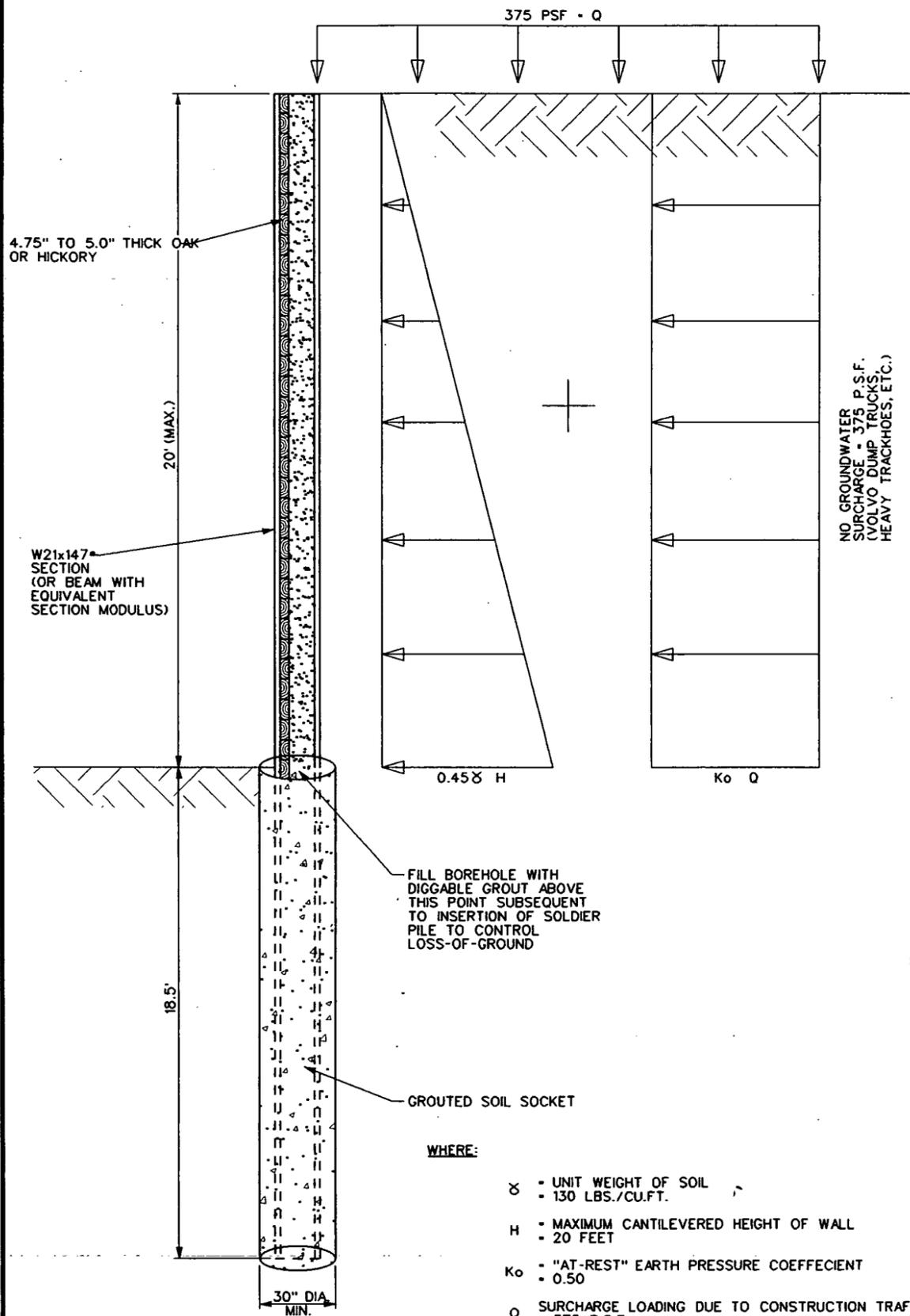
PLAN VIEW - "SOUTH" WALL

SHORING FOR PRS-66
 CH2M HILL MOUND, INC.
 MIAMISBURG, OHIO

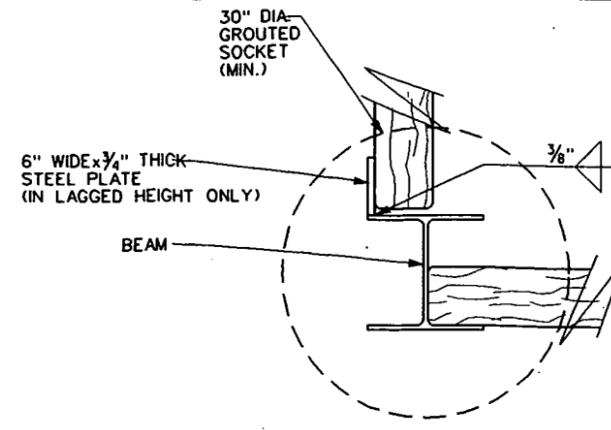
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DRAWING AND DESIGN INFORMATION
 PREPARED BY CBC ENGINEERS AND ASSOCIATES.

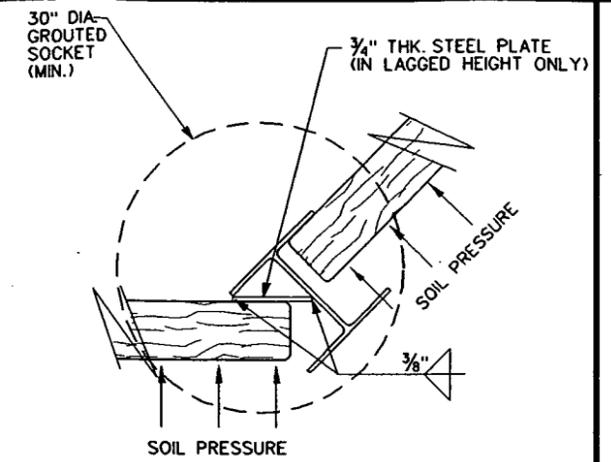
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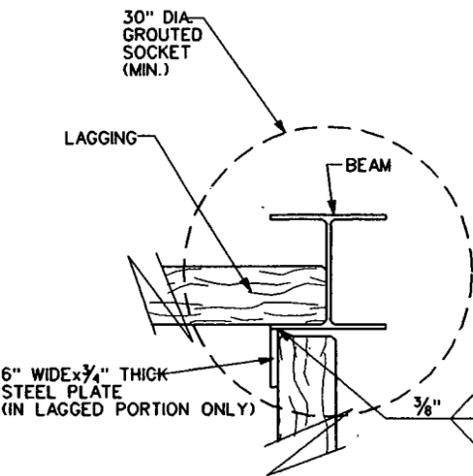
EARTH PRESSURE AND SURCHARGE DIAGRAM



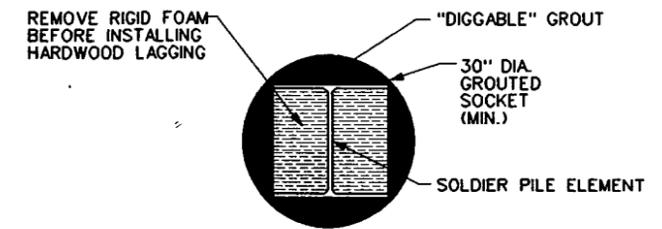
OUTSIDE CORNER GEOMETRY (IF NECESSARY)



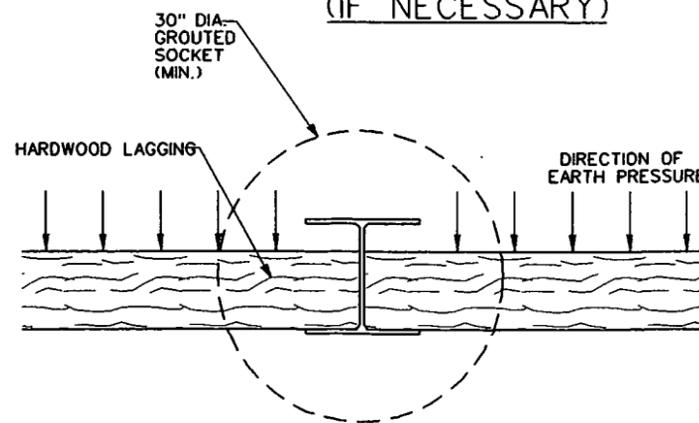
ANGLED CORNER GEOMETRY (IF NECESSARY)



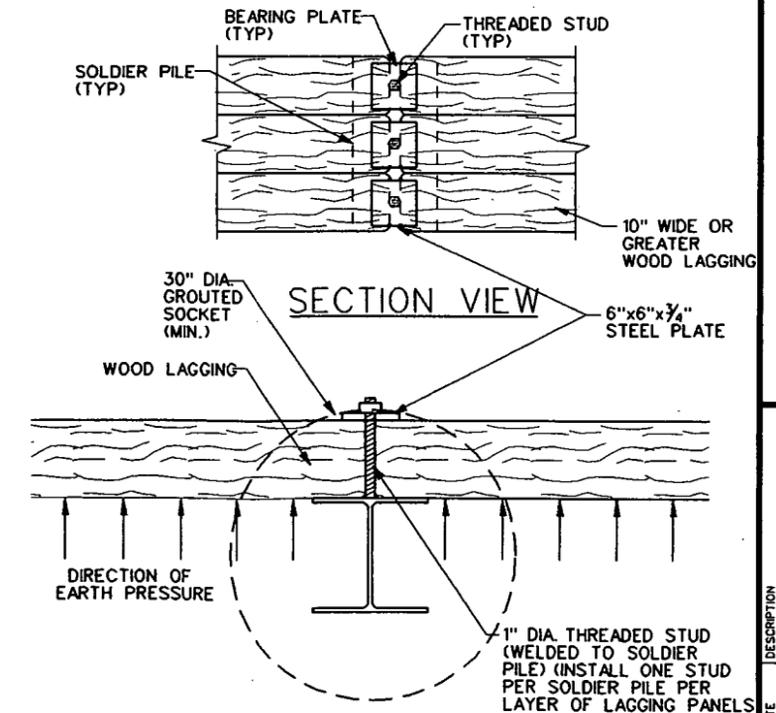
INSIDE CORNER GEOMETRY (IF NECESSARY)



DETAIL OF SOLDIER PILE IN "DIGGABLE" GROUT ZONE



TYPICAL LAGGING ATTACHMENT METHODOLOGY



ALTERNATE LAGGING ATTACHMENT METHODOLOGY

| DR. | CHK. | DATE | DESCRIPTION |
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TEMPORARY CANTILEVERED SOLDIER PILE AND LAGGING RETAINING WALL SPECIFICATIONS ("SOUTH WALL")

1.0 PURPOSE

THE PURPOSE OF THE PROPOSED "SOUTH" TEMPORARY CANTILEVERED RETAINING WALL IS TO STABILIZE THE EXISTING INSITU SOIL MASS SUCH THAT EXCAVATION CAN BE PERFORMED ADJACENT TO AN EXISTING DETENTION BASIN AT THE MOUND PLANT LOCATED IN MIAMISBURG, OHIO TO ALLOW FOR THE REMOVAL AND REMEDIATION OF RADIOACTIVE CONTAMINATION. PLEASE NOTE THAT DISTURBANCE TO THE EXISTING AREAS LOCATED UPSLOPE OF THE TEMPORARY WALL AND EXISTING UTILITIES AND ROADWAYS ARE TO BE MINIMIZED DURING CONSTRUCTION ACTIVITIES.

2.0 DESCRIPTION OF WORK

THE PROPOSED "SOUTH" CANTILEVERED RETAINING WALL IS TO BE LOCATED AS SHOWN ON THE CONSTRUCTION DRAWINGS. THE LENGTH OF THE CANTILEVERED "SOUTH" WALL IS 160 FEET. THE WALL SHALL CONSIST OF A MINIMUM OF (2) SOLDIER PILES PLACED ON ABOUT 8 FOOT CENTERS WITH WIDE FLANGE ROLLED STEEL SECTIONS AND WILL HAVE A MAXIMUM CANTILEVERED HEIGHT OF 20 FEET EACH.

THE CANTILEVERED RETAINING WALL SHALL BE CONSTRUCTED AS DESCRIBED BELOW:

- 2.1 THE RETAINING WALL SHALL BE CONSTRUCTED AT THE LOCATION DESIGNATED ON THE CONSTRUCTION DRAWINGS.
- 2.2 THE PROPOSED RETAINING WALL SHALL BE CONSTRUCTED OF THE SOLDIER PILE AND LAGGING USING WIDE FLANGE ROLLED-STEEL SOLDIER PILES AND HARDWOOD LAGGING AS SHOWN ON THE CONSTRUCTION DRAWINGS.

3.0 SOLDIER PILE INSTALLATION

- 3.1 CONSTRUCT THE SOLDIER PILE AND LAGGING RETAINING WALL USING WIDE FLANGE ROLLED STEEL SOLDIER PILE SECTIONS AS SHOWN ON THE CONSTRUCTION DRAWINGS.
- 3.2 THE SOLDIER PILES SHALL CONSIST OF W21x147 • SECTIONS (OR STEEL MEMBERS WITH AN EQUIVALENT OR LARGER SECTION MODULUS) THAT ARE EMPLACED WITHIN 30 INCH DIAMETER (MINIMUM) PREDRILLED SHAFTS THAT EXTEND TO A DEPTH OF AT LEAST 18.5 FEET BENEATH THE PROPOSED MAXIMUM EXCAVATION DEPTH (I.E., 20.0 FEET) AS SHOWN ON THE CONSTRUCTION DRAWINGS. IF EXCESSIVELY SOFT SOILS ARE EXCAVATED (AS DETERMINED BY THE ON-SITE SOIL INSPECTOR) IN THE SOCKETS, THEN THE SOCKETED LENGTH MAY BE REQUIRED TO BE INCREASED. DRILLED SHAFTS SHALL BE TEMPORARILY CASSED (AS NECESSARY) TO PRECLUDE "CAVE-INS" OF THE BORE HOLE. ALL STEEL ELEMENTS UTILIZED FOR THIS PROJECT SHALL BE AT LEAST GRADE A36. BECAUSE OF THE INSITU GEOLOGY OF THE PROJECT SITE, IT IS HIGHLY PROBABLE THAT NUMEROUS HARD LIMESTONE "FLOATERS" AND/OR BOULDERS WILL BE ENCOUNTERED DURING THE DRILLING PROCESS. AS A CONSEQUENCE, IT MAY BE NECESSARY TO EMPLOY SPECIALIZED DRILLING TECHNIQUES IN ORDER TO CLEAR AND/OR "BREAK UP" THESE LARGE TABULAR SECTIONS OF HARD LIMESTONE (WHICH ARE COMMON AT THE PROJECT SITE). THE SOLDIER PILES SHALL BE PLACED ON 8-FOOT CENTERS UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS.
- 3.3 THE SOLDIER PILES SHALL BE LOCATED WITHIN 6.0 INCHES OF THE PLANNED INSTALLATION LOCATION. THE SOLDIER PILES SHALL MAINTAIN A MAXIMUM PLUMBNESS DEVIATION OF 1.0 INCH IN 10 FEET OF VERTICAL HEIGHT.
- 3.4 ONCE THE W21x147 • (OR SIMILAR) STEEL SECTION IS INSTALLED IN THE PREDRILLED SHAFT, THE PREDRILLED SHAFT SHALL BE BACKFILLED WITH CONCRETE TO THE BOTTOM OF LAGGING ELEVATION. THIS CONCRETE SHALL HAVE A 3,000 P.S.I. COMPRESSIVE STRENGTH AT 28 DAYS WITH NO AIR ENTRAINMENT AND A MAXIMUM SLUMP EQUAL TO BUT NOT GREATER THAN 5.0 INCHES AND SHALL BE PLACED USING THE "FREE FALL" METHOD. THE PREDRILLED SHAFT BASE SHALL BE CLEARED OF DEBRIS AND A MAXIMUM 2 INCHES OF GROUND WATER SHALL BE ALLOWED IN THE SOCKET PRIOR TO CONCRETE PLACEMENT. PILE EMBEDMENT CONCRETE SHALL BE PLACED ON THE SAME DAY OF SOLDIER PILE SHAFT COMPLETION.
- 3.5 TO ALLOW REMOVAL OF SOLDIER PILE SHAFT CONCRETE (WITHIN THE LAGGED PORTION OF THE WALL) FOR INSTALLATION OF LAGGING TIMBERS, 500 P.S.I. CONCRETE (I.E., "DIGGABLE" CONCRETE) SHALL BE SUBSTITUTED FOR THE 3000 P.S.I. CONCRETE ABOVE THE BOTTOM OF THE LAGGED ZONE OF THE WALL. RIGID FOAM INSULATION CAN ALSO BE USED BETWEEN THE FLANGES OF THE PILES TO EXPEDITE THE GROUT REMOVAL PROCESS IN THE LAGGED ZONE OF THE WALLS AS SHOWN ON THE CONSTRUCTION DRAWINGS.
- 3.6 THE CONTRACTOR SHALL MAINTAIN A RECORD OF EACH SOLDIER PILE SHAFT INSTALLATION WHICH WILL INCLUDE AS A MINIMUM:
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 - SOLDIER PILE BASAL TIP ELEVATION;
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 - TOP ELEVATION OF THE 500 P.S.I. "DIGGABLE" CONCRETE ZONE;
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 - AND, WEATHER CONDITIONS.

4.0 LAGGING INSTALLATION

- 4.1 LAGGING TIMBERS SHALL CONSIST OF HARDWOOD OAK OR HICKORY TIMBERS (WHICH POSSESSES A MODULUS OF RUPTURE OF AT LEAST 1.7 ksi.) THAT MEASURE AT LEAST 4.75 TO 5.0 INCHES IN THICKNESS AND AT LEAST 10.0 INCHES IN HEIGHT EACH. ALL LAGGING TIMBERS SHALL HAVE AT LEAST 3 INCHES BEARING AGAINST EACH SOLDIER PILE TO PRECLUDE STRESS CONCENTRATIONS. EXCAVATION FOR THE LAGGING EMPLACEMENT CAN PROCEED ONCE THE GROUTED ANNULUS AROUND THE PILES HAS ADEQUATELY CURED.
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- 4.5 ANY VOIDS WHICH ARE MANIFEST BEHIND THE RETAINING WALL SHOULD BE FILLED WITH GRANULAR MATERIAL SUCH AS ODOT NO. 304 MATERIAL AS SOON AS POSSIBLE TO PRECLUDE THE LOSS-OF-GROUND FROM BEHIND THE WALL (WHICH COULD RESULT IN DAMAGE OR DISTRESS TO NEARBY ROADWAYS OR UTILITIES).
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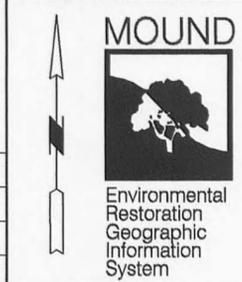
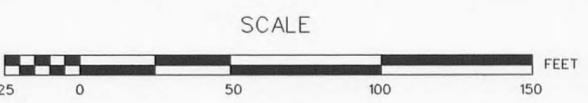
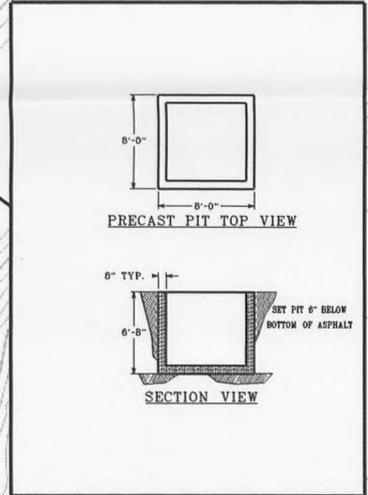
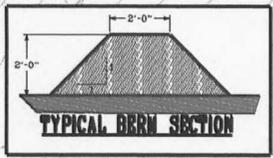
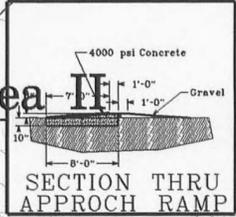
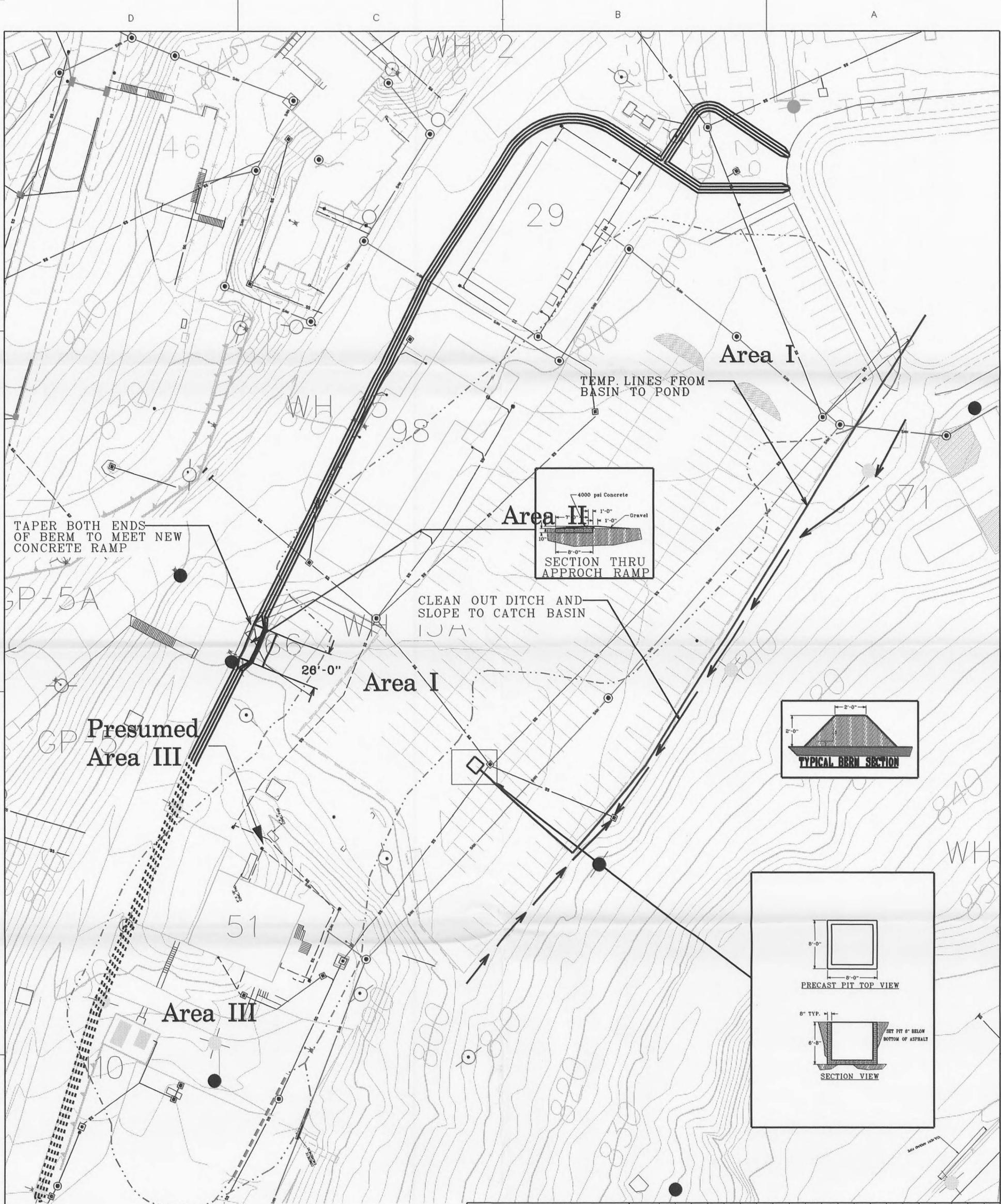
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 ENGINEERS ARCHITECTS PLANNERS
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 Phone (937) 438-0318 Fax (937) 438-0379

SPECIFICATIONS

SHORING FOR PRS-66
 CH2M HILL MOUND, INC.
 MIAMISBURG, OHIO

| DR. | CHK. | DATE | DESCRIPTION |
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| | | 1-13-03 | ORIGINAL ISSUE |
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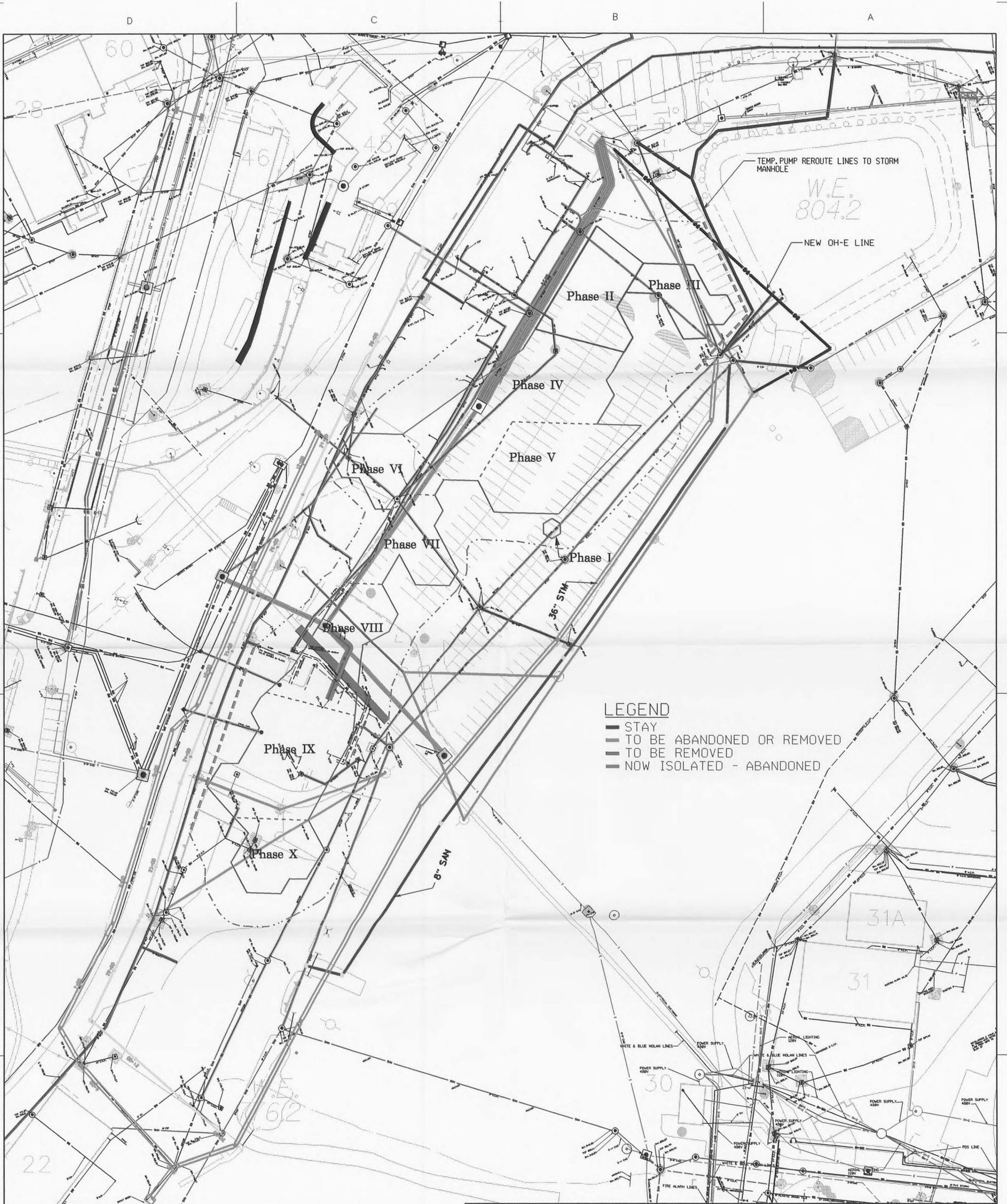
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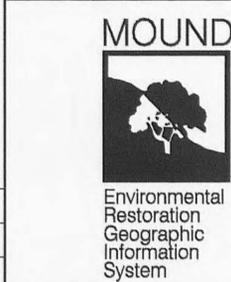
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| SHEET | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | |
| ISSUE | | | | | | | | | | | | | | | | | | | | | | |
| SHEET | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | | | | | | |
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| PART CLASSIFICATION | | | | | | | | | | | | | | | | | | | | | | |
| DRAWING CLASSIFICATION | UNCLASSIFIED | | | | | | | | | | | | | | | SIZE | DRAWING NUMBER | | JOB NUMBER | | | |
| DWG TYPE | STE | PRMG | ER-GIS | CAGEC | | | | | | | | | | | | SCALE | GRAPHIC | SHEET 1 OF 1 | | | | |
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| ISS | DATE | REVISION | BY | CHKR | ENG | LP&EC | APVD | M | | | | | | | | | | | | | | |

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- LEGEND**
- STAY
 - TO BE ABANDONED OR REMOVED
 - TO BE REMOVED
 - NOW ISOLATED - ABANDONED

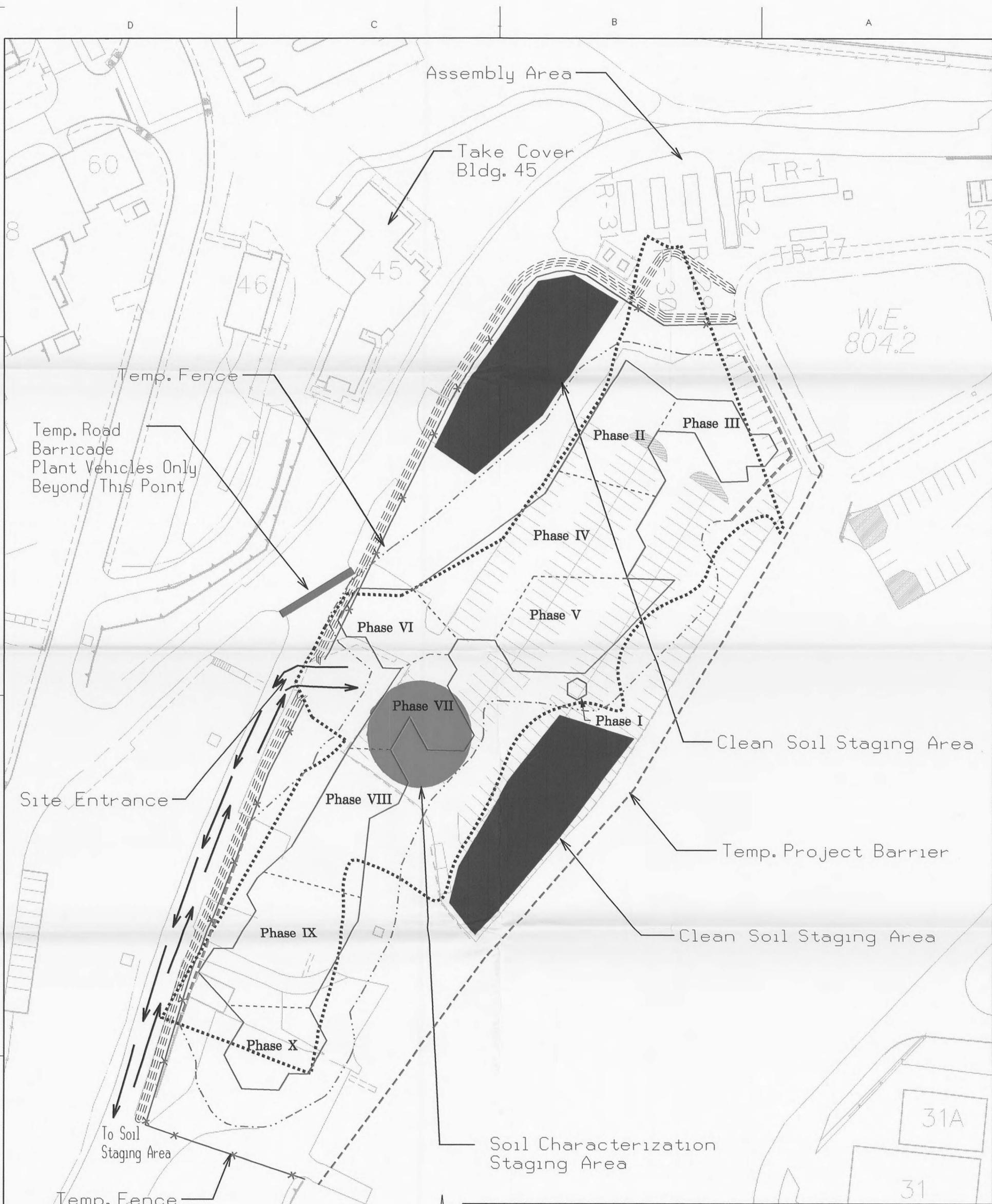


| | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|-----------------|------|--------|-------|---------------|----|----|----|----|----|--------|----------------|----|----|----|----|------------|----|----|----|----|--|
| SHEET | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | |
| ISSUE | | | | | | | | | | | | | | | | | | | | | | |
| SHEET | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | | | | | | |
| ISSUE | A | | | | | | | | | | | | | | | | | | | | | |
| PART CLASSIFICATION | | | | | | | | | | | | | | | | | | | | | | |
| DRAWING CLASSIFICATION | UNCLASSIFIED | | | | | | | | | | SIZE | DRAWING NUMBER | | | | | JOB NUMBER | | | | | |
| DWG TYPE | STE | PRMG | ER-GIS | CAGEC | SCALE GRAPHIC | | | | | | | | | | | | | | | | | |
| STATUS | MD-REL-11/20/02 | | | | | | | | | | ORIGIN | MSTATION / J | | | | | | | | | | |

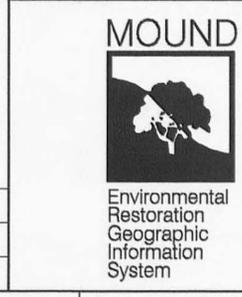
**FIGURE 1
PRS 66
SITE UTILITIES**

| | | | | | | | | |
|-----|----------|------------------------|----|------|-----|-------|------|---|
| A | 11/20/02 | ISSUE FOR WORK PACKAGE | A | * | | * | | |
| ISS | DATE | REVISION | BY | CHKR | ENG | LP&EC | APVD | M |

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|-----|----------|------------------------|------|------|------------------|
| A | 11/26/02 | Issue for work package | KRW* | | * |
| ISS | DATE | REVISION | BY | CHKR | ENG LP&EC APVD M |



| | | | | | | | | | | | | | | | | | | | | | |
|------------------------|-----|------|--------|-------|----------------------------|----|--|----------------|----|----|----|---------------------|----|------------|----|----|----|----|----|----|----|
| SHEET | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| ISSUE | | | | | | | | | | | | | | | | | | | | | |
| SHEET | 1 | 2 | 3 | 4 | 5 | 6 | FIGURE 2 PRS 66 GENERAL SITE WITH EXCAVATION PHASES | | | | | | | | | | | | | | |
| ISSUE | A | | | | | | DRAWING CLASSIFICATION UNCLASSIFIED | | | | | | | | | | | | | | |
| PART CLASSIFICATION | | | | | | | SIZE | DRAWING NUMBER | | | | | | JOB NUMBER | | | | | | | |
| | | | | | | | | figure_2.dgn | | | | | | * | | | | | | | |
| DWG TYPE | STE | PRMG | ER-GIS | CAGEC | SCALE GRAPHIC SHEET 1 OF 1 | | | | | | | | | | | | | | | | |
| STATUS MD-REL-11/26/02 | | | | | | | | | | | | ORIGIN MSTATION / J | | | | | | | | | |

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