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1.0 PURPOSE

The Department of Defense Standard 6055.9-STD, Chapter 12, requires information be provided to the Department of Defense Explosives Safety Board (DDESB) for review and approval of explosive safety aspects when plans are made for leasing, transferring, remediating, or disposing of DOD real property where ammunition and explosives contamination exists or is suspected to exist.

2.0 SCOPE

This Explosives Safety Submission (ESS) outlines the explosive safety aspects for the ordnance and explosives (OE) removal action for an area consisting of approximately 1.5 acres of property located in the southwestern quadrant of the Ravenna Army Ammunition Plant (RVAAP).

RVAAP is located in northeastern Ohio within east central Portage County and southwestern Trumbull County, approximately 4.8 km (3 miles) east/northeast of the town of Ravenna and approximately 1.6 km (1 mile) northwest of the town of Newton Falls. The installation consists of 8668.3 ha (21,419 acres) contained in a 17.7 (11 mile) long by 5.6 km (3.5 mile) wide tract. Figure 1 in Appendix A shows a map of the RVAAP Installation.

3.0 DESCRIPTION OF AREAS AND PAST USE LEADING TO THE PRESENCE OF OE

Open Demolition Area 1 (OD1) is located in the southwest quadrant of the RVAAP and consists of a total area of six (6) acres. Figure 2 in Appendix A shows the location of OD1. The 400' x 600' portion designated as the Area of Concern (AOC) was in operation as an Open Burn/Open Detonation Area (OB/OD) from 1941 to 1949.

The Area of Concern (AOC) lies immediately south of the NACA Test Area crash runway opposite the indicated abandoned access road, formerly known as Demolition Road. Prominent features of the AOC, as derived from aerial photos of the site circa 1940's and 1950's, depict an oval OB/OD area surrounded by an earthen berm approximately 7.6m (25 ft.) wide at the top. The top of the berm appears to have been an extension of Demolition Road. Following, and possibly concurrent with, its use as a demolition area, the area outside the berm (plane storage area) was used to stage aircraft used during NACA Test Area operations (1947 to 1953).

The oval-shaped detonation area is approximately 1.5 acres and as mentioned, is surrounded by an earthen berm approximately 7.6 meters (25 ft.) wide at the top. Currently, the earthen berm surrounding the former OD1 is approximately 0.3 m to 0.4 m (1 ft. to 1.5 ft.) high. Areas of bare soil measuring 9 to 14 m^2 (100 to 150 ft^2) lie immediately outside of the berm within the former plane storage area on the southwest side. Fragments of 90mm projectiles, M500 Series time fuzes, booster cups, and other debris are visible on the bare soil outside the berm. The occurrence of these materials on the ground surface outside the thermal demolition area suggests that kickout and shrapnel were generated during thermal destruction of ammunition.

4.0 ANTICIPATED USE OF REAL PROPERTY

The U.S. Army Operations Support Command ultimately intends to transfer the RVAAP property to the Ohio National Guard (i.e. property is to be kept under DOD control). Portions of the Ravenna Army Ammunition Plant are already being utilized as general training areas for various military operations and storage of munitions from Crane Army Ammunition Activity (CAAA).

Areas within the NACA Test Area adjoining OD1 have been transferred and used since 1969 by the Ohio Army National Guard for dismounted troop training, bivouac, and vehicle parking. Certain restrictions shall apply during the training activities at the NACA and are presented in Section 13.0, "Protective Measures on Site".

The land in the area of OD1 is considered excess, and will potentially be used by the Army National Guard for future training and maneuvers.

5.0 EXPECTED AMOUNTS AND TYPES OF ORDNANCE, EXPLOSIVES AND CONTAMINATION

5.1 An attempt to gather information on the types and amounts of ordnance and explosives expected to be found on-site was made from a variety of sources including: Archive Search Reports, Science Applications International Corp (SAIC) DA 1 Phase I Remedial Investigation Report, the Operations Support Command (OSC), and discussions with installation personnel.

However, no definite records exist as to the exact quantities and types of munitions disposed of at this project site.

5.2 The Ravenna Site personnel were known to have performed open burn/ .

open detonation (OB/OD) procedures at DA 1 for 90mm high explosive projectiles. A portion of the former Demolition Area 1 (DA1) contains unexploded ordnance (UXO) and scrap from failed burning and detonation attempts. The residues of these burning and detonation attempts are the explosives and munitions containing Trinitrotoluene (TNT), hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), dinitrotoluene (DNT) and lead. See Appendix D for specifications concerning the 90mm high explosive projectile.

5.3 Lead contamination has been identified at hazardous levels in certain areas of DA1 during a Phase I Remedial Investigation carried out and reported on by SAIC. A cooperative remedial effort has been arranged between the OSC and MKM Engineers, Inc. to remove and dispose of the lead contaminated soils in conjunction with the OE/UXO removal operations.

Ordnance, explosives and debris noted in the preliminary geophysical and initial visual walk through inspection include the following:
90mm projectile fragments, M500 Series time fuzes, and expended flare base plates.
See Section 9.4 for information on the identification and handling of the Most Probable Munition (MPM).However, the actual amounts of ordnance and explosives cannot be determined.

Figure 3 in Appendix A is a photo-documentation of OE/UXO items observed during the initial inspection of the site. Figure 4 in Appendix A contains the Grid layout of the identified contaminants to be removed during this project. Removal operations are described in Section 11.0, "Techniques Used to Remove Ordnance, Explosives and Lead Contaminated Soils."

6.0 ANTICIPATED REMOVAL START DATE

The intrusive phase of the remediation project is scheduled to commence in October 2000, but is dependent upon agency review/approval of this document and the operational work plans.

7.0 CLEARANCE DEPTHS

The clearance depth will be four feet for the entire project area. Four feet was chosen because it is presently the DOD default standard for the intended reuse of this area.

The average frost line depth for the Ravenna Army Ammunition Depot is 48" below grade.

8.0 DETERMINING AREAS TO BE CLEARED

8.1 The ordnance removal is divided into two phases: Phase I - Survey/Surface Clearance, and Phase II- Removal/Intrusive Clearance.

8.2 Phase I: Survey/Surface Clearance

During this phase, a surface sweep will be conducted to locate ferrous anomalies using a Schonstedt GA–52CX commercial handheld magnetometer. The magnotometer is capable of detecting a 90mm projectile at a depth of 3 feet. The magnetometer will be utilized also at a depth of 2-3 feet to detect any potential remaining 90mm laying at and below that depth. A 50 ft. x 50 ft. grid layout will then developed to identify the areas of OE/UXO, explosives and lead contamination. Figure 4 in Appendix A indicates the grid layout (color-coded) with explosive, lead and OE/UXO contamination.

8.3 Phase II: Removal/Intrusive Clearance

UXO personnel capable of locating, identifying, documenting, storing, transporting, and disposing of OE will be present during excavation and earth moving activities. These activities are described in Section 11.0, "Techniques Used to Remove Ordnance, Explosives and Lead Contamination".

9.0 DETERMINING QUANTITY-DISTANCE (Q-D)

This section describes the Q-D for the potential explosive sites for this project.

9.1 UXO Potential Explosive Sites

The UXO potential explosive sites are contained in the general area designated as Open Demolition Area 1 and consist of certain grid areas identified in Figure 4, Appendix A. These areas are identified as follows:

- Nine (9) Grids Having OE/UXO Contamination + Explosive Contamination in Soil
- Four (4) Grids Having OE/UXO Contamination + Lead Contamination in Soil
- Two (2) Grids Having OE/UXO Contamination + Explosive and Lead Contamination in Soil
- Five (5) Grids Having High Surface OE/UXO Contamination (No Environmental Concerns).

The quantity distance (Q-D) for the clearance work being performed within the grids of OD1 will be established at 1,250 feet. Refer to Figures 1 and 5 in Appendix A for Q-D arcs for UXO project personnel.

9.2 Inhabited Building Distance (IBD)

There are no inhabited buildings within 3,000 feet of the OD1 project area. However, MKM Engineers, Inc. has chosen an IBD of 2,500 feet as shown in Figures 1 and 5 in Appendix A for the project area to non-project personnel. This IBD exceeds the 1,250-foot default IBD applicable for the types of munitions expected to be encountered during this project (i.e. primers, fuzes, 3" and 90 mm projectile fragments).

Exception: Preliminary site work such as surveying, grid layout or detection of anomalies using schonstedt does not require an exclusion zone for Q-D purposes.

9.3 Magazines

The igloo/magazines in the Wet Storage Area shall be utilized to store both, detonation charges – Ammunition Supply Point (ASP) and the recovered UXOs. Refer to Figure 1 in Appendix A.

All explosives and demolition materials will be stored in earthen igloo magazines. The magazines were previously approved for use during other phases of this project. In addition, the detonation charges will be kept in a double locked portable magazine within one of the igloos. The lightning arrestor and grounding systems for these magazines will require inspection and repairs if necessary. The SUXOS will be responsible for the safe handling of all explosives.

Magazine construction is in accordance with BATF P 5400.7. Each door is to be equipped with two of the following locks:

- S&G 833C, Padlock, Key Operated, High Security, Shrouded Shackle
- S&G 831B, Padlock, Key Operated, High Security, Shrouded Shackle
- HI SHEAR LK12OO, High Security Padlock.

The following safe separation distances apply to the site magazines with a maximum of 150 pounds net explosive weight of Class 1.1 explosives per magazine. Based on DOD 6055.9 STD Ammunition and Explosives Safety Standards, October 1992, the distance to inhabited buildings is 500 feet and

Standards, October 1992, the distance to inhabited buildings is 500 feet and the distance to the nearest public road is 300 feet. Refer to Tables 1 and 2. The safe separation of the Explosive Storage (ES) Areas are as follows:

- ES to Site Trailers = Approximately 1,300 feet.
- ES to Public Road = Approximately 2,000 feet.
- ES to nearest Inhabited Building = (There are no inhabited buildings visible from the site).

TABLE – 1: Demolition Explosives

Description	Class/Division	Quantity	Net Explosive Weight	Storage Compatibility Group
Blasting Caps	1.1	50 ea.	Less than 1-0 lb	B
Jet Perforators (Shape Charge)	1.4	40 ea.	6.0 lbs.	D
Detonating Cord (80 gr. Per foot)	1.1	1000 ft	7.0 lbs.	D

TABLE – 2: Inhabited Building and Public Traffic Route Distances

Net Explosive Weight		Distance in Feet to Inhabited Building from Class II Magazine		Distance in Feet to Public Traffic Route from Class II Magazine	
Over	Not Over	Front	Rear/Side	Front/Side	Rear/Side
100lbs	150lbs	500	250	300	150

Note: There are no inhabited buildings within 4,000+ feet of the igloos/magazines to be utilized for this project.

9.4 Project Detonation Area, Identification of and Handling of Most Probable Munition (MPM)

All required disposal detonations will be performed weekly at the Open Demolition Area 2, as illustrated in Figure 1 in Appendix A. The quantity distance around the planned detonation area is 2,500 feet. The exclusion zone is based on the default distances in DOD 6055.9 – STD.

- The default distances in DOD 6055.9-STD are 2,500 feet for munitions up to 5 inch caliber or K328, whichever is larger or 4,000 feet for munitions 5 inch or larger or K328, whichever is larger.

- For this site, the 90mm projectile or similar is the most probable munition (MPM) to be located. See Appendix D for specifications concerning the 90mm projectile. However, for the excavation and sifting operations, M500 series time fuzes, and expended flare base plates will be the most probable munitions. Since the UXO technicians will be surveying each grid (twice) to a depth of 4 feet using a magnetometer, the possibility of occurrence of 90-mm projectiles during excavation will be eliminated. If an anomaly is encountered that has the magnetic characteristics of a 90-mm or similar, during the survey, the UXO technicians will stop the operations and evacuate all the non-essential personnel to a safe distance. The UXO technicians will then uncover the buried munition manually using standard procedures and following the Basic Safety Concepts and Considerations for Ordnance and Explosives (OE) Operations, OE Center for Expertise (CX) Interim Guidance Document 00-02. The entire munition will be inspected, if fuzed, it will be left in place and blown. If unfuzed or a partial round, the item will be transported to a magazine for temporary storage. If a larger munition is encountered requiring the 4,000 feet exclusion zone, an amendment to this Explosive Safety Submission (ESS) will be submitted.

10.0 MILITARY EXPLOSIVE ORDNANCE DISPOSAL AND CHEMICAL WARFARE MATERIAL (CWM) SUPPORT

The 52nd Explosive Ordnance Detachment (EOD), Fort Gillem, GA (404) 362-3339 will provide support when requested. The nearest EOD unit is the 731st Ordnance Company, located at Wright Patterson, AFB, Dayton, Ohio (937) 257-4536. They will be notified in the event that an item of ordnance or explosives that cannot be detonated on site or suspected Chemical Warfare Material is encountered. The Ravenna Army Ammunition Depot is not a known buried-Chemical Warfare Material (CWM) site.

11.0 TECHNIQUES USED TO REMOVE ORDNANCE, EXPLOSIVES AND LEAD CONTAMINATED SOILS

MKM will provide the necessary personnel and equipment to locate, access, identify/document and dispose of all OE and lead contaminated soils to a depth of

four feet. See Table 1 in Appendix B for flow charts representing the steps involved in the entire project process from discovery to disposal.

11.1 During the subsurface intrusive operations, MKM Engineers, Inc. proposes using a reinforced, armored track excavator, to remove all soil down to a four foot depth within each grid in the project area. The soil will be processed through utilization of a mobile sifter operation. Items larger than 1" will be separated from the processed soil. Clean processed soil or offsite backfill will be replaced in excavation after the pit is cleared by the SUXOS.

Excavation activities will not be conducted until all personnel have cleared the grid layout section and are located outside of the safe zone: 1,250 feet for non-essential personnel and 200 feet for UXO project personnel.

11.2 The grids will be excavated in three lifts (0 to 1 ft., 1 ft to 3 ft. and 3 ft. to 4 ft.) using an armored human-operated track excavator. The excavator is armored with a front shield consisting of a 1½" lexan window and ¾" plywood sheet with 1 row of sandbags overhead for additional operator protection. The hardening of the excavator cabin allows a greater feeling of comfort and protection for the equipment operator. The choice of the specified lexan and plywood was based on previous experience. For instance, the Blast Testing conducted by British MOD with 10 Kg bar mines (similar to a 90-mm projectile in explosive content) in association with Heartlands Group North America (Phone: 918-225-4322), a 10 mm (0.4 inch) armor was used to protect the excavator operator. Though the most probable munition during the excavation and sifting operations at the OD-1 site is not a 90-mm projectile or similar, a 150-200 percent safety factor was added and the 1½" lexan window and ¾" plywood sheet with 1 row of sandbags overhead are being used. This will certainly protect the excavator operator from any fragments, M500 series time fuzes or similar small items, which may be encountered during excavation.

In the event a potential OE hazard is detected, the UXO supervisor will stop the operations, identify and log type, quantity and location of the item(s). If warranted and authorized by the UXO supervisor, UXO personnel will enter the site in specially designed Bomb Suits. All non-essential personnel will be evacuated to the safe area while a UXO technician enters the excavated pit to perform visual inspection of the uncovered items. The Schonstedt Model GA-52CX Magnetometer will be utilized at a 2-3 foot depth. The magnotometer is capable of detecting a 90mm projectile at a depth of three (3) feet which is more than adequate to locate the most probable munitions (MPM) found at this site. Smaller items that are known to exist at this site (90mm primers)

that may not be detected by the magnetometer will be removed by the sifting operations.

11.3 The excavated soil will be dumped slowly in an area behind the dig site from a height that would allow the cascading soil. After a complete pass is made in the grid, UXO personnel will visually inspect the completed grid and stockpiled soil for hazards. Any potential hazardous UXO threats from large items would have been removed during the intrusive monitoring process/EOD checks up to this point. The possibility of smaller items may still exist with net explosive weight (NEW) being negligible at this point. All OE considered safe to move, will be removed and placed in storage in the igloo located at the Wet Storage Area. OE considered hazardous or unsafe to transport, or those that cannot be specifically identified will be blown/disposed of in place. All accumulated UXO/OE will be detonated as required. See Figure 2, Appendix A for the map containing positions of sifting operations.

11.4 The excavated soil will be moved, using a loader, from near the grids to the centralized area where the mobile sifter and conveyor are staged. See Figure 2, Appendix A. The human-operated excavator or loader will be used to load the excavated soil into the hopper of the sifter. The sifter will be operated manually and will have two remote kill switches (one with the excavator/front-end loader operator and the other with the UXO QA/Safety) that will shut the sifter when required. During sifting, soil would travel through the hopper to the screening plant and thereafter down a conveyor belt. During sifting, all items larger than 1" will be directed to one pile for inspection by UXO personnel and the sifted soil will travel down another conveyor to a clean stockpile. UXO Technicians will inspect the sifted soil for <1" anomalies as they travel down the conveyor belt. A temporary blast shield, made of 2" x 6" plywood frame with Vermiculite poured into the frame will be constructed between the screening plant and the conveyor belt to provide additional protection to the operating personnel/technicians along the conveyor. Such vermiculite-plywood blast shields are commonly used in protecting personnel from small blasts. Constant two-way radio communications will be maintained between UXO personnel during all excavation and sifting operations.

11.5 All recovered OE scrap will be moved to the decontamination staging area, steam cleaned, scrubbed and rinsed using a hot water 1,500-psi pressure washer. Upon completion of the pressure washing, the non-hazardous OE scrap will be processed through MKM's Transportable Flashing Furnace (TFF) to attain 5X levels in accordance with IOCP 385-1, "Classification and Remediation of Explosive Contamination".

11.6 Processed/sifted soils that have been determined to be of environmental concern per SAIC/USACE Phase-I RI Report will be stockpiled separately and treated as per the Action Memo attached as Appendix C. After the grids have been cleared by the UXO technicians at 4 ft. depth, they will be backfilled to grade using treated and/or approved clean soils from the excavation (grid) pits, or clean offsite backfill material.

11.7 An Anomaly Review Board will not be established for this ordnance and explosives removal action.

12.0 PLANNED METHODS FOR ON-SITE DISPOSAL

On-site disposal will be accomplished for all OE items at the Open Demolition Area 2. See Figure 2, Appendix A. No Federal, State or local permits are required, nor will be obtained for on-site disposal of OE. Demolition operations will be conducted in accordance with the MKM work plan. These methods, used in conjunction with standard EOD safety procedures, have been successfully used at both formerly used defense department sites (FUDDS) and active installations. See Section 17, "On Site Demolition Operations".

13.0 PROTECTIVE MEASURES ON SITE

13.1 As mentioned previously in this document, the Ohio Army National Guard utilizes the NACA Test Area adjoining the DA 1 for monthly training and maneuvers and must adhere to the following restrictions:

- Parking and vehicle traffic is limited to the former NACA Test Area concrete runway and established trails,
- Digging of soil is prohibited,
- Disposal of trash is prohibited other than in designated above-ground receptacles,
- Disposal of gray water is prohibited,
- Fires or the firing of live ammunition is prohibited,
- Firing of blank ammunition of 7.62mm and smaller is permitted within the training area between 10:00 a.m. and 10:00p.m. daily

A contractors meeting takes place weekly and is attended by all contractors presently performing work at RVAAP, installation representatives, the Ohio Army National Guard and Mr. Tim Morgan of RVAAP. The OD1 project operations will be discussed at this meeting to ensure that the Ohio Army National Guard is not present or performing any maneuvers at the site when excavation or sifting operations are in progress.

13.2 While performing work in areas with explosive or lead contaminated soils, MKM Engineers, Inc. will comply with all safety procedures, rules and regulations as put forth in the Site Specific Safety and Health Plan.

13.3 In areas with the potential for a member of the public or any base contractors to enter the designated safety zone, an individual will stand watch at all times to instruct UXO teams to stop work if a non-UXO person(s) enters the safety zone, until the person(s) has cleared the area.

Prior to priming of demolition charges at OD2, all avenues of ingress will be physically blocked by UXO personnel. Radio communications will be maintained between all concerned parties. Avenues of ingress will not be opened without the express permission of the Site SUXOS/SSHO. A constant state of vigilance will be maintained between all personnel to detect any intrusion into the detonation area.

13.4 MKM Engineers, Inc. will provide security necessary to perform the ordnance, ammunition, and explosives removal. Coordination with local law

enforcement and fire departments shall also be arranged prior to and during the contractor's work.

14.0 TURN-IN OF OE RELATED AND NON-OE RELATED SCRAP

UXO personnel will visually inspect the OE related scrap and stage into a holding area. Suspect items will be secured in the igloo/magazine in the Wet Storage Area. When necessary, items may be tested for residue/explosives using the EXPRAY detection kit. Items with significant contamination may be explosively treated during on-site detonations of recovered OE/UXOs at the Open Demolition Area 2. All OE scrap will be decontaminated using steam/high pressure wash and thermally treated as required. MKM UXO personnel will perform final inspection/certification.

15.0 UNUSED

16.0 PUBLIC PLANNING DOCUMENTS

16.1 MKM will perform community relation requirements when requested by the Operations Support Command or the RVAAP Commanders Representative. All press releases and media appearances will be coordinated with and approved by the Operations Support Command.

16.2 A Media Day is not currently scheduled at this time.

17.0 ON-SITE DEMOLITION OPERATIONS

All OE/UXO will be disposed of/detonated on-site at the Open Demolition Area 2 – Refer to Figure 2 in Appendix A. On-site demolition safety and operations will be conducted in accordance with the standard practices and procedures outlined in TM 60A1-1-31 and the appropriate specific 60 Series EOD Publications. Electric demolition procedures will be employed as the method of choice for all detonations.

Demolition operations, if required, will take place on a weekly basis. UXOs will be stored in existing earthen igloo/magazine prior to disposal - refer to Figure 1 in Appendix A. MKM will make arrangements to provide security for the site as required. The SUXO Supervisor and MKM Site Supervisor are responsible for determining whether or not minimum safe conditions to conduct demolitions operations are met.

When a UXO item is visually located in ground or is uncovered via excavation, and it is determined that it must be destroyed in place, UXO personnel will cover the item with tamping material. MKM will determine the amount of earth cover based on the information provided for the identified round.

Emphasis will be placed on noise mitigation. MKM does not anticipate a noise problem with the surrounding community using the procedures of the Explosive Safety Submission and the remote location of this site.

17.1 Separation Sequence

Detonations will occur, if required, at the designated demolition time but not later than 1730 hours. All detonations will be conducted in accordance with 60A1-1-31. Detonations will occur only after all unnecessary personnel have left the area and road guards have been posted. Quantity Distances (Q-D) as previously described in Section 9.0 will be strictly adhered to.

The composition of the Demolition Team will be determined by the UXO Supervisor (UXOS). The team will only be composed of qualified UXO personnel under the direct supervision of a UXOS who is the designated blaster. Additional Demolition Teams may be used at the discretion of the UXOS if there are large quantities of UXO to detonate. The remaining UXO and project-related personnel may act as Q-D perimeter security or as directed by the UXOS. During detonations, a designated project vehicle will remain outside of the Q-D in the area to provide emergency egress for the demolition team. Notification of detonations will be made in accordance with the MKM Standard Operating Procedures for Notification of UXO Detonations.

Only the Demolition Team, UXOS, QC, and the SSHO will be permitted in the area where charges are being assembled and demolition operations are being conducted. However, all of the above authorized personnel should not be in the demolition operations area at the same time.

All demolition materials will be accounted for by the UXOS and reported to the SUXOS. Only the amount required to complete the day's operations will be drawn from the Ammunition Supply Point (ASP) or bunkers (Wet Storage Area) and transported to the site.

The area where demolition operations are being conducted will remain secured until the "all clear" is given by the UXOS or SSO. This “all clear” signal is in the form of a siren or radio communications.

After each detonation, the detonation points will be inspected by the UXOS and SSO to ensure that a misfire, low order, or a kick out has not occurred. All charges will be initiated electrically. Detonating cord trunk and branch lines will be used to link multiple shots.

17.2 Misfire Procedures

In accordance with 29 CFR 1910-109 (e), (4), vi; EM 385-1-1 §29; and 60A1-1-31, if a misfire occurs, the following general procedures will be strictly adhered to:

> The UXOS will notify the MKM Project Manager and the SSHO. All other personnel will he notified of the event via radio and instructed to hold their positions until the "all clear" is given. The circumstances surrounding the misfire will be included in the Daily Construction Report.

17.3 Detonating Cord Misfires

A new blasting cap will be attached to the remaining detonating cord, with care taken to fasten it properly, and the original charge will be detonated.

Branch lines will be treated in the same manner as noted above.

If the detonating cord leading to the charge detonates but fails to function the charge, the following actions will be taken:

- Investigation will not occur if charges are buried. Caps and detonating cord may have detonated, but possible burning explosives will not be visible. The contractor shall allow a minimum of 30 minutes wait on all charges that failed to detonate.

- The charge will be reset and another attempt will be made to detonate it. Scattered charges that do not contain blasting caps may be collected and detonated together.

Notifications will take place as outlined in the MKM Standard Operating Procedures for Notification of UXO Operations.

17.4 Transportation of UXO/Demolition Materials On-Site

All movement of explosives and UXO will be escorted by either the UXOS or the SSHO. All loads will be visually inspected by the SSHO to ensure they are properly secured and safe to move. If in his opinion the material is improperly loaded, he shall cause whatever corrective action he deems necessary before allowing the load to move.

When transporting explosives or UXO, vehicles will not exceed the authorized speed limit. In many areas a prudent speed may be less than 25 mph, in which case the driver may not exceed a safe and reasonable speed.

Blasting caps and high explosives will remain separated at all times during transport. Suitable metal containers will be used for this purpose. The internal space of the container will be padded and the boxes will be separated by the largest distance possible in the bed of the truck. The containers will remain closed at all times, except when actually using the materials.

Vehicles hauling UXO will remain covered at all times, except when actually loading or unloading, and a flame resistant tarpaulin or a metal container with a flame resistant lid (such as a metal ammunition box) may be used for this purpose.

Vehicles transporting explosives and UXO will be placarded with a Department of Transportation "Explosives Class 1.1" placard. Class 1.1 consists of explosives that have a mass detonating hazard.

Detonation of UXO that cannot be moved will occur in the position where they are found. The location of UXO which must be detonated in place cannot be predicted, and they could occur at any point on the site. All UXO that is detonated in place will be well documented and the position indicated on the site map. All demolition shots, will be tamped with sand/earth to minimize fragmentation and noise emissions. Planned detonation operations of the recovered and stored UXO will be conducted at the Open Demolition Area 2.

Protection of personnel and property are critical elements of any removal operations performed at this site. Engineering controls will be employed during any intrusive activities and/or demolition operations to protect nearby structures and evacuation of personnel will be the primary method of protecting people. There is no history of underground utilities within the restricted zone. Site control will be maintained by UXO and safety personnel. Roadblock positions will be manned prior to all demolition operations.

17.5 Magazine Protection

Property (Wet Storage Area) upon which outdoor type magazines are located shall be posted with signs reading "EXPLOSIVES - KEEP OUT," legibly printed thereon in letters not less than three inches high on a reflective surface. Such signs shall be located so as to minimize the possibility of a bullet traveling in the direction of the magazine if anyone should shoot at the sign.

A hazard identification for fire fighting personnel (indicated by a distinctive symbol in order to be recognized by the fire fighters approaching the fire scene) will be the only sign displayed. For the purpose of identifying the symbol from long range, the symbol shape shall be as follows: Octagon shape with an orange background, 10" high by 2" thick black number "1", and with each side of the octagon 10" in length. Class 1 (explosive) Division 1.1 placards as prescribed by the U.S. Department of Transportation in Title 49 CFR Parts 171 - 180 and 390 - 397 will not be placed on the outside of the magazines.

17.6 Explosives Storage

Packages of explosives stored within the magazine shall be laid flat with top up. Corresponding grades or brands shall be stored together in such a manner that brands/grade marks show, easily counted and checked, and in a stable manner. Packages of explosives shall not be unpacked or repacked in a magazine nor within 50 feet of a magazine. Tools used for opening packages of explosives shall be constructed of non-sparking materials. Open packages of explosives shall be securely closed before being returned to the magazine.

Smoking, matches, open flames, spark-producing devices, and firearms shall not be permitted inside of or within 50 feet of magazines. The land surrounding the magazines shall be kept clear of all combustible materials for a distance of at least 25 feet. Combustible materials shall not be stored within 50 feet of magazines.

17.7 Explosives Records

The UXOS will record usage data of explosives and the quantities of UXO destroyed in place. The UXOS will record the location and type of UXO detonated in-place for inclusion in the final report. He will be responsible for the proper storage, issue, and maintenance of all explosives and explosives' records. All magazines will be grounded and have lightening protection provided as outlined in DOD 6055-9.

18.0 LIGHTNING PROTECTION

It is required by DOD 6055.9 to install lightening protection on buildings and structures used for processing, handling, or storage of explosives, ammunition, explosive ingredients, and other hazardous materials, particularly where operations cannot be shut down during electrical storms.

The details of construction and installation of lightning protection systems shall, in general, be in accordance with DOD 6055.9 and DOD 4145.26M and conform with the requirements of National Fire Protection Association (NFPA) Standard No.78.

There are four types of lightening protection systems acceptable for the protection of structures housing ammunition and explosives. They are overhead wires, masts, integral, and Faraday cage lightening protection systems. The Separately Mounted Shielding System (Mast Type) will be used.

The mast-type protection consists of a pole, which, if a non-conducting material, shall be provided with an approved air terminal securely mounted to the top, extending no less than two feet nor more than five feet above the top of the pole. If the pole is of non-conductive material, it shall be provided with an approved air terminal securely mounted to the top, and a down conductor shall be run down the side of the pole and be connected to ground electrodes. If a metal pole is used, the pole will act as both the down conductor and a ground. For such systems, air terminals need not be provided and if the resistance of the pole to ground is less than 10 ohms or less, additional grounding is unnecessary. When the resistance exceeds 10 ohms, additional grounding shall be provided and the ground connection shall be securely fastened to the metal pole and the ground.

When a ground rod is necessary, it shall be driven approximately six feet from the base of the pole. The grounding rod shall be at least ¾ inch solid steel or copper and ten feet long, driven into the ground, with the top of the grounding rod at least one foot below the surface. If the resistance to ground of this rod is more than 10 ohms, an additional ground rod shall be driven no closer than 10 feet from the first rod.

The zone of protection of an air terminal or mast of conducting material is taken as the space enclosed by a cone, which has its apex at the highest point of the rod or mast and a radius at the base which bears a relation to the height. For a mast not exceeding 50 feet in height, the zone defined by a radius of base equal to the height of the rod or mast has been found to be substantially immune to direct strokes of lightning.

For mast heights in excess of 50 feet, the zone of protection is based on the striking distance of the lightning stroke. The zone of protection is defined by a circular arc concave upward. The radius of the arc is the striking distance and the arc passes through the tip of the mast and is tangent of adjacent masts.

Two magazines may be protected by the same pole provided all parts of these magazines fall within the cone of protection. The mast must be set at a distance from the structure equal to one-third of the height of the building, but in no case shall be less than six feet. Where two magazines are to be protected by the same mast, it shall be placed at least one-third the height of the tallest magazine away from the tallest magazine and at least one-third the height of the shortest magazine from the shortest magazine but not less than six feet from either magazine.

18.1 Testing

Seven-Month Test: The lightning protection system shall be inspected visually every seven months for evidence of corrosion or broken wires or loose connections. All repairs will be made immediately.

Fourteen-Month Test: The lightning protection system shall be tested electrically every 14 months to afford testing of the system during all seasons. The test shall be conducted in accordance with the appropriate manufacturer's instructions, by personnel familiar with lightning protection systems.

Test Equipment: Only those instruments designed for earth-ground system testing are acceptable. The instrument must be able to measure 10 ohms, plus or minus 10 percent, for ground resistance testing and one ohm, plus or minus 10 percent, for bonding testing. The most recent test results will be kept on file.

19.0 HAZARDS ASSESSMENT AND MITIGATION

Precautions to be taken if hazardous, toxic, and radioactive waste or chemical warfare material are encountered, will be are in accordance with the established Site-Specific Safety and Health Plan.

The only known contamination in respect to the site might possibly be the explosive residue from demolition materials and explosive fillers from the UXOs. The potential for migration of any explosive residue contamination is not anticipated.

While performing work in areas with explosive or lead contaminated soils, MKM Engineers, Inc. will comply with all MKM safety procedures, rules and regulations as put forth in the Site Specific Health and Safety Plan.

20.0 OFF-SITE DISPOSAL PLAN

No off-Site Disposal or Transportation will be conducted.

MKM shall destroy all ordnance and explosive encountered in support of this contract by detonation at Open Demolition Area 2 and dispose all OE found at Ravenna Army Ammunition Plant, Ohio in accordance with MKM Standard Operating Procedures.

21.0 REFERENCES

1. DOD 6055.9-STD Ammunition and Explosives Safety Standard
2. AR 385-10, The Army Safety Program
3. AR 385-64, U.S. Army Explosives Safety Program
4. AR 405-90, Disposal of Real Estate
5. Archives Search Report, Ravenna Army Ammunition Plant
6. Phase I Remedial Investigation Report, SAIC, US Army Corp of Engineers
7. 29CFR 1910.1025 Subpart Z-Toxic and Hazardous Substances - Lead
8. TM5-855-1, Fundamentals of Protective Design for Conventional Weapons
9. IOCP 385-1, Classification and Remediation of Explosive Contamination

Figure 1: Location Map for Ravenna Army Ammunition Plant (RVAAP)

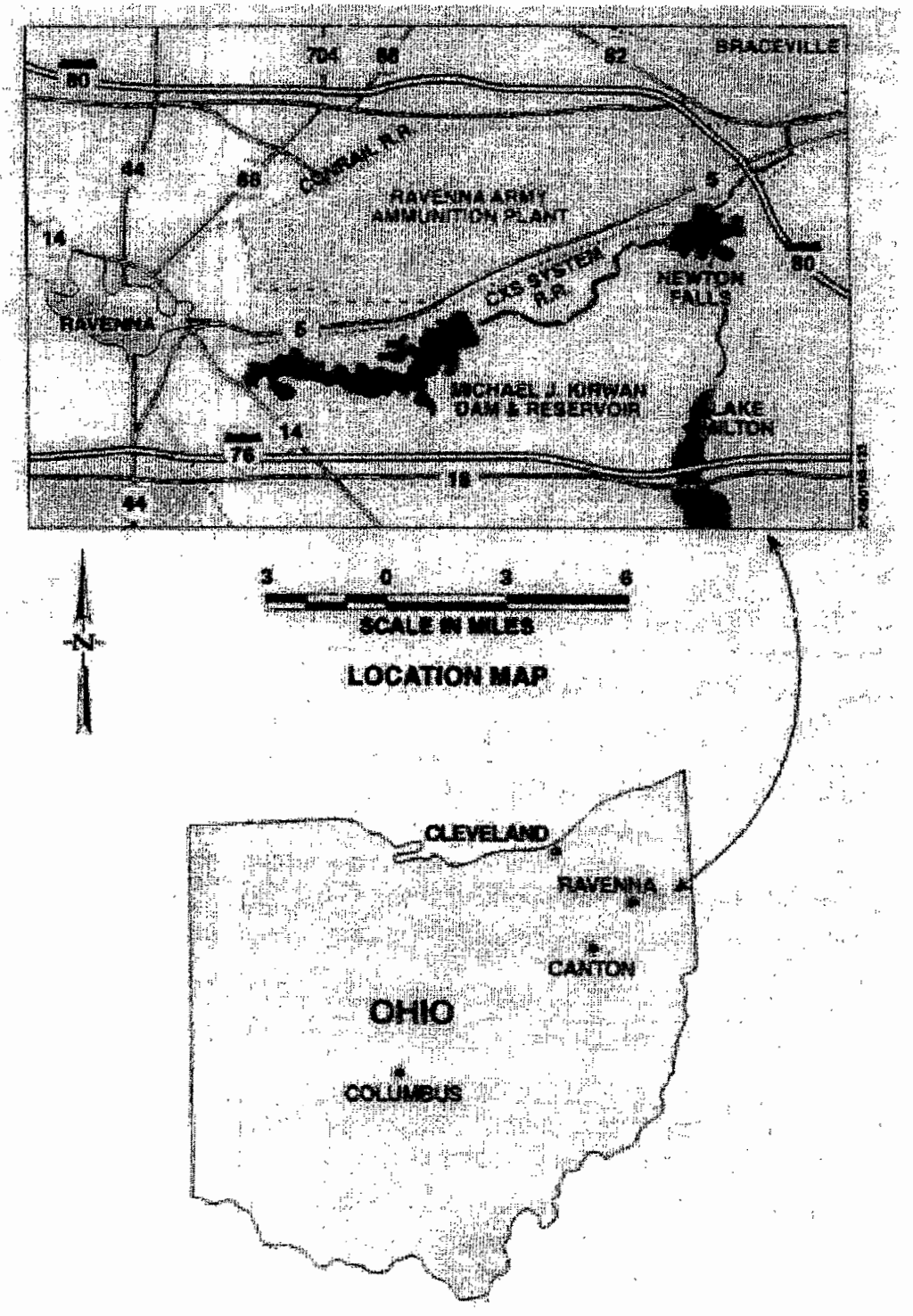


Figure 1 RVAAP Facility Map Showing Location of Open Demolition Area 1 (OD1)

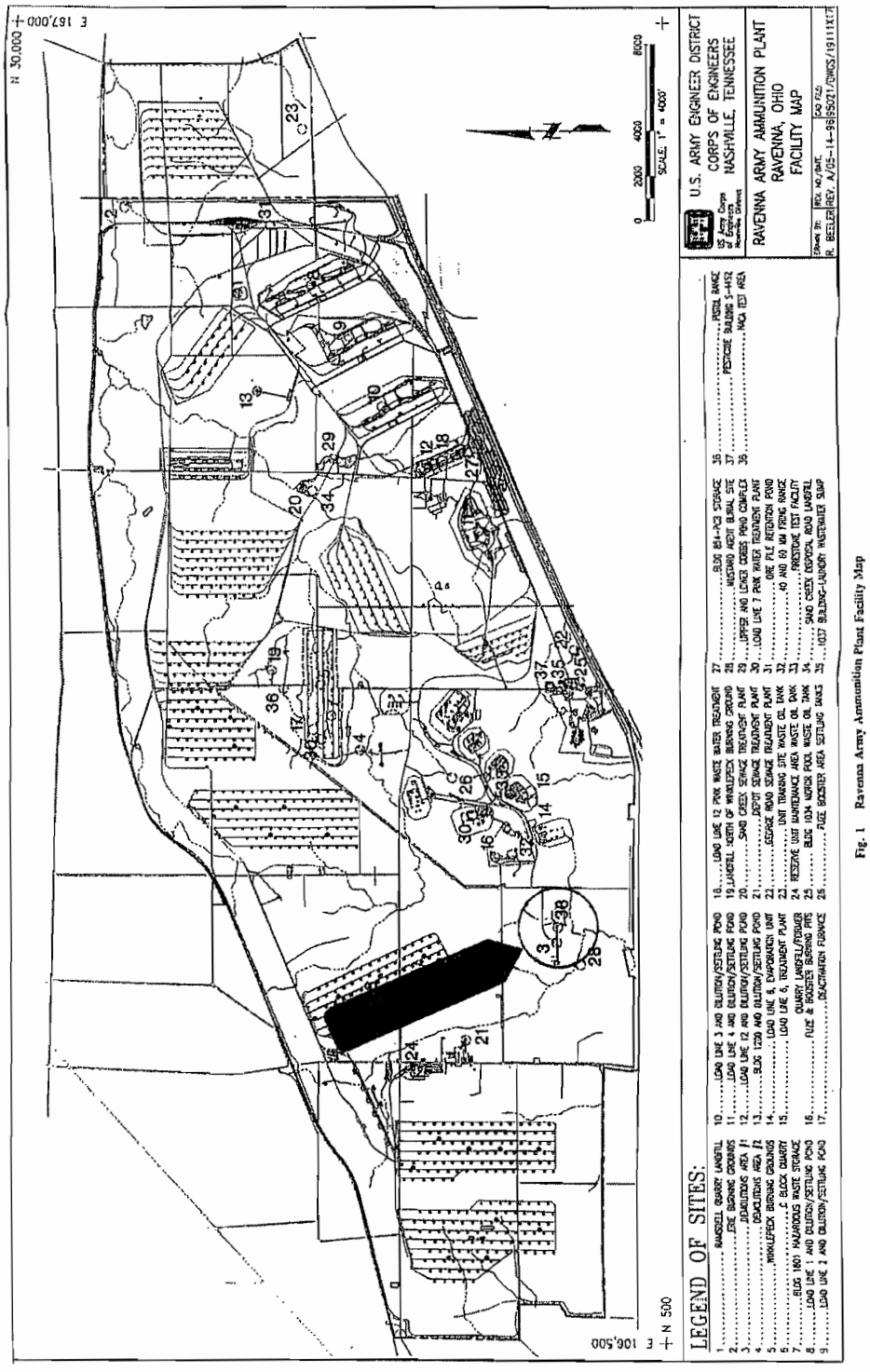
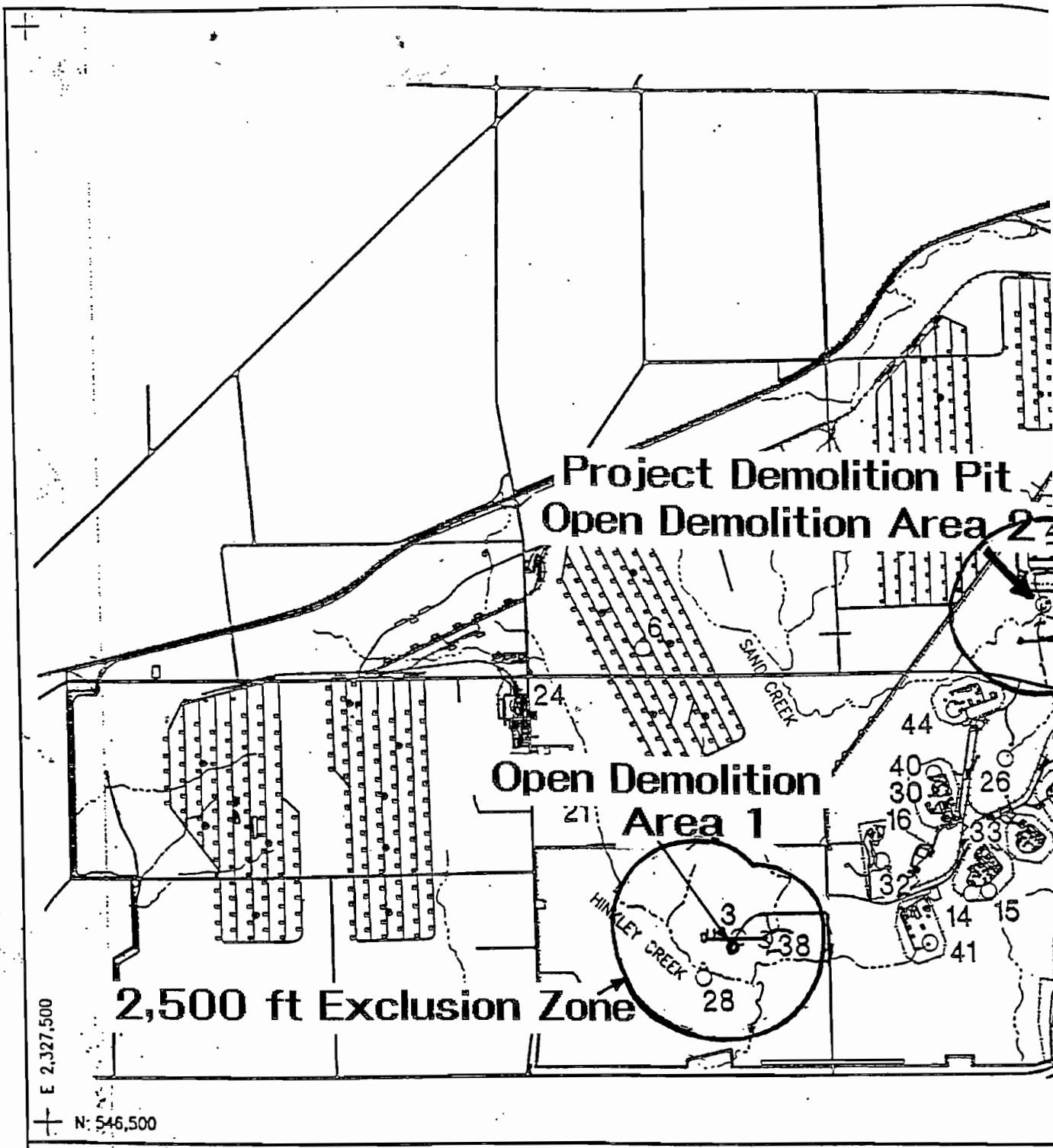


Fig. 1 Ravenna Army Ammunition Plant Facility Map

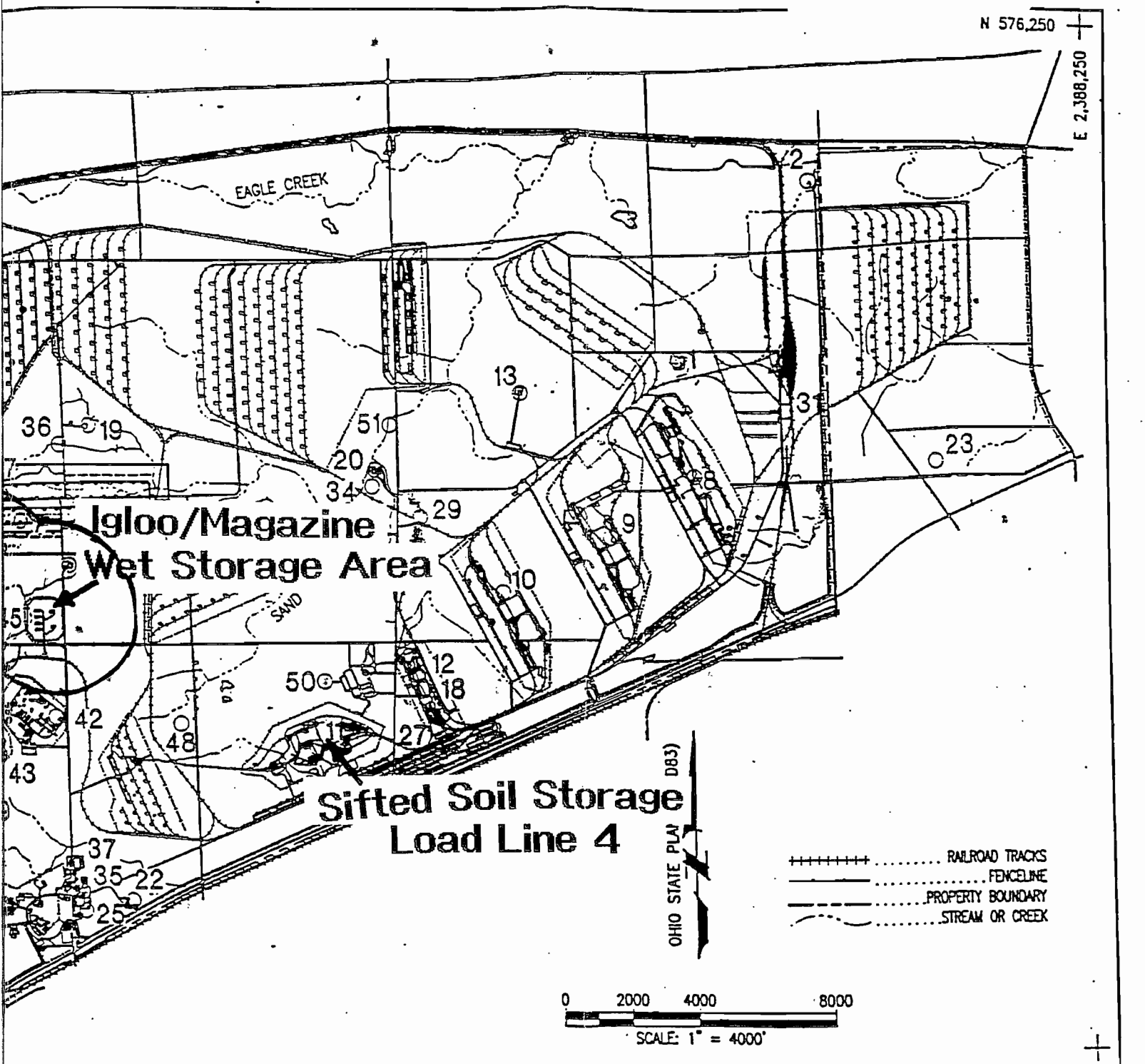


LEGEND OF SITES.

1	RAMSDELL QUARRY LANDFILL	13	BLDG 1200 AND DILUTION/SETTLING POND	25	BLDG 1034 MOTOR POOL WAST
2	ERIE BURNING GROUNDS	14	LOAD LINE 6, EVAPORATION UNIT	26	FUZE BOOSTER AREA SETT
3	DEMOLITIONS AREA #1	15	LOAD LINE 6, TREATMENT PLANT	27	BLDG 854-PC
4	DEMOLITIONS AREA #2	16	QUARRY LANDFILL/FORMER FUZE & BOOSTER BURNING PITS	28	MUSTARD AGENT
5	WINKLEPECK BURNING GROUNDS	17	DEACTIVATION FURNACE	29	UPPER AND LOWER COBBS PON
6	C BLOCK QUARRY	18	LOAD LINE 12 PINK WASTE WATER TREATMENT	30	LOAD LINE 7 PINK WASTEWATER TREAT
7	BLDG 1601 HAZARDOUS WASTE STORAGE	19	LANDFILL NORTH OF WINKLEPECK BURNING GROUND	31	ORE PILE RETE
8	LOAD LINE 1 AND DILUTION/SETTLING POND	20	SAND CREEK SEWAGE TREATMENT PLANT	32	40 AND 60 MM FI
9	LOAD LINE 2 AND DILUTION/SETTLING POND	21	DEPOT SEWAGE TREATMENT PLANT	33	FIRESTONE TI
10	LOAD LINE 3 AND DILUTION/SETTLING POND	22	GEORGE ROAD SEWAGE TREATMENT PLANT	34	SAND CREEK DISPOSAL RO
11	LOAD LINE 4 AND DILUTION/SETTLING POND	23	UNIT TRAINING SITE WASTE OIL TANK	35	1037 BUILDING-LAUNDRY WASTE
12	LOAD LINE 12 AND DILUTION/SETTLING POND	24	RESERVE UNIT MAINTENANCE AREA WASTE OIL TANK	36	PI

Figu

Figure 1:



IL TANK	37. PESTICIDE STORAGE BUILDING T-4452	49.	CENTRAL BURN PITS
TANKS	38. NACA TEST AREA	50.	ATLAS SCRAP YARD
TORAGE	39. LOAD LINE 5 / FUZE LINE 1	51.	DUMP ALONG PARIS-WINDHAM ROAD
IAL SITE	40. LOAD LINE 7 / BOOSTER LINE 1	○XX	CERCLA
OMPLEX	41. LOAD LINE 8 / BOOSTER LINE 2	○XX	RCRA
T PLANT	42. LOAD LINE 9 / DETONATOR LINE	○XX	OTHER REGULATORY
N POND	43. LOAD LINE 10 / PERCUSSION ELEMENT		
RANGE	44. LOAD LINE 11 / ARTILLERY PRIMER		
FACILITY	45. WET STORAGE AREA		
ANDFILL	46. BUILDING'S F-15 AND F-16		
R SUMP	47. BUILDING T-5301 DECONTAMINATION		
RANGE	48. ANCHOR TEST AREA		

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO
INSTALLATION MAP

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	REV. 1/ 07-13-99	/98026/DWGS/D23SITE

RVAAP Installation Map

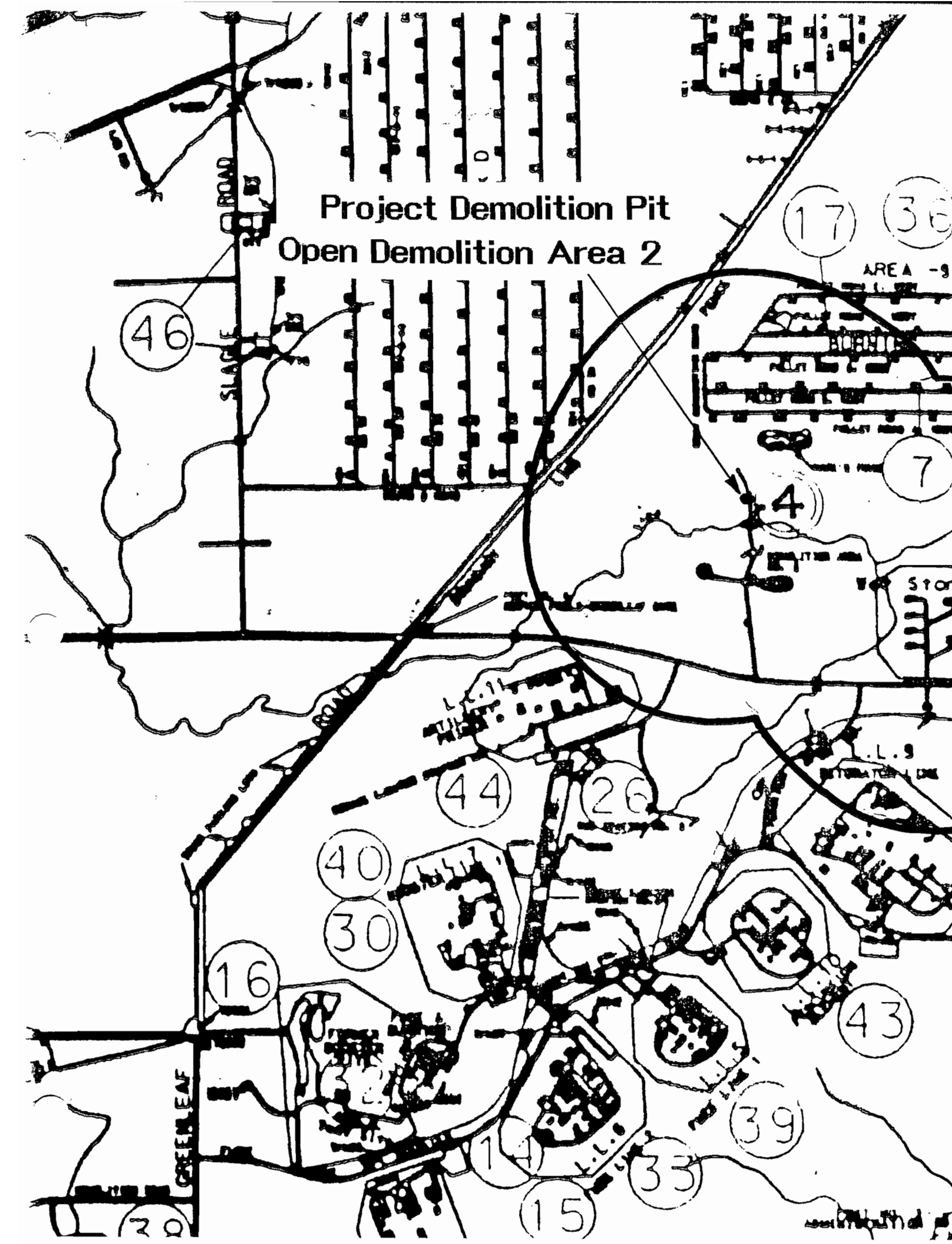

Project Demolition Pit
Open Demolition Area 2
17
36
AREA -9
46
7
4
44
26
40
30
16
43
39
14
33
15
SLAGLE ROAD
GREENLEAF

Figure 1A

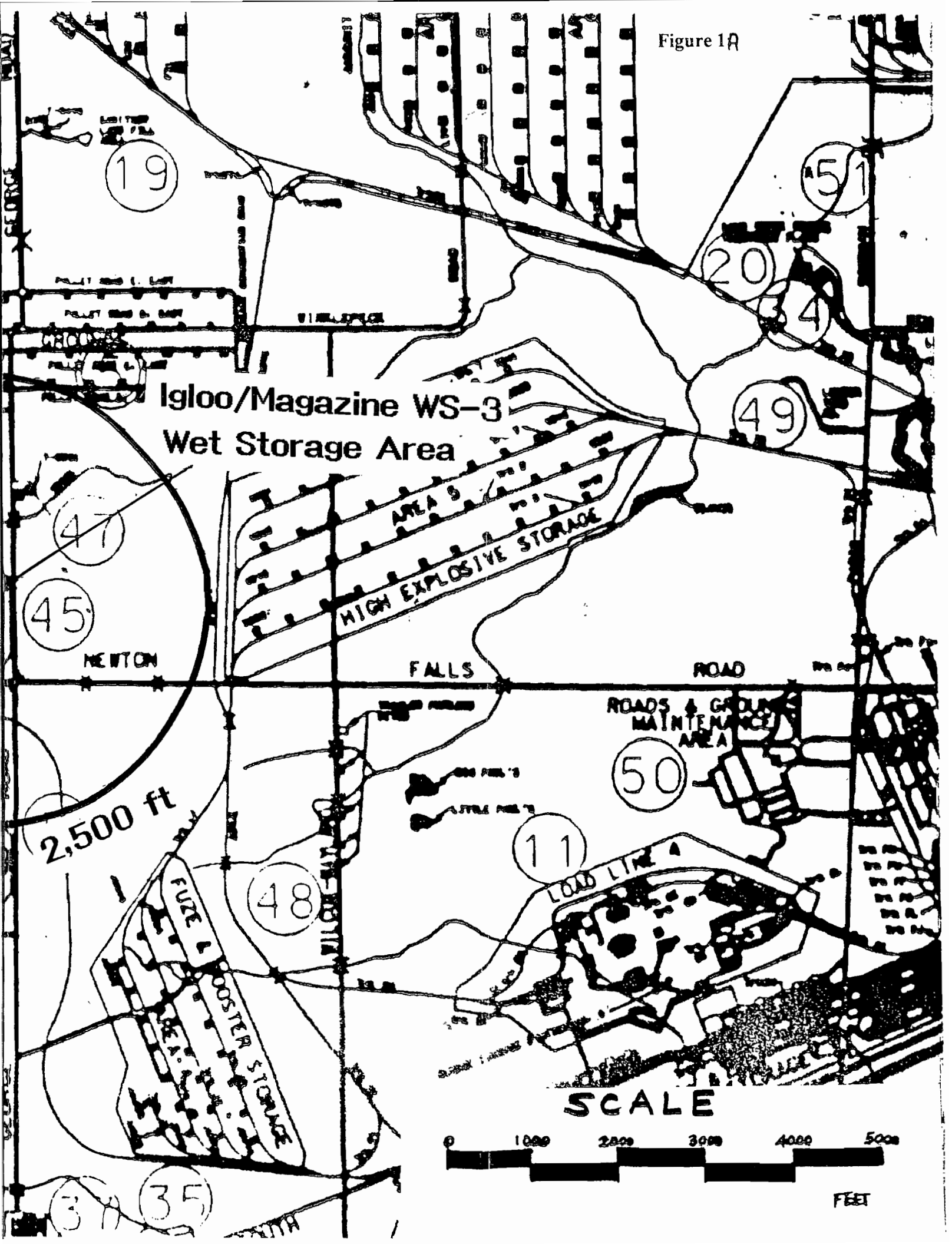
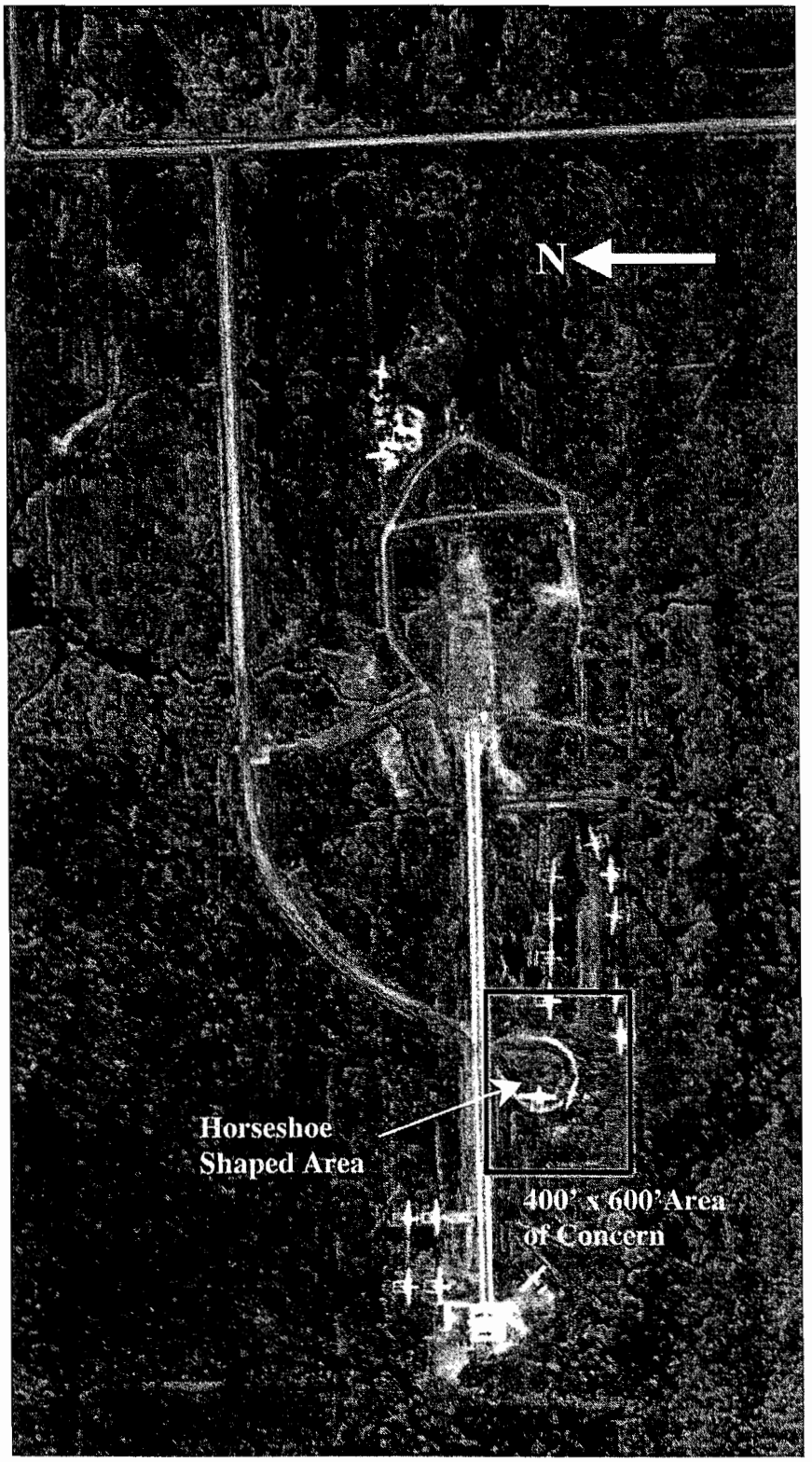

Igloo/Magazine WS-3
Wet Storage Area
2,500 ft
HIGH EXPLOSIVE STORAGE
AREA 3
FALLS
ROAD
NEWTON
ROADS & GROUNDS MAINTENANCE AREA
LOAD LINE A
FUZE & BOOSTER STORAGE AREA
19
20
49
47
45
50
11
48
35
SCALE
0
1000
2000
3000
4000
5000
FEET

Figure 3: Aerial Map of Open Demolition Area 1 showing 400' x 600' Area of Concern with Explosive, Lead and Ordnance Contamination



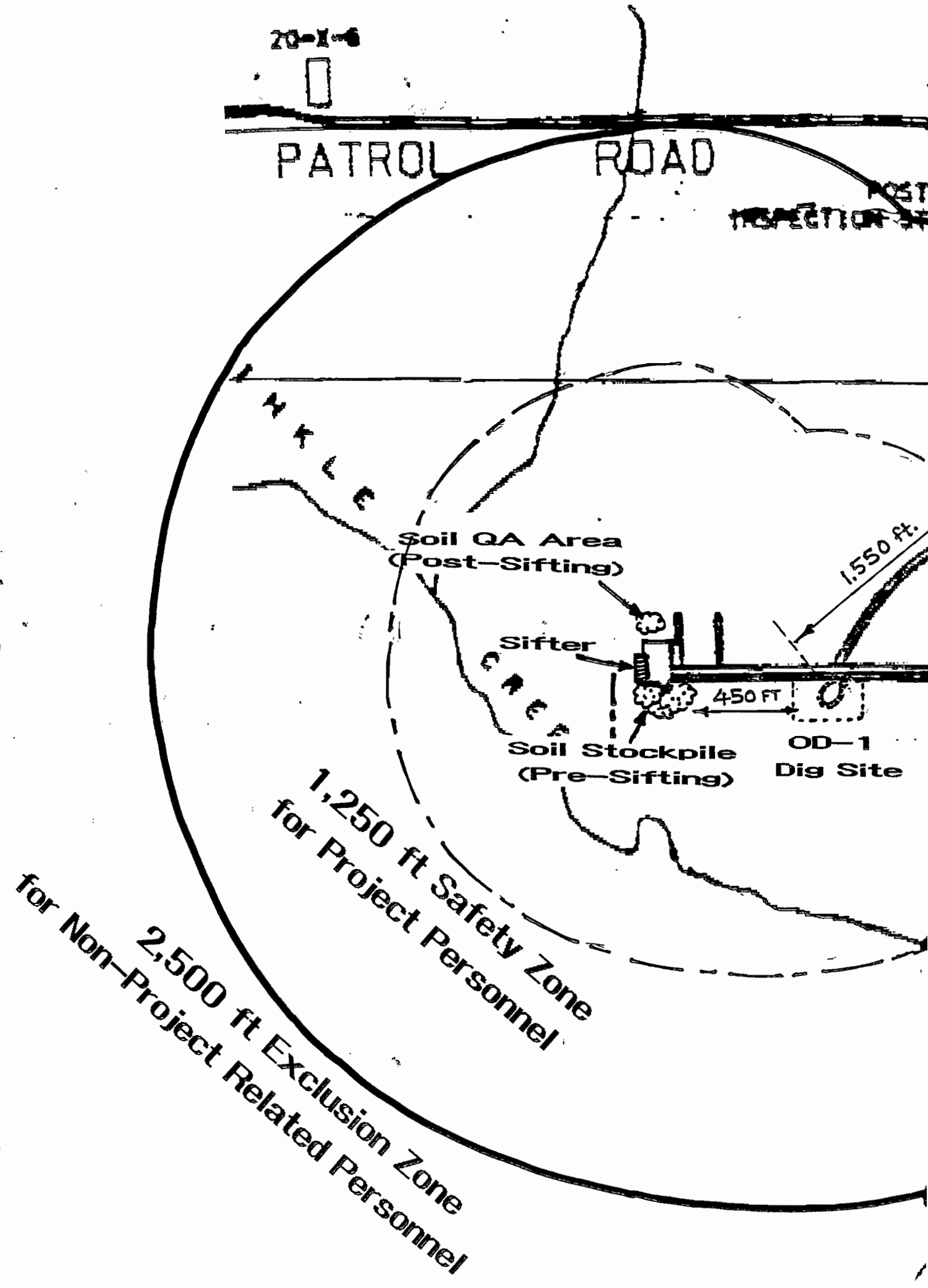

PATROL ROAD
Soil QA Area
(Post–Sifting)
1,550 ft.
Sifter
450 FT
Soil Stockpile
(Pre–Sifting)
OD–1
Dig Site
1,250 ft Safety Zone
for Project Personnel
2,500 ft Exclusion Zone
for Non–Project Related Personnel

Figure 2:

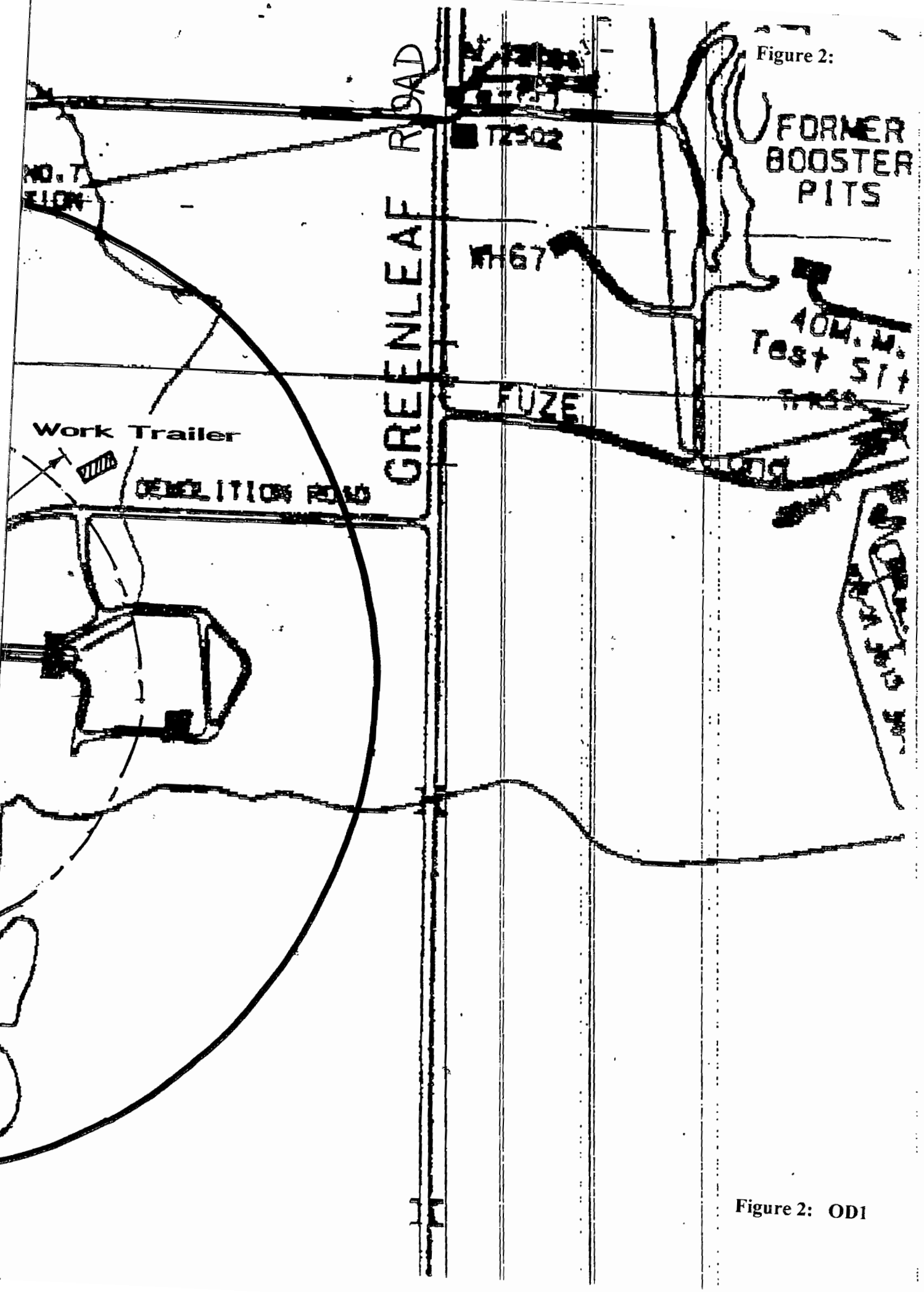
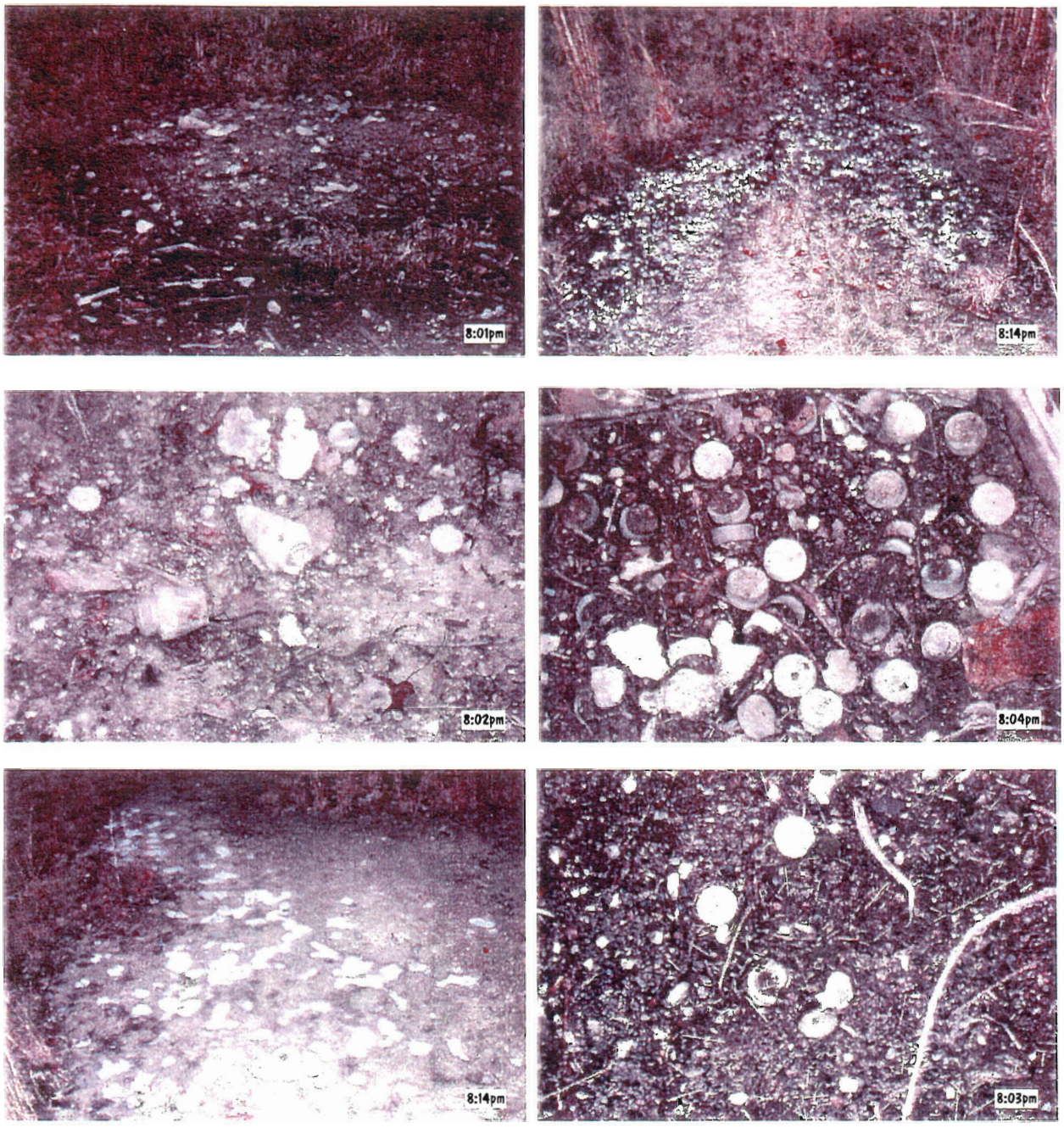


Figure 2: OD1

Figure 3: **Photo-Documention**



OE/UXO SURFACE CONTAMINATION AT OPEN DEMOLITION AREA 1

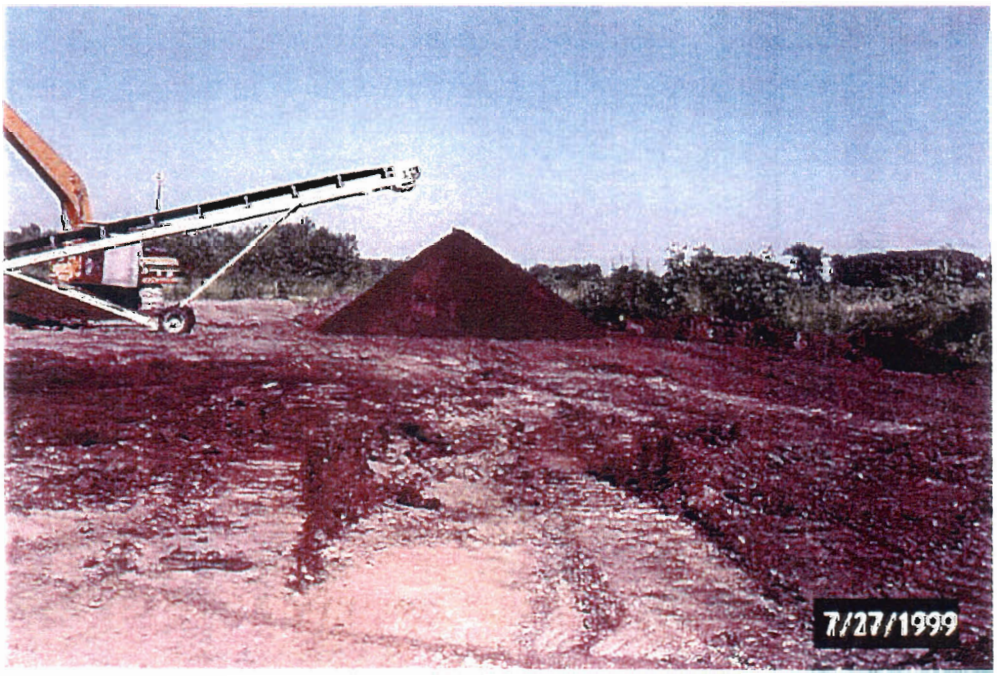
Figure 3: **Photo-Documention**

SURFACE SWEEP OF AREA OF CONCERN (AOC) USING SCHONSTEDT

TYPICAL HARDENED CABIN OF HUMAN-OPERATED EXCAVATOR

Figure 3: **Photo-Documention**

EXCAVATED SOIL BEING LOADED BY THE EXCAVTOR INTO THE SIFTER



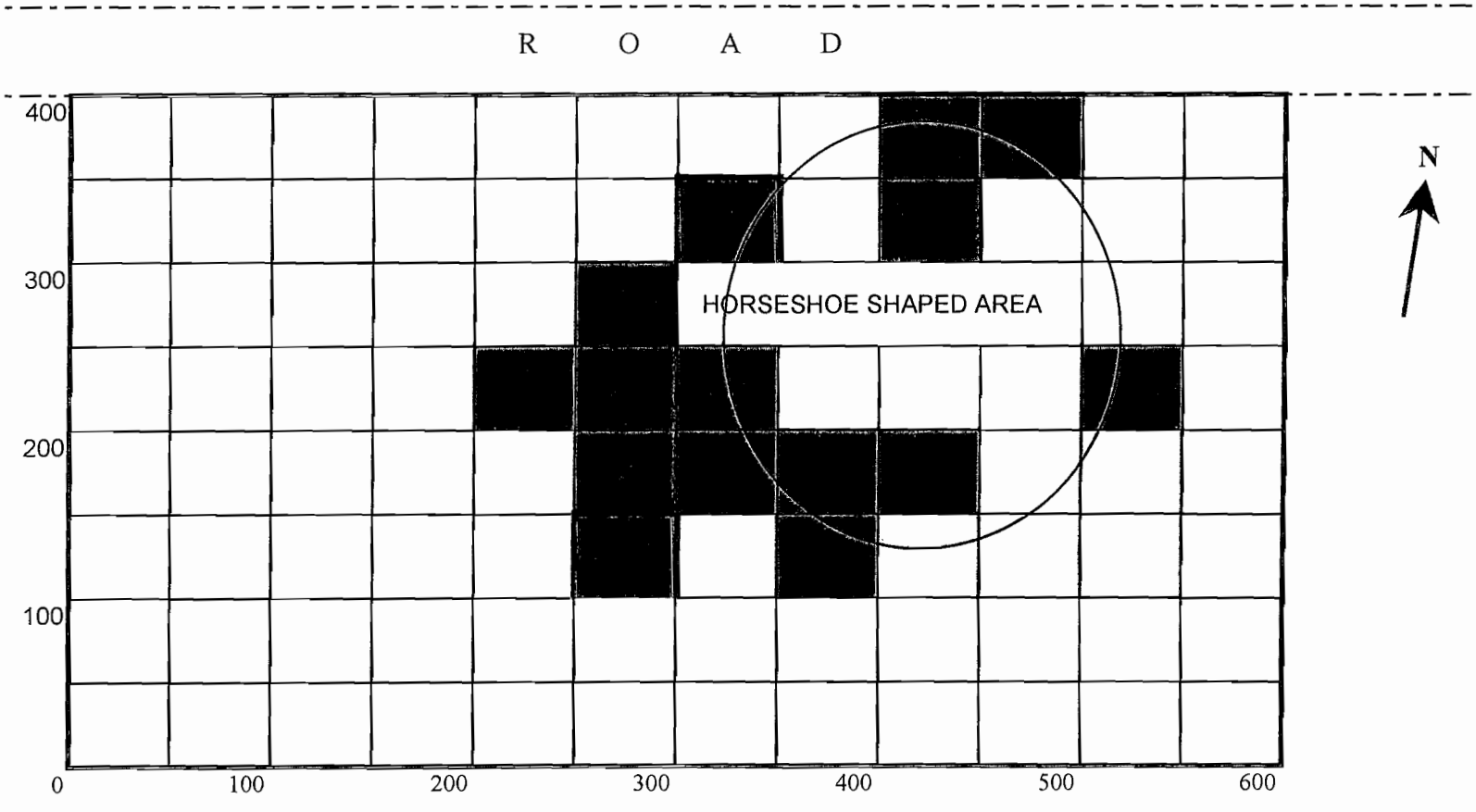
STOCKPILE OF SIFTED SOIL AWAITING
EXPLOSIVES AND METALS FIELD SCREENING RESULTS

Figure 3: **Photo-Documention**

ON-SITE IGLOO WS-3 LOCATED AT THE WET STORAGE AREA – FOR STORAGE OF RECOVERD ORDNANCE

FINAL CLEARANCE OF GRIDS BY UXO PERSONNEL BEFORE BACKFILLING

Figure 4: Grid Layout of the 6-Acre Area of Concern showing the Priority Grids with Explosives, Lead and Surface OE/UXO Contamination



Total Area of High Ordnance Contamination at OD1 = 400 ft. W x 600 ft. L

Grid Size = 50 ft. x 50 ft. (Approximately 400 cubic yards per grid)

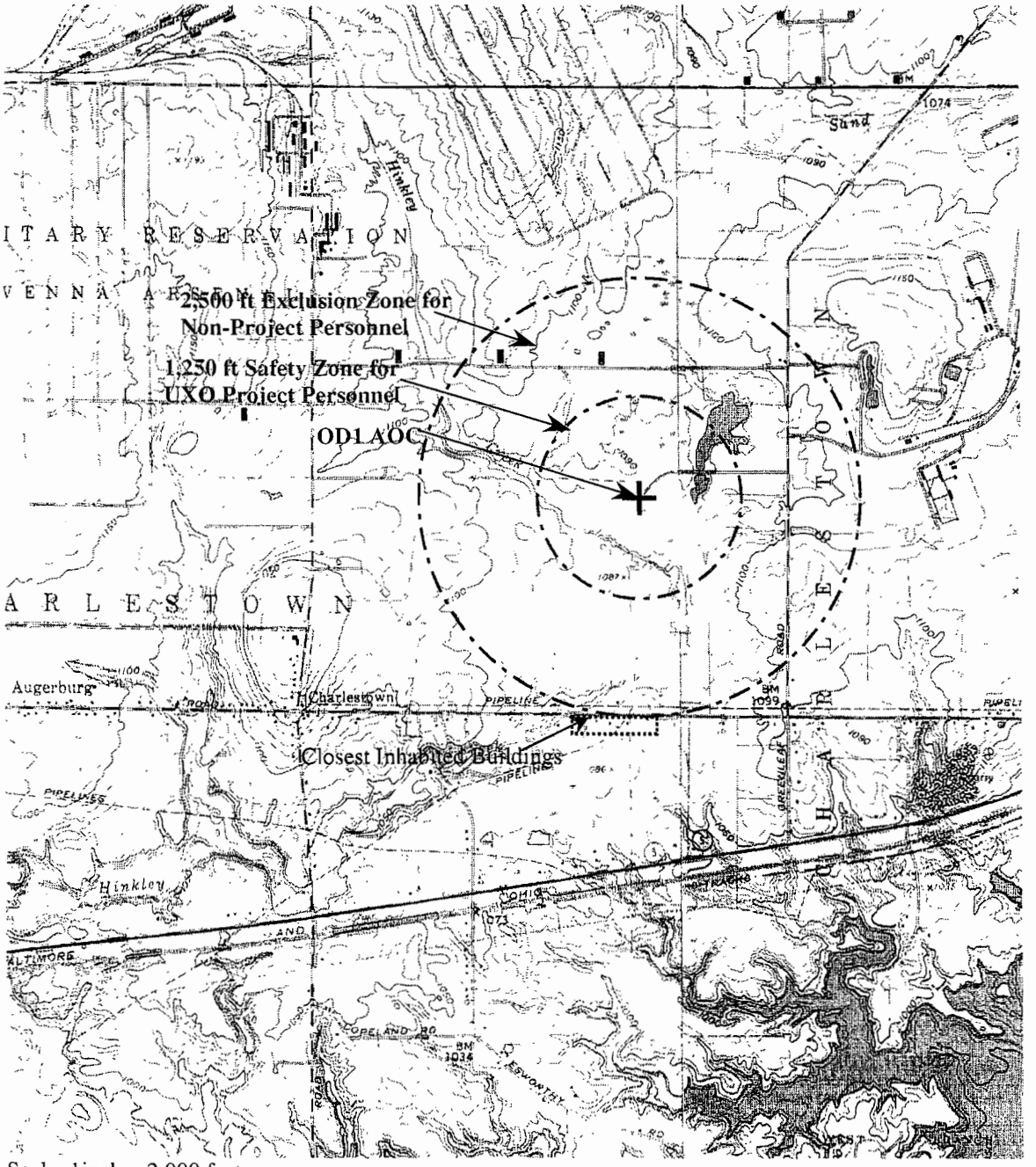
Grids Having Explosive Contamination

Grids Having Lead Contamination

Grids Having Explosive and Lead Contamination

Grids Having Highest Surface OE/UXO Contamination that will be Excavated under Current Scope of Work. These grids will be verified during the initial walk-through and field changes may be made as necessary.

Figure 5: USGS Topography Map showing the Quantity- Distance (Q-D) Arcs for UXO/Project-Related and Non-Project Related Personnel



Scale: 1inch = 2,000 feet

Figure 5 : Overview of Level 1 Restricted Area

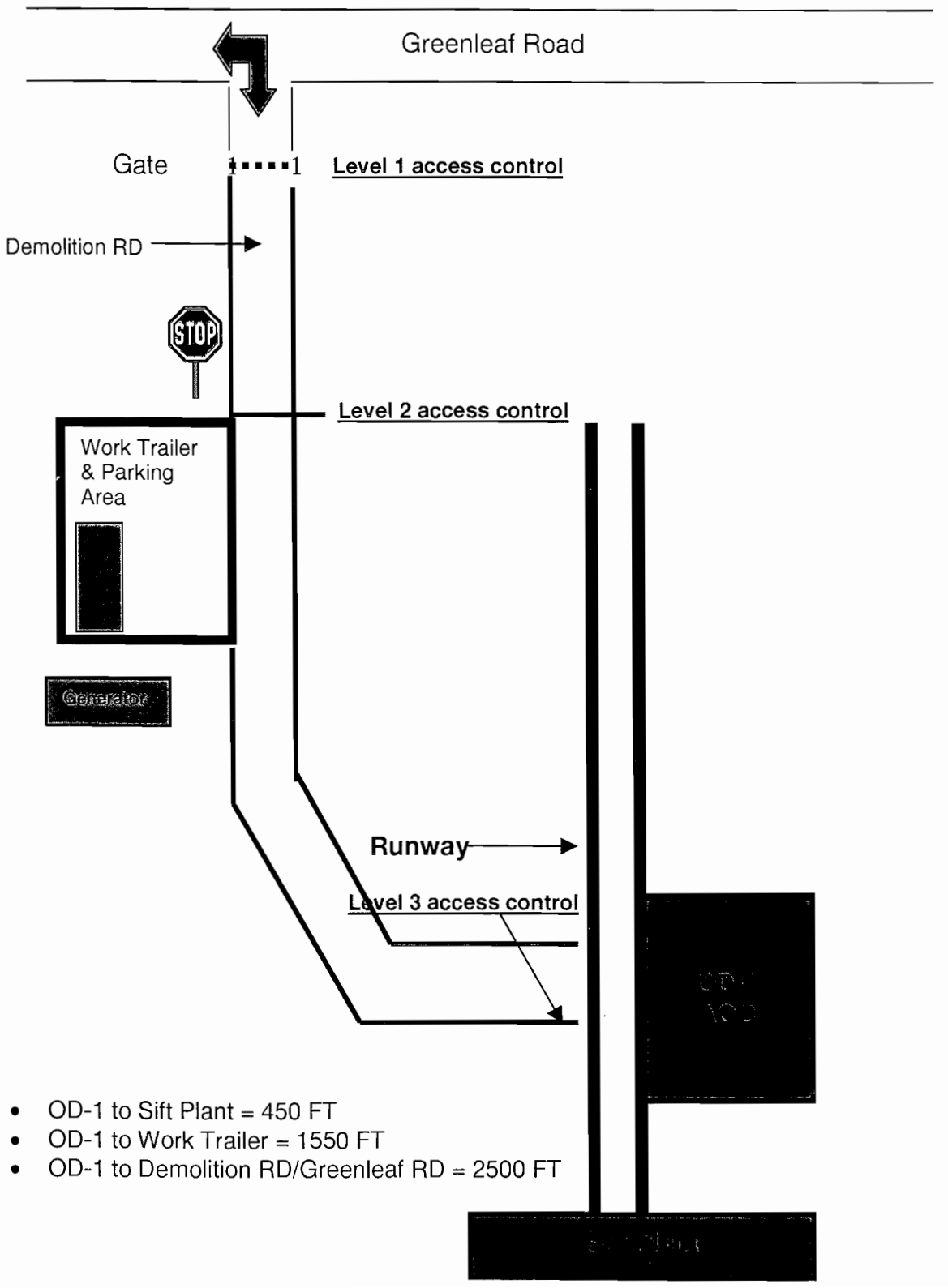


Figure 5 Contd.: Overview of Level 2 Restricted Area

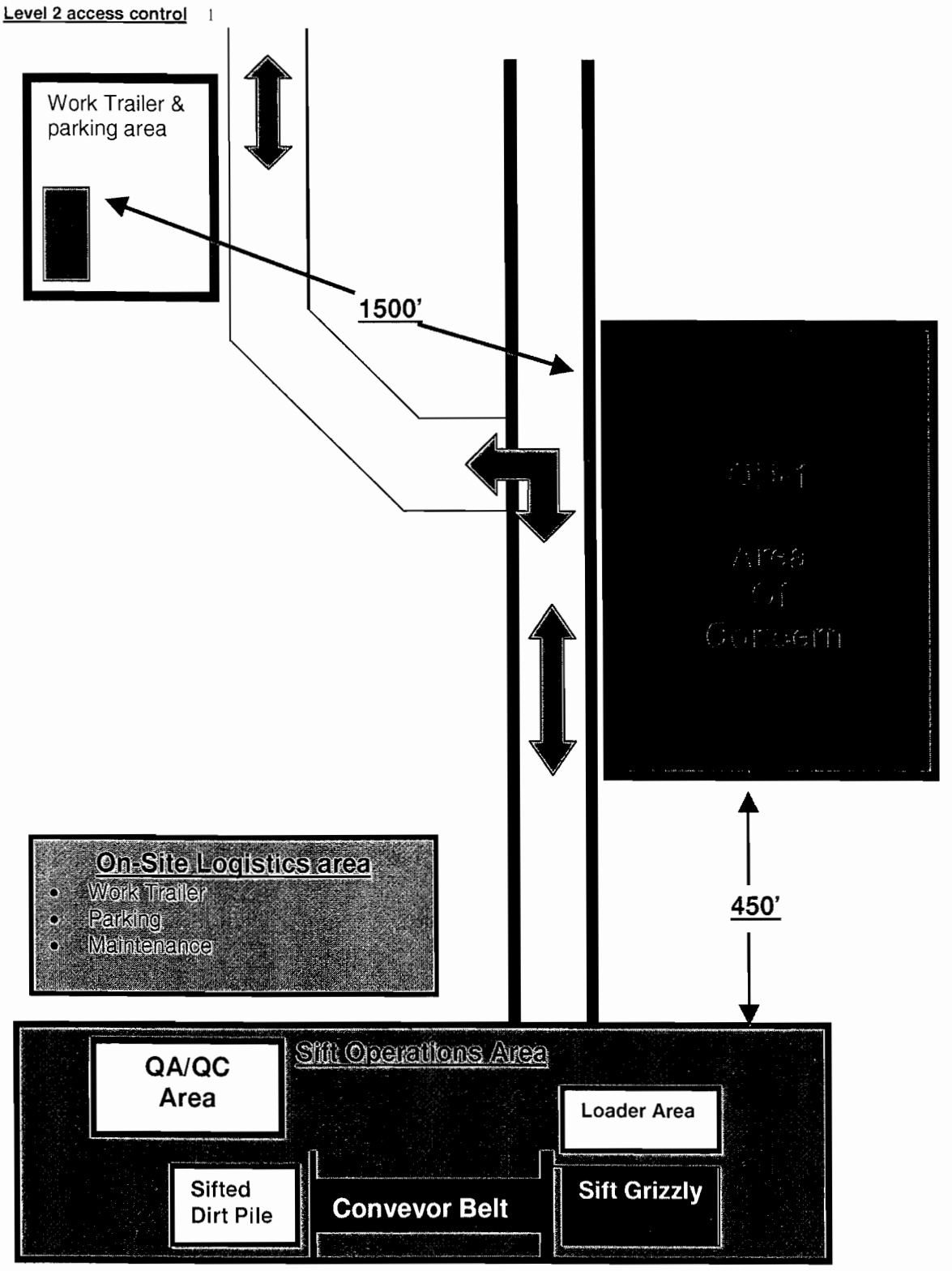
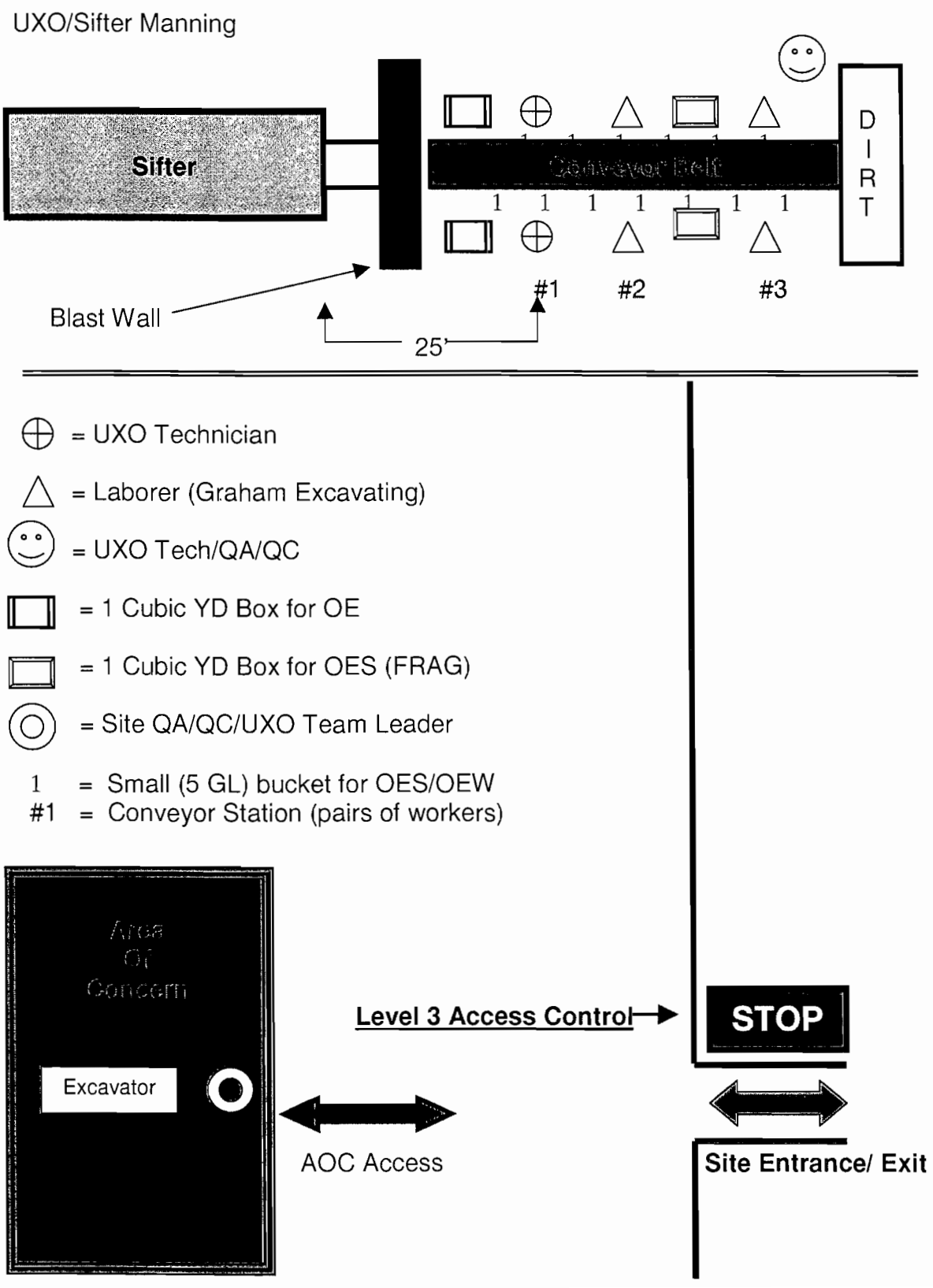
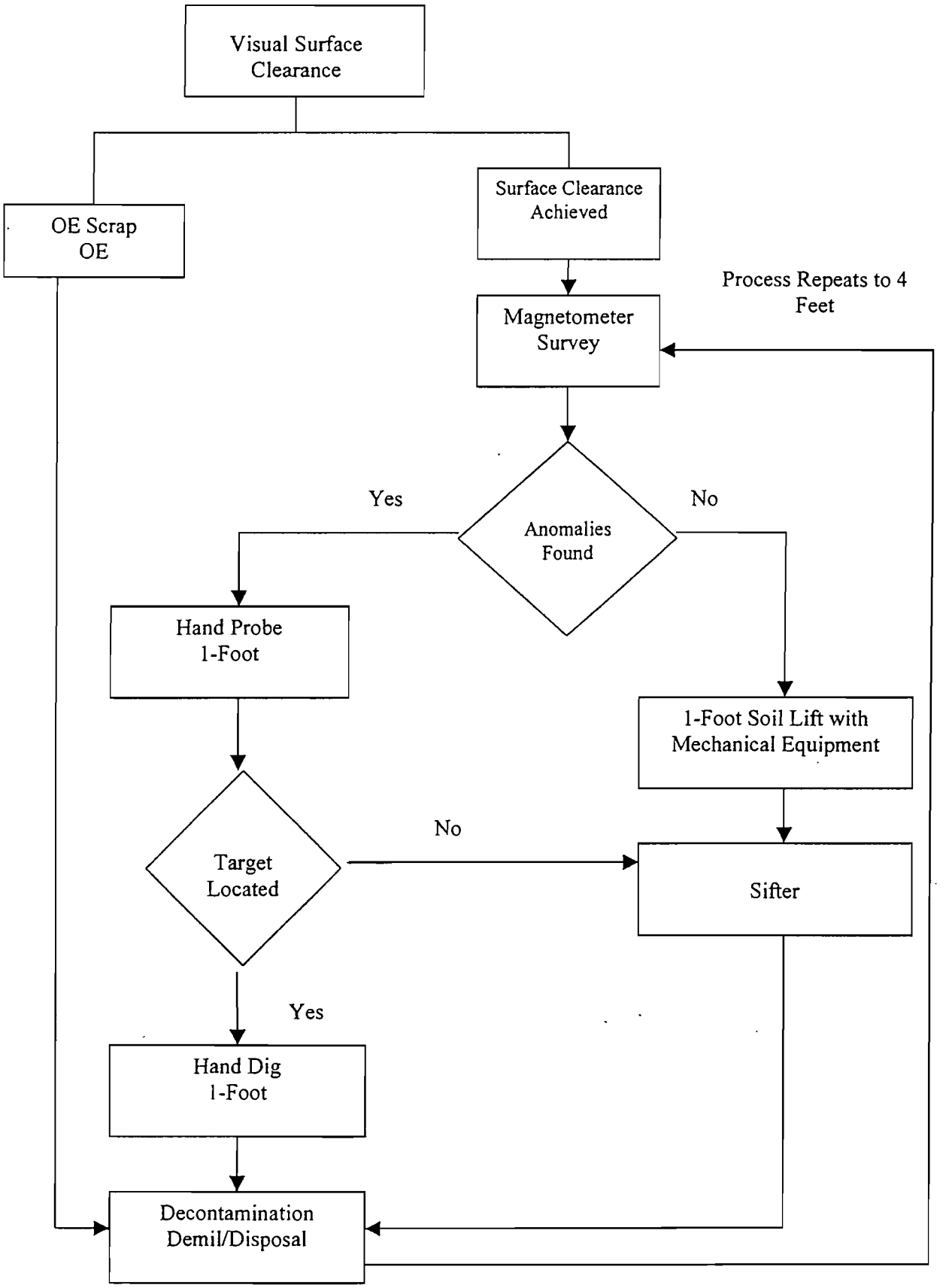


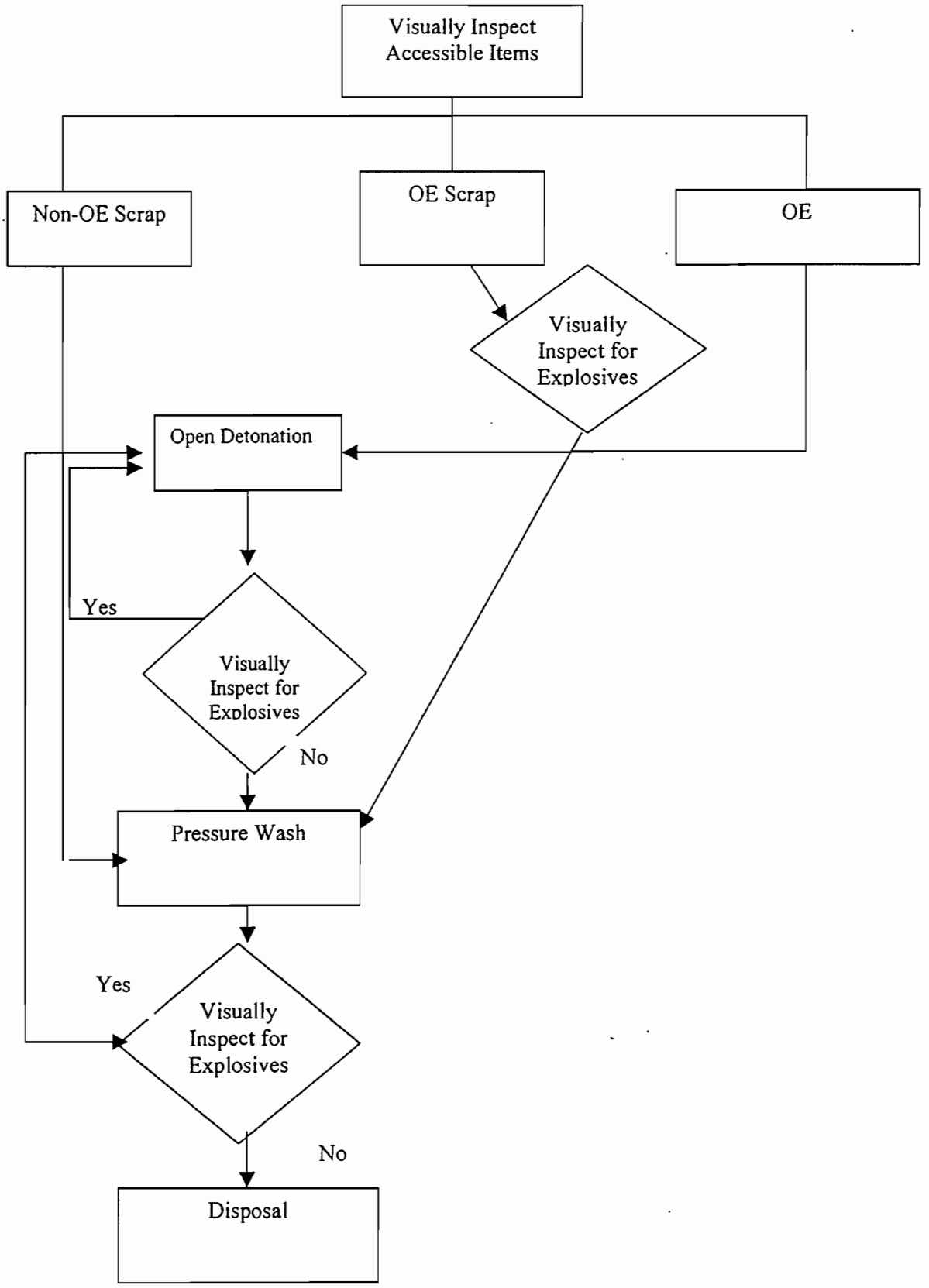
Figure 5 Contd.: Overview of Level 3 Restricted Area



Field Process (4-Foot Clearance)



Decontamination Demil/Disposal



MKM

MKM Engineers, Inc.

Geotechnical, Environmental and Remediation Services

DRAFT

September 26, 2000

Ms. Eileen Mohr
Project Coordinator
DERR, NEDO
2110 East Aurora Road
Twinsburg, OH 44087

Subject: Technical Memorandum - Sampling Summary for IRA at OD-1.

Dear Ms. Mohr:

The following presents a summary of the sampling scheme to be implemented during the excavation of soils at OD-1 as part of the Interim Removal Action (IRA). The purpose of sampling is to screen the excavated soils prior for use as backfill and to determine the residual concentrations at the bottom of each excavation. This memo annotates the meetings and agreements between OEPA, MKM, and RVAAP/OSC on the September 13, 2000, and MKM and OEPA on September 25, 2000 at the MKM Office in Ravenna. SAIC-USACE conducted a Phase I Remedial Investigation at the OD-1 site in 1999 and a final report has been submitted to the Operations Support Command (OSC) of the Department of the Army. It was concurred at these meetings that the SAIC-USACE investigation results in conjunction with Jenkins Analysis for Explosives would be used as decision drivers for the use of excavated soils from OD 1 as backfill.

Twenty grids with OE/UXO contamination have been identified for this IRA. Fifteen of these twenty grids are reportedly contaminated with explosives, metals or both (0 –1 foot) according to the SAIC-USACE data. Based on this data, the top 0 – 1-foot soil from all fifteen grids will be excavated, sifted and transported to the Building G1 at Load Line 4 for future remediation activities. Only one grid (grid 10) has explosives and lead contamination at 1 - 3 feet depth also. This grid will be excavated up to 3 feet and sifted and transported to Load Line 4 for future remediation. Work plan for treatment of these soils will be submitted under separate cover. All grids will be excavated to a maximum depth of 4 feet. The remaining 1 – 4-feet depth soil will be excavated from the fifteen grids on a grid-by-grid basis, sifted to eliminate or segregate OE/UXO scrap and then field-tested for presence of explosives. Presence of metals in these soils will be inferred from the SAIC-USACE data.

Jenkins Method will be used to test the sifted soils for presence of TNT and RDX in the field laboratory prior to backfilling. One sample per 100 cubic yards of soil will be analyzed. Soil (1 - 4 feet) from each grid will be excavated, sifted and stockpiled

Ravenna Army Ammunition Plant, 8451 State Rt. 5, Building 1038
Phone: (330) 358-2920 Fax: (330)358-2924

separately on concrete at the OD 1 site. The sifted soil from each grid will be loaded on to dump trucks and placed on the concrete away from the sift plant. One composite sample will be collected from each pile that is placed on the concrete for the Jenkins analysis. Soils that indicate presence of explosives and therefore inappropriate for direct backfill at OD 1 will be transported to the storage area in Load Line 4 for remediation.

If the Jenkins analysis on the composite sample collected from a grid does not indicate presence of explosives, and the SAIC-USACE data indicates metals concentrations consistent with installation-wide background numbers, the soil from that grid will be considered clean for use as backfill within the excavated grid.

Confirmatory samples (a composite of four samples from each grid) will be collected from the bottom of the fifteen excavated grids for a laboratory analysis for explosives and metals. Ten percent of the total samples collected as part of the confirmatory sampling will be analyzed for full suite (propellants, pesticides/PCBs, Cyanide, VOCs and SVOCs) as per the facility-wide sampling and analysis plan. The excavated grids will be backfilled immediately following collection of the confirmatory soil samples. The attached flow chart outlines the activities at the 20 grids identified for the IRA at OD 1.

Should you have any questions please call me at 330-358-2202 or 330-358-2920.

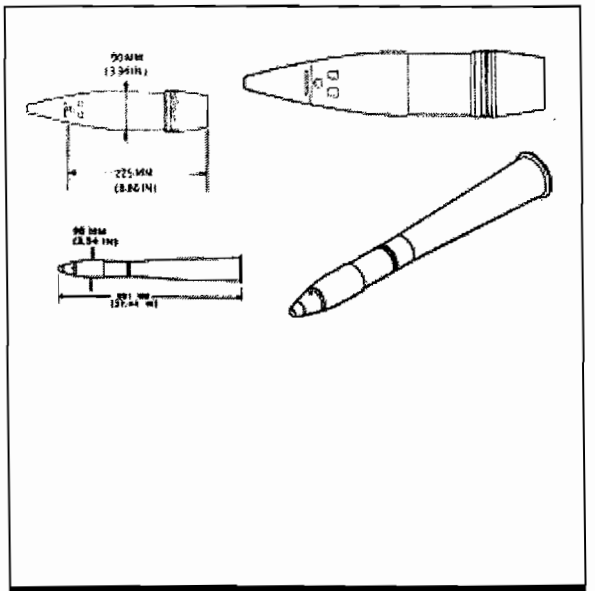
Thank You,

Sincerely,

Srini Neralla, Ph.D.
Project Manager

Munition Information: Description

U.S. PROJECTILE, 90-MM, GUN, HE, M71



External View

Country of Origin	United States
Diameter/Width	90.00 mm
Length	225.00 mm
Weight	Not Available
Explosive Type	Composition B
Net Explosive Weight	975.24 g

Do not transport.

Disposal by detonation.

Projectiles in this general type category produce their intended effect by blast and/or fragmentation. HE projectiles are issued either with a nose fuze in place, or with a removable lifting plug or closing plug which is replaced with a nose fuze before firing. Fuze types include ET, MT, MTSQ, PD, and PDSD. These projectiles do not have base fuzes. The projectile is made of steel.

Munition Information: Possible Hazards

U.S. PROJECTILE, 90-MM, GUN, HE, M71

Movement

Definition The act or process of moving. Change the place or position or posture. Motion.

Safety Precautions Do not move or disturb in any manner.

Static

Definition Static electricity can be produced by dust storms, snowstorms, escaping steam, moving belts, and revolving, automobile/truck tires.

Safety Precautions Ground and discharge self by touching ground prior to touching explosive item.

EMR

Definition Electromagnetic Radiation. Magnetic forces associated or produced by electricity.

Safety Precautions Do not turn on or off any radio/radar transmitters.

Proximity (VT)

Definition An electronic device that detonates ordnance within effective range of a target by means of radio waves sent out to and reflected back from the target.

Safety Precautions Observe one hour wait before approaching. Approach diagonally from rear.

Munition Information: Possible Hazards

U.S. PROJECTILE, 90-MM, GUN, HE, M71

Explosive (HE)

Definition Explosive-loaded ordnance includes high and low explosives of all countries. High explosives burn/detonate at rates of a few inches to 1300 feet per second.

Safety Precautions Do not subject any explosive to heat, shock, fire, friction, or rough handling. High temperature can greatly increase the sensitivity of explosives. Exercise extreme caution when dealing with old, damaged and possibly deteriorated explosive loaded ordnance. Certain explosives may react with metal, other explosives, air, or chemicals in the earth to produce extremely sensitive explosive components.

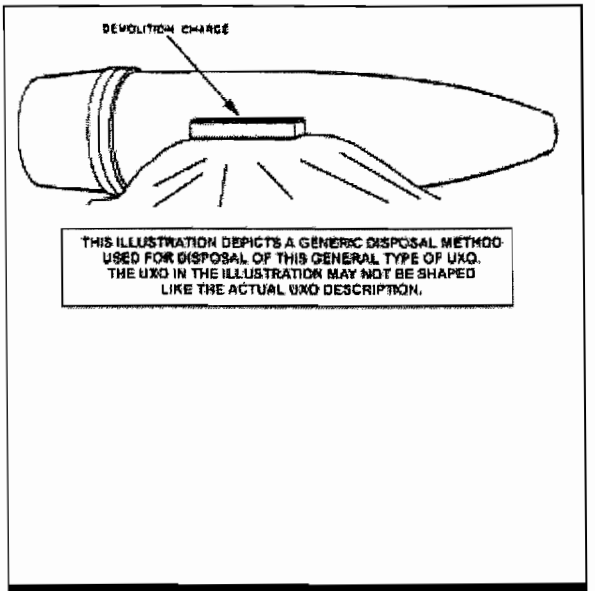
Frag

Definition The pieces of a munition (metal, plastic, etc) that fragment or break apart violently upon detonation and scatter causing property damage and personal injury.

Safety Precautions Observe specified minimum safe distance. Take overhead and frontal cover behind/under protective barricades.

Munition Information: Disposal

U.S. PROJECTILE, 90-MM, GUN, HE, M71



Disposal Figure

Transport?

Do not transport. Blow in place.

Fragmentation Distance 300 m

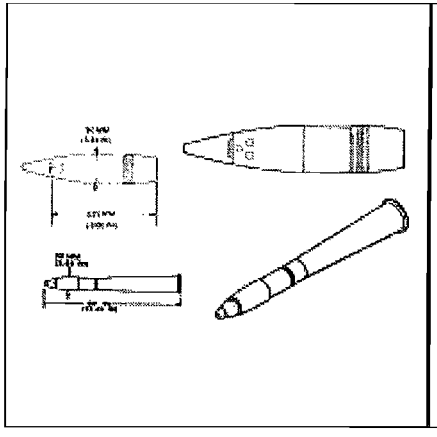
Disposal Method

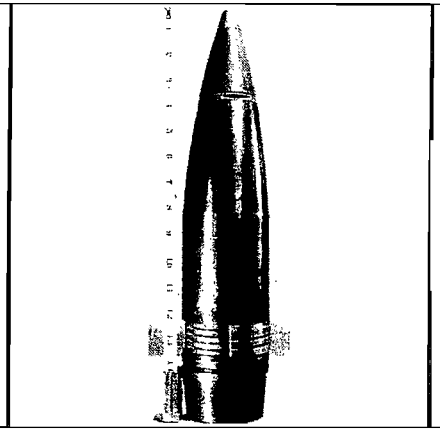
Disposal by detonation.

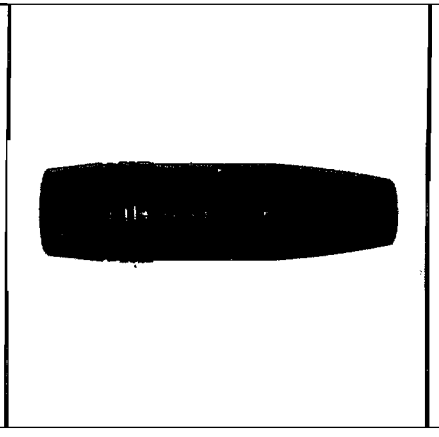
Counter Charge Main Charge using:

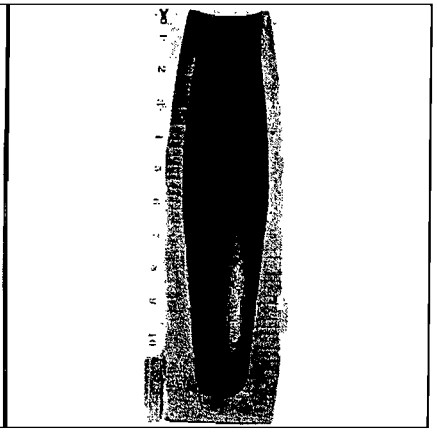
1.25 lb / .57 kg of explosive charge

U.S. PROJECTILE, 90-MM, GUN, HE, M71

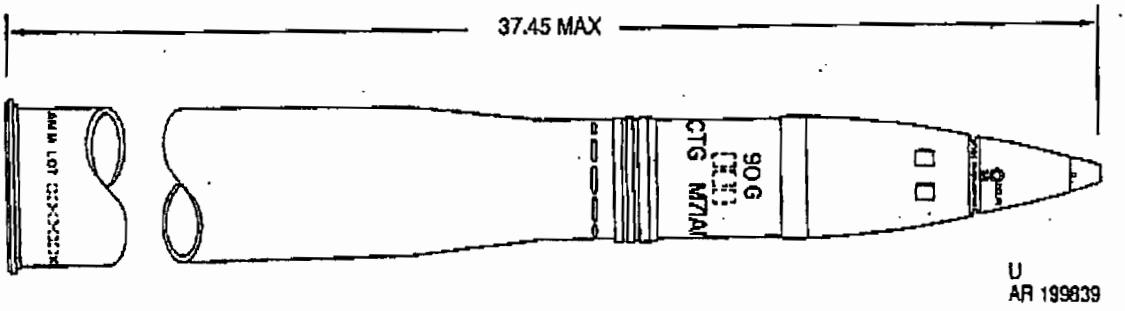








CARTRIDGE, 90 MILLIMETER: HE-T, M71A1, AND HE, M71



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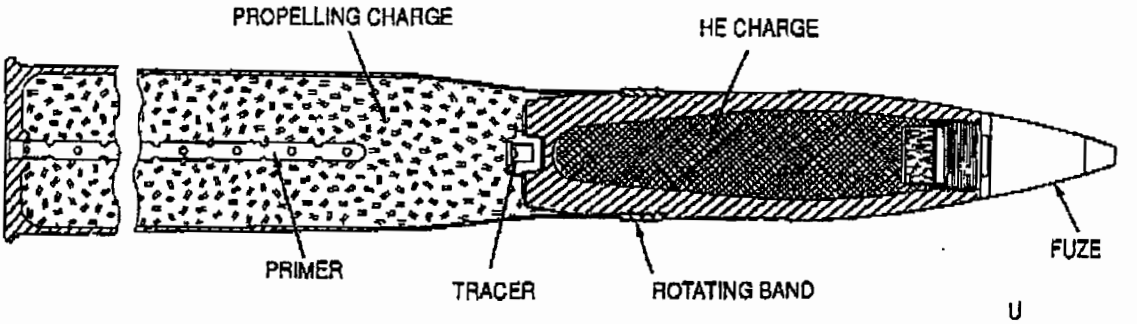

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Type Classification:

STD OTCM 37436 dtd 1960 (M71A1).
CON MSR 11756003 (M71).

Use:

This cartridge is used in 90mm guns against personnel and materiel, producing blast and fragmentation at the target.

Description:

The hollow steel forged projectile has a boat-tailed base and a streamlined ogive. Fuze cavity may be a normal or a deep cavity type. The projectile is loaded with 2.15 pounds (1.68 lb, deep cavity) of Composition B or TNT. A tracer is threaded into the projectile base (M71A1). A point-detonating fuze is assembled to the projectile. Loaded projectile weights fall into one of three weight zones.

Functioning:

When the weapon is fired, the burning propellant ignites the tracer and creates gases which propel the projectile out of the gun tube. The tracer burns for a minimum of three seconds. Upon impact, the fuze functions on superquick or delay, as preset, and detonates the high-explosive filler producing blast and fragmentation.

Difference Between Models:

M71A1 has a tracer; M71 does not. M71A1 has MI propellant resulting in lower velocity; M71 has M6 or M15 propellant.

Tabulated Data:

Complete round:

	M71A1	M71
Type	HE-T	HE
Weight	38.8-39.54 lb	41.19-41.93 lb
Length		37.46 in.
Cannon used with		M36, M41 or M54

Projectile:

Body material	Steel
Color	Olive drab w/yellow marking
Filler and weight	Comp B, 2.15 lb

Component:

Cartridge case	M19, M19B1
Propelling charge	M1, 5.33 lb (M71A1); M6 or M15, 7.31 lb (M71)
Primer	M28B2, M28A2
Tracer	XM10 (M71A1)
Fuze	PD, M51A5, M557; MTSQ, M520 Series, M564

Performance:

Maximum range	15,800 m (17,300 yd) (M71A1); 17,800 m (19,475 yd) (M71)
Muzzle velocity	730 mps (2400 fps) (M71A1); 823 mps (2700 fps) (M71)

Temperature limits:

Firing:

Lower limit	-40°F
Upper limit	+125°F

Storage:

Lower limit	-80°F (for period not more than 3 days)
Upper limit	+160°F (for period not more than 4 hr/day)
*Packing	1 round per fiber container; 2 containers per wooden box

*Packing box:

Weight	132 lb
Dimensions	43-5/8 x 13 x 8-5/32 in.
Cube	2.69 cu ft

* NOTE: See DOD Consolidated Ammunition Catalog for complete packing data including NSN's.

Shipping and Storage Data:

UNO serial number	0321
Quantity-distance class	(12) 1.2
Storage compatibility group	E
DOT shipping class	A
DOT designation	AMMUNITION FOR CANNON WITH EXPLOSIVE PROJECTILE
DODAC	1315-C280 (M71A1); 1315-C265 (M71); 1315-C266 (M71); 1315-C267 (M71)
Drawing number	8849017-1 (M71A1); 75-1-157 (M71)

References:

AMC-P 700-3-3
SB 700-20
TM 9-1300-251-20

SITE-SPECIFIC
SAFETY AND HEALTH ADDENDUM

FOR THE

OPEN DEMOLITION AREA 1

Prepared for

Operations Support Command
AMSIO – ACE – D
Procurement Directorate
Rock Island, IL 61299-6000

Prepared By

MKM Engineers, Inc.
4153 Bluebonnet Drive
Stafford, TX 77477

September 22, 2000

LIST OF APPENDICES

PREFACE

This Safety addendum has been prepared to address the potential health (chemical exposure) and safety (physical) hazards that exist at Open Demolition Area 1(OD 1) project site. It has been prepared for the Ravenna Army Ammunition Plant (RVAAP) by MKM Engineers Inc. for the purpose of aiding in the implementation of the removal of Ordinance and Explosive (OE) materials.

This safety addendum is intended to provide direction and guidance to ensure the safety and health of all field personnel, resident employees, occasional visitor, observer, contractors and the public.. It has been prepared as an aid for each operating organization to assist in reducing the frequency and severity of accidents, and to help eliminate unsafe and hazardous conditions.

Although MKM will provide a Site Safety and Quality Control Officer (SQCO) whose primary role is to implement the SSHP, it must be understood that cooperation from all employees is critical. Since the primary goal of MKM is to provide a safe and healthy workforce, it is imperative that all employees, contractors, and subcontractors abide by the provisions contained within the SSHP.

1. HAZARD ANALYSIS

During this project, various tasks will be performed that potentially pose chemical and/or physical hazards, in addition to the potential for a high order detonation to occur. This section has been developed to supplement the safety information already presented in the "Explosive Safety Submission for Ordinance and Explosive Removal"document. It examines the health and safety hazards associated with each of the scheduled tasks and prescribe preventive measures, as well as emergency contingency actions. .

1.1 CHEMICAL HAZARDS

Based upon the Statement of Work (SOW) for OD 1, the primary chemicals of concern that employees may be exposed to while performing excavation, sifting and removal activities include Explosives and Metal particulate (i.e. dust). Accordingly, exposure to the following specific compounds in the form of dust or particulate is expected during field tasks.

- TNT
- DNT
- RDX
- Lead
- Arsenic
- Cadmium
- Chromium

Table 1.1 lists relevant chemical exposure limits and acute health affects information for the specific chemical contaminants of concern. This information will be used to assist with the implementation of specific engineering and administrative control measures and appropriate levels of PPE needed to protect workers. During this project, contact with chemically contaminated materials will intermittent and the primary routes of exposure will be respiratory (e.g. inhalation) and skin (e.g. dermal) contact associated with material handling activities. For remediation work activities, the Threshold Limit Values (TLVs) are the most important control levels to be monitored. The selection of PPE and the implementation of control measures are based upon the degree to which the TLV is measured in the breathing zone of the worker and the specific activity being performed.

Table 1.1 Chemicals of Potential Concern, Exposure Limits, and Monitoring Instrumentation

Chemical Of Concern	Exposure Limits (mg/m^3)	IDLH (mg/m3)	Exposure Route	Symptoms of Acute Exposure	First Aid	Physical Properties	Reactivity Incompatibility	Instrument Information
TNT	PEL:1.5 TLV:.05	500	Inhalation, skin absorption and ingestion	Abdominal cramps. Blue lips and skin, cough, headache, redness to skin and eyes	Eyes: flush with water immediately; Swallow: immediate medical attention; Skin: soap flush promptly; Inhalation: Respiratory support	FP= ND LEL= ND UEL= ND	Strong oxidizers such as hydrogen peroxide, acids, combustible materials, heat.	IP=10.59eV
DNT	PEL: TLV: 0.2		Inhalation, skin absorption and ingestion		Eyes: flush with water immediately; Swallow: immediate medical attention; Skin: soap flush promptly; Inhalation: Respiratory support if exposed to IDLH levels			
RDX	PEL: None TLV:1.5		Inhalation, skin absorption and ingestion	Irritation of eyes, respiratory system, weak tremors, nausea. Seizures, if exposed to large amounts	Eyes: flush with water immediately; Swallow: immediate medical attention; Skin: soap flush promptly; Inhalation: Respiratory support if exposed to IDLH levels	FP = ND LEL= ND UEL=ND	Strong oxidizers such as hydrogen peroxide, acids, combustible materials, heat.	IP= ND
Cadmium dust	PEL: .050 TLV: .020	9	Inhalation Skin Contact	Pulm. edema, breathing difficulty, cough, chest tight, substernal pain, headache, chills, muscle aches, nausea., & mild anemia	Eyes: flush with water; Swallow: immediate medical attention; Skin: Soap wash; Inhalation: respiratory support.	FP = NA LEL = NA UEL = NA Silver-white, blue-tinged, lustrous, odorless solid	Strong oxidizers, elemental sulfur, selenium & tellurium	IP = NA

Chemical of Concern	Exposure Limits Criteria*	IDLH	Exposure Route	Symptoms of Acute Exposure	First Aid	Physical Properties	Reactivity Incompatibility	Instrument Information
Arsenic	PEL: 0.5 mg/3		Inhalation	Irritation to skin, upper respiratory distress muscle tremor, dermatitis	Eyes & Skin: flush with water immediately; Swallow: immediate medical attention; Inhalation: Respiratory support	Varies depending on compound	Varies	NA
Chromium (III)	PEL: 0.5 TLV: 0.5	25	Inhalation Skin Contact	Irritation of eyes; sensitization dermatitis	Eyes & Skin: flush with water promptly; Swallow: immediate medical attention; Inhalation: respiratory support	FP = NA LEL = NA UEL = NA	Varies	IP = NA
Lead (as Pb)	PEL: .050 TLV: .05	5	Inhalation	Abdominal pain, anemia, hypertension, and irritation of eyes	Eyes: flush with water immediately; Swallow: immed. medical attention; Skin: soap flush promptly; Inhalation: Respiratory support if exposed to IDLH levels	FP=NA LEL=NA UEL=NA	Strong oxidizers such as hydrogen peroxide, acids	IP=NA

(C) = Ceiling exposure limit recommended by NIOSH
Ceiling = Exposure limit not to be exceeded for any duration, as established by OSHA
FP = Flash Point
IDLH = Immediately Dangerous to Life and Health
IP = Ionization Potential
LEL = Lower Explosive Limit
NA = Not Applicable
PEL = 8-hour Time Weighted permissible Exposure Limit established by OSHA
REL = Recommended Exposure Limits (NIOSH Standard)
(ST) = 15 minute Short Term Exposure Limit recommended by NIOSH
STEL = 15 minute Short Term Exposure Limit established by OSHA
TLV = Threshold Limit Value (ACGIH Standard)
UEL = Upper Explosive Limit
ND = Not Determined

Apply standards, which are most restrictive.
****Consult instrument operating manual for details.***

1.2 PHYSICAL HAZARDS

Potential physical hazards associated with the removal action at OD – 1 include:

- Explosive Hazard
- Struck by
- Caught Between (i.e. cave-ins)
- Noise
- Vehicle Traffic
- Biological Hazards
- Slips,Trips, and Falls

Injuries that may result from these physical hazards can range from simple slip-trip-fall accidents to casualties including fatalities associated with high order detonation. These types of injuries can generally be avoided through the use of safe work practices when working with machinery and equipment. Reference should be made to the Safety and Health procedures referenced in Appendix B of this addendum. To ensure a safe work place, the SQCO will conduct and document regular safety inspections. The SQCO will inform all site workers of any applicable physical hazards related to each work zone during the daily toolbox meetings.

1.3 TASK SAFETY AND HEALTH ANALYSIS

Table 1.2 provides a summary of the risks, know hazards, required starting level of PPE (which may be upgraded or downgraded depending upon monitoring of activities), and monitoring controls that are associated with each task during this project. A detailed hazard analysis of each task is contained in specific Job Safety Analyzes (JSAs) which is located in Appendix C of this addendum.

Table 1.2 Task Safety and Health Risk Analysis Summary

FIELD TASK	POTENTIAL HAZARDS	HAZARD ELIMINATION	STARTING PPE	MONITORING	REF. JSA	CONDITIONS WHICH REQUIRE IMMEDIATE RESPONSE
Mobilization and Site Preparation: This task will involve unloading the necessary equipment and tools to perform the required tasks and the setting-up of work zones,	• Explosion • Slips, trips, and falls • Struck by • Caught between • Muscle strains • Equipment and tool accident	• UXO screening required before any type of activity that disturbs soil or subsurface. • Identify pre-existing slip, trip, and fall hazards and remove, barricade, or eliminated as is feasible. • Avoid potential for being struck by moving equipment, keep out of swing areas • Utilize proper lifting techniques such as keeping back straight, lifting with legs, and getting help when moving or lifting heavier objects. • Manage and operate heavy equipment IAW Heavy equipment procedures outline in SHP-26 (Appendix B). .	Level D (Hardhat, safety glasses, safety shoes, and work gloves.)	UXO screening (visual Shonstedt).	20	• Injury to field personnel -Sop work and notify SQCO.
Excavation: This includes excavation of soil contaminated with EO and metal constituents. Excavation will be to depths of one to four feet.	• Explosion • Slips, trips, and falls • Struck by • Exposure to explosive and metal dust. • Fire Hazard	• UXO screening required before any type of intrusive digging or grading activity. • Identify pre-existing slip, trip, and fall hazards and take precautions. • Avoid potential for being struck by moving equipment, keep out of swing areas • Be aware of dust hazard and wear APR with combination cartridge, if dust levels justify. • Use proper procedure when refueling equipment.	Modified C (Coverall suit only) for skin protection against airborne dust and soil.	UXO screening inspection. Dust meter survey (Mini-Ram) Sound meter to determine noise level of operation.	31, 18.	• Injury to field personnel - stop work and notify SQCO. • High risk EO materials encountered- Notify UXO personnel and follow their instructions. • UXO incidents evacuate area immediately and follow implement Contingency plan.

FIEL TASK	POTENTIAL HAZARDS	HAZARD ELIMINATION	STARTING PPE	MONITORING	REF. JSA	CONDITIONS WHICH REQUIRE IMMEDIATE RESPONSE
Soil Sifting; This task includes the use of a mechanical sifter that is equipped with a cultivator, conveyor system and screening device to separate soil and EO debris on the basis of particle size.	• Explosion • Struck by • Caught between • Exposure to explosive and metal dust.. • Noise	• UXO screening required before when handling soil and before sifting soil. • Avoid potential for being struck by moving equipment , keep out of swing areas • Watch for pinch points and moving parts when operating sifter. • Be aware of dust hazard and wear APR with combination cartridge, if dust levels justify.	Modified C (Coverall suit only) for skin protection against airborne dust and soil.	UXO screening inspection. Dust meter survey (Mini-Ram) Sound meter to determine noise level of operation.	31	• Injury to field personnel - stop work and notify SQCO. • High risk EO materials encountered- Notify UXO personnel and follow their instructions. • UXO incidents evacuate area immediately and follow implement Contingency plan.
Soil stockpile: Includes transferring of treated soil from Sifter operation to a designated storage area.	• Exposure to explosive and metal dust • Struck by objects • Heavy equipment accidents	• Avoid potential for being struck by moving equipment. Keep out of traffic lane of front-end loader • Beware of traffic hazards. • Follow procedures outlined in SHP – 26 for operating Heavy Equipment (Appendix B)	Modified C (Coverall suit only) for skin protection against airborne dust and soil.	None	31	• Injury to field personnel - stop work and notify SQCO. • High risk EO materials encountered- Notify UXO personnel and follow their instructions.
Soil sampling Includes collection of surface soil samples from stockpile areas.	• Slips, trips, and falls • Exposure to explosive and metal dust	• Identify pre-existing slip, trip, and fall hazards and remove, barricade, or eliminated as is feasible. • Be aware of dust hazard and wear APR with combination cartridge.	Modified C (Coverall suit only) for skin protection against airborne dust and soil.	None	21	• Injury to field personnel - stop work and notify SQCO. • High risk EO materials encountered- Notify UXO personnel and follow their instructions.

FIEL TASK	POTENTIAL HAZARDS	HAZARD ELIMINATION	STARTING PPE	MONITORING	REF: JSA	CONDITIONS WHICH REQUIRE IMMEDIATE RESPONSE
Backfill / Grading: Task involves placement of processed soil or clean soil back into excavation	• Explosive and metal dust exposure • Struck by objects • Slips, trips, and falls	• When needed, wear appropriate APR as noted. • Avoid potential for being struck by moving equipment; keep out of swing areas. • Refer to heavy equipment, backhoe, and excavation guidelines in SHP – 26 (Appendix B). • Beware of traffic hazards. • Personnel will identify and eliminate slip, trip, and fall hazards.	Level D (Hard hat, safety glasses, safety shoes, and work gloves.)	Work Zone Monitoring • Mini Ram (total dust) • PID (VOCs) • PASPs (total dust and metal particulate**)	•	Injury to field personnel - stop work and notify SQCO.
Equipment Decontamination: Includes power washing of Heavy equipment used for soil processing,	• Struck by objects • Chemical splashes	• Avoid potential for being struck by moving equipment, keep out of swing areas. • Wear designated PPE and avoid direct contact with power wash stream.	Level D (Rainsuit with safety glasses and face shield)	None	6	Injury to field personnel - stop work and notify SQCO.

2. CONTINGENCY PLAN

This project involves the excavation of explosive materials which could potentially result in a low probability to generate a high order detonation, fire (low probability), and dust contamination (remotely). Other types of emergencies that may occur include personal injuries; due to struck by events associated with heavy equipment or possible fire or explosion hazards linked to explosive residue or UXO materials. The following subsections describe work practices designed to avoid emergency incidents and emergency response actions should such incidents occur.

2.1 PREVENTATIVE MEASURES

Preventative Measures include following safe work practices described in applicable JSAs (Appendix C) and related Safety and Health procedures (Appendix B). In addition standard work practices such as the following will be relied upon to control site activities;

- Site Access - Access to the site will be controlled and limited to Essential personnel only. The site will restricted for entry and radio communications will be used to authorized the entry of non-essential personnel. All personnel will register at the main entrance of the site and sign the " Site Access Log" (Appendix A).
- UXO Inspection – All intrusive work will be inspected and cleared by the lead UXO specialist before the start of the specific task.
- Daily Safety Brief – Tool box meetings will be given daily by the SQCO before the start of each shift to maintain the level of hazard awareness and recorded on the safety meeting form (Appendix A).
- Safety Observer – Each day a site worker will serve as the Safety Observer and present his findings the following morning in an effort to remind personnel of needed safe work practices. (Appendix A).
- Daily Site Inspection – The SQCO will conduct a formal walk through of the site daily to identify and correct safety deficiencies.
- JSA Review - Personnel will review applicable JSAs daily.

2.2 EMERGENCY EQUIPMENT

Several items of emergency equipment will be maintained at the work site. Any incident that is not clearly controllable by personnel wearing standard site clothing plus protective gloves and using the listed equipment will require re-evaluation by the SQCO. If the SQCO does not feel that on-site personnel can safely control the emergency with the available equipment, the crew will use an alternate approach such as allowing a small fire to burn until firefighters arrive or evacuating the site. The required emergency equipment includes:

- 16-Unit first aid kit indoors or in weatherproof container, inspected weekly
- Compressed gas horns

- Emergency eye wash to meet American National Standards Institute standard if corrosives (water sample preservatives) are being poured
- Fire extinguisher(s) (at least 20-b) 7.6 to 22.9 meters (25 to 75 feet) from potentially flammable areas.
- Basic spill kit suitable to handle small spills of decontamination fluids, hydraulic fluid, or fuels and containing sorbent pads, tubes, and nitrile or similar gloves
- Telephone and 2-way radios

2.3 EMERGENCY ACTION

IN THE EVENT OF AN EMERGENCY, PERSONNEL ARE DIRECTED TO THE EMERGENCY ACTION PLAN GUIDELINES CONTAINED IN EAP FORM 2 (Appendix B). The EAP identifies critical telephone numbers, driving directions, evacuation routes, rally points, emergency response duties.

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SHF-1. SSHP ACKNOWLEDGEMENT

All field personnel and visitors will sign this acknowledgement form after site specific training is completed and before being permitted to work on the site. Any employee or visitor failing or refusing to comply with, or supervisors failing to enforce compliance with the SSHP will be terminated or removed from the site.

I have read and understood the site-specific SSHP. I understand the information presented in it and will comply with the provisions contained therein.

Project Location: _____

Project Site: _____ Project No: _____

Name:	**Signature:** **Date:**	**Affiliation:**

SHF-2 SITE ACCESS LOG

Project Location: _____

Project Site: _____ Project No: _____

Date	Name	Representing	Equipment and PPE Level	Time In	Time Out

Comments: _____

SHF-3. SITE SAFETY MEETING LOG

Project Location: _____

Project Site: _____ Project No: _____

Date: _____ Time: _____ _____
(Start) (End)

Meeting Title and Purpose: _____

_____

Meeting Place: _____

Chair-Person: _____

Attended By:

_____ _____

_____ _____

_____ _____

Topics of Discussion: (Check applicable topic)

_____ Chemical Exposure
_____ Symptoms of Exposure
_____ First Aid
_____ Emergency Procedures
_____ Site Controls
_____ Use of Protective Clothing
_____ Use of Respirators
_____ Planned Tasks
_____ Safety Hazards
_____ Decontamination Methods
_____ Sampling Hazards

Others (Explain) _____

_____

Equipment Inspected: _____

_____

_____

Next Meeting Agenda/Other Comments: _____

_____

(SSHO Signature)

SHF–4 Incident Report Form

REPORTING INSTRUCTIONS: Report all incidents, that require medical care, immediately by paging the MKM Safety Director at 330-352-1473. The job site Superintendent shall complete the Incident Report form and forward it to the Director within 24 hours.

Employer *(If other than MKM, identify Contractor or Subcontractor)*

1. Company: _____ Address: _____
2. Project: _____ Site Superint: _____ PM: _____

Incident Details

3. Date :_____Time: _____ Location: _____
4. Describe how incident occurred: _____
5. Cause of incident: _____
6. Photographs taken? ___Yes ___ No Name(s) of witness(es): _____
7. Have arrangements been made for drug screen? ___Yes ___ No

Injured Employee

8. Name: _____ Address: _____
9. Job Title: _____ 14. Birth Date: _____ 15. Sex: M___ F___
10. Type of injury: ___ First Aid Only ___ Medical Only ___ Lost Time ___Fatality
11. Describe body part affected: _____
12. Medical care facility _____ Physician's Name:

    _____
13. Address_____City_____State_____Zip _____

Job Site

14. Property/Vehicle Damage: ___Yes___ No; Details:_____
15. Chemical Release: ___Yes ___ No; Details:_____
16. Corrective Action Taken: _____
17. Reported by: _____

(Name) (Signature) (Date)

_____ *(Office Use Only)* _____

SHF-05. QUALITATIVE FIT TEST RECORD

Project Location: _____

Project Site: _____ **Project No.:** _____

This record represents a factual account of a qualitative Fit-Test conducted on the named individual, and specifies the type of test which was conducted.

Name: _____

Signature: _____ **Date:** _____

Location: _____

_____

Name of Fit Tester: _____

Signature of Fit Tester: _____ **Date:** _____

Qualifications of Fit Tester: _____

Irritant Fume

Type of Mask: _____

Manufacturer: _____ Pass/Fail

Model: _____ **Size:** _____

Type of Mask: _____

Manufacturer: _____ Pass/Fail

Model: _____

Type of Mask: _____

Manufacturer: _____ Pass/Fail

Model: _____

Comments: _____

_____

Note: This Fit-Test was conducted according to the standard prescribed in 29 CFR 1910.1025.

SHF-06 AIR MONITORING LOG

Project Location: _____

Project Site: _____ **Project No.:** _____

INSTRUMENT ID: _____
(Make, Model, Serial No., etc.)

Calibration Data: **Date:** _____

Time	Span Gas & Concentration	Remarks (Zero & Calibrate Readings)	Name of Sample Technician

Air Monitoring Data: **Date:** _____

Time	Wind Direction	Location & Work-in-Progress	Readings (PPM - mg/m^3)	Name of Sample Technician

SHF-07 PERSONAL AIR MONITORING RECORD

Project Location _____

Project Site _____ **Project No.** _____

Date_____ **Shift** _____ **Building** _____ **Area** _____

PERSONAL DATA

Name _____

Job Duties _____

Machine _____

AIR MONITORING DATA

Sample Data for _____ Sample No. _____

Start Time _____ Finish Time_____ Total Time (min.)_____

Pump Flow_____ Liters/Minute

Total Volume Sampled_____ Calibration Date _____

Sampling Equipment _____ Collection Media _____

NOTES

_____

_____

_____

ANALYSIS

Type of Sampling _____ Breathing Zone _____ Total _____ Respirable _____

Area _____

Contaminants Sampled for _____

_____

_____

Analytical Lab._____ Date Submitted _____

Sampled By _____

SHF-8. WEEKLY WASTE STORAGE INSPECTION RECORD

Project Location: _____

Project Site: _____ **Project No.:** _____

INSTRUCTIONS:

1. Inspector to enter "yes" or "no" response for each item.
2. Sign, enter date of inspection, and return to Site Safety Officer at R&R project site office.
3. Report any deficiency, in person, to Site Safety Officer immediately.

Item No.	Item	Week 1	Week 2	Week 3	Week 4	Week 5
1.	Signs Posted					
2.	Required Aisle Space					
3.	Acceptable Container Integrity					
4.	Container Marking Visible					
5.	Spilled/Leaked Material Present					
6.	Acceptable Storage Tanks Integrity					
7.	Separation Distance Maintained					
8.	Waste Pile Covered					
9.	Containment Curbing Acceptable					
10.	Run-on/off Controls Functional					
	Inspector's Signature					
	Inspection Date					

NOTE: See reverse for Deficiency Response Actions

SHF-9. SPILL RESPONSE ASSESSMENT FORM

Project Location: _____

Project Site: _____ **Project No.:** _____

During a spill response, the following information should be determined to the extent possible.

- **What happened?**
  - type of incident _____
  - cause of incident _____
  - extent of chemical release and transport _____
  - extent of damage to structures, equipment and terrain _____
- **Casualties?**
  - victims (number, location, and condition) _____
  - treatment required _____
  - missing personnel _____
- **What could happen?** Consider:
  - types of chemicals on-site _____
  - potential for fire, explosion, and release of hazardous substances _____
    _____
  - location of all personnel on-site relative to hazardous areas _____
    _____
  - potential for danger to off-site population or environment _____
    _____
- **What can be done?** Consider:
  - equipment and personnel resources needed for victim rescue and hazard mitigation _____
    _____

SHF-10 EQUIPMENT INSPECTION CHECKLIST

Place a ✓mark in the "In Order" column to indicate that the item is present and in working condition. If absent or deficient describe the discrepancy and the corrective action taken in the "Discrepancy/Comments" box. If item does not apply to equipment being inspected, enter "NA". All listed items must have a response.

Make/Description: _____ Model: _____ Serial No.: _____

Item	In Order	Discrepancies/Comments
Service Brakes		
Emergency Brakes		
Parking Brake		
Brake Lights		
Back-up Alarms		
Horn		
Tires		
Steering		
Seat Belt		
Operating Control		
Fire Extinguisher		
2 Head Lights		
2 Tail Lights		
Coupling Devices		
Windshield		
Windshield Wipers		
Guards for Moving Parts		
Overhead canopy guard & mesh covering		
Rear canopy guard & mesh covering		
Brake – Hydraulic		
Brake Fluid		
Hydraulic Oil		
Engine Oil		
ROPS		
Dump Body: Locking Device Dump Body Hoisting Control Switch		
Odometer: _____		Hour Meter: _____ Fuel Level: _____
Inspected by: _____		Date: _____

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PURPOSE

This procedure is designed to identify accident causes, prevent similar occurrences, and to comply with OSHA reporting and record keeping requirements contained in 29 CFR 1904. This procedure is applicable to all contractor employees and subcontractor personnel who are involved in a work-related incident.

RESPONSIBILITY

The Site Superintendent (SS) or designated Site Safety and Health Officer (SSHO) shall be responsible for implementation of this procedure and compliance with all applicable provisions as outlined below, unless otherwise stated.

GENERAL

This procedure addresses responding to an incident and to the investigation and reporting of incidents that occur on any company controlled job site.

Respond immediately

Upon knowledge of a work-related incident, the site supervisor must ensure that injured employees are properly cared for and that professional medical services are made available. Response should include the following:

1. Secure area to ensure that the area is free of any additional hazards that may endanger personnel.
2. Provide or summons medical attention as quickly as possible after determining the extent of injury.
3. Perform CPR/First Aid as appropriate and secure injured employee until professional medical personnel arrive.
4. Dispose of biological waste (body fluids) and related waste accordingly. After injured personnel have been removed from the incident scene, all surfaces contaminated by body fluids must be cleaned and disinfected in accordance with SHP-5 Body fluids.

Investigate

Investigation of a work-related incident must be made immediately and should involve participation of immediate supervision, all injured persons, and any witnesses to the incident. The SS or SSHO will perform the following:

1. Question all personnel involved in order to reconstruct how the incident occurred.
2. Obtain written statements signed by employees who were directly involved in the incident and any eyewitnesses. Statements should contain only factual and applicable information

Report

Prompt notification is critical, in order that necessary actions can be implemented within prescribed time frames.

1. Contact the SHE Manager immediately at pager xxxxxxxx. The SHE Manager shall be responsible for notifying government authorities and agencies.

2. Complete the Report form (Attachment 1) and forward it to the SHE Manager and Program Manager within 24 HOURS of the incident.

3. The SHE Manager shall report all incidents that result in a fatality or the hospitalization of one or more persons to the OSHA Area Director within eight hours after the incident occurs.

4. The SHE Manager shall arrange for all employees who were directly involved in the incident to undergo drug testing in accordance with the company's Substance Abuse Program, within 24 hours of the incident.

5. Any employee(s) who may have been exposed to body fluids during the course of providing CPR/First Aid must notify the SHE Manager as soon as possible to initiate exposure control procedures.

6. Inquiries from media (newspaper, TV, etc.) concerning work related incidents shall be referred to the SHE Manager.

ATTACHMENTS

- Incident Report form - Attachment 1

DOCUMENTATION

- Incident Report form

RELATED REFERENCE

- 29 CFR 1904

INCIDENT REPORT FORM (Attachment 1)

REPORTING INSTRUCTIONS: Page company SHE Manager immediately at xxxxxxx. Forward a completed Incident Report within 24 hours to the SHE Manager.

Employer *(Identify the RVAAP Contractor or Subcontractor)*

1. Company: _____ Address: _____
2. Project: _____ Site Superint: _____ PM: _____

Incident Details

3. Date : _____ Time: _____ Location: _____
4. Describe how incident occurred: _____
5. Cause of incident: _____
6. Photographs taken? ___Yes ___ No Name(s) of witness(es): _____
7. Have arrangements been made for drug screen? ___Yes ___ No

Injured Employee

8. Name: _____ Address: _____
9. Job Title: _____ 14. Birth Date: _____ 15. Sex: M____ F____
10. Type of injury: ____ First Aid Only ____ Medical Only ____ Lost Time ____Fatality
11. Describe body part affected: _____
12. Medical care facility _____ Physician's Name: _____
13. Address_____City_____State_____Zip _____

Job Site

14. Property/Vehicle Damage: __Yes___ No; Details:_____
15. Chemical Release: ___Yes ___ No; Details:_____
16. Corrective Action Taken: _____
17. Reported by: _____

(Name) (Signature) (Date)

_____ *(Office Use Only)* _____

PURPOSE

This procedure describes work practices that are prescribed by 29 CFR 1910.147 and is designed to prevent accidental energizing of equipment that can result in the release of stored mechanical, electrical, pneumatic, or chemical energy. All equipment, process systems, and machines requiring service or maintenance shall be de-energized and secured prior to servicing or maintenance via lockout/tagout practices.

RESPONSIBILITY

The Site Superintendent (SS) or designated Site Safety and Health Officer (SSHO) shall be responsible for implementation of this procedure and compliance with all applicable provisions as outlined below, unless otherwise stated.

GENERAL

This procedure addresses general lockout/tagout requirements, placement of lockout/tagout devices, verification of isolation, and training.

As used in this procedure, the following terms apply:

Affected Employee - An employee who is required to operate or use a machine or equipment (i.e., backhoe, drill rig, nibbler, etc.) on which servicing or maintenance is being performed under lockout or tagout, or who is required to work in an area in which servicing or maintenance is being performed.

Authorized Employee - An employee who locks out or tags out machines or equipment in order to perform maintenance or servicing on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing services or maintenance covered under this procedure.

Lockout - The placement of a lockout device, such as a lock with key, on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Energy Isolating Device - A mechanical device that physically prevents the transmission or release of energy. For example: A manually operated electrical circuit breaker or a disconnect switch. The term does not include a push button, selector switch, and other control type devices.

Tagout - The placement of a tagout device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed in accordance with the established procedure.

Servicing and/or Maintenance - Work place activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines, process systems, or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or start up of the equipment and the release of hazardous energy or hazardous substances.

General Work Practices

Shut down of equipment shall happen prior to the servicing and/or maintenance of machines, process systems, or equipment.

Notification to all departments and related personnel of a shut down requiring lockout/tagout. An authorized employee will perform necessary lockout protocol.

When stopping equipment the power source(s) of the machine or equipment shall be de-energized and all moveable parts shall be mechanically blocked.

Lockout of all lockable controls or readily lockable controls must be locked out or placed in the OFF position.

Tagout devices will only be used when lockout cannot occur or when it can be demonstrated that utilization of a tagout device will be as effective as a lockout system.

Placement of Lockout/Tagout Devices

The placement of lockout/tagout devices shall be performed in a manner to ensure effectiveness.

Lockout devices shall be accompanied by a "Danger" tag and attached in a manner that will hold energy isolating devices in a "safe" or OFF position .

Tagout devices, when used, shall be attached in an obvious location and in a manner that clearly describes their purpose.

Verification of Isolation

Prior to starting work on machines, process systems, or equipment that have been locked out or tagged out, a verification of successful de- energization shall be made.

Inspect the work area for nonessential items and to ensure that the machine or equipment is capable of operation.

Notify all personnel to both the removal or transfer of lockout/tagout devices and the restoration of energy to machines or equipment.

Removal or transfer of lockout/tagout devices from each energy isolating device will be performed by the employee, or designated representative, who applied the device.

Training

Prior to engaging in site activities, all field personnel will have received training that satisfies the requirements contained in OSHA Standard 1910.147. Site- specific Lockout/Tagout training shall address the following:

- An authorized/designated employee shall be familiar with hazardous energy sources, the energy being employed, and the methods for hazardous energy control.
- Each employee that is affected by the use of lockout/tagout shall be instructed in the purpose and function of these procedures.
- All other employees whose work operations take place in an area where lockout/tagout procedures may be used, shall be instructed about the procedure.

If tagout systems are used, employees shall be trained in the following limitations of tags:

- Tags are only warning devices and do not provide physical restraint.
- Tags are not to be removed without authorization from the authorized employee responsible for their placement.
- Tags are never to be ignored, bypassed, or otherwise defeated.
- Tags must be legible and understandable by all employees.
- Tags must be durable enough to withstand the environment of the work place.
- Tags may evoke a false sense of security and their meaning must be fully understood for a successful program.
- Tags must be securely fastened to discourage inadvertent or accidental detachment.

Lockout/Tagout procedure training will be performed by the SS or SSHO with assistance from the SHQA department as needed.

Lockout/Tagout procedure training will be performed prior to engaging in site-specific activities and annually as part of a SHQA refresher training course.

ATTACHMENTS

DOCUMENTATION

RELATED REFERENCE

- OSHA 29 1910.147

PURPOSE

This procedure describes requirements for safe operation and maintenance of backhoes and states that only qualified operators will be permitted to operate the backhoe.

RESPONSIBILITY

The Site Superintendent (SS) or designated Site Safety and Health Officer (SSHO) shall be responsible for implementation of this procedure and compliance with all applicable provisions as outlined below, unless otherwise stated.

GENERAL

This procedure addresses work practices, safety precautions, and maintenance practices.

Work Practices

Stop the machine immediately whenever you have found a symptom threatening safe operation

Before operating the machine, always carry out the pre-operation inspection and complete an Equipment Inspection Checklist (Attachment 1) as described in this procedure.

Never let people near the working range of the machine and remove all obstacles before starting operation.

Before digging; check, locate, and mark (with flags or paint) the location of buried gas pipes and electric power lines.

Safety Precautions

Never touch the control levers when getting on and off the machine -- use the handrails.

Do not allow a person to ride on the machine except in the cab.

Before traveling the machine, check to see if the travel motors are at the rear or front of the lower frame and then operate the travel control levers accordingly. Also be sure to engage the swing lock when traveling.

When traveling uphill or downhill, lower the attachment close to the ground.

When traveling downhill or in tight quarters, reduce the engine speed and work slowly.

On loose and soft ground, instead of digging up close to the machine, back off the machine a little, in order to provide extra room for the machine.

Wear cab guards on job sites where there may be a danger of falling rocks or cave-ins.

Never jump on or off the machine when traveling or during operation.

Make sure the machine is parked safely. When leaving it on a slope, use blocks to secure the machine and lower the bucket to the ground to act as a brake.

When machine is not in use, place the control levers in neutral, engage the swing lock, and remove the engine key.

If circumstances do not permit the lowering of the bucket to the ground, the operator should remain in his seat ready to operate the control levers.

WARNING:

Never operate any part of machine closer than 20 feet to any live power lines. (Check local power company codes and regulations, and conform to them if different from above.) (See SHP-18 for overhead clearance guidelines.)

In case the machine comes into contact with live power lines, the operator should remain in his seat until the power is cut off. If he must leave the machine, he should jump off, not climb down. Also, do not let anybody on the ground touch the machine while any part of it is in contact with a live power line.

Do not exceed the machine's capacity charts.

Use only approved slings and shackles (clevises).

Never lift a load from the bucket teeth.

Maintenance Practices

Tagout all equipment that is or needs to be serviced.

Never work under a machine that is supported only by the boom and bucket. Use heavy-duty wooden blocks under the crawlers when working under the machine.

When working on the boom, arm, or bucket, lower the bucket to the ground.

If necessary to inspect, service, or repair the machine with its boom and arm up, apply safety blocks and struts.

Use extreme caution when removing the radiator cap. If the engine is still hot, boiling water may spray out. If possible, wait until the engine has cooled.

Gas generated from battery electrolyte is flammable so do not smoke or expose open flames when servicing the batteries. Also, make sure to keep this electrolyte off clothing and skin, and out of eyes. Never use a match to check battery levels.

Stop the engine when filling the fuel tank and be sure there are no open flames or heated surfaces that could ignite the fuel.

ATTACHMENTS

DOCUMENTATION

RELATED REFERENCE

- OSHA 29 1926 Subpart O; Motor Vehicles, Mechanized Equipment, and Marine Operations

Equipment Inspection Checklist (Attachment 1)

Place a ✓mark in the "In Order" column to indicate that the item is present and in working condition. If absent or deficient describe the discrepancy and the corrective action taken in the "Discrepancy/Comments" box. If item does not apply to equipment being inspected, enter "NA". All listed items must have a response.

Make/Description: _____ Model: _____ Serial No.: _____

Item	In Order	Discrepancies/Comments
Service Brakes		
Emergency Brakes		
Parking Brake		
Brake Lights		
Back-up Alarms		
Horn		
Tires		
Steering		
Seat Belt		
Operating Control		
Fire Extinguisher		
2 Head Lights		
2 Tail Lights		
Coupling Devices		
Windshield		
Windshield Wipers		
Guards for Moving Parts		
Overhead canopy guard & mesh covering		
Rear canopy guard & mesh covering		
Brake – Hydraulic		
Brake Fluid		
Hydraulic Oil		
Engine Oil		
ROPS		
Dump Body: • Locking Device • Hoisting Control Safety/Switch		

Odometer: _____ Hour Meter: _____ Fuel Level: _____

Print Name: _____ Signature: _____

Date: _____ Time: _____ To _____

PURPOSE

This procedure is designed to provide safe work practices for backhoes, front-end loaders, and other types of mechanical and material handling equipment (e.g. heavy equipment).

RESPONSIBILITY

The Site Superintendent (SS) or designated Site Safety and Health Officer (SSHO) shall be responsible for implementation of this procedure and compliance with all applicable provisions as outlined below, unless otherwise stated.

GENERAL

This procedure addresses general requirements, protection devices, safety equipment, and heavy equipment safe practices.

As used in this procedure, the following terms apply:

ROPS - Rollover Protective Structures

FOPS - Frame Overhead Protective Structures

General Requirements

All heavy equipment shall be inspected by the operator prior to use on each shift and an "Equipment Inspection" checklist (Attachment 1) shall be completed to ensure that operating components are not defective.

Vehicles will not have cracked windshields or windows.

Blades, buckets, dump bodies, and other hydraulic systems must be fully lowered when equipment is not in use

Parking brakes will be engaged when equipment is not in use.

Protection Devices

Seat belts and Rollover Protective Structures (ROPS) will be provided and used on all motor vehicles including:

- Crawler and rubber tire tractors
- Self-propelled pneumatic tire earth movers
- Motor graders
- Water tank trucks with tank height less than the cab and
- Self-propelled construction equipment such as front-end loaders, backhoes, rollers, and compactors.

ROPS will not be required on:

- Trucks designed for hauling on public highways
- Crane-mounted dragline backhoes
- Cranes, draglines, or equipment on which the operator's cab and boom rotate as a unit and sections of rollers and compactors (tandem steel-wheeled and self-propelled pneumatic tire type that do not have an operator's station).

FOPS will be provided on bulldozers, tractors, or similar equipment used in clearing operations or when the operator is exposed to falling object hazards. FOPS include guards, canopies, or grills to protect the operator from falling or flying objects as appropriate to the nature of the clearing operations.

Required Safety Equipment

Mechanical and Material handling equipment with an obstructed rear view must have (when being operated in reverse) an audible alarm sufficient to be heard under normal working conditions and will operate automatically upon commencement of backward motion. All self-propelled equipment must be equipped with a backup alarm unless the equipment allows the operator to face the direction of motion.

Material handling equipment that lack ROPS must be operated on grades that the equipment can safely accommodate.

A safety barrier will be used to protect workers whenever tires are inflated, removed, or installed on split rims.

All self-propelled heavy equipment must carry a dry chemical or carbon-dioxide fire extinguisher with a minimum rating of 5-B:C.

Gas cylinders must be properly secured to heavy mobile equipment.

Hard hats, safety glasses, safety shoes, and other protective gear are to be worn at all times around heavy equipment.

Safe Practices

When operating cranes and other types of hoisting equipment and verbal communication is difficult, standard hand signals shall be used. Designate one person per equipment operator to give hand signals.

Only trained or licensed people are to operate heavy equipment.

Use chains, hoists, straps, and any other equipment to aid in safely moving heavy materials.

Never walk directly in back of, or to the side of, heavy equipment without the operator's knowledge.

Be sure that no underground or overhead power lines, sewer lines, gas lines, telephone lines, or other utilities present a hazard in the work area. This includes marking of all underground utilities and flagging all support wires for utility poles. Guy lines will be marked with yellow caution tape at eye level and several other points to aid in visual identification.

Be knowledgeable of marked "swing zones" for rotating equipment, e.g., back hoes.

ATTACHMENTS

- Equipment Inspection Checklist - Attachment 1

DOCUMENTATION

RELATED REFERENCE

- OSHA 29 CFR 1926 Subpart O; Motor Vehicles, Mechanized Equipment, and Marine Operations

Equipment Inspection Checklist (Attachment 1)

Place a ✓mark in the "In Order" column to indicate that the item is present and in working condition. If absent or deficient describe the discrepancy and the corrective action taken in the "Discrepancy/Comments" box. If item does not apply to equipment being inspected, enter "NA". All listed items must have a response.

Make/Description: _____ Model: _____ Serial No.: _____

Item	In Order	Discrepancies/Comments
Service Brakes		
Emergency Brakes		
Parking Brake		
Brake Lights		
Back-up Alarms		
Horn		
Tires		
Steering		
Seat Belt		
Operating Control		
Fire Extinguisher		
2 Head Lights		
2 Tail Lights		
Coupling Devices		
Windshield		
Windshield Wipers		
Guards for Moving Parts		
Overhead canopy guard & mesh covering		
Rear canopy guard & mesh covering		
Brake – Hydraulic		
Brake Fluid		
Hydraulic Oil		
Engine Oil		
ROPS		
Dump Body: • Locking Device • Hoisting Control Safety/Switch		

Odometer: _____ Hour Meter: _____ Fuel Level: _____

Print Name: _____ Signature: _____

Date: _____ Time: _____ To _____

PURPOSE

This procedure addresses site control measures and is designed to ensure that potential contamination of workers and the public is minimized and that only authorized personnel wearing appropriate PPE are permitted to enter specific work areas.

RESPONSIBILITY

The Site Superintendent (SS) or designated Site Safety and Health Officer (SSHO) shall be responsible for implementation of this procedure and compliance with all applicable provisions as outlined below, unless otherwise stated.

GENERAL

This procedure addresses general aspects of six control measures, which include: Site map, site preparation, work zones, buddy system, security, and communications. The appropriate sequence for implementing these measures should be determined on a site-specific basis. In many cases, it will be necessary to implement several measures simultaneously.

SITE MAP

A site map showing topographic features, prevailing wind direction, drainage and the location of buildings, containers, impoundments, pits, ponds and tanks shall be used.

The map should be prepared prior to site entry and updated throughout the course of site operations to reflect:

- Accidents.
- Changes in site activities
- Emergencies.
- Hazards not previously identified.
- New materials introduced on site.
- Vandalism.
- Weather conditions.

SITE PREPARATION

Time and effort must be spent in preparing a site for the cleanup activity to ensure that response operations go smoothly and that worker safety is protected. Site preparation can be as hazardous as site cleanup. Therefore, safety measures should be afforded the same level of care at this stage as during actual cleanup.

SITE WORK ZONES

To reduce the accidental spread of hazardous substances from the contaminated area to the clean area, contractors shall delineate the site where different types of operations will occur and control the flow of personnel among the zones.

Hazardous waste sites should be divided into as many different zones as needed to meet operational and safety objectives. For illustration, this manual describes three frequently used zones:

- **Exclusion Zone**, the contaminated area.
- **Contamination Reduction Zone** (CRZ), the area where decontamination takes place.
- **Support Zone**, the uncontaminated area where workers should not be exposed to hazardous conditions.

Delineation of these three zones should be based on sampling and monitoring results and on an evaluation of potential routes and amount of contaminant dispersion in the event of a release. Movement of personnel and equipment among these zones should be minimized and restricted to specific Access Control Points to prevent cross-contamination from contaminated areas to clean areas.

EXCLUSION ZONE

The Exclusion Zone is the area where contamination does or could occur. The primary activities performed in the Exclusion Zone are:

- Site characterization, such as mapping, photographing, and sampling.
- Installation of wells for groundwater monitoring.
- Cleanup work, such as drum movement, drum staging and materials bulking.

CONTAMINATION REDUCTION ZONE

The Contamination Reduction Zone (CRZ) is the transition area between the contaminated area and the clean area. This zone is designed to reduce the probability that the clean Support Zone will become contaminated or affected by other site hazards. The distance between the Exclusion and Support Zones provided by the CRZ, together with decontamination of workers and equipment, limits the physical transfer of hazardous substances into clean areas. The boundary between the CRZ and the Exclusion Zone is called the Hotline. The degree of contamination in the CRZ decreases as one moves from the Hotline to the Support Zone, due both to the distance and the decontamination procedures.

Decontamination procedures take place in a designated area within the CRZ called the Contamination Reduction Corridor (CRC). They begin at the Hotline. At least two lines of decontamination stations should be set up within the CRC: one for personnel and one for heavy equipment. A large operation may require more than two lines. Access into and out of the CRZ from the Exclusion Zone is through Access Control Points: one each for personnel and equipment entrance, one each for personnel and equipment exit, if feasible.

The boundary between the Support Zone and the CRZ, called the Contamination Control Line, separates the possibly low contamination area from the clean Support Zone. Access to the CRZ from the Support Zone is through two Access Control Points if feasible: one each for personnel and equipment. Personnel entering the

CRZ should be required to wear the personal protective clothing and equipment prescribed for working in the CRZ. To reenter the Support Zone, workers should remove any protective clothing and equipment worn in the CRZ, and leave through the personnel exit Access Control Point. The CRZ must be well designed to facilitate:

- Decontamination of equipment, PDS operators, personnel, and samples.
- Emergency response: transport for injured personnel (safety harness, stretcher), first-aid equipment (such as bandages, blankets, eye wash, splints, and water), containment equipment (absorbent, fire extinguisher).
- Sample packaging and preparation for on-site or off-site laboratories.
- Worker temporary rest area: toilet facilities, bench, chair, liquids, and shade. Water and other potable liquids should be clearly marked and stored properly to ensure that all glasses and cups are clean. Wash facilities to allow employees to wash before drinking. Drinking, washing, and toilet facilities should be located in a safe area where protective clothing can be removed. Facilities should be cleaned and inspected regularly. Appropriate protective measures should be taken by maintenance workers.
- Drainage of water and other liquids that are used during decontamination.
- Personnel with the CRZ should be required to maintain internal communications, line-of-sight contact with work parties, work party monitoring (e.g., for air time left, fatigue, heat stress, hypothermia), and site security.

SUPPORT ZONE

The Support Zone is the location of the administrative and other support functions needed to keep the operations in the Exclusion and Contamination Reduction Zones running smoothly. Any function that need not or cannot be performed in a hazardous or potentially hazardous area is performed here. The Command

Post Supervisor should be present in the Support Zone. Other personnel present in the Support Zone. Other personnel present will depend on the functions being performed, and may include the Project Team Leader and field team members who are preparing to enter or who have returned from the Exclusion Zone.

Personnel may wear normal work clothes within this zone. Any potentially contaminated clothing, equipment, and samples must remain in the CRZ until decontaminated.

Support Zone personnel are responsible for alerting the proper agency in the event of an emergency. All emergency telephone numbers, change for the telephone (if necessary), evacuation route maps, and vehicle keys should be kept in the Support Zone.

Support facilities are located in the Support Zone. To place these facilities, consider factors such as:

- **Accessibility**. Topography, open space available, locations of highways and railroad tracks, ease of access for emergency vehicles.
- **Resources**. Adequate roads, power lines, telephones, shelter, and water.
- **Visibility**. Line -of-sight to all activities in the Exclusion Zone.
- **Wind direction**. Upwind of the Exclusion Zone, if possible.
- **Distance**. As far from the Exclusion Zone as practicable.

THE BUDDY SYSTEM

Most activities in contaminated or otherwise hazardous areas should be conducted with a buddy who is able to:

- Provide his or her partner with assistance.
- Observe his or her partner for signs of chemical or heat exposure.
- Periodically check the integrity of his or her partner's protective clothing.
- Notify the command Post Supervisor or others if emergency help is needed.

SITE SECURITY

Site security is necessary to:

- Prevent the exposure of unauthorized, unprotected people to site hazards.
- Avoid the increased hazards from vandals or persons seeking to abandon other wastes on the site.
- Prevent theft.
- Avoid interference with safe working procedures.
- To maintain site security during working hours:
- Maintain security in the Support Zone and at Access Control Points.
- Establish and identification system to identify authorized persons and limitations to their approved activities.
- Assign responsibility for enforcing authority for entry and exit requirements.
- Erect a fence or other physical barrier around the site.
- If the site is not fenced, post signs around the perimeter and use guards to patrol the perimeter. Guards must be fully apprised of the hazards involved and trained in emergency procedures.
- Have the Project Team Leader approve all visitors to the site. Make sure they have a valid purpose for entering the site. Have trained site personnel accompany visitors at all times and provide them with the appropriate protective equipment.

To maintain site security during off-duty hours:

- If possible, assign trained, in-house technicians for site surveillance. They will be familiar with the site, the nature of the work, the site's hazards and respiratory protection techniques.

- If necessary, use security guards to patrol the site boundary. Such personnel may be less expensive than trained technicians, but will be more difficult to train in safety procedures and will be less confident in reacting to problems around hazardous substances.
- Enlist public enforcement agencies, such as the local police department, if the site presents a significant risk to local health and safety.
- Secure the equipment.

COMMUNICATIONS SYSTEMS

Two sets of communication systems should be established: internal communication among personnel on site and external communication between on-site and off-site personnel.

Internal communication is used to:

- Alert team members to emergencies.
- Pass along safety information, such as the amount of air time left before the next rest period, air change, heat stress check, etc.
- Communicate changes in the work to be accomplished.
- Maintain site control.

An external communication system between on-site and off-site personnel is necessary to:

- Coordinate emergency response.
- Report to management.
- Maintain contact with essential off-site personnel.

ATTACHMENTS

DOCUMENTATION

RELATED REFERENCE

- OSHA 29 CFR 1910.120 (d)

JSA # 06 Power Washing

JSA # 18 Refueling

JSA # 20 Support Zone Setup

JSA # 21 Soil Sampling

JSA # 31 Sifting Operation

JOB SAFETY ANALYSIS – N0. 06

CONTRACT No.		Prepared by: **Robert J. Snow Jr.**
PROJECT No.	G00071	Reviewed by: **P. David Gura**
CONTRACTOR:	MKM Engineers, Inc. 4153 Bluebonnet, Stafford, TX 77477 TEL: (281) 277-5100 FAX: (281) 277-5205	**Equipment:**
LOCATION:	Ravenna Army Ammunition Plant 8451 SR 5, Ravenna, Ohio 44266-9297	**Inspections:**
TASK:	Power Washing	**Training:**

ACTIVITIES	POTENTIAL HAZARDS	HAZARD ELIMINATION TECHNIQUES
1. Area set up	Slips, trips, falls, strains and sprains.	Make sure ground surface is level. Remove any ice or snow from the area before constructing decon area. Use proper lifting techniques at all times. Delineate the area with caution tape or hi-vis fencing and signage to keep unauthorized persons out of the area when washing operations start
2. Building the decon area	Slips, trips, falls, scrapes, abrasions, struck by or against.	Keep the work area clean of debris and unneeded equipment. Put tools away after they are used. Make sure you use a gfi when utilizing power tools. Inspect cords regularly. Get help moving heavy or awkward items. Use care when hammering nails. Always be aware of the dangers of striking you own hand or finger with the hammer. Try not to walk on poly surfaces as they can be very slippery. Delineate the area as a n exclusion zone to keep any unauthorized persons out of the area when washing operations begin.
3. Moving equipment into he decon area	Struck by or against, strains and sprains	Utilize mechanical means of moving equipment into the area. Use proper hand signals and stay in constant eye contact with the operator when utilizing mechanical means of movement. If manual means of movement are required always use proper lifting techniques and be aware of sharp edges and pointed objects. Wear gloves at all times as material may still be contaminated. Stage materials moved into the decon area on some sort of wood to keep the materials from puncturing the liner of the decon area.
4. Washing with a power washer	Struck by, cold stress, strains, sprains, slips, trips, and falls, exposure to contaminants.	Make sure the PPE is intact. Always wear goggles if a full face respirator is not required. Dress in layered clothing and stay as dry as possible at all times. Bring a change of clothing to work with you in case you get wet. Keep in mind that the poly floor will be slippery as it accumulates water on it. Keep the water level o the decon pad pumped down often to eliminate trip hazards and slip hazards. Inspect electrical cords on a daily basis. Route all cords overhead whenever possible. Do not allow electrical cords to lie in water. Poly wrap cord plugs. When spraying with the wand do not point the wand in the direction of a coworker or any part of your own body. Get help moving items that are being deconned as they may be heavy or even slippery when they are wet.
5. Moving equipment out of the decon area	Struck by or against, strains and sprains	Utilize the same hazard elimination techniques as were listed in the moving items INTO the decon area.

JOB SAFETY ANALYSIS – N0. 18

CONTRACT No.		Prepared by: **Dewey Thedford**
PROJECT No.	G00071	Reviewed by: **P. David Gura**
CONTRACTOR:	MKM Engineers, Inc. 4153 Bluebonnet, Stafford, TX 77477 TEL: (281) 277-5100 FAX: (281) 277-5205	**Equipment:**
LOCATION:	Ravenna Army Ammunition Plant 8451 SR 5, Ravenna, Ohio 44266-9297	**Inspections:**
TASK:	Refueling Equipment	**Training:**

ACTIVITIES	POTENTIAL HAZARDS	HAZARD ELIMINATION TECHNIQUES
1. Refueling equipment	Exposure to fuel compounds. Burns. Splash hazard, strains/sprains. Slips trips falls. Fire. Spilled fuel.	Proper PPE should be donned when refueling equipment. Long sleeve shirt or tyvek suit to protect your arms as well as a pair of nytril gloves or other polyurethene equivalent to protect your hands. Wear either a splash shield with safety glasses or a pair of goggles. Never refuel a piece of equipment while it is running. Allow time for the engine to cool down enough so that fuel is spilled onto the engine a fire will not be started. There should always be a ABC type fire extinguisher present at all stationary equipment as well as all refueling locations. Always use a funnel when refueling equipment unless the fuel container has a spout tube or a pump nozzle. Never refill a fuel tank completely to the top, always leave room for the cap as it may displace fuel out of the tank spilling onto the engine. Keep refueling areas clear of snow and ice. Make sure that the main site fuel tank is grounded and all refueling cans are safety cans stored at all times within the containment berm of the main site fuel tank. Use proper lifting techniques when lifting fuel cans to pour fuel into equipment. A 5 gallon can full of full can weigh as much as 35 lbs.

JOB SAFETY ANALYSIS REPORT

CONTRACT #:	DAAA09-98-G-001	Ravenna Army Ammunition Plant
MKM PROJECT #:	G00073	PAGE: 1 of 1
CONTRACTOR:	MKM Engineers, Inc. 4153 Bluebonnet, Stafford, TX 77477 TEL:(281) 277-5100 Fax: (281) 277-5205	
LOCATION:	Ravenna Army Ammunition Plant, Ravenna, Ohio	
DESCRIPTION:	Remedial Investigation	**JSA # 20**
TASK:Support Zone Setup		JSA BY: Robert J. Snow Jr.

TASK	POTENTIAL HAZARDS	HAZARD ELIMINATION TECHNIQUES
Support zone set up	Slips,trips,falls. Struck by, Caught between,	Level or grade the area utilized as a support zone to assure a level.
	Strains,sprains. Cuts/punctures. Electrical shock.	Keep area free from tripping hazards. Stay clear of machine swing
	Heat Stress.	radius, and watch for struck by and caught between hazards. Take
		breadks as needed and replenish body fluids throughout day.
		Use proper lift techniques at all times. Get help lifting objects
		in excess of 40 pounds. Keepp all electrical cords out of wet areas.
		Inspect these cords on before start of each shift.
		Utilize GFIC at all times. Make sure all structures and power
		supplies are grounded.

JOB SAFETY ANALYSIS – N0. 21

CONTRACT No.		**Reviewed by**: P.David Gura
PROJECT No.	00071	
CONTRACTOR:	MKM Engineers, Inc. 4153 Bluebonnet, Stafford, TX 77477 TEL: (281) 277-5100 FAX: (281) 277-5205	**Equipment:** Hand spatulas, sample cooler, and transport vehicle.
LOCATION:	Ravenna Army Ammunition Plant 8451 SR 5, Ravenna, Ohio 44266-9297	**Inspections: None**
TASK:	Soil Sampling	**Training:**

ACTIVITIES	POTENTIAL HAZARDS	HAZARD ELIMINATION TECHNIQUES
1. Set up the sample area	Slips, trips, falls, exposure to contaminants.	Make sure that the work area is clear of debris on the floor or ground. Be aware of slippery floor surface. Wear level D PPE consisting of dust coveralls, nitrile gloves, safety glasses, safety shoes, and hardhat. Saranex suit and full face respirator with combination cartridges.
2. Collecting the sample	Exposure to contaminants.	Make sure you are in the proper level of PPE and monitor air as stated above.
3. Loading the sample cooler	Strains.	Do not overload the sample cooler. It may become too heavy to handle by one person. Keep in mind that the lab technicians will also be handling the cooler. Use proper lift techniques at all times to avoid muscle strains.
4. Transporting sample cooler	Strains, sprains, slips, trips, falls, exposure to contaminates.	Get help lifting or moving cooler. Keep work areas and aisles clear stay out of the way of heavy equipment. Follow proper decon procedures when exiting the immediate work area and dispose of PPE at designated area.

JOB SAFETY ANALYSIS – N0. 31

CONTRACT No.		**Reviewed by:** P. David Gura.
PROJECT No.	G99039	**Date:** 09-22-00
CONTRACTOR:	MKM Engineers, Inc. 4153 Bluebonnet, Stafford, TX 77477 TEL: (281) 277-5100 FAX: (281) 277-5205	**Equipment:** Material Separator (sifter), Excavator, Front-end loader, and Dump truck.
LOCATION: **Load line 12**	Ravenna Army Ammunition Plant 8451 SR 5, Ravenna, Ohio 44266-9297	**Inspections: (1).**Perform UXO inspection and clearance of all land areas intended to be disturbed. **(2)** Inspect all heavy and process equipment before each shift to ensure that safety devices are operable and that manufacturer recommendations are followed.
TASK:	Excavate and sift soil contaminated with EO material..	**Required Training:** Only certified UXO Specialist and trained Heavy Equipment operators..

ACTIVITIES	POTENTIAL HAZARDS	HAZARD ELIMINATION TECHNIQUES
1.Mobe equipment to site and set up and service sifter equipment, and set up work area.	• Slip, trip, falls. • Pinch points/ moving mechanical parts • Falls from elevated surface	• Clear work area of tripping hazards and ensure that footing is on stable ground. • Lockout equipment before servicing unit, per SP-13. • Inspect equipment to ensure that it is operational and not in need of past due maintenance. • Wear full body harness and tie off when climbing sifter unit for servicing. • Maintain three-point contact when climbing / descending ladder at all times.
2. Schonsedet, excavate, and transport soil to sifter staging area for processing.	• Explosion • Struck by • Slip, trip, fall • Dust exposure • Fire hazard	• Perform Schonsedet test or make visual inspection by UXO personnel • Inspect equipment prior to start of shift and ensure all features are operational per SHP-26, including completion of Equipment Checklist. • Mark off swing area of excavator to avoid personnel entry into moving zone. • Use three-point contact when climbing into and out of operating cab. • Wear dust coveralls to avoid skin contact with dust • Follow proper refueling technique outlined in JSA 18.
3. Inspect staged soil for explosives	• Explosion • Struck by	• Receive UXO clearance before loading soil into sifter.

and load into sifter processor.	• Dust exposure	• Mark off loading area to avoid personnel entry into operating equipment zone.
4. Operate Sifter to cultivate and separate soil by particle size.	• Caught between (Pinch points) • Dust exposure • Noise	• Keep hands and feet out of moving mechanical parts (i.e. conveyor belts, schredder blades, etc.). • Wear dust coveralls for skin protection. • Wear earplugs when operating Sifter.
5. Transport processed soil in dump truck to designated stockpile area for sampling.	• Struck by • Dust exposure • Slips, Trips, Falls.	• Mark off loading area to avoid personnel entry .into moving zone. • Wear dust coveralls to avoid skin contact.

HERCULES -- TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM
MATERIAL SAFETY DATA SHEET
NSN: 137600N018210
Manufacturer's CAGE: 2D881
Part No. Indicator: A
Part Number/Trade Name: TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM

General Information

Company's Name: HERCULES INCORPORATED
Company's Street: RADFORD ARMY AMMUNITION PLANT
Company's City: RADFORD
Company's State: VA
Company's Country: US
Company's Zip Code: 24141
Company's Emerg Ph #: 703-639-7294
Company's Info Ph #: 703-639-7294
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 02JUL91
Safety Data Review Date: 10SEP91
MSDS Serial Number: BKZPP
Hazard Characteristic Code: E1

Ingredients/Identity Information

Proprietary: NO
Ingredient: 2,4,6-TRINITROTOLUENE (TNT)
Ingredient Sequence Number: 01
Percent: 99
NIOSH (RTECS) Number: XU0175000
CAS Number: 118-96-7
OSHA PEL: S, 1.5 MG/M3
ACGIH TLV: S, 0.5 MG/M3; 9293

Physical/Chemical Characteristics

Appearance And Odor: FLAKES, PALE YELLOW IN COLOR.
Boiling Point: 464F,240C
Vapor Density (Air=1): N/A
Specific Gravity: 1.5-1.6
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: 0.01% @ 25C
Percent Volatiles By Volume: <0.1

Fire and Explosion Hazard Data

Flash Point: EXPLODES
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: DELUGE WITH WATER-USE LARGE QUANTITIES.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). EVACUATE THE AREA.
Unusual Fire And Expl Hazrds: HIGHLY DANGEROUS-SHOCK WILL EXPLODE IT. WILL DETONATE IF CONFINED AND EXPOSED TO EXTRME HEAT.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): AVOID CONTACT WITH ALKALINE MATERIALS. WILL DETONATE IF CONFINED AND EXPOSED TO EXTREME HEAT.
Materials To Avoid: SODIUM HYDROXIDE, POTASSIUM HYDROXIDE AND OTHER HIGHLY

ALKALINE MATERIALS.
Hazardous Decomp Products: NOX.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ALLERGENIC, CAN CAUSE DERMATITIS. DISCOLOR SKIN AND HAIR PALE YELLOW. CAUSES NAUSEA, VOMITING AND ANOREXIA ALSO LIVER AND BLOOD DAMAGE, AND APLASTIC ANEMIA.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE:IMEEDIATELY FLUSH THOROUGHLY WITH LARGE AMOUNTS OF LOW PRESSURE WATER FOR AT LEAST 25 MINUTES. REMOVE CONTACT LENSES TO ASSURE THOROUGH FLUSHING. CALL MD. SKIN:WASH WITH TNT INDICATOR SOAP AND RUNNING WATER. INHAL:REMOVE TO FRESH AIR. TREAT ANY IRRITATION SYMPTOMATICALLY. CALL MD. INGEST:CALL MD IMMEDIATELY (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: CLEAN UP SPILL IMMEDIATELY USING A SOFT BRISTLE BRUSH AND A CONDUCTIVE RUBBER OR PLASTIC SHOVEL.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: BURN ON OPEN BURNING GROUND IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. MAY ALSO BE BURNED IN AN INCINERATOR APPROVED FOR EXPLOSIVES. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).
Precautions-Handling/Storing: NONE SPECIFIED BY MANUFACTURER.
Other Precautions: NONE SPECIFIED BY MANUFACTURER.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR FOR DUSTS.
Ventilation: MECHANICAL (GENERAL) VENTILATION.
Protective Gloves: COTTON OR LEATHER GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: FLAME-PROOF COVERALLS AND CONDUCTIVE SHOES.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Trans Data Review Date: 91294
DOT PSN Code: EEL
DOT Proper Shipping Name: CYCLOTETRAMETHYLENETETRANITRAMINE, WETTED OR HMX, WETTED OR OCTOGEN, WETTED
DOT Class: 1.1D
DOT ID Number: UN0226
DOT Pack Group: II
DOT Label: EXPLOSIVE 1.1D
IMO PSN Code: PBV
IMO Proper Shipping Name: TRINITROTOLUENE
IMO Regulations Page Number: 1144
IMO UN Number: 0209
IMO UN Class: 1.1 D
IMO Subsidiary Risk Label: -

ENSIGN-BICKFORD -- DESENSITIZED RDX
MATERIAL SAFETY DATA SHEET
NSN: 685000N019215
Manufacturer's CAGE: 0B2N1
Part No. Indicator: A
Part Number/Trade Name: DESENSITIZED RDX

General Information

Company's Name: ENSIGN-BICKFORD COMPANY
Company's Street: 660 HOPMEADOW STREET
Company's City: SIMSBURY
Company's State: CT
Company's Country: US
Company's Zip Code: 06070
Company's Emerg Ph #: 203-658-4411
Company's Info Ph #: 203-658-4411
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 18DEC90
Safety Data Review Date: 12JUL95
MSDS Preparer's Name: E L STEARNS
Preparer's Company: SAME
MSDS Serial Number: BLCSK
Hazard Characteristic Code: E1

Ingredients/Identity Information

Proprietary: NO
Ingredient: CYCLONITE
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: XY9450000
CAS Number: 121-82-4
OSHA PEL: S, 1.5 MG/M3
ACGIH TLV: S, 1.5MG/M3; 9192

Physical/Chemical Characteristics

Appearance And Odor: ODORLESS CRYSTALLINE SOLID W/COLOR RANGING FROM WHITE TO GREY DEPEND (SUPP DATA)
Boiling Point: N/A
Melting Point: 400F,204C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.82
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: N/A

Fire and Explosion Hazard Data

Flash Point: NOT APPLICABLE
Extinguishing Media: NONE. SEE SPECIAL FIRE PROCEDURES.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). DO NOT FIGHT FIRES WHERE RDX IS PRESENT. ISOLATE AREA. EVACUATE PERSONNEL TO A SAFE AREA.
Unusual Fire And Expl Hazrds: WILL DETONATE IF SUITABLY PRIMED WITH SEVERE IMPACT OR BY HEAT OR FLAME. HAZARDOUS GASES PRODUCED IN FIRE ARE NOX.

Reactivity Data

IATA PSN Code: YYG
IATA UN ID Number: 0209
IATA UN Class: 1.1D
AFI PSN Code: XSI
AFI Prop. Shipping Name: TETRAHYDROFURAN
AFI Class: 3
AFI ID Number: UN2056
AFI Pack Group: II
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 10SEP91
Label Date: 10SEP91
Label Status: G
Common Name: TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-Severe: X
Reactivity Hazard-Severe: X
Special Hazard Precautions: ACUTE:CAUSES NAUSEA, VOMITING, AND ANOREXIA. DO NOT BREATHE VAPORS OR SWALLOW MATERIAL. USE WITH ADEQUATE VENTILATION. CAN CAUSE SKIN IRRITATION. AVOID CONTACT WITH EYES, SKIN, AND CLOTHING. TARGET ORGANS:CAN CAUSE DERMATITIS, LIVER AND BLOOD DAMAGE. AN ALLERGEN.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: HERCULES INCORPORATED
Label Street: RADFORD ARMY AMMUNITION PLANT
Label City: RADFORD
Label State: VA
Label Zip Code: 24141
Label Country: US
Label Emergency Number: 703-639-7294

Stability: YES
Cond To Avoid (Stability): BECOMES UNSTABLE WITH EXPOSURE TO EXTREME HEAT, IMPACT, OR ELECTROSTATIC DISCHARGE.
Materials To Avoid: NO KNOWN CHEMICAL INCOMPATIBILITIES.
Hazardous Decomp Products: HAZARDOUS FUMES PRODUCED ARE NOX.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: EYE & SKIN: NONE. INHAL: RDX POISONING VIA UNKNOWN.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: NONE SPECIFIED BY MANUFACTURER.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. SKIN: WASH WITH SOAP AND WATER. INHAL: IF DETONATION FUMES ARE INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION, PREFERABLE MOUTH TO MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL MD. INGEST: INDUCE VOMITING IMMEDIATELY BY GIVING TWO GLASSES OF WATER AND STICKING FINGER DOWN THROAT.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REVIEW FIRE & EXPLOSION HAZARDS AND SAFETY PRECAUTIONS BEFORE PROCEEDING WITH CLEAN UP. USE APPROPRIATE PERSONAL PROTECTION DURING CLEAN UP. MOP UP WITH WATER.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: CONSULT AN EXPLOSIVES MANUFACTURER FOR RECOMMENDED METHODS FOR DESTROYING EXPLOSIVE MATERIALS. COMPLY WITH APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: TRANSPORTATION AND STORAGE MUST BE IN COMPLIANCE WITH STATE AND FEDERAL REGULATIONS.
Other Precautions: REFER TO MANUFACTURER'S INSTRUCTIONS AND WARNINGS SUPPLIED WITH PRODUCT.

Control Measures

Respiratory Protection: FILTER RESPIRATOR: NIOSH/MSHA APPROVED DUST RESPIRATOR. AVOID DUSTING BY KEEPING WET WHEN POSSIBLE.
Ventilation: NOT APPLICABLE.
Protective Gloves: BUTYL GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: NONE.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: APPEAR & ODOR: ON WAX AND/OR GRAPHITE CONTENT.

Transportation Data

Trans Data Review Date: 91317
DOT PSN Code: EEL
DOT Proper Shipping Name: CYCLOTETRAMETHYLENETETRANITRAMINE, WETTED OR HMX, WETTED OR OCTOGEN, WETTED
DOT Class: 1.1D
DOT ID Number: UN0226
DOT Pack Group: II

DOT Label: EXPLOSIVE 1.1D
IMO PSN Code: EZS
IMO Proper Shipping Name: CYCLOTRIMETHYLENETRINITRAMINE, DESENSITIZED
IMO Regulations Page Number: 1106
IMO UN Number: 0483
IMO UN Class: 1.1 D
IMO Subsidiary Risk Label: -
IATA PSN Code: IBH
IATA UN ID Number: 0483
IATA UN Class: 1.1D
AFI PSN Code: IBH
AFI Symbols: T
AFI Prop. Shipping Name: CYCLOTRIMETHYLENETRINITRAMINE, CYCLONITE, HEXOGEN, OR RDX, DESENSITIZED
AFI Class: 1.1D
AFI ID Number: UN0483
AFI Pack Group: II
AFI Basic Pac Ref: 5-42

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 01OCT91
Label Date: 01OCT91
Label Status: G
Common Name: DESENSITIZED RDX
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-None: X
Fire Hazard-None: X
Reactivity Hazard-Moderate: X
Special Hazard Precautions: ACUTE: POISONING POSSIBLE VIA THE RESPIRATORY SYSTEM CAN RESULT IN CNS IRREGULARITY. AVOID BREATHING DUSTS. DO NOT BREATHE FUMES FROM DETONATION. WILL DETONATE IF PRIMED WITH SEVERE IMPACT OR BY HEAT OR FLAME. KEEP AWAY FROM HEAT AND FLAME. DO NOT DROP. DO NOT FIGHT FIRES WHERE THIS PRODUCT IS PRESENT. CHRONIC: POSSIBLE RDX POISONING.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ENSIGN-BICKFORD COMPANY
Label Street: 660 HOPMEADOW STREET
Label City: SIMSBURY
Label State: CT
Label Zip Code: 06070
Label Country: US
Label Emergency Number: 203-658-4411

ENSIGN-BICKFORD -- HMX;OCTOGEN;SUPERFINE BETA HMX - HIGH EXPLOSIVE MATE
MATERIAL SAFETY DATA SHEET
NSN: 1376009084218
Manufacturer's CAGE: 96336
Part No. Indicator: A
Part Number/Trade Name: HMX;OCTOGEN;SUPERFINE BETA HMX

General Information

Item Name: HIGH EXPLOSIVE MATE
Company's Name: ENSIGN-BICKFORD COMPANY
Company's Street: 660 HOPMEADOW STREET
Company's City: SIMSBURY
Company's State: CT
Company's Country: US
Company's Zip Code: 06070
Company's Emerg Ph #: 203-658-4411 OR 203-843-2276
Company's Info Ph #: 203-658-4411 OR 203-843-2276
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 21MAR91
Safety Data Review Date: 09MAR92
Supply Item Manager: CX
MSDS Preparer's Name: TA SHREVE
MSDS Serial Number: BNQCH
Hazard Characteristic Code: NK
Net Explosive Weight: .100000

Ingredients/Identity Information

Proprietary: NO
Ingredient: CYCLOTETRAMETHYLENETETRANITRAMINE
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: XF7450000
CAS Number: 2691-41-0
OSHA PEL: NOT KNOWN
ACGIH TLV: NOT KNOWN
Other Recommended Limit: NOT KNOWN

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS,ODORLESS CRYSTALS.
Boiling Point: SEE SUPP
Melting Point: 527F,275C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: BETA 1.96,H*2=1
Decomposition Temperature: NOT KNOWN
Evaporation Rate And Ref: N/A
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100
Autoignition Temperature: ADDATA

Fire and Explosion Hazard Data

Flash Point: NOT KNOWN
Lower Explosive Limit: NOT KNOWN
Upper Explosive Limit: NOT KNOWN
Extinguishing Media: NONE
Special Fire Fighting Proc: DO NOT FIGHT FIRES INVOLVING HMX.HIGHLY EXPLOSIVE AND MAY DETONATE WHEN EXPOSED TO HEAT OR FLAMES.ISOLATE AREA AND

EVACUATE ALL PERSONNEL TO DISTANT,SAFE AREA.
Unusual Fire And Expl Hazrds: HIGHLY EXPLOSIVE.EXPOSURE TO SHOCK,HEAT, IMPACT,SPARKS,FRICTION MAY DETONATE.BURNS VIGOROUSLY IN FIRE.EXPLOSIVE TEMPERATURE:621F,327C.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): EXPOSURE TO SHOCK,HEAT,SPARKS,PRESSURE OR IMPACT MAY RESULT IN DETONATION.
Materials To Avoid: STRONG ACIDS,OXIDANTS AND ALKALIES.REACTS VIGOROUSLY WITH REDUCING AGENTS.
Hazardous Decomp Products: HAZARDOUS GASES (NITROGEN OXIDES) MAY BE RELEASED WHEN HMX BURNS OR DETONATES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): WILL NOT OCCUR

Health Hazard Data

LD50-LC50 Mixture: LD50 MOUSE ORAL 1500 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: PROLONGED OR REPEATED EXPOSURE MAY CAUSE ECZEMA.EXCESSIVE INHALATION MAY RESULT IN CARDIOVASCULAR COLLAPSE. OVEREXPOSURE BY INGESTION WILL RESULT IN DEATH.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: EYES:MAY CAUSE IRRITATION,POSSIBLE CORNEAL INJURY. SKIN:PROLONGED OR REPEATED EXPOSURE MAY CAUSE IRRITATION. INGESTION:MAY CAUSE GASTROINTESTINAL IRRITATION. INHALATION:MAY CAUSE NASAL AND RESPIRATORY IRRITATION.
Med Cond Aggravated By Exp: NOT KNOWN
Emergency/First Aid Proc: EYES:FLUSH IMMEDIATELY W/ RUNNING WATER FOR AT WASH THOROUGHLY W/ SOAP & WATER FOR AT LEAST 15 MINUTES.IF IRRITATION OCCURS,GET MEDICAL ATTN. INGESTION:INDUCE VOMITING IMMEDIATELY BY STICKING FINGER DOWN VICTIM'S THROAT.GET IMMEDIATE MEDICAL ATTN. INHALATION:GET TO FRESH AIR.GIVE ARTIFICIAL RESPIRATION IF BREATHING STOPPED.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ISOLATE AREA.ELIM ALL IGNIT SOURCES.EVAC ALL NON-ESSENTIAL PERS TO SAFE,DISTANT AREA.REMOVE ALL EXPLOSIVES NOT INVOLVED IN SPILL FROM AREA.CAREFULLY COLLECT SPILL,AVOIDING EXCESS FRICTION/IMPACT. PLACE IN PLASTIC BAG.CONTAM W/ DIRT,ETC. (SEE SUPP)
Neutralizing Agent: NOT KNOWN
Waste Disposal Method: DISP MUST BE IAW FED,STATE,& LOC REGS.COORDINATION W/ SUPPORTING INSTALLATION/MACOM ENVIRONMENTAL COORDINATION PRIOR TO DISP IS REC TO DETERM APPROPRIATE DISP METH (FP A).REC METHOD OF DISPOSAL OF WASTE EXPLOSIVES IS OPEN BURNING OR OPEN DETONATION.
Precautions-Handling/Storing: HANDLE AND STORE IAW ALL APPLICABLE REGULATIONS AND INDUSTRY PRACTICES PERTAINING TO CLASS A EXPLOSIVES.HMX SHOULD BE HANDLED WET WHENEVER POSSIBLE.
Other Precautions: EXPOSURE TO SHOCK,HEAT,SPARKS,PRESSURE OR IMPACT MAY RESULT IN DETONATION.HANDLING ONLY BY INDIVIDUALS FAMILIAR WITH PROPER EXPLOSIVE HANDLING PROCEDURES.AVOID DUSTING BY KEEPING THE HMX WET WHEN POSSIBLE.

Control Measures

Respiratory Protection: NIOSH APPROVED DUST RESPIRATOR SHOULD BE WORN WHEN HANDLING HMX.

Ventilation: LOCAL EXHAUST RECOMMENDED TO MINIMIZE EMPLOYEE EXPOSURE.
Protective Gloves: BUTYL RUBBER
Eye Protection: CHEMICAL SAFETY GOGGLES.
Other Protective Equipment: COTTON OR ANIT-STATIC COVERALLS WHICH WILL PROTECT AGAINST POWDER SPLASHES.
Work Hygienic Practices: REPLACE COVERALLS WHEN CONTAMINATED.
Suppl. Safety & Health Data: BOILING POINT:HMX DEFLAGRATES AT 549F,287C. SPILL PROC:RENDERS IT MORE SENSITIVE TO DETONATION.IF POSSIBLE,SEPARATE UNCONTAMINATED MATERIAL FROM CONTAMINATED MATERIAL.STORE COLLECTED MATERIAL FOR PROPER DISPOSAL.

Transportation Data

Trans Data Review Date: 92345
DOT PSN Code: EEL
DOT Proper Shipping Name: CYCLOTETRAMETHYLENETETRANITRAMINE, WETTED OR HMX, WETTED OR OCTOGEN, WETTED
DOT Class: 1.1D
DOT ID Number: UN0226
DOT Pack Group: II
DOT Label: EXPLOSIVE 1.1D
IMO PSN Code: ICJ
IMO Proper Shipping Name: HEXOGEN, WETTED
IMO Regulations Page Number: 1106
IMO UN Number: 0072
IMO UN Class: 1.1 D
IMO Subsidiary Risk Label: -
IATA PSN Code: NLP
AFI PSN Code: NLP
Additional Trans Data: HMX DEFLAGRATES @ 287C (549F). U.S. ARMY REPORTS AN AUTOIGNITION TEMPERATURE OF 234C (453F).

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 09MAR92
Label Date: 27FEB92
MFR Label Number: NOT KNOWN
Label Status: F
Common Name: HMX;OCTOGEN;SUPERFINE BETA HMX
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Slight: X
Fire Hazard-Severe: X
Reactivity Hazard-Severe: X
Special Hazard Precautions: CLASS A HIGH EXPLOSIVE.MAY DETONATE WHEN EXPOSED TO HEAT,FLAMES,SHOCK,IMPACT,FRICTION.HANDLE HMX WET WHENEVER POSSIBLE. ACUTE:EYES:MAY CAUSE IRRITATION,POSSIBLE CORNEAL INJURY. INGESTION:MAY CAUSE IRRITATION.OVEREXPOSURE WILL RESULT IN DEATH.WASH THOROUGHLY AFTER HANDLING. INHALATION:MAY CAUSE IRRITATION.EXCESS INHALATION MAY RESULT IN CARDIOVASCULAR COLLAPSE. CHRONIC:SKIN:PROLONGED OR REPEATED EXPOSURE MAY CAUSE IRRITATION & ECZEMA. FIRST AID:INGESTION:INDUCE VOMITING IMMEDIATELY BY STICKING FINGER DOWN VICTIM'S THROAT.SEEK IMMEDIATE MEDICAL ATTENTION.INHALATION:GET TO FRESH AIR.GIVE ARTIFICIAL RESPIRATION IF BREATHING STOPPED.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ENSIGN-BICKFORD COMPANY
Label Street: 660 HOPMEADOW STREET
Label City: SIMSBURY

Label State: CT
Label Zip Code: 06070
Label Country: US
Label Emergency Number: 203-658-4411 OR 203-843-2276

ALPHA METALS -- 81 SOLDER ALLOYS OF LEAD-TIN-SILVER-BISMUTH- - SOLDER,LEAD ALLOY
MATERIAL SAFETY DATA SHEET
NSN: 3439000038601
Manufacturer's CAGE: 96613
Part No. Indicator: A
Part Number/Trade Name: 81 SOLDER ALLOYS OF LEAD/TIN/SILVER/BISMUTH/
ANTIMONY/INDIUM

General Information

Item Name: SOLDER,LEAD ALLOY
Company's Name: ALPHA METALS
Company's Street: 600 ROUTE 440
Company's City: JERSEY CITY
Company's State: NJ
Company's Country: US
Company's Zip Code: 07304
Company's Emerg Ph #: 201-434-6778/800-424-9300(CHEMTREC)
Company's Info Ph #: 201-434-6778
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 03MAR91
Safety Data Review Date: 04MAR96
Supply Item Manager: CX
MSDS Serial Number: BYFKF
Specification Number: QQ-S-571
Spec Type, Grade, Class: SN10WRP2 0.028LB
Hazard Characteristic Code: N1

Ingredients/Identity Information

Physical/Chemical Characteristics

Appearance And Odor: SILVER-GRAY METAL, ODORLESS, VARIOUS SHAPES & SIZES.
Boiling Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: NA-COMPO VARIES
Evaporation Rate And Ref: N/A
Solubility In Water: INSOLUBLE.
Percent Volatiles By Volume: N/A
pH: N/A

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: PER MSDS NOT APPLICABLE HOWEVER USE APPROPRIATE FIRE EXTINGUISHING MEDIA FOR SURROUNDING FIRE/MATLS.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS & FYULL PROTECTIVE CLOTHING IF INVOLVED IN FIRE.
Unusual Fire And Expl Hazrds: MODERATE IN THE FORM OF DUST WHEN EXPOSED TO HEAT OR FLAME. WHEN HEATED TO HIGH TEMPS, LEAD EMITS HIGHLY TOXIC FUMES.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NOT APPLICABLE
Materials To Avoid: OXIDIZING MATERIALS, ACIDS, HYDROGEN PEROXIDE >52%.
Hazardous Decomp Products: LEAD OXIDE/ANTIMONY OXIDE FUMES EVOLVED.

Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: PB:HIGH LEVELS AIRBORNE EXPO/INGEST MAY PRODUCE SMPTOMS-ANEMIA,INSOMNIA,WEAK,CONSTIPATION,NAU,ABD PAIN.OVEREXPO MAY CUASE DMG TO BLOOD-FORMING,NERV,REPROD,INTESINAL,URINARY SYS.CHRONIC TOXICITY:WOMEN OF CHILD BEARING AGE SHOULD AVOID EXPO TO LEAD/ITS INORG CMPDS DUE TO POST-NATAL EFFECTS.CAN CAUSE POTENTIAL (SUPPLEMEN)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: PER MSDS:IARC CLASSIFIES LEAD/SOME LEAD CMPDS AS 2B CARCINOGENSPB-.KNOWN TO STATE OF CA CAUSE BIRTH DEFECTS/REPROD HARM.
Signs/Symptoms Of Overexp: ANEMIA,INSOMNIA,WEAK,CONSTIPATION,NAU,ABD PAIN,BLOOD-FORMING/NERV/REPROD/GI/URINARY SYS DMG;SKIN/MUC MEMB IRRIT, BENIGN PNEUMOCONIOSIS(STANNOSIS);EYE/SKIN(ARGYRIA)DISCOLOR.FOUL BREAHT, BLUE-BLK LINE ON GUMS,STOMATITIS;GI UPSET,SLEEPLESSNESS,IRRITY,MUSC PAIN, RESP TRACT IRRIT,METALLIC TASTE,KID/LIV/CNS DMG;PULM EDEMA.
Med Cond Aggravated By Exp: DISEASE OF THE BLOOD & BLOOD-FORMING ORGANS, KIDNESY, NERVOUS, POSSIBLY REPRODUCTIVE SYSTEMS.
Emergency/First Aid Proc: INHAL:LEAD EXCESSIVE OVEREXPO MAY RESULT IN ACUTE/CHRONIC ILLNESS SYMPTOMS PRESENT REMOVE FROM EXPO.CONSULT PHYSICIAN. INGEST:CALL PHYSICIAN/POISON CNTRL CNTNR @ONCE. SKIN:HOT METAL BURNS COOL EXPO AREA W/WATER.SEEK MED ATTN.DUST VAP/FUME NOT READILY ABSORBED THRU SKIN. EYE:FLUSH W/WATER.CONTACT PHYSICIAN.DUST/FUME IRRIT.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: AVOID SOLDER FUME/DUST INHAL.VACUUMING/ WASHING RECOMMENDED.DO NOT USE DRY SWEEPING/COMPRESSED AIR CLEANING SYSTEMS.
Neutralizing Agent: NOT APPLICABLE
Waste Disposal Method: SCRAP/WASTE SOLDER SHOULD BE RECYCLED/STORED IN SEALED CNTNRS FOR LATER DISPOSAL.DISPOSAL MUST BE IAW FED/STATE/LOC LAWS/ REGS. CONTAINS COMPONENTS THAT MAY BE PRESENT @LEVEL WHICH COULD REQUIRE REPORTING UNDER SARA TITLE III SEC 313:LB,SB,AG.
Precautions-Handling/Storing: FOOD/DRINK SHOULD NOT BE CONSUMED/TOBACCO PRODUCTS USED/COSMETICS APPLIED IN AREAS WHERE SOLDER MAY BE USED.KEEP OUT OF REACH OF CHILDREN.
Other Precautions: DO NOT TAKE INTERNALLY.SINCE EMPTY CNTNR MAY RETAIN RESIDUE(VAP/LIQ/SOLID)ALL LABEL HAZ PRECAUT MUST BE OBSERVE.FOR INDUSTRIAL USE ONLY.FOR OVERVIEW OF EFFECTS OF LEAD EXPO CONSULT OSHA APPENDIX A OCCUPATIONAL EXPO TO LEAD (29CFR 1910.1025)

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED DUST/FUME RESP SHOULD BE WORN WHERE AIRBORNE E

Transportation Data

Disposal Data

Label Data

Label Required: YES

Label Status: G
Common Name: 81 SOLDER ALLOYS OF LEAD/TIN/SILVER/BISMUTH/
ANTIMONY/INDIUM
Special Hazard Precautions: PB:HIGH LEVELS AIRBORNE EXPO/INGEST MAY
PRODUCE SMPTOMS-ANEMIA,INSOMNIA,WEAK,CONSTIPATION,NAU,ABD PAIN.OVEREXPO MAY
CUASE DMG TO BLOOD-FORMING,NERV,REPROD,INTESINAL,URINARY SYS.CHRONIC
TOXICITY:WOMEN OF CHILD BEARING AGE SHOULD AVOID EXPO TO LEAD/ITS INORG
CMPDS DUE TO POST-NATAL EFFECTS.CAN CAUSE POTENTIAL (SUPPLEMEN)ANEMIA,
INSOMNIA,WEAK,CONSTIPATION,NAU,ABD PAIN,BLOOD-FORMING/NERV/REPROD/GI/
URINARY SYS DMG;SKIN/MUC MEMB IRRIT,BENIGN PNEUMOCONIOSIS(STANNOSIS);EYE/
SKIN(ARGYRIA)DISCOLOR.FOUL BREAHT,BLUE-BLK LINE ON GUMS,STOMATITIS;GI
UPSET,SLEEPLESSNESS,IRRITY,MUSC PAIN,RESP TRACT IRRIT,METALLIC TASTE,KID/
LIV/CNS DMG;PULM EDEMA.
Label Name: ALPHA METALS
Label Street: 600 ROUTE 440
Label City: JERSEY CITY
Label State: NJ
Label Zip Code: 07304
Label Country: US
Label Emergency Number: 201-434-6778/800-424-9300(CHEMTREC)

RED BIRD SERVICE -- ARSENIC STANDARD 1000 PPM, A-270
MATERIAL SAFETY DATA SHEET
NSN: 681000N059534
Manufacturer's CAGE: 0H0Z7
Part No. Indicator: A
Part Number/Trade Name: ARSENIC STANDARD 1000 PPM, A-270

General Information

Company's Name: RED BIRD SERVICE
Company's Street: 205 WESTERN AVE
Company's City: OSGOOD
Company's State: IN
Company's Country: US
Company's Zip Code: 47037
Company's Emerg Ph #: 800-424-9300(CHEMTREC)
Company's Info Ph #: 800-428-3502
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 11JUL91
Safety Data Review Date: 17MAY95
MSDS Preparer's Name: GENE C FEITH
Preparer's Company: SAME
MSDS Serial Number: BXJMY

Ingredients/Identity Information

Proprietary: NO
Ingredient: ARSENIC TRIOXIDE (SARA 302/313) (CERCLA) (MFR CAS # 1327-53-2)
Ingredient Sequence Number: 01
Percent: 0.13
NIOSH (RTECS) Number: CG3325000
CAS Number: 1327-53-3
OSHA PEL: SEE 1910.1018
ACGIH TLV: 0.01 MG/M3, A1; 9495

Proprietary: NO
Ingredient: SODIUM HYDROXIDE (CERCLA)
Ingredient Sequence Number: 02
Percent: <1
NIOSH (RTECS) Number: WB4900000
CAS Number: 1310-73-2
OSHA PEL: 2 MG/M3
ACGIH TLV: C 2 MG/M3; 9495

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 03
Percent: BALANCE
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Physical/Chemical Characteristics

Appearance And Odor: A CLEAR, COLORLESS LIQUID WITH NO ODOR.
Boiling Point: 212F,100C
Melting Point: 32.0F,0.0C
Vapor Pressure (MM Hg/70 F): 14 (H*2O)
Vapor Density (Air=1): 0.7 (H*2O)
Specific Gravity: 1 (H*2O = 1)
Evaporation Rate And Ref: (H*2O = 1):1

Solubility In Water: COMPLETE
Percent Volatiles By Volume: 99

Fire and Explosion Hazard Data

Flash Point: NON FLAMMABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: USE THAT WHICH IS APPROPRIATE FOR THE SURROUNDING FIRE.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: CONTACT WITH ACIDS, OXIDIZERS, BROMINE OXIDE, ZINC, CHROMIUM TRIOXIDE AND SODIUM PEROXIDE.
Hazardous Decomp Products: TOXIC FUMES OF ARSENIC.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: LD50 (HUMAN,ORAL) 1430 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: LESIONS TO SKIN AND MUCOUS MEMBRANES. NERVOUS AND RESPIRATORY SYSTEM DAMAGE. DISORDERS TO CIRCULATORY SYSTEM AND LIVER. PERIPHERAL NEUROPATHY, HEARING LOSS AND DEATH. DEPRESSION OF BONE MARROW WITH HYPOPLASMIC ANEMIA. EYE CONTACT MAY CAUSE IRRITATION OR MINOR BURNS IF NOT REMOVE PROMPTLY. INHALATION(EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: ARSENIC TRIOXIDE:IARC MONOGRAPHS, SUPPLEMENT. VOL 7,PG:100, YR:1987. GROUP 1. NTP 7TH ANNUAL RPT ON CARCINOGENS,(SUPDAT)
Signs/Symptoms Of Overexp: HLTH HAZ:MAY CAUSE COUGHING, DYSPNEA OR CHEST PAIN. INGESTION CAUSES IRRITATION OF MUCOUS MEMBRANES, WEAKNESS AND LOSS OF APPETITE, AND GASTROINTESTINAL DISTRUBANCES. OVERDOSE CAN CAUSE ARSENIC POISONING BUT SYMPTOMS ARE DELAYED.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE: FLUSH WITH RUNNING H*2O FOR AT LEAST 15-MIN, INCLUDING UNDER EYELIDS. GET MED ATTENTION. SKIN: WASH WELL WITH GIVE SEVERAL GLASSES OF H*2O & INDUCE VOMITING BY STICKING FINGER DOWN THROAT. DO NOT GIVE LIQUIDS TO UNCONSCIOUS PERSON. CONTACT MD IMMED.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ABSORB ON SUITABLE MATERIAL AND PLACE IN A CONTAINER FOR HAZARDOUS WASTE DISPOSAL OF ARSENIC.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE OF IN A MANNER TO SATISFY ALL STATE, FEDERAL AND LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN WELL CLOSED CONTAINERS AT NORMAL ROOM TEMP. MATERIAL MAY HAVE TO BE ISOLATED FROM NORMAL WORK AREAS DUE TO ITS CARCINOGENIC POSSIBILITIES.
Other Precautions: DO NOT EAT, DRINK OR SMOKE IN AREAS OF STORAGE OR USE.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N). A NIOSH/MSHA APPROVED RESPIRATOR MAY BE REQUIRED TO MEET TLV IF MISTING IS PRESENT OR IF SOLUTION IS EVAPORATED TO DRYNESS CAUSING A DUST SITUATION.
Ventilation: GENERAL AND/OR LOCAL EXHAUST.
Protective Gloves: RUBBER GLOVES.
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: ANSI APPRVD EMER EYE WASH & DELUGE SHOWER (FP N). CNTCT LENSES POSE SPECIAL HAZ; SOFT LENSES ABSORB & LENSES CONC IRRIT.
Work Hygienic Practices: LAUNDER ALL CONTAMINATED CLOTHING BEFORE REUSE. WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: EXPLAN OF CARCIN: 1994:. KNOWN TO BE CARCINOGENIC.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 17MAY95
Label Date: 17MAY95
Label Status: G
Common Name: ARSENIC STANDARD 1000 PPM, A-270
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: MAY PRODUCE TOXIC FUMES OF ARSENIC UPON DECOMP. ACUTE:LESIONS TO SKIN & MUCOUS MEMBRANES. NERVOUS & RESP SYSTEM DAMAGE. DISORDERS TO CIRCULATORY SYSTEM & LIVER. PERIPHERAL NEUROPATHY, HEARING LOSS & DEATH. DEPRESS OF BONE MARROW WITH HYPOPLASMIC ANEMIA. EYE CONTACT MAY CAUSE IRRITATION/MINOR BURNS IF NOT REMOVE PROMPTLY. INHALATION MAY CAUSE COUGHING, DYSPNEA/CHEST PAIN. INGESTION CAUSES IRRITATION OF MUCOUS MEMBRANES, WEAKNESS & LOSS OF APPETITE, & GASTROINTESTINAL DISTURBANCES. OVERDOSE CAN CAUSE ARSENIC POISONING BUT SYMPTOMS ARE DELAYED. CHRONIC:CANCER HAZARD. CONTAINS ARSENIC TRIOXIDE WHICH IS LISTED AS A SKIN & LIVER CARCINOGEN (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: RED BIRD SERVICE
Label Street: 205 WESTERN AVE
Label City: OSGOOD
Label State: IN
Label Zip Code: 47037
Label Country: US
Label Emergency Number: 800-424-9300(CHEMTREC)

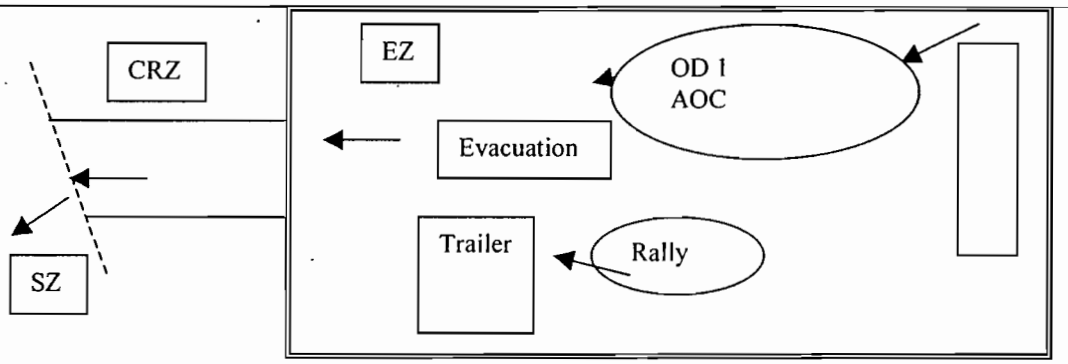
I. EMERGENCY RESPONSE: In the event of any type of incident (fire, accident, etc.), the following plan will be implemented at this project site.

EMERGENCY EVENT	FIRST ACTION	THEN DO THIS
Fire or Explosion	Call (330) 358-2017	Sound alarm, evacuate non-essential personnel, Response Team report to On-Scene Commander.
Chemical Release	Call (330) 358-2017	Contain spill or release. If life threatening, evacuate area, remove victims clothing, douse victim with water
Medical assistance	Call (330) 358-2017	Ensure clear access to the area, begin cpr if qualified
Tornado	Call (330) 358-2017	Evacuate to designated tornado shelter area
Intruder / wild animal	Call (330) 358-2017	Avoid direct confrontation with person or animal. Notify SQCO

	CONTACT LIST - please notify contacts in the order as they are listed	
1.	**Emergency-** Main Gate Security	(330) 358-2017
2.	**Site First Aid/CPR** – Brian Stockwell	(Office) 358-2920
3.	**MKM Safety Director** – P. David Gura	(Office) 358-1717 (Cell) (330) 352-1473
4.	**MKM Site Superintendent** – Dewey Thedfore	(Office) 358-2218 (Cell) (330) 352-7675
5.	**Project Manager** – Srini Neralla	(Office) 358-2202 (Cell) (281) 703-1582
6.	**RVAAP Env. Manager** – Mark Patterson	358-7311
7.	**Ambulance** – Ravenna fire Dept.	297-5738
8.	**Hospital** – Robinson Memorial Hospital	297-2449 or 297- 0811
9.	**Fire Department** – Ravenna Fire Dept.	297-5738
10.	**Police** – Portage County Sheriff	(330) 296-5100
11.	**Poison Control Center**	800-642-3625
12.	**CHEMTREC** (Chemical information)	800-424-9300
13.		
14.		

II. EVACUATION AND HOSPITAL ROUTES: Jobsite employees should follow below directions.

When a serious incident occurs, one long blast from an air horn will be sounded. This means stop all job site work, shut down equipment, and report to the rally point described below by following evacuation routes for a specific jobsite. Once assembled, attendance and a debriefing will be conducted.

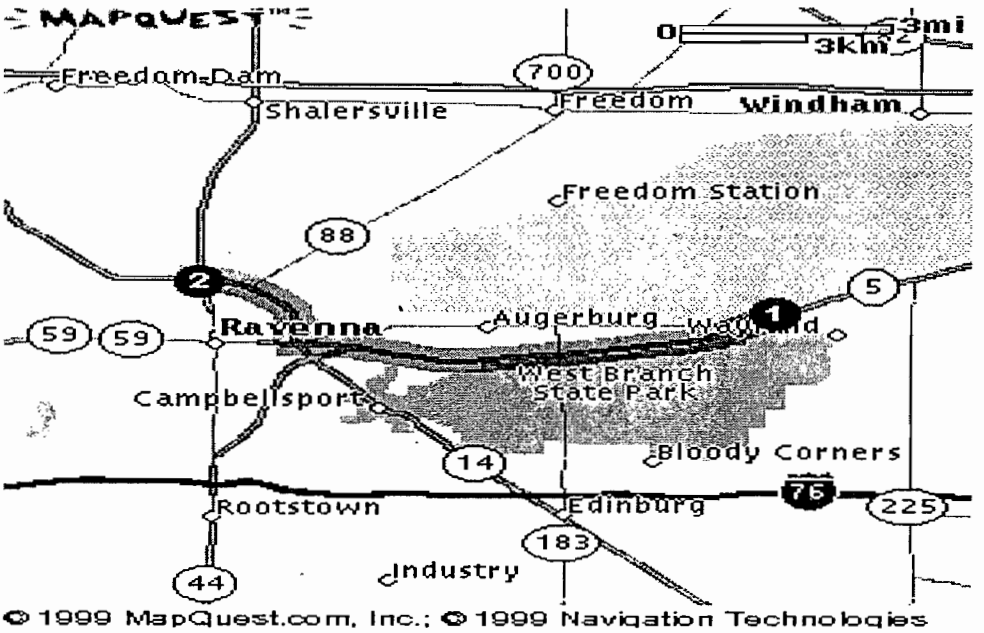


Directions From Main Gate to Work Site: See 911 Map on next page.

HOSPITAL MAP AND DIRECTIONS: Site personnel requiring care beyond first aid shall be transported by ambulance or other means to Robinson Memorial Hospital, as described below.

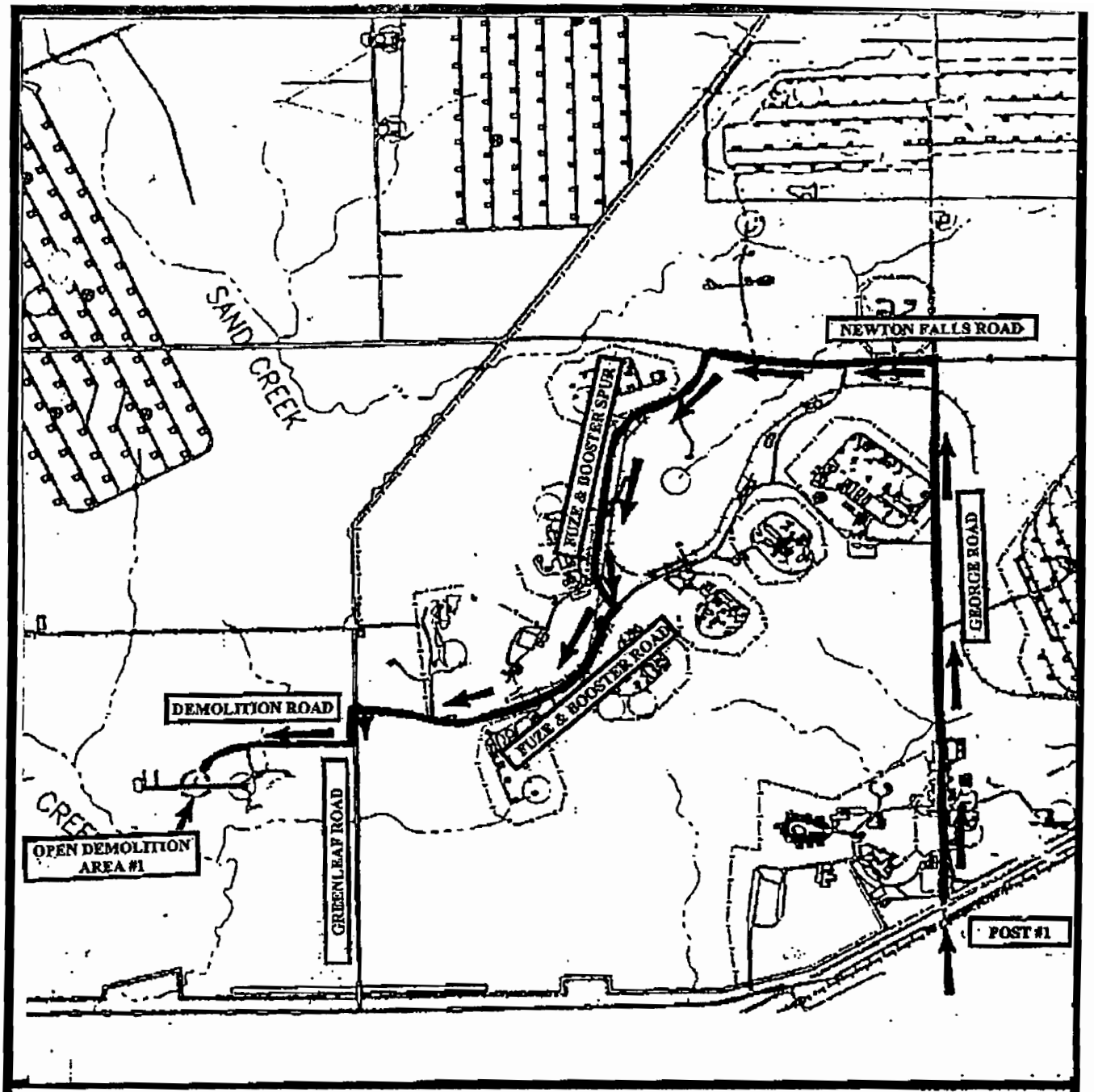
From:	To:	Distance:	Travel Time:
Ravenna Arsenal 8451 State Route 5 Ravenna, OH 44266	**Robinson Memorial Hospital** 6847 N. Chestnut St. Ravenna, OH 44266	9.5 miles	16 mins

Directions	miles
1. Start out going West on OH-5 towards Ravenna by turning right.	6.3
2. Stay straight to go onto OH-59 W.	0.7
3. Turn RIGHT onto OH-14/OH-44.	2.4
4. Turn LEFT onto N CHESTNUT ST.	0.1



III. EMERGENCY RESPONSE ACTIONS: DESIGNATED RESPONSE TEAM SHOULD PERFORM THE FOLLOWING:

SITE SUPERINTENDENT- ASSIGNMENTS	
All events	- Act as On Scene Commander, until relieve by Fire Chief (Ravenna Fire Chief)
SITE SAFETY/QC OFFICER	
All events	- Notifies applicable emergency responder(s): Fire Dept., Ambulance, Police, etc. - Advises site commander on all matters related to health and safety of responders. - Record all events.
GATE SECURITY PERSONNEL	
	- Controls site access at project gate.
RESPONSE TEAM GUIDLINES	
Fire	- Evacuate area and account for everyone. - Call Fire Department - Use extinguisher when it's safe to do so – considering size and position of fire.
Spill	- Stop leak/release if it's safe to do so. - Confine and contain spill. - Cleanup.
Tornado	- Sound tornado alarm. - Retreat to designated tornado shelter and take attendance. - Office trailers **will not** withstand tornado winds – Use neighboring buildings (basements) for tornado shelter. - If no buildings are present seek low-lying areas – Refer to SHP-10 for additional information.
Animal Bite	- Apply first aid. -Watch for signals of allergic reaction Call emergency number as needed. -Capture animal if possible



Emergency Route to Open Demolition Area # 1 (OD#1)

Enter the Ravenna Arsenal at Post No. 1 off State Route 5.
Proceed North on George Road approximately 1.6 miles to Newton Falls Road and Turn LEFT.
Proceed West on Newton Falls approximately 0.6 miles to Fuze & Booster Spur and Turn LEFT.
Proceed South on Fuze & Booster Spur approximately 0.3 miles to end at Fuze & Booster Rd, and Turn RIGHT.
Proceed South and West on Fuze & Booster Road approximately 0.8 miles to end at Greenleaf Rd, and Turn LEFT.
Proceed South on GreenLeaf Road approximately 500 feet to first gravel road on Right – This is Demolition Road.
Proceed West on Gravel Road. Support Trailer will be on the Right, OD# 1 lies ahead approximately 1200 feet.

MEDICAL EMERGENCY INFORMATION

(***Medical Provider***: The below listed employee is seeking medical treatment for a work related injury. After treatment, please contact the company MKM Safety Director @ (330) 358 – 1717.

Employee Name: _____

Company: MKM Engineers Inc. **OBWC Risk No;** 1297858

MCO: Intergrated Comp **Phone No.** (440) 546-5499

Known Allergies: _____

_____

_____

Medical Conditions under treatment: _____

_____

_____

_____

MKM's RESPONSE TO THE OSC's October 04th, 2000 COMMENTS
Interim Removal Action at OD-1, Ravenna Army Ammunition Plant, Ravenna, OH 44266

Description	OSC's Comment	MKM's Response To The Comment
1. Section 11.2	• Protection provided by the Lexan and Plywood – Test data for protection from the most probable munition (90 mm HE proj.) • Point of resweep of the area with the Magnetometer	• Frontal protection from fragmentation is provided by the 1 ½ -inch Lexan and the overhead protection is provided by the plywood and sandbags. EODB 60A1-1-4 states that frontal and overhead protection will be provided for fragmentation hazards. • A magnetometer survey will be conducted in each grid prior to the start of excavation and at two-feet intervals until the completion depth of 4-feet is achieved. The section 11.2 also indicates that the excavation will be done in 3 lifts: 0-1 ft., 1-3 ft., and 3-4 ft. to facilitate appropriate magnetometer survey.
2. Section 11.3	• OE unsafe to transport will be blown in place – When?	• OE that cannot be moved due to fusing/sensitivity will be detonated in place immediately after all non-essential personnel have moved to the safe area (2500 ft.). The item will be tamped with sandbags to minimize the fragmentation hazard.
3. Section11.4	• Where will the excavated soil be moved?	• Excavated soil will be transported to the sifter area for sifting and removal of OE/OES under the direct supervision of MKM UXO personnel. The sifter area is about 450 ft. from the closest grid that will be excavated. The modified map now shows this staging area.

Description	OSC's Comment	MKM's Response To The Comment
4. Section 11.5	• OE Scrap Flashing: To what temperature and how long? Determination of 5X and procedure for washing down – Treatment of the contaminated wash water.	• OE scrap will be thermally treated in MKM's Flashing Furnace. The minimum temperature will be 1400 degrees F for a minimum of one hour. This treatment will ensure that the items are 5X, IAW IOCP 385-1. • The contaminated water is cycled through three carbon filters and pumped into a poly tank for reuse. The filters are changed daily and treated as hazardous waste and disposed according to Federal, State and local rules, regulations and laws. The cleaning process is outlined in this section of the DDESB.
5. Section 14.0	• How will MKM perform final inspection / certification?	• Final inspection/certification consists of a thorough visual inspection of all surfaces to ensure no explosive residue can be detected and materials can be certified as 5X, IAW IOCP 385-1.
6. Section 17.2	• Misfires- At what length of det cord does it become unsafe?	• Placement of a new blasting cap at any point along the detonating cord is safe. EODB 60A-1-1-31 does not specify nor give any safety warnings for this procedure.
7. Appendix A	• Single map with locations to be used with their respective Q-D arcs. Where is the sifter operation, G1 Load line 4 and NG training and parking area?	• A map with the locations to be used and Q-D arcs is now included in the document. Location of the sifter is also indicated in this map (and also in Figure 11). Building G1 used for soil storage is in Load line 4 and is indicated in Figure 9. The National Guard will not be using the OD-1 area during any excavation/sifting operations per agreement with LTC. Thomas Tadsen, Commander, RVAAP-OHARNG.

Description	OSC's Comment	MKM's Response To The Comment
8. Appendix C	• Nothing is included for DNT in the sampling. Section 5.0 lists DNT as an expected explosive.	• Subsurface soils in the grids planned for this IRA are not contaminated with DNT per SAIC-USACE Phase I RI. Though some grids are contaminated with DNT in the 0-1 ft. depth, these surface soils (0-1 ft.) will be excavated for remediation activities at Load Line 4 along with surface soil from all other grids. Also, the proposed Jenkins analysis for explosives can also detect and quantify the DNT in soils if there is a need.
9. Appendix D	• The reference to Appendix B in section 1.2.	• The reference to Appendix B was a typographical error. The text has been modified to reflect the correction.
10. Appendix E	• Not needed for this submission	• The Appendix E has been removed from this submission.
11. Appendix F	• Not needed for this submission	• The Appendix F has been removed from this submission.
12. Appendix G	• Not needed for this submission	• The Appendix G has been removed from this submission.
13. Appendix H	• Not needed for this submission	• The Appendix H has been removed from this submission.

MKM's RESPONSE TO THE OSC's October 06th, 2000 COMMENTS
Interim Removal Action at OD-1, Ravenna Army Ammunition Plant, Ravenna, OH 44266

Description	OSC's Comment	MKM's Response To The Comment
1. Appendix A	• Please reinsert the corrected Q-D Maps	• Q-D maps have been modified according to the reviewer's suggestions and have been reinserted in Appendix A.
2. Section 9.4 and 11.2	• MPM for the project was mentioned to be a 90-mm projectile. Please clarify this and also justify the use of 1.5-inch lexan and 0.75-inch plywood for protecting the excavator operator.	• The contents of section 9.4 have been reworded to reflect the actual maximum probable munition (MPM) during intrusive activities at the site. Though 90-mm projectile was mentioned as MPM for the site in the previous submission, survey of the grids up to 4 feet depth with a magnetometer prior to excavation will eliminate the possibility of occurrence of 90-mm projectiles or similar during the excavation and sifting operations. M500 series fuzes, and expended flare base plates would be the MPM for this project for the intrusive operations. Section 9.4 has been reworded to reflect these clarifications. • Justification for use of lexan and plywood has been incorporated in Section 11.2. Safety is MKM's top priority and all precautions have been and will be taken to ensure safety for all personnel and public.

Description	OSC's Comment	MKM's Response To The Comment
3. Section11.4	• What is the Blast wall between the sifter and the conveyor made of and please justify the use of this particular type of blast wall.	• A description and justification of the Blast wall has been included in Section 11.4. • In addition to the documented standard safety procedures, MKM always implements several safety features based on experience from previous projects/ operations similar in nature.

PS: These are MKM's responses to OSC's comments as discussed during a telephone meeting between OSC (Mr. William Ingold), and MKM (Ms. Jennifer Duberg, Mr. Shahrukh Kanga, Dr. Srini Neralla, Mr. Dewey Thedford, and Mr. Bill Howell) on Thursday, October 06, 2000.

MKM's RESPONSE TO THE OEPA's SEPTEMBER 30th, 2000 COMMENTS
Interim Removal Action at OD-1, Ravenna Army Ammunition Plant, Ravenna, OH 44266

Description	OEPA's Comment	MKM's Response To The Comment
1. Section 4.0	• The text on page 5 should indicate that the OSC "....ultimately intends to transfer the rest of the RVAAP property....", as approximately 16,000 acres have already been transferred to the control of the NGB. The disposition of the rest of the acreage is currently under discussion between the NGB and the Army.	• Agreed.
2. Section 7.0	• Clearance depth of four feet: Please confirm with ONG that this depth is adequate for the proposed end use of the AOC.	• Agreed. The clearance depth of four feet was chosen because it is currently the DOD default standard for the intended reuse of the area. Based on discussions with the ONG, anomalies at 4-feet depth will be mapped and given to ONG at the end of the project to aid in instituting necessary land use controls/restrictions for the area.
3. Section 1-21	• Define the acronym SUXOS	• SUXOS stands for Senior UXO Supervisor.

Description	OEPA's Comment	MKM's Response To The Comment
4. Sections 9 and 17	• Please ensure that the magazines that are utilized for the storage of the recovered UXO will have the necessary and required signs posted. Please contact Mr. Greg Orr, DHWM for additional information regarding this issue.	• Agreed. Necessary signs will be posted at the magazines where the recovered UXO will be stored. OEPA DHWM will be informed of all Hazardous Waste issues and contacted for any additional information.
5. General	• Coordinate with OEPA DHWM for emergency permits for detonation of UXO or suspected UXO.	• Agreed.
6. Section 10.0	• Please be advised that the RVAAP is listed on the Non-Stockpile Chemical Warfare Materiel Preliminary Environmental Impact Statement (NSCWMPEIS) as a site with potential CWM due to the suspected/reported presence of a mustard agent burial site (AOC 28)	• Agreed. Necessary precautions will be taken and fact sheets will be posted at the site trailer regarding the suspected/reported presence of the mustard agent burial site.
7. Sections 11 and 14	• Please ensure that all decontamination fluids are containerized and characterized, and ultimately disposed of in accordance with all applicable state and federal rules, laws and regulations.	• Agreed.

Description	OEPA's Comment	MKM's Response To The Comment
8. Sections 11 and 14	• Flashing furnace should appear in the decontamination demil/disposal treatment flow chart that is found in Appendix B	• Agreed. The flow chart is modified to reflect the reviewer's suggestion.
9. Section 11	• Please confirm that the areas excavated to the four feet depth will be swept for magnetic anomalies prior to filling in the grids with clean soil.	• Agreed. Also please refer to response to Comment 2.
10. Appendix C	• Please revise the draft technical memorandum in Appendix C to reflect the discussions and agreements between the Ohio EPA and MKM reached on September 29, 2000.	• Agreed.
11. Health and Safety Plan	• Please spell-check the entire document • Site-specific HASP should reference the installation-wide HASP, under which this plan is tiered. • The text of the HASP should reference the correct appendices.	• Agreed. • Agreed. • The reference to incorrect appendices is now corrected.