RCRA PART B PERMIT APPLICATION
(SUBPART X)
41ST EXPLOSIVE ORDNANCE DEMOLITION TREATMENT UNIT
FT. BLISS/McGREGOR RANGE, OTERO COUNTY, NEW MEXICO

Prepared for:

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Ft. Bliss, Texas
and
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AMENDMENT
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August 1993

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C. Facility Location: McGregor Range in Otero County, New Mexico.

I. FACILITY DESCRIPTION

This is an amendment to the RCRA Part B permit application submitted November 2, 1988. In order to clearly indicate amendments, the original application information is typed in italics and the amendments are typed in standard type. This amendment is not being submitted because the treatment unit or its operation have changed or are planned for change. Rather, the descriptions provided are intended to be responsive to the State of New Mexico Environmental Department's April 2, 1993 letter RE: Administrative Review: Notice of Deficiency of Part B Permit Application, NM 4213720101. This amendment application is arranged in the order of the Notice of Deficiency to make the items requested easier to locate.

The information furnished in this section provides a general description of the open burning/open detonation (OB/OD) unit at the Ft. Bliss, Texas/McGregor Range, New Mexico. The description provided here is intended only to acquaint the permit writer/reviewer with the site (Ft. Bliss/McGregor Range) and the treatment unit. More complete details may be found in other parts of this application.

I.A. GENERAL DESCRIPTION (40 CFR 270.14(b)(1))

Ft. Bliss is the U.S. Army's primary training center for ground to air missile batteries, including the Patriot. McGregor Range is within the Ft. Bliss military reservation boundary and is the primary missile target practice range for the U.S. Army.

In the interest of national security, enormous inventories of military ordnance items and bulk energetic materials are maintained at various military installations around the country. Because the Explosive Ordnance items and bulk energetic materials held in this military readiness stockpile are subject to deterioration and obsolescence, action has to be taken to safely remove and thermally treat these items on an ongoing basis. The U.S. Army Air Defense Center and Fort Bliss (USAADACENFB) is currently operating an Explosive Ordnance Detachment (EOD) Open Demolition (and Open Burn) Area. This demolition area has been in operation since 1965. Unlimited amounts of explosive material are authorized at this site. However, military chemical warfare agents or related compounds or materials contaminated with or suspected of being contaminated with these agents or compounds will not be open burned or open detonated at this unit. Also, these warfare agents are not intended to ever be treated here.

The 41st EOD conducts explosives demolitions at the EOD range approximately 2 to 3 times per quarter. Explosives are blown with C-4 in existing demolition pits, which are visually inspected following each blow. The demolition area is operated under RCRA interim status (40 CFR 265) as a hazardous waste thermal treatment facility. Quantities of explosives destroyed average approximately 900 kg per quarter, while demonstrations consist of 2.3 to 4.5 kg charges. Powder burning conducted by the 41st EOD ceased in early 1987 and is not planned to occur in the foreseeable future.

As illustrated in Figure I.A-1, the treatment unit is located in the northern portion of Ft. Bliss Military Reservation on McGregor Range. Exhibits 1,2, and 3 (map pockets) provided details of the area and the treatment unit which is located about 10 mi (16.1 km) east of U.S. Hwy 54 at coordinates 32°05'15" lat., 106°04'45" long. As shown on Figure I.A-2, the unit is on an active portion of McGregor Guided Missile Range within the impact area for ballistic aerial targets (BATs), and the large caliber munitions and guided rockets which are used to destroy the BATs. EOD operations at the unit only occur when McGregor Range is inactive.

The surrounding area is owned by the government (minimum of 5.5 mi (8.9 km) in any direction), is uninhabited desert, is used as a firing range, and is secured by Range Control at Davis Dome. Access is from Hwy 54, through McGregor Camp, past Davis Dome. The unit is about 4 mi (6.4 km) east of Davis Dome at the foothills of the Hueco Mountains. However, PEP wastes are not transported by this route. All PEP materials to be treated come from bunkers on the Military Reservation and are only transported on military roads.

I.A.1 General Dimensions

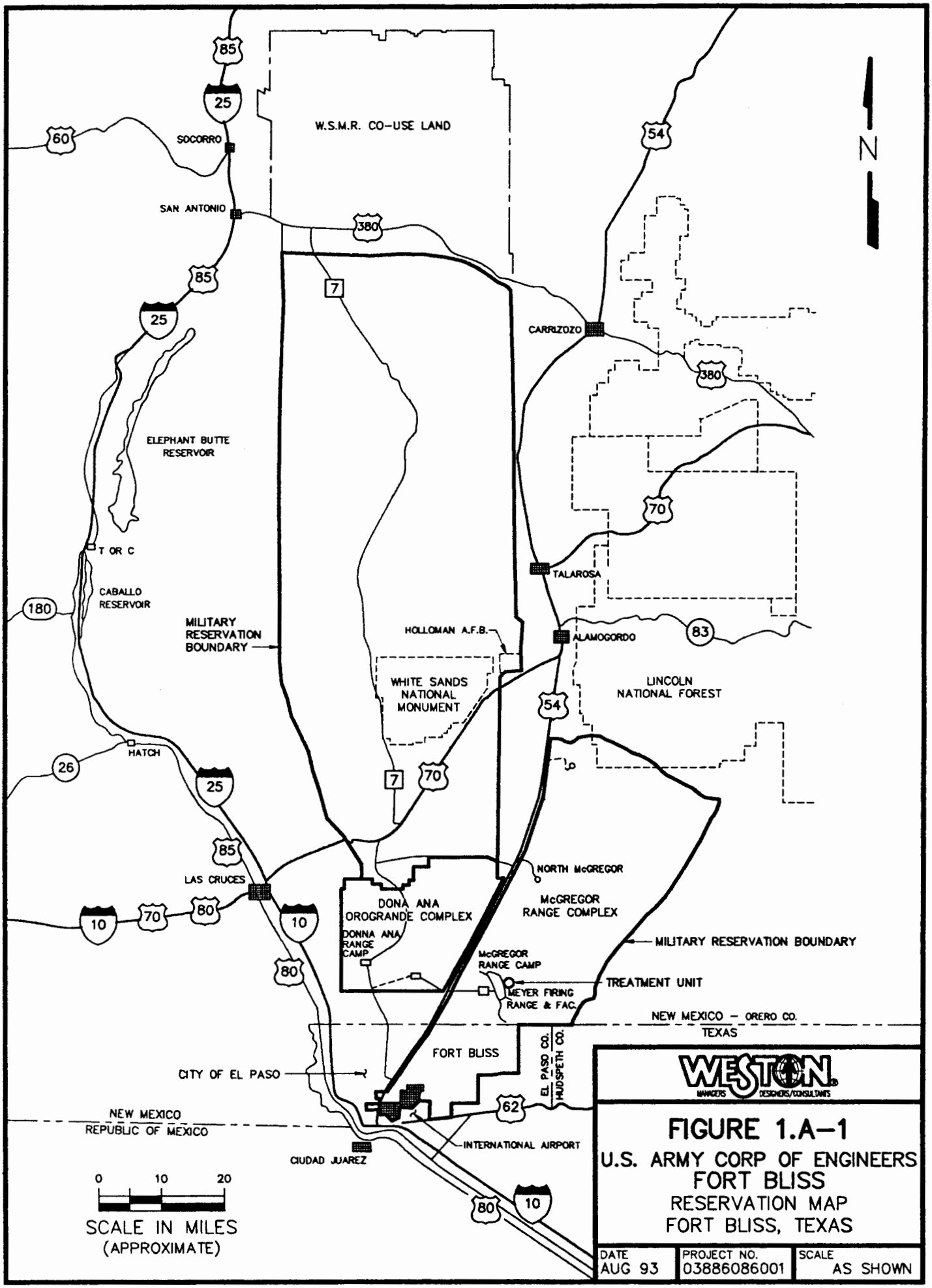
The treatment unit is a manmade excavation with a roughly oval shape. As shown on Exhibit 3 the dimensions are approximately 500 ft (152.4 m) x 200 ft (61 m) and 20 ft (6.1 m) deep. Within this excavation there are two pits (Pit A and Pit B) which are used for Open Detonation (OD), and a shallow trench which is used for Open Burn (OB). Dimensions of the two pits are 6 to 7 ft (1.8 to 2.1 m) deep and 40 ft (12.2 m) in diameter of the top lip. The trench is approximately 100 ft (30.5 m) x 40 ft (12.2 m) and 1 ft (0.3 m) deep. A photograph of the trench is provided in Figure I.A-3. All structures at the unit are earthen.

The closest non-earthen structure is a viewing stand (covered bleachers) 2.5 mi (4 km) to the west which is occasionally used when dignitaries are invited to view missile launch operations. Because the site is on the target range, OB/OD operations cannot occur when the range is active. Therefore, no non-EOD personnel will be in the viewing stand or on the range during OB/OD operations. The closest authorized non-EOD personnel during OB/OD operations will be at Davis Dome, 4 mi (6.4 km) west of the site (Figure I.A.2).

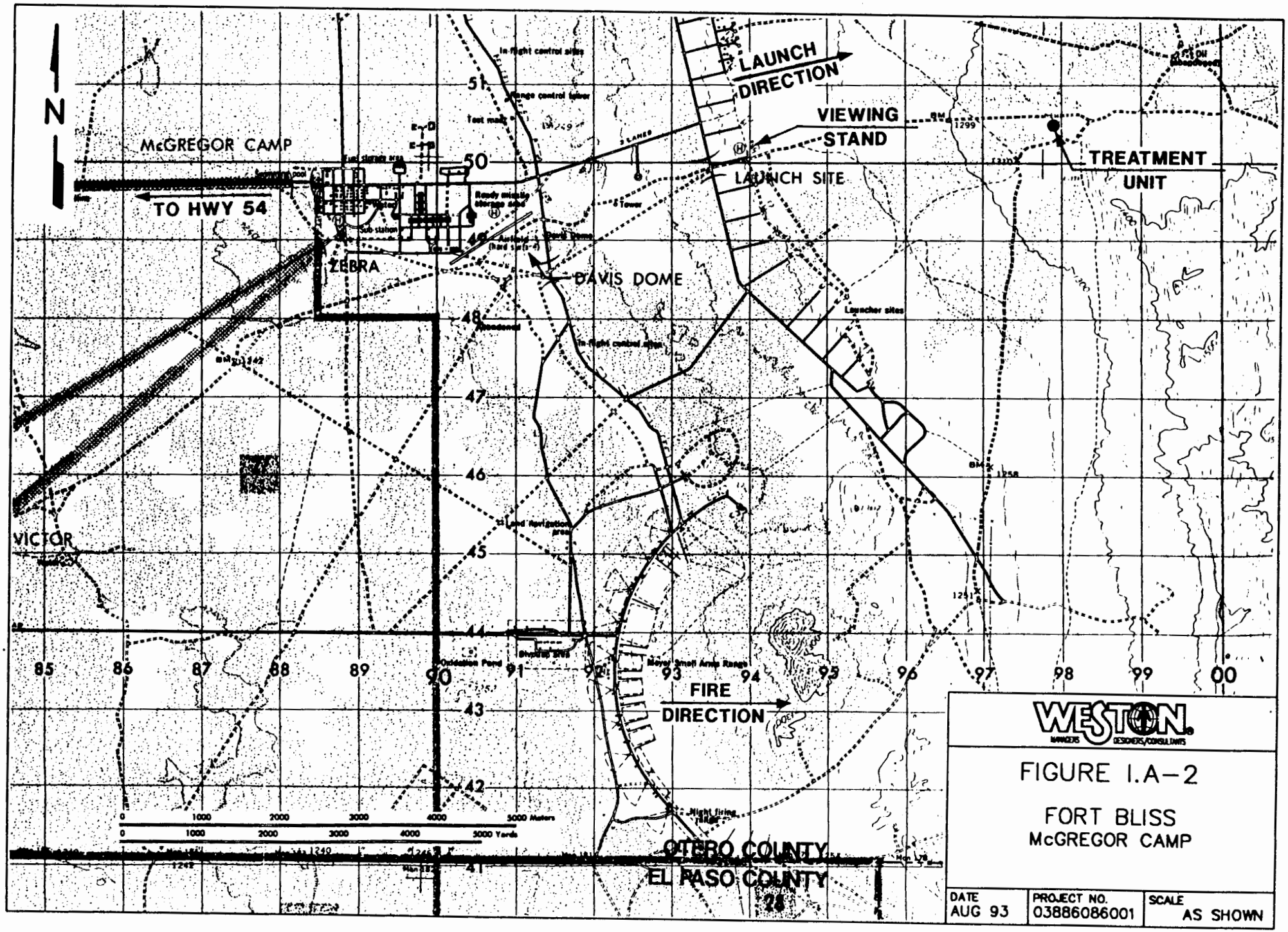
Access to the site from McGregor Camp (Figure I.A-2) is by asphalt road about 3 mi (4.8 km) to check in at Range Control at Davis Dome, about 3 mi (4.8 km) of asphalt road and about 4 mi (6.4 km) of one lane unpaved road to the unit. Entry to the unit to place the waste in the appropriate OD pit, or the OB trench is by earthen ramp at the south side of the excavation (Exhibit 3). The waste material is placed in the pit or trench (in conformance with EOD procedures described later), the EOD personnel retreat to a safe distance, and the material is detonated or burned.

I.A.2 Engineering Controls/Drawings

All control structures are earthen (i.e., the unit is an approximately 20 ft (6.1 m) deep excavation, within the unit are two detonation pits and a burn trench). Therefore, Exhibit 3, Site Contour Map, illustrates the engineered controls. A generalized cross-section of the treatment unit is provided as Figure I.A-3.



J:\DRAWINGS\GENERAL\GENERB20.PB 1=1 08-17-93



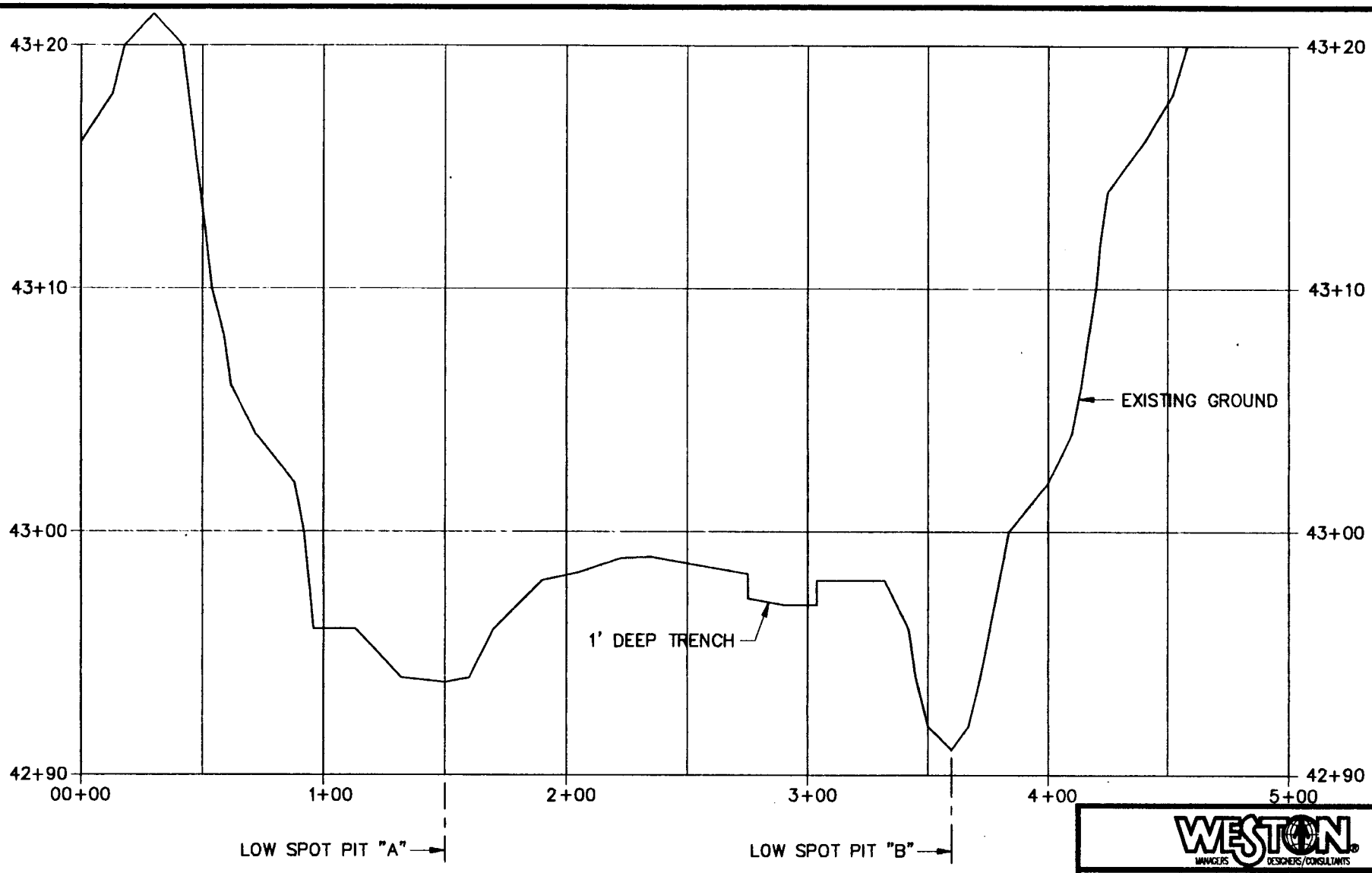
WESTON
MANAGERS DESIGNERS/CONSULTANTS

FIGURE I.A-2

FORT BLISS
McGREGOR CAMP

DATE	PROJECT NO.	SCALE
AUG 93	03886086001	AS SHOWN

NOT COMPUTER GENERATED



SCALE:

HORIZ. 1"=60'
VERT. 1"=6'

WESTON
MANAGERS DESIGNERS/CONSULTANTS

FIGURE 1.A-3

U.S. ARMY CORP OF ENGINEERS
FORT BLISS
GENERALIZED CROSS-SECTION

DATE	PROJECT NO.	SCALE
AUG 93	03886086001	AS SHOWN

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I.A.3 Best Available Description of Waste

The OB/OD unit is used to thermally treat pyrotechnics, explosives, and propellants (PEP) that result from demilitarization of existing stockpiles and off specification material. The operation was begun in 1965, but records are only maintained by the EOD for two years. Using the estimate of 1984 lbs (900 kg) per quarter, the total PEP destroyed at the site is approximately 207,232 lbs (94,000 kg) through 2nd quarter 1993.

Currently, the PEP materials treated at this site are large caliber (non-handheld) munitions, and rocket propellants. Pyrotechnics are rarely treated here. C-4 is used as an initiator. Black powder is no longer used.

The EOD has historically been responsible for ordnance and explosives found off of Ft. Bliss property in New Mexico and west Texas. However, every effort is made to detonate such off-site material where it is located and the current EOD officer has no recollection of off-site materials being treated at the unit in her two year tenure. It will be the intent of the 41st EOD to continue the policy of not treating off-Ft. Bliss materials at this site. However, if the need arises, NMED will be contacted and a variance will be requested for the specific waste involved.

Generally, no residue ash remains after detonation. Similarly, there is no visible ash from open burning of propellants. Sampling of waste or soil have not been conducted to date, however, a sampling plan and schedule are provided herein (Section II.C).

Wastes are removed from the shipping containers before OB/OD and the containers are reused or recycled.

I.A.4. Open Burn/Open Detonation Facility

This permit application is for continued operation as both an OB and OD treatment facility.

I.B. TOPOGRAPHIC MAP (40 CFR 270.14 (b) (19)).

The topographic map for the OB/OD unit is provided as Exhibit 3. The map is dated and orientation, surface waters, surrounding land uses, roads, and facilities are shown for the radius of 1,000 ft (304.8 m). Also, Exhibits 1 and 2 provide similar information for a radius of approximately 50 mi (80.5 km) from the site and 5 mi (8 km) from the site, respectively.

I.B.1. Contour Lines

Exhibit 3 provides 2 ft (0.6 m) contours of the excavation which contains the OB/OD unit, and 2 ft (0.6 m) contours for a distance of 1,000 ft (304.8 m) from the center of the unit. Contours for the general area are provided on Exhibits 1 and 2.

I.B.2. Wind Rose

Recent meteorological data compiled by the National Weather Service for the El Paso International Airport (approximately 30 mi (48.3 km) south of the site) has been used to construct wind roses for the years 1988, 1989, 1990, 1991, and 1992. This information is graphically illustrated on Exhibits 2 and 3.

I.B.3. Legal Boundaries

Because the OB/OD unit is within the large aerial expanse of McGregor Range and the Military Reservation, legal boundaries cannot be shown at the scale of Exhibits 2 and 3. Therefore, legal boundaries of the Military Reservation are shown on Exhibit 1.

I.B.4. Access Control

The site is posted with signs that bear the legend, "DANGER, NO UNAUTHORIZED PERSONNEL" on all approaches to the site. These signs are visible from 25 feet. The site is patrolled several times during hours of operation and hours of nonoperation.

Four signs will be maintained within 100 ft (30.5 m) of the perimeter of the OB/OD unit. These signs will state the following in English and Spanish:

Danger
No Unauthorized Personnel
Keep Out

The policies, procedures, and equipment concerning demolition and unserviceable ammunition disposal operations is outlined in the Department of the Army 41st Ordnance Detachment (EOD) FORSCOM Field Operation Activity's SOP (Appendix C, changed to Appendix A*). The minimum protective distances for open detonation operations are given in Table 2.* (Changed to Table III.B-1).

Access to the treatment unit during operations is limited to members of the 41st EOD. Access to the Range is limited to trained military personnel and accompanied visitors. Because of the potential for unexploded ordnance from target practice, this restriction is true of the entire impact area, of which the OB/OD unit is a part. When OB/OD treatment is being conducted, the range is closed and Range Control will only allow access to the treatment unit to EOD personnel and EOD escorted visitors.

Physical access controls are the unit's remoteness, the Hueco Mountains to the south and east (Exhibit 1), and the monitoring provided at Davis Dome (Figure 1.A-2). Davis Dome is manned on a 24-hr basis and monitoring includes visual inspection of the Range supplemented with helicopter fly-overs, usually two per day. The military reservation boundary (Exhibit 1)

and the lack of public roads make the potential access for hikers and 4-wheel drive very difficult. This is by design and is a requirement for the firing ranges.

Illegal immigrants moving north from Mexico would have to cross about 40 mi (64.4 km) of desert to reach this site. If they did reach the area, Range Control should spot and arrest them. If that failed, there is no reason for them to stop at the unit (i.e., no water, shade, or other comforts). If for some reason illegal immigrants or others were in the unit, the EOD team would discover them during the placement of the PEP and they would be arrested. If all of these controls failed, the soil in the unit is not expected to be hazardous due to contact or dust inhalation (this will be determined during planned soil sampling, Section II, Waste Characterization).

I.B.5. Wells, Buildings, Drainage/Flood Barriers

There are no buildings on the site. As mentioned the nearest structure is the viewing stand about 2.5 mi (4 km) west of the site. The nearest occupied buildings are the Range Control facilities on Davis Dome, about 6 mi (9.7 km) west of the site.

There are no water wells near the unit. No monitoring wells, injection wells, or recovery wells have been constructed. As discussed in Section I.C.3, there are no drinking water wells because the groundwater at the site is not potable. The facilities at McGregor Camp and Davis Dome obtain water from the El Paso municipal system via a 12-inch (30.5 cm) diameter underground pipeline.

Drainage away from the unit is natural and generally directed to the south, west, and north. The unnamed arroyo approximately 1,000 ft (304.8 m) north of site (Exhibit 3) drains an area of the Hueco Mountains of about 40,000 acres (162 sq km), as discussed in Section I.D. Drainage to the west and south is by sheet flow and naturally eroded swales. It does not enter a well defined stream bed near the site. Run-on will be diverted from the site by berms (to be built). Run-off from the east from the unit does not occur because it is an excavation with no outlet.

Flood barriers at the site consist of natural vertical relief. As discussed in Section I.D. the unit is above the estimated 100 yr. floodplain (FIA maps are not available for this area).

I.B.6. Location of Treatment Facility, Public Roadways, Railroads

As shown on Exhibits 1, 2, and 3, the treatment unit is located in the impact area of McGregor Missile Range, approximately 30 mi (48.3 km) north of El Paso. The nearest public roadway is Hwy 54 which is 10 mi (16.1 km) west of the site. The Southern Pacific Railroad tracks which parallel Hwy 54 and are directly adjacent to it (approx. 50 to 100 ft) (15.2 to 30.5 m), are also about 10 mi (16.1 km) to the west. These tracks are not currently used for passenger service.

As shown on Exhibit 1 the Military Reservation surrounding the unit extends for 40 mi (64.4 km) to the north, 12 mi (19.3 km) to the east, and 5.5 mi (8.9 km) to the south. The impact area monitored by Davis Dome Range Control includes about 100 sq mi (259 sq km) which surround the treatment unit. This is illustrated on Figure I.A-2.

I.C. DESCRIPTION OF TREATMENT UNIT (40 CFR 270.23)

This section provides information concerning the treatment unit's design, operation, and maintenance, local geology/hydrogeology, and meteorology. Also, "kick-out" (the uncontrolled spread of PEP particles) is addressed.

I.C.1 Plans and Engineering Reports

As illustrated in Exhibit 3 and Figure I.A-4, the treatment unit is designed for three treatment areas, each occupying about one third of the containment excavation. These are located within an area of approximately 80,000 sq ft (7,432 sq m). The average depth of the containment excavation is about 20 ft (6.1 m). The OD treatment areas are two approximately conical shaped excavations 6 to 7 ft (1.8 to 2.1 m) deep in east and west thirds of the site. The OB treatment area is a trench approximately 1-ft (0.3 m) deep and 40-ft (12.2 m) wide, and 100-ft (30.5 m) long in the middle third of the site. The design is intended to retain any "kick-out" from the three treatment areas within the 80,000 sq ft (7,432 sq m) excavation which is the treatment unit.

I.C.2. Location, Operation, Maintenance

The location has been described, and is illustrated on Figures I.A-1 and I.A-2, and Exhibits 1, 2, and 3. The unit's remoteness and the access control provided by Range Control make this an ideal site for an OB/OD facility.

Treatment operations are conducted entirely by the 41st EOD and their training requirements are provided in Section V. The PEP waste materials are transported by truck from the McGregor Range bunkers to the unit. Treatment only occurs on days when the range is not operational (target practice is not on-going) and transportation does not occur unless treatment can occur shortly after arrival (i.e., PEP are not stored at the treatment unit). Shipping containers are those normally used for movement of the particular PEP materials to and from military operations.

All PEP waste is transported on roads internal to the Military Reservation, and not on Hwy. 54. Check in at Range Control at Davis Dome is required before entering the range. Davis Dome is equipped with an elevated observation tower, from which McGregor Range is monitored.

After clearance from Range Control, the truck transporting the PEP proceeds east on asphalt roads, then unpaved roads to the treatment unit (Figure I.A-2). All movement after check-in

is within the monitored area of Davis Dome. All personnel transporting, handling, and treating the PEP are appropriately trained 41st EOD personnel (training is discussed in Section V).

Open Burn - OB operations only occur during daylight hours and during favorable weather conditions. Acceptable conditions for operation, safety precautions, and detailed operational steps are specified in SOP AN-0000-H-033, "Burning Propellant Powder (Bulk or Bags)"; and SOP AN-0000-H-038, "Burning of HE Loaded Projectile".

When treating propellant, the material is moved to the OB unit by enclosed truck. The packed propellant is unloaded and placed adjacent to the trench and the allowable amount of bulk propellant or bagged propellant is placed in the trench. An ignition train of excelsior is laid to the end of the prepared propellant. Safety fuse is used to ignite the excelsior; the length of the safety fuse is sufficient to allow personnel to evacuate to a designated area at least 1,800 ft (548.6 m) from the burning site.

After the burn is complete, the EOD supervisor and one specialist will return to the burning area to assure that the area is safe. The area is then inspected for unburned or partially burned material; any such material that is found is burned during the next burning. This is continued to last burn of the day, then any remnants are burned individually. No remnants are left unburned at the end of the day. No residue analyses have been done to date.

Open Detonation - Use of the open detonation pits is only during daylight hours and during favorable conditions. Acceptable conditions for operation, permissible munitions for destruction, safety precautions, and detailed operational steps are specified in SOP AN-0000-G-026, "Detonation of H.E. Load Items, Pyrotechnics and Ammo Components."

Prior to any explosives being transported to the detonation site, the demolition area is inspected. The PEP is then delivered to the pit areas by an enclosed truck and placed in the bottom of the conical excavation. Initiating explosives are then placed on the ground at least 25 ft (7.6 m) from the carrier truck and at least 10 ft (3 m) from the demolition site. Packing material from unpacking initiating and PEP explosives is then loaded on the carrier truck and, after the carrier truck has moved away, the initiating explosive is placed on the item to be destroyed. Detonating cords are then prepared and the blasting caps are wired into firing wire circuits and connected to the detonating cords. After all personnel are clear of the area the charges are detonated.

After detonation is complete, the area is inspected for unexploded items. Items that are determined to be safe to handle, such as lumps of explosive and unfused projectiles, are picked up and prepared for the next detonation. If the material is not safe to handle, the unexploded items are destroyed by placing a demolition charge adjacent to, but not in contact with the item in accordance with SOP-0000-K-036. No remnants are left untreated at the end of the day.

I.C.3 Geology, Hydrogeology, and Meteorology

This section provides a physical description of the region.

Regional Geology - The treatment unit area is located in the Hueco Bolson, a part of the transition-zone between the Basin and Range, and Great Plains tectonic provinces in an area referred to as the Rio Grande Rift. The Rio Grande Rift is characterized by evidence of Quaternary faulting, high heat flow, Tertiary volcanic activity, and a minor number of earthquakes.

The Hueco Bolson is a marginal Basin and Range structure, lying between the Franklin and Hueco Mountains and is the southernmost extension of the Tularosa Basin of New Mexico. It is a flat intermontane basin approximately 19 mi (30 km) in width, with an elevation of about 4,000 ft (1,220 m) at the base of the Franklin Mountains, rising eastward to about 4,430 ft (1,350 m) near the Hueco Mountains. The Franklins are a tilted fault-block sequence of Paleozoic rocks underlain by Precambrian granite, totalling approximately 8,000 (2,440 m) of section (Barrie, 1975). Their counterparts on the eastern side of the Bolson, the Hueco Mountains, are described below.

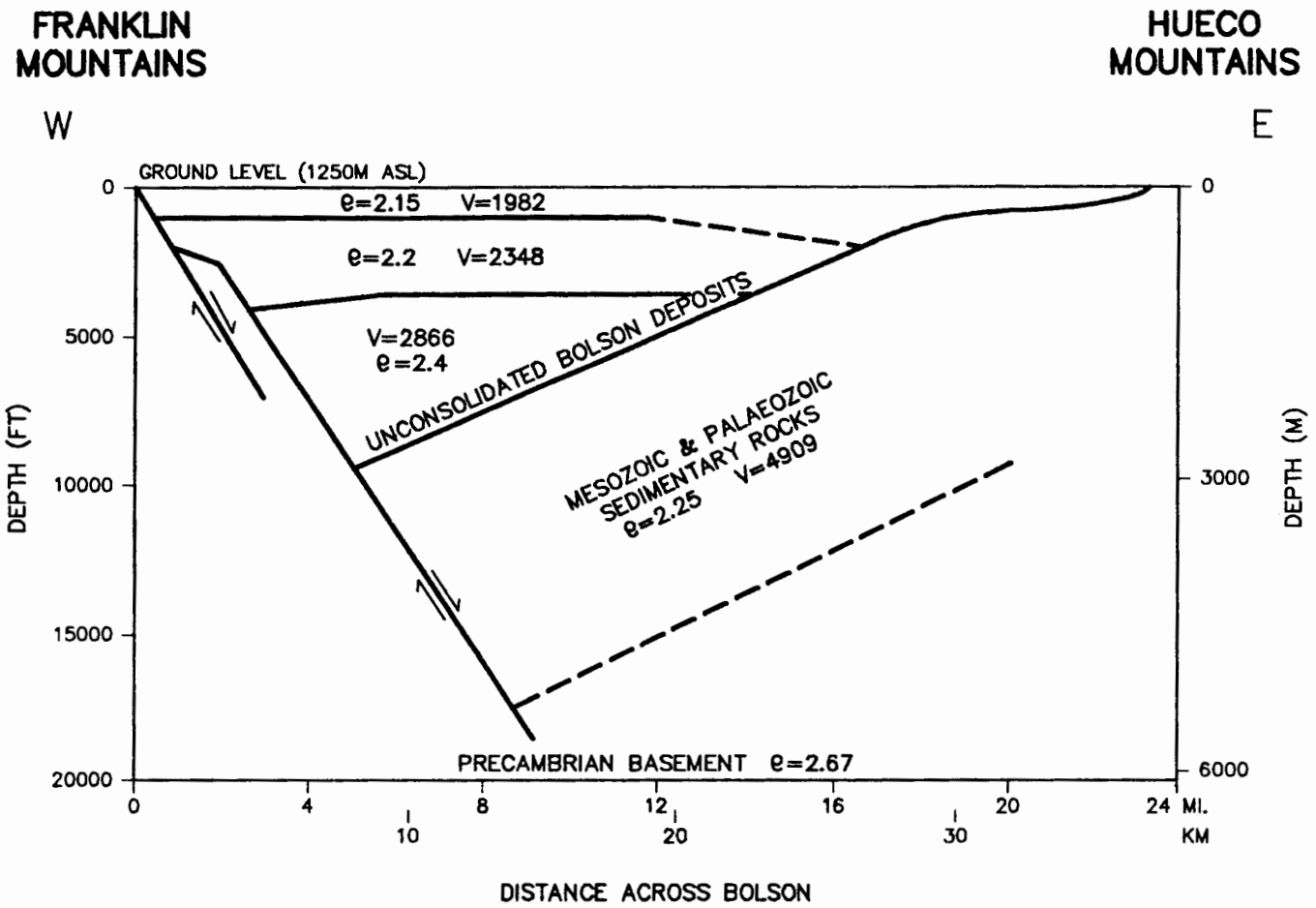
Bolson sediments consist of late Cenozoic Camp Rice and Fort Hancock Formations (fluvial and lacustrine sands, gravels and clays), plus recent valley fill and eolian sand. Deformation of the bolson, so active in its developmental stages in the Tertiary, continues at a much reduced scale. Several north-south trending depressions in the Hueco bolson represent recent faults, which even cut caliche deposits, and minor earth tremors have been reported on the east side of the Bolson.

Geophysical investigations have revealed a deep asymmetric trough, fault-bounded on the west, where the maximum depth of fill is estimated to be approximately 9,000 ft (2,740 m). Three distinct refracting horizons were found within the Bolson fill and are shown on Figure I.C-1. The upper two horizons are relatively uniform in thickness. The third unit is noticeably thicker on the west and thins to the east (Taylor, 1981).

In general, the bedrock surface slopes gently southward until it approaches the Rio Grande Valley, where it drops into a roughly northwesterly-trending trough.

The Hueco Mountains, located east of the treatment unit, are a range of hills, comprising mainly Paleozoic sedimentary rocks, which rise approximately 984 ft (300 m) above the floor of the Hueco Bolson. They form an impressive escarpment in their northern part. Small hills surrounded by alluvium to the west of the main mountain block would appear to be faulted-off outliers. A series of Tertiary igneous bodies have intruded the sediments around Hueco Tanks State Park. A simplified geologic map of the area is shown in Figure I.C-2.

Precambrian granites are exposed at the southern end of the range. About 1,500 ft (450 m) of lower Paleozoic sandstone and limestone overlie the granite. These are, in turn, overlain by a thick sequence 3,400 ft (1,035 m) of Carboniferous and Permian limestones in the northern part of the area; these latter formations also make up the present surface of the plateau (Diablo Plateau) to the east of the Hueco Mountains. Cherty and sandy limestones of the Helms Formation Mississippian are followed by the grey fosiliferous Magdalena Limestone (Pennsylvania); this unit contains a 50 ft (15 m) thick gypsum bed in the northern part of the area, on McGregor Range. An angular unconformity separates the Magdalena from the Hueco Limestone, which is of Pennsylvanian/Permian age (Wolfcamp Series), and forms the capping



WESTON
MANAGERS DESIGNERS/CONSULTANTS

F1GURE 1.C–1

U.S. ARMY CORP OF ENGINEERS
FORT BLISS
GEOPHYSICAL CROSS–SECTION
OF THE HUECO BOLSON
FORT BLISS, TEXAS

DATE	PROJECT NO.	SCALE
AUG 93	03886086001	AS SHOWN

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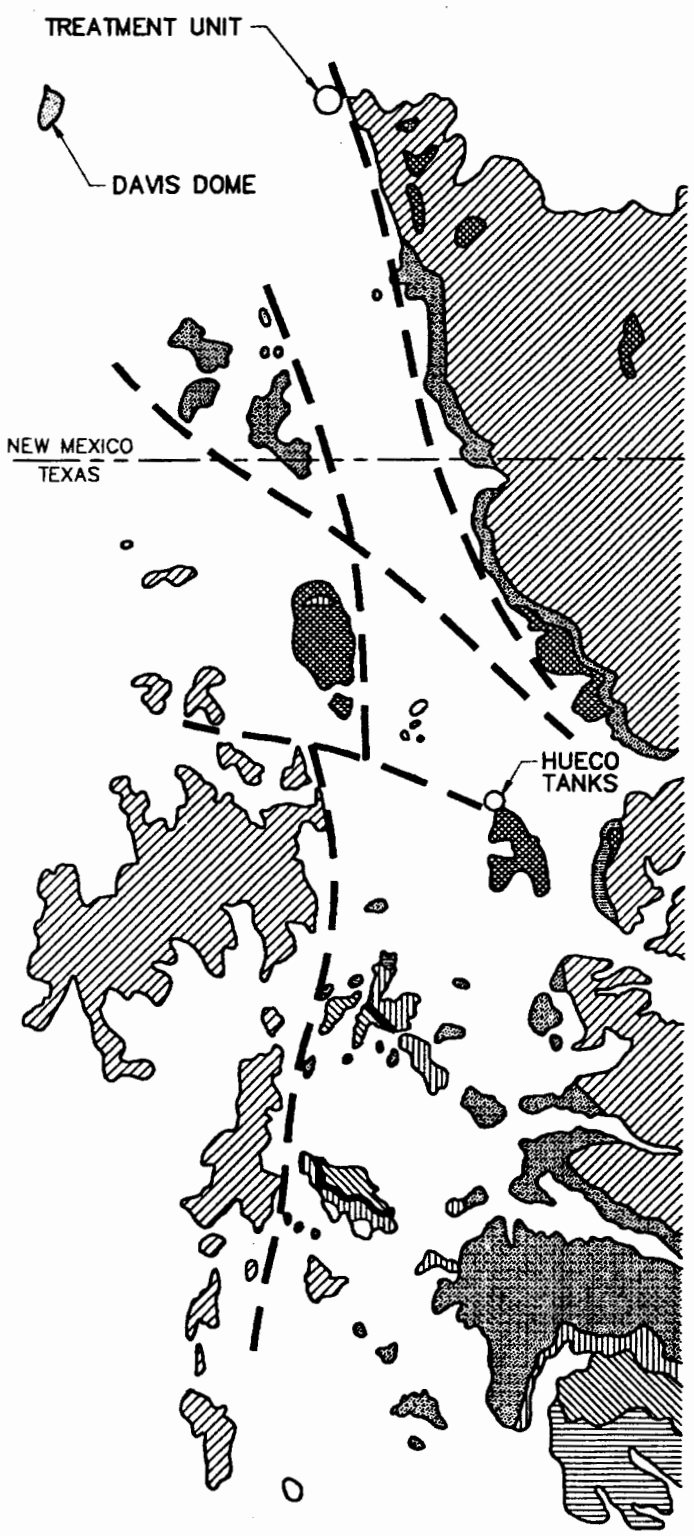
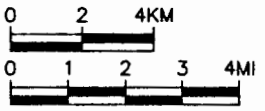


LEGEND

IGNEOUS INTRUSIVES	– TERT.
HUECO LIMESTONE	– PERM.
MAGDALENA LIMESTONE	– PENN.
HELMS FORMATION	– MISS.
SHALE, LIMESTONE	– DEV.
FUSSELMAN LIMESTONE	– SIL.
MONTOYA, EL PASO LIMESTONES	– ORD.

INFERRED FAULT



WESTON
MANAGERS DESIGNERS/CONSULTANTS

FIGURE 1.C–2

U.S. ARMY CORP OF ENGINEERS
FORT BLISS
SIMPLIFIED GEOLOGIC MAP
FORT BLISS, TEXAS

DATE	PROJECT NO.	SCALE
AUG 93	03886086001	AS SHOWN

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rock on the Hueco Mountain escarpment. The Hueco Limestone consists of massive bedded limestones, interbedded with reddish shales, and with a basal conglomerate.

In the northern part of the Hueco Mountains, are several sizeable igneous bodies. Hueco Tanks itself, and the peak of Cerro Alto a little to the east, are probably intrusive plugs or stocks. Other bodies are concordant with the sedimentary strata, some undoubtedly representing erosional remnants of larger intrusions.

The treatment unit is located on alluvial deposits near the northern terminus of the Hueco Mountains.

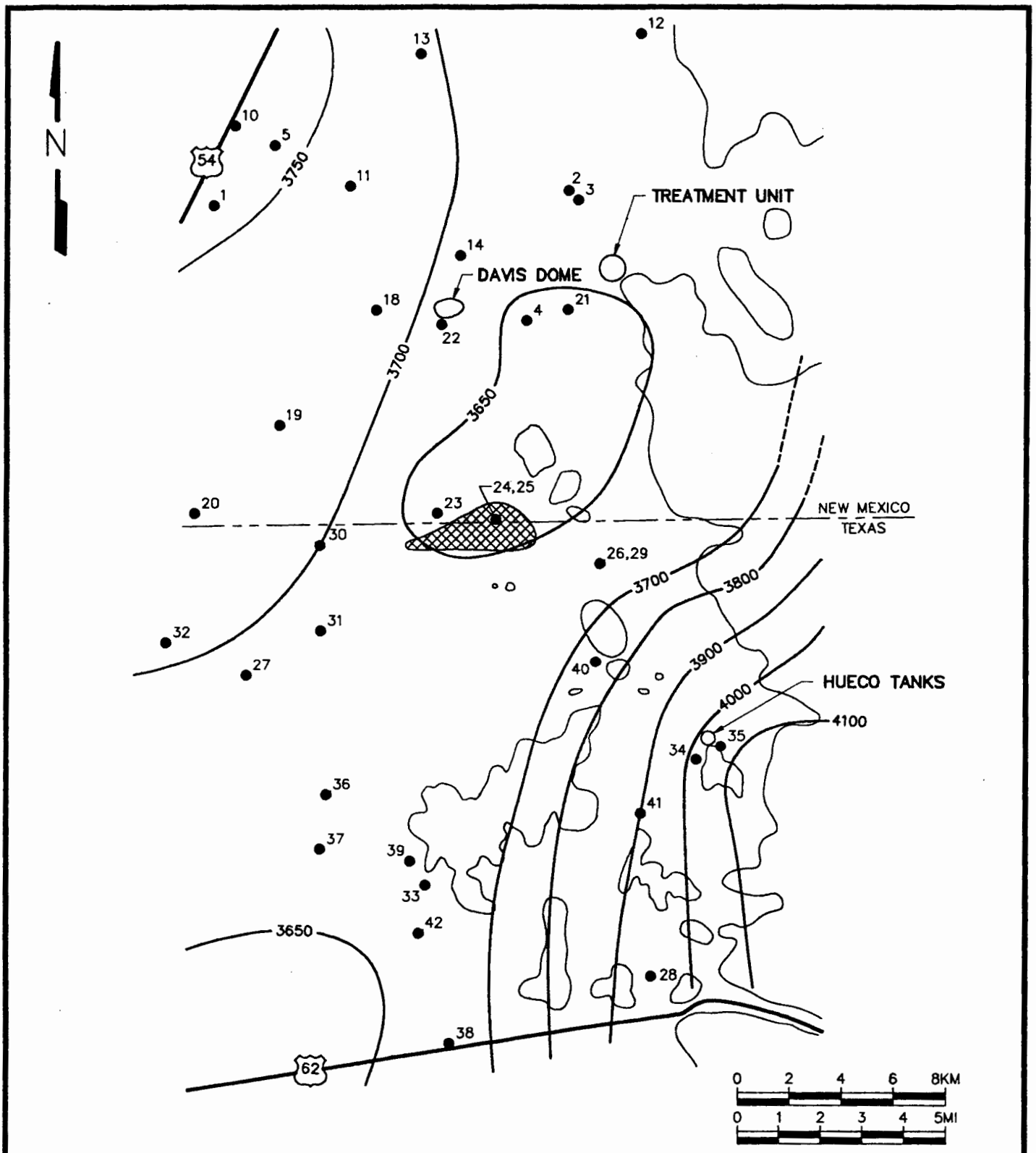
Regional Hydrology - Groundwater resources on the eastern side of the Hueco Bolson are sparse and of generally poor quality when compared with those on the west side of the Hueco Bolson, from which the City of El Paso derives its drinking water. Bolson deposits are composed of deep alluvial accumulations washed into intermontane areas from the surrounding highlands. The water bearing sediments which form this aquifer are generally unconsolidated, alternating, and discontinuous beds of silt, clay, sand, gravel, and boulders with associated caliche, gypsum, conglomerate, volcanic ash, tufts, and basalts (Taylor, 1981).

Precipitation and, to a minor extent, infiltration from the Rio Grande and Pecos Rivers, are the principal sources of recharge to the alluvial and Bolson deposits. Groundwater movement in this area begins with recharge along the foothills of the mountains and plateaus where the sediments are coarse grained and permeable, and possibly along the channels of ephemeral streams in the basins. Generally, recharge does not occur unless precipitation is sufficient to cause surface flow through the foothill areas in the ephemeral streams, otherwise the water is either directly evaporated or lost from the shallow subsurface by evapotranspiration.

Groundwater moves from recharge areas to discharge in the topographically lower parts of the basins. Fresh water is generally located in recharge areas that flank the topographically higher basin edge and may occur down gradient in distinct lenses intertongued with less permeable sediments which contain older, more saline waters. Total dissolved solids, chloride, and sulfate concentrations increase along the groundwater flow path by interaction with the rock matrix, dissolution of associated evaporite deposits, and/or evapotranspiration concentration. Basinward, slightly saline to saline groundwater may discharge naturally through evaporation, which can result in accumulation of salts on the land surface; may leave the topographically closed basin through the rocks that underlie the basin; or discharge directly to surface drainage such as the Rio Grande (Groundwater Availability in Texas).

Currently, large amounts of groundwater are withdrawn for municipal and industrial use in the El Paso area from the Hueco and lower Mesilla Bolsons. Overproduction of groundwater may result in a rise in dissolved constituents due to mixing of fresh water with slightly saline to saline water withdrawn from the sediments which underlie, overlie, or adjoin the fresh-water bearing zones.

The water table is generally deep, greater than 230 ft (70 m) below ground surface. Available well data from the area, Figure I.C-3, have been summarized, Table I.C-1, and used to



LEGEND

POTENTIAL PERCHED WATER

1 WELL LOCATION

3650 WATER TABLE CONTOUR

WESTON
MANAGERS DESIGNERS/CONSULTANTS

FIGURE 1.C-3

U.S. ARMY CORP OF ENGINEERS
FORT BLISS
WELL LOCATIONS AND
WATER TABLE CONTOURS
FORT BLISS, TEXAS

DATE	PROJECT NO.	SCALE
AUG 93	03886086001	AS SHOWN

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TABLE I.C-1

WELL DATA FOR HUECO TANKS AND VICINITY

MAP NO.	NAME	LOCATION	DATE	ELEV. (m)	DEPTH TO BEDROCK (m)	T.D. (m)	DEPTH TO WATER (m)	LITHOLOGY DEPTH (m)	T.D.S. (ppm)
1	Otero Co., *Ernest #1 Fee	New Mexico T25SR7E S20 444	1942	1250	--	1202	127-'fresh' 631-'saline'	421-igneous 665-base fill 704-base Hueco 720-top Penn	--
2	*Bechtel #1 Maris	T25SR8E S23 310	1950	--	146	301	--	bolson fill 146-top Penn 186-porous lmst.	--
3	*Page #1 Maris	T25SR8E S23 340	7949	1225	--	223	--	bolson fill ?198-igneous	--
4	*Wilmoth #1 Federal	T26SR8E S3	--	1260	--	63	--	bolson fill	--
5	*Muldry #1 State	T25SR73	--	1252	--	80	--	bolson fill	--
6	L1, T28 G2	T25SR6E S4 110	1953	1253	--	368	-- --	bolson fill	7000
7	Hueco Camp #, L7	T25SR6E S19 440	1943	1229	--	134	91.5	bolson fill	--
8	Hueco Camp #3, L8	T25SR63 S20 343	1944	1226	--	134	89.3	bolson fill	375
9	M2, T36	T25SR6E S28 444	1953	1219	--	225	82.3	bolson fill	2690
10	Alvarado Well	T25SR7E S16 121	--	1250	--	135	108.4	bolson fill	1160
11	North Well	T25SR7E S24 410	--	1255	--	123	--	bolson fill	--
12	Borego Well	T25SR8E S1 220	--	1265	--	236	154.5	bolson fill?	--
13	N1, T31	T25SR	1953	1241	273	288	--	--	--
14	McMillan Well	T25SR8E S32 333	1956	1241	273	288	--	--	--
15	L13	T26SR5E S24 320	--	1233	--	122	99.8	--	--
16	T5	T26SR6E S23 332	1957	1215	--	116	80.9	bolson fill	1420
17	M6	T26SR6E S34 130	--	1219	--	122	86.4	bolson fill	--
18	T1	T26SR7E S1 241	1956	1250	--	154	112	bolson fill	1140
19	--	T26SR7E S22 122	1936	1241	--	137	99.3	bolson fill	--
20	M5, T6	T26SR7E S32 122	1953	1238	--	366	106.1	bolson fill 265-sandstone?	1680 (3/53, 268m)
21	T2	T26SR8E S2 131	1956	1280	--	215	165.3	bolson fill	2620 (12/56, 215m)
22	"Hot Well"	T26SR8E S5 332	1945	1252	--	138	133.3	bolson fill	8740
23	N6, T8	T25SR8E S32 111	1953	1248	--	252	136.4	bolson fill 216-conglomerate	2670?
24	N8, "Nations Hot Well"	T26SR8E S33 120	--	1249	--	--	138.1 124.6	bolson fill	6200
25	N7	T26SR8E S33 120	--	1249	--	91.5	53.7 49.4 (perched W.T)	bolson fill	485

TABLE I.C-1
WELL DATA FOR HUECO TANKS AND VICINITY
Continued

MAP NO.	NAME	LOCATION	DATE	ELEV. (m)	DEPTH TO BEDROCK (m)	T.D. (m)	DEPTH TO WATER (m)	LITHOLOGY DEPTH (m)	T.D.S. (ppm)
26	El Paso Co., *Wilmoth #1	Texas T1Bk1 S6 PSL	--	1273	--	427	--	T.D. in 1mst.	--
27	*Texaco #1 El Paso Fee 23/79/1 (HW-2)	T1Bk79 S23	1965?	1240	793	2077	105	T.D. in 1mst.	--
28	*Jones #1 Sorley	T1 Bk5 S17 PSL	--	1340	--	683	--	T.D. in P/C granite	--
29	HW-1 "Santa Cruz Well"	T1Bk1S6 344	1956	1273	113	180	173.8	bolson fill 113-1mst. 119-fault?	7857
30	"Old Joint Well"	T1Bk78 S6 140	--	1242	--	122	110.9	bolson fill	--
31	"New Joint Well"	T1Bk78 S18 130	--	1242	--	131+	111.8	bolson fill	--
32	HW-4, "Palos Pintos #2"	T1Bk79 S16 220	1968	1241	--	300+	105?	bolson fill	2737
33	--	T2Bk78 S4	--	--	308	310	--	bolson fill 308-1mst.	--
34	"Hueco Estates"	T1Bk77 S9	--	1363	--	260?	120	bolson fill	--
35	Hueco Tanks Park	T1Bk77 S10	1971	1390	137?	175	112.8	bolson fill 137-syenite?	--
36	S9	T1 Bk78 S42	1953	1236	--	305	109.1	bolson fill 139-base, fresh water sands	--
37	Nations East Well	T1Bk78 S43	1943	1238	--	186	110.7	bolson fill	--
38	Deep Well	T2Bk78 S3	1953	1242	--	309	120.2	bolson fill 155-base, fresh water sands	--
39	*Texaco #1 El Paso Fee 45-78-1	T1Bk78 S45	--	--	--	502	--	--	--
40	Navar "Rock Well"	T1Bk1 S19 PSL	1797	1292	10?	155	--	syenite	--
41	HW-3	T1Bk77 S17	--	1341	--	190	200?	--	--
42	CTR-1	T2Bk6 S9 PSL	--	1244	--	--	135	bolson fill	--

Reference: Taylor, B., 1981 - Heat Flow Studies and GeoThermal Exploration in Western Trans-Pecos Texas, unpublished. Ph.D Dissertation, University of Texas at El Paso.

construct a water table contour map, Figure I.C-3, (Taylor, 1981). The map shows a water table depression to the east and south of Davis Dome, on McGregor Range, encouraging an easterly movement of water into the northern Hueco Mountains, as compared with a westerly movement, away from the mountains in the south. The water flow in the central part of the Hueco Bolson is southward towards the Rio Grande. The difference in flow regime is probably due in part to a decrease in transmissibility of the bolson sediments (an increase in clay content, for instance) to the immediate east of Davis Dome. The depth to groundwater in the immediate area of the treatment unit may be in excess of 600 ft (182.9 m).

Some water quality data is variable for the area. Test holes drilled by the Army in 1956 to investigate the potential for drinking water beneath McGregor Camp found no water considered potable. In general the hot waters are highly mineralized, with up to 8,980 ppm total dissolved solids (TDS) being recorded, while the cold groundwater of the region has a lower salinity. The two adjacent wells (numbers 24 and 25 in Table I.C-1 and on Figure I.C-3) apparently display both types: the "Hot Well" encountering hot water (presumably originating at depth) at the water table, and the shallower well finding "normal" water in what appears to be a perched zone. Some shallow holes drilled for a geothermal project hit small amounts of water at this same level. A small playa lake located near the "Hot Well" could provide recharge for such a localized perched aquifer (Taylor, 1981). More generally, alluvial fans emanating from the Hueco Mountains are the probable source of the low salinity non-thermal waters.

Flow data are almost non-existent for the eastern side of the Bolson. Alluvial deposits tend to be coarser-grained at greater depths allowing water movement, although the underlying lake-bed sediments are less permeable, having a considerable clay content. The limestone bedrock is generally fairly compact, often crystalline; and having a low porosity. However, many fractures and solution cavities have been reported by drillers, and this suggests a means by which water may move, especially from depth (Taylor, 1981)

Regional Meteorology - The climate in the site region is typical of the arid to semi-arid regions of the southwestern United States. Table I.C-2 presents a summary of climatic information for the Alamogordo, Tularosa, Cloudcroft, El Paso, and Orogrande areas. Alamogordo, Tularosa, El Paso, and Orogrande are typical of the central portion of the basin and Cloudcroft is typical of the bordering mountains. The mean annual precipitation in the basin ranges from 8.8 in (22.4 cm) in the central portion of the basin at Orogrande to 25.4 in (64.5 cm) at Cloudcroft in the bordering mountains. Precipitation on the slopes of the surrounding mountains produce intermittent stream runoff that drains toward the center of the basin, or moves as groundwater flow through the alluvial fans as interflow. The intense summer thunderstorms produce high runoff of short duration, most of which flows into the playas or alkali flats and evaporates (New Mexico Water Resources Research Institute, 1976).

Temperatures in the basin range from an annual average of about 61°F (16°C) in the central portion of the basin to about 45°F (7°C) in the bordering mountains (Table I.C-2).

Annual wind data for the years 1988, 1989, 1990, 1991, and 1992 are presented on Exhibits 2 and 3. These diagrams show that wind direction is quite variable, however, there is a predominant north-south directional trend.

TABLE I.C-2

SELECTED CLIMATIC DATA FOR STATIONS WITHIN THE REGION

	UNITS	ALAMOGORDO[a]	TULAROSA[a]	OROGRANDE[b]	EL PASO[c]	CLOUDCROFT[b]
Elevation (above MSL)	feet	4,350	4,460	4,200	--	8,827
Average days above 32°F	days	209	211	NA	--	NA
Average frost-free period	date	Apr. 7 - Nov. 2	Apr. 4 - Nov. 1	NA	--	NA
Mean annual precipitation	inches	9.8	10.1	8.8	8.9	25.4
Maximum mean monthly air temp.	mo-°F	Jul. - 79.7	Jul. - 80.4	Jul. - 81.5	Jul. - 82	Jul. - 59.9
Minimum mean monthly air temp.	mo-°F	Jan. - 42.0	Jan. - 43.4	Jan. - 42.0	Jan - 42	Jan. - 30.0
Average annual air temp.	°F	61.3	61.7	61.9	62	45.0

NA: not available

[a] New Mexico Interstate Stream Commission and New Mexico State Engineer Office, *County Profile-Otero County, Water Resources Assessment for Planning Purposes*, Santa Fe, New Mexico, 1975, pp. 12-13.

[b] U. S. Department of Commerce, NOAA-EDS, *Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1941-70*, Climatography of the U. S. No. 81 (by state), National Climatic Center, Asheville, NC, August 1973.

I.C.4 "Kick-Out" Residue

This section addresses the concern that the PEP waste or ashes are ejected from the treatment unit and the fragments, ash, or residue potentially result in environmental contamination.

Open Burn - Potential environmental contamination is minimized at the OB unit by two measures. First, the containment device (excavation) is of a sufficient size and height to reduce the ejection of PEP waste. Second, post-burning inspections will reveal the presence of ejected materials. These materials are collected and reburned.

Open Detonation - Little, if any, ash is generated following a detonation. The residue following a detonation consists of metallic fragments and occasional pieces of PEP which were not thermally treated during the explosion. Following each detonation, and as soon as the site can be safely approached, the site is closely inspected for metallic or PEP fragments. Metallic fragments that are obviously free of PEP are collected and stored to be surplused. PEP fragments found are detonated at the point they are found with no additional handling.

Potential for Danger - Waste PEP is not present at the OB/OD facility until immediately prior to being treated. During the treatment process, access to the site is controlled by Range Control and there is only one access road. There is, therefore, no significant potential for exposure of domestic animals, wildlife, crop, or vegetation during the OB/OD process.

PEP is burned or detonated in accordance with minimum safety distances detailed in 40 CFR 265.382. These safety distances refer to the distance from the open burning or open detonation unit to the property of others and are specified in Table I.C-3.

TABLE I.C-3
MINIMUM SAFETY DISTANCES FOR OPEN BURNING AND OPEN DETONATION OPERATIONS

Quantity of Waste Explosives	Minimum Distance from Open Burning or Detonation to Property of Others
0 to 100 pounds (0 to 45.4 kg)	670 feet (204.2 m)
101 to 1,000 pounds (45.5 to 453.6 kg)	1,250 feet (381 m)
1,001 to 10,000 pounds (453.7 to 4,536 kg)	1,730 feet (527.3 m)

Unidentified Remnants - Very small pieces of "kick out" which are not located and left in the soil will be characterized by soil sampling. Section II, Waste Characterization, describes characterization sampling which will determine the impact of unrecovered residue.

I.D. SEISMIC AND FLOODPLAIN (40 CFR 264.18(b) and 40 CFR 270.14 (b) (11) (iii))

Flooding and runoff/runon hazards are negligible due to the topographic and meteorologic conditions at the site. The enclosed United States Geological survey (USGS) map, Attachment No. 1 (replaced by Exhibits 1 and 2), *clearly shows the drainage patterns in the area. Federal Insurance Administration information is not available for this region, however, due to the elevation and drainage patterns, it has been determined that this area is not within the 100-year floodplain. The site is and will remain bermed to eliminate runoff and/or runon during high intensity short duration rains.* Berm damage to the east will be repaired.

This facility is not located in a political jurisdiction listed in Appendix VI of 40 CFR 264.

There are no homes in this area, therefore, no Federal Insurance Administration floodplain maps have been developed. Calculations follow to predict the 100 year flood elevation.

The dry arroyo north of the site (Exhibits 2 and 3) is the only likely potential source of flood water and an estimated 100 year flood is determined for this arroyo using runoff and discharge equations as described in this section. The objective will be to predict a stream discharge (Q) for the arroyo adjacent to the site, and calculate the stream capacity to determine if the resulting flood will reach the treatment unit.

I.D.1 Discharge Calculation

The design flood for the arroyo north of the site was developed based on the intensity of the 30 minute 100 year rainfall. The assumptions are that the rain event occurs over the entire 40,000 acres (162 sq km) of the drainage basin at the rate of 5 in (12.7 cm) per hr. The other assumption is that the duration of the rain event is sufficiently long that runoff from the farthest upstream locations in the basin has time to flow to the point in the drainage way adjacent to the facility. Both of these assumptions result in a higher calculated maximum discharge adjacent to the site than would result from a 100 yr flood.

Based on the above assumptions, the design flood has a discharge rate of about 100,000 cfs (2,832 cms) as calculated using the rational equation:

$$Q = CIA$$

where:

C = Runoff Coefficient (assumed to be 0.5)
I = Rainfall intensity (assumed to be 5 in per hr)
A = Area of the basin (measured at approximately 40,000 acres) (Chow, 1964, p. 14-7)

These assumptions result in a 100,000 cfs (2,832 cms) discharge rate from the basin.

The drainage basin was also evaluated using the USDA equation for the southwest:

$$Q = CM^{.94}$$

Where

Q = Discharge in cfs

C = Runoff Coefficient (different from that for the rational equation and empirically developed for conditions in the southwest).

M = Drainage Basin Area in acres.

(Davis, 1969, p. 39-8, 9)

The runoff coefficient was estimated at 100. This is the average of the extreme values recommended for hilly areas. Much of the drainage area is relatively flat (slopes less than 5 percent) so this is a conservative runoff coefficient value. The calculation is:

$$Q = 100\ (40{,}000)^{.94}$$

$$= 685{,}000 \text{ cfs } (19{,}399.2 \text{ cms})$$

Because the southwest equation predicts more stream flow, it will be used.

I.D.2 Available Stream Capacity

Based on the Manning Equation for open channel flow (Chow, 1964,p. 7-24, 25), the discharge capacity of the arroyo and overbank areas north of the site were calculated.

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

where:

Q = the flow in an open channel in cfs
n = the Manning number (estimated at 0.025)
A = Cross Sectional area of the channel
R = Hydraulic Radius (approximately equal to the mean channel depth)
S = Slope of the Energy Gradient

To determine the total drainage way discharge capacity two discharge rates have been calculated. The first (Q_1) is that capacity when the arroyo channel is full. The second (Q_2) is that capacity available when the arroyo overflows and water spreads out over the surface of the alluvial fan.

The discharge capacity of the main channel of the arroyo (Q_1) was calculated based on current mapping in the area of the site (Exhibit 3). The main channel is about 200 ft (61 m) wide and 2 ft (0.6 m) deep. Therefore:

$$Q_1 = \frac{1.49}{0.025}(360)(2)^{5/3}(0.015)^{1/2}$$

$$= 4{,}162 \text{ cfs } (117.9 \text{ cms})$$

The discharge capacity of the overbank area (Q_2) was calculated using topographic data from both current mapping (Exhibit 3) and the published 1:24,000 scale map (Exhibit 1).

Based on current mapping, the lip of the treatment unit excavation is approximately 8 ft (2.4 m) higher than the bottom of the arroyo. Assuming a design flow depth is a total of 6 ft (1.8 m) (i.e. 2 ft (0.6 m) in the arroyo channel and 4 ft (1.2 m) in the floodplain), and assuming the floodplain extends to within 1,000 ft (304.8 m) of the adjacent (further north) arroyo the Q_2 value can be calculated. The resulting 9,300 ft (2,834.6 m) floodplain is reasonable given the conservative values for rainfall intensity and the low probability of it occurring over more than one drainage basin at the same time.

The overbank flow area discharge capacity (Q_2) assuming 4 ft (1.2 m) of water over an area 9,300 ft (2,834.6 m) wide is:

$$Q_2 = \frac{1.49}{0.25}(37{,}200)(4)^{5/3}(0.015)^{1/2}$$

$$= 681{,}631 \text{ cfs } (19{,}303.8 \text{ cms})$$

The total available discharge capacity ($Q_1 + Q_2$) is approximately 685,000 cfs (19,399.2 cms) with a design depth of 6 ft (1.8 m), 2 ft (0.6 m) below the elevation of the lip of the treatment unit. This approximately equals the maximum estimated flood discharge of 685,000 cfs (19,399.2 cms)

Therefore, the conservatively derived 100 year storm is predicted to reach an elevation of about 4,326 ft (1,318.6 m) adjacent to the treatment unit. Because the lip of treatment unit is at about elevation 4,328 ft (1,319.2 m), there is approximately 2 ft (0.6 m) of free board under the assumed conditions. This is a conservative analysis and the probability that flood conditions will reach the calculated elevation adjacent to the treatment unit is low.

I.D.3 Erosion

The morphology of the alluvial fan and ridges near the unit suggest erosion of the arroyo into the unit will not occur. There is a ridge of rock east of the unit which marks the likely southwestern limit of the arroyo. If the arroyo migrates under extreme flood conditions it will

likely migrate to the north, away from the treatment unit. Therefore, erosion of the treatment unit due to flooding by the arroyo is unlikely.

I.E. TRAFFIC PATTERNS

Traffic inside and around the Explosive Ordnance Disposal Demolition Area is limited to Explosive Ordnance Detachment (EOD) personnel. EOD personnel will maintain all approaching roads in serviceable condition.

This section describes the general traffic patterns at McGregor Range. Materials destined for OB/OD treatment are removed from the McGregor Range storage bunkers and hauled entirely on military roads on the Military Reservation. Trucks moving PEP waste travel east of McGregor Camp use the road to Davis Dome which is asphalt, two lane, and very well maintained (Figure I.A.2) Progressing further eastward toward the treatment unit there are one and two lane asphalt roads to the various launch areas, one of which leads to the viewing stand and the treatment unit. Nearer to the site, in the impact area of the range, the road becomes unpaved, but well cleared. There is a single road into the site which leads to the ramp which is used to enter the excavation.

East of Davis Dome during OB/OD operations there is no reason for traffic except EOD personnel. The EOD unit establishes its base of operation on the unpaved entry road during treatment operations so as to stop any traffic approaching the treatment unit.

I.E.1 Number and Type of Vehicles

The only vehicles on the dirt roads between the viewing stands (Figure I.A-2) and the treatment units during OB/OD operations are carrier trucks appropriate for transport of the waste in its containers, and lighter trucks for personnel transport. There should not be more than four such vehicles in the area at one time.

During range operations (i.e., target practice) there will not be any vehicles east of the viewing stands. Any other vehicle movement in the area of the treatment unit (i.e., when there are no OB/OD operations and no Range operations) will be Range personnel conducting maintenance operations or, potentially, reclamation of target materials.

I.E.2 Transfer and Pick-Up Stations

Pickup is at the PEP bunkers on McGregor Range. When loaded the waste materials are transported directly to the OB/OD unit, without being transferred.

I.E.3 Quantity of Waste Per Movement

The weight of PEP waste per movement, including shipping containers, will not exceed the load limit of the vehicle. However, practically the loads are much less and are not expected to exceed 1,000 lbs (454 kg) per load.

I.E.4 Route Capacities

The road surface design loads are not known, however, the asphalt roads have supported the trucks transporting PEP, as well as missile carriers and other heavy military equipment, since 1965 with normal maintenance and resurfacing. The unpaved roads are on a very hard vase (usually rock) and have also supported the vehicles involved in treatment operations for many years.

II. WASTE CHARACTERISTICS

The chemical and physical characteristics of waste thermally treated at the Open Burn/Open Detonation (OB/OD) Treatment Facility are described in this section along with a waste analysis plan for sampling, testing, and evaluating the waste.

II.A CHEMICAL AND PHYSICAL ANALYSES [40 CFR 270.14 (b) (2) and 264.13(a)]

For the vast majority of the wastes thermally treated at the Explosive Ordnance Detachment Demolition Area, the physical and chemical characteristics required to prove that adequate treatment of the waste will occur during the open detonation process has been well documented by Department of Defense personnel. A detailed analysis of selected propellants, explosives, and pyrotechnics (PEP) to be Open Burned/Open Detonated (OB/OD) at Department of the Army thermal treatment facilities is included in Appendix A (original Appendix Deleted). *Table I* (now Table II.A-1) *lists the wastes potentially treated at the Explosive Ordnance Disposal Demolition Area.*

The formulations of some Department of Defense waste ordnance, propellants, explosives, and pyrotechnics (PEP) may be classified (i.e., secret or top secret) information (RCRA Part B Permit Writers' guidance manual for Department of Defense OB/OD Detonation Units). The sensitive nature of this information is much different from that addressed in 40 CFR 270.12, Confidentiality of Information. The owner/operator of the demolition area will not provide analytical data which would jeopardize national security.

Delays in the disposal of products that have been determined to be wastes, can lead to potentially severe safety problems. The inherent instability of these products greatly increases with time. Therefore, delays caused by requirements to perform time-consuming sampling and analysis may be counterproductive. Additional physical and chemical data will be worthless if the reactive waste detonated or ignited prematurely while sampling the product, or at a storage facility awaiting results of these analyses.

- ***Containerized Waste [40 CFR 270.15 (b)(1)]***

There is no containerized waste stored at the OB/OD facility.

Shipping containers are used to transport the PEP, and they are reused or recycled.

- ***Waste in Tanks [40 CFR 264.191]***

There are no wastes in tanks associated with the OB/OD facility.

TABLE II.A-1

TYPICAL REACTIVE WASTES TO BE OPEN BURNED/OPEN DETONATED

TYPE OF WASTE	CONSTITUENTS	GENERAL OR TYPICAL CONCENTRATION OR AMOUNT
75 mm Cartridge (Armor Piercing)		
PEP		
	Nitroguanidine	50%
	Nitroglycerin	20%
	Nitrocellulose	20%
	Ethyl Centralite	Trace
	Potassium Nitrate	Trace
	Charcoal	Trace
	Cryolite	Trace
	Sulfur	Trace
	Barium Peroxide	Trace
	Strontium Nitrate	Trace
	Lead Sulfocyanate	Trace
	Antimony Sulfide	Trace
	Potassium Chlorate	Trace
	TNT	Trace
	DNT	Trace
	Calcium Resinate	Trace
	Graphite	Trace
	Polyvinyl Chloride	Trace
	Aluminum Powder	Trace
Casing and Body		
	Forged steel body and head	
	Brass booster cup	
Waste MZ		
Propellant	Nitrocellulose	75-80%
	Nitroglycerin	17-22%
	Ethyl Centralite	Trace
	Barium Nitrate	Trace
	Potassium Nitrate	Trace
	Graphite	Trace
Off-Spec TNT	2,4,6-TNT	90-98%
	Various isomers of TNT	Trace
	Isomers of DNT	Trace
	Other various compounds	Trace

- ***Waste in Piles [40 CFR 264.(c)(1) and (4)]***

There are no wastes in piles associated with the OB/OD facility.

- ***Landfilled Wastes [40 CFR 264.314]***

There are no RCRA landfilled wastes associated with the OB/OD facility.

II.A.1 Physical and Chemical Characteristics of Wastes and Residues

Because the sampling and chemical analysis of PEP waste entering the unit is impractical for safety reasons, and because the materials treated may have changed over the years (e.g., initiators changed from black powder to C-4), direct waste characterization will not be done. Instead unclassified literature will be used to document the general contents of the PEP and soil sampling will be used to determine what constituents may remain in the unit. Two types of sampling are proposed: initial site characterization sampling, and closure sampling. The first, initial site characterization sampling is discussed in Section II.B, Waste Analysis Plan. Closure sampling is presented in the Closure Plan.

Based on the information in Tables II.A.-2, through II.A.-6, all of the waste accepted for thermal treatment will be considered hazardous prior to treatment because of its explosive or reactive nature. Full hazardous characteristics analyses will not be performed prior to OB/OD in order to avoid danger associated with excess handling of such materials and to eliminate costly and potentially dangerous time delays. The waste is visually inspected prior to treatment to ensure that only appropriate wastes are subjected to thermal treatment, and to ensure that the PEP arriving at the facility matches the waste identity designated on the accompanying manifest(s).

II.A.2 Container and Pile Management

Containers and waste piles are not part of the treatment process. They are mentioned in EOD operating procedures, but are only used at the unit as follows:

- "Containers" are the shipping containers used to transport PEP from the manufacturer to brinker storage, to the practice range or battlefield for use, or to the OB/OD unit for treatment. As such they are designed for safety and endurance, and are reusable. Therefore, they are reused or recycled after they are used to transport PEP to the treatment unit.

TABLE II.A-2

SPECIFICATION REFERENCES FOR PROPELLANTS

TITLE	NUMBER
Propellant Artillery	MIL-P-270A
Propellant Charge Assy for Rocket, Practice, 35MM Subcaliber, M73	MIL-P-50981A(1)
Propellant Charge Assy Rocket, HE, 66MM, M72A1, w/coupler	MIL-P-60009A
Propellant Charge Nuclear Component	MIL-P-48194
Propellant Charge, Nuclear Component, Tng	MIL-P-50838
Propellant Charge, Rocket, M180	MIL-P-50202A(4)
Propellant CTBN 23-17	MIL-P-85364
Propellant Double Base Sheet, XM36	MIL-P-48357A(1)
Propellant Feed System, Rocket Propulsion, General Specification For	MIL-P-27409(1)
Propellant For Small Arms Ammunition	MIL-P-3984G(3)
Propellant for 20MM Aircraft Gun Mark 12	MIL-P-18942A(3) NOTICE (1)
Propellant for 20MM Ammunition	MIL-P-81994
Propellant Grain M753 for 8" Projectile	MIL-P-63159
Propellant Grain, Cylindrical, for Rocket Motors	MIL-P-18906(1)
Propellant Grain, MK 43, Mod 1	MIL-P-18811A(2)
Propellant Grain, M28	MIL-P-6007A(1)
Propellant Grain Igniter	MIL-P-82691
Propellant M1 for Use in Charge, Propelling, XM164	MIL-P-43848
Propellant M1 Type II (Master Lot) for Use in Charge XM72	MIL-P-14768(1)
Propellant M1 for Use in Charge, Propelling, M4A2	MIL-P-60397B
Propellant M1 for Use in Charge, Propelling, 155 MM, M3A1 for 155 MM Howitzer Cannon	MIL-P-60416A(1)
Propellant M1 for Use in 90 MM Cartridges	MIL-P-48759
Propellant M10 for Use in Cartridges, for 57 MM Rifle, M18 and M18A1	MIL-P-48051A
Propellant M10 for 81MM Mortar Propelling Charges	MIL-P-48130A(1)

TABLE II.A-2

SPECIFICATION REFERENCES FOR PROPELLANTS
(Continued)

TITLE	NUMBER
Propellant M14 for Use in Cartridge 105 MM TP-T M490E1	MIL-P-63517
Propellant M26 (T28) for Use in Increment XM90E1 for 81MM Mortar	MIL-P-46993
Propellant M26 for Use in Cartridge, Antipersonnel XM581 for 106MM Rifle M40A1	MIL-P-60375
Propellant M26A1 for Use in Charge Propelling M189	MIL-P-50472A
Propellant M30 for Use in Cartridge 105MM, APFSDS-T M833	MIL-P-63515A
Propellant M30 for Use in Cartridge 105MM APFSDS-T, M735 M735A1 and XM774	MIL-P-63105B(1)
Propellant M30 for Use in Cartridge 105MM HEAT-T M456A1, HEAT-T-MP M456A1E2 and TP-T,M490.	MIL-P-46458F
Propellant M30A1 for Use in 155MM Propelling Charges	MIL-P-48349
Propellant M30 for Use in Cartridge, 150MM, APDS-T, M728	MIL-P-48266A
Propellant M30 for Use in Cartridge, 105MM, TPDS-T, M724A1	MIL-P-48154B
Propellant M30 for Use in Cartridge, 90MM, Anti-personnel, XM580 for Guns M36 and M41	MIL-P-60382(1)
Propellant M30 for Use in 105MM Cartridge HEAT-T, M622	MIL-P-63301
Propellant M30 for Use in Cartridges, TP-T M353A1 and AP-T M318A1E1 and 90MM Guns	MIL-P-46999B
Propellant M30 Type 1 for Use in Charge, XM72, Zone III	MIL-P-14769
Propellant M30 for Use in Cartridge, HEAT-T M431 for 90MM Guns	MIL-P-46600C
Propellant, M30A1 (M30E1) for Use in Charge, Propelling, 105MM, XM176, for Cartridge, HE, XM548 for Howitzers M101, M102 and M108	MIL-P-60422(1)
Propellant, M30A1 for Use in Charge Propelling M203	MIL-P-48367(B)
Propellant M30A1 for Use in Charge, Propelling XM201E2	MIL-P-48366(1)
Propellent M30A1 for Use in Charge, Propelling XM203 for 155MM Projectile, Rocket-assisted, M549	MIL-P-48257

TABLE II.A-2

SPECIFICATION REFERENCES FOR PROPELLANTS
(Continued)

TITLE	NUMBER
Propellant M30A1 for Use in Charge, Propelling XM201E1 for 155MM Projectile, Rocket-assisted M549	MIL-P-48256
Propellant M30A2 for Use in Charge, Propelling, M188 and M188E1 for 8 Inch Projectiles	MIL-P-48181C
Propellant M30E1 for Use in Propelling Charge M85 and XM121 for 105MM Howitzer	MIL-P-46651B(1)
Propellant M31E1 for Use in Charge Propellant M188E2 for 8 Inch Projectiles	MIL-P-63341A
Propellant M5 for Use in Charge, Propelling, XM178 for 90MM Recoilless Rifle	MIL-P-60358(1)
Propellant M6 for Use in Cartridge 105MM HEP-T, M327	MIL-P-48058
Propellant M6 for Use in Cartridge, 105MM APERS-T M494	MIL-P-48231
Propellant M6 for Use in Cartridge, 76MM, HEAT-T, M496	MIL-P-46484A
Propellant M6 for Use in Cartridge, 90MM, APERS, XM580E1 for Guns M36 and M41	MIL-P-60417
Propellant M6 for Use in Cartridge, 90MM, Canister, M377	MIL-P-60465
Propellant M6 for Use in Cartridge, 90MM, TP-T, M353	MIL-P-60359
Propellant M6 for Use in Charge, Propelling, M119, 155MM	MIL-P-1494OB(1)
Propellant M6 for Use in Charge Propelling 175MM, M199 and M86A2B1	MIL-P-46230C
Propellant M6 for Use in Charge Propelling 155MM, M119A2	MIL-P-63404
Propellant, M6 for Use in Charge, Propelling, (Green Bag) 175MM, XM124	MIL-P-60384(2)
Propellant M9 for Use in Charge, Propelling, M36A2	MIL-P-48127
Propellant M9 for Use in Increments M90 and M90A1 for 81MM Mortar	MIL-P-60029B(1)
Propellant M9, Flake (For Use in Ignition Cartridges)	MIL-P-60398A(1)
Propellant M9, Flake (For Use in 40 MM Cartridges)	MIL-P-50206(2)
Propellant Powder (For Use in Base Grain OGK)	MIL-P-604638B
Propellant Pressurizing Agent, Helium	MIL-P-27407A

TABLE II.A-2

SPECIFICATION REFERENCES FOR PROPELLANTS (Continued)

TITLE	NUMBER
Propellant Pressurizing Agent, Nitrogen	MIL-P-27401C
Propellant, Ammonia	MIL-P-27406
Propellant, Ball Powder for Cartridge, 105MM, HE, XM710	MIL-P-63084
Propellant, Booster, Grain-Ignition (For Torpedo Mk 46 Mod 0)	MIL-P-81095 NOTICE 1
Propellant, Cannon, Naco	MIL-P-19264A NOTICE 1
Propellant, Chlorine Pentafluoride	MIL-P-27413
Propellant, Chlorine Trifluoride	MIL-P-81399A
Propellant, Double Base Sheet M36	MIL-P-483457A
Propellant, Double Base Sheet N5	MIL-P-17689
Propellant, Composite ADC-109	MIL-P-83405
Propellant, Double Base, Type N-2 (JPN)	MIL-P-18617
Propellant, Ethylene Oxide (Asg)	MIL-P-8845A
Propellant, Fluoride	MIL-P-27405(2)
Propellant, Foam (For Torpedo Mk 46 Mod 0)	MIL-P-81069(1)
Propellant, Furfuryl Alcohol	MIL-P-45702B
Propellant, Grain, Inhibited	MIL-P-60852A
Propellant, High Density Synthetic Hydrocarbon Type, Grade JP-9 and JP-10	MIL-P-87107B(1)
Propellant, Hydrazine	MIL-P-26536C(2)
Propellant, Hydrazine - UNS-DIMETHYLHYDRAZINE (50 Percent N2H4 - 50 Percent Udmh)	MIL-P-27402B
Propellant, Hydrogen	MIL-P-27201B
Propellant, Hydrogen Peroxide	MIL-P-16005E
Propellant, H8	MIL-P-23929A
Propellant, Kerosene	MIL-P-25576C(2)
Propellant, Igniter X-62	MIL-P-85489

TABLE II.A-2

SPECIFICATION REFERENCES FOR PROPELLANTS
(Continued)

TITLE	NUMBER
Propellant, M1 for Use in Charge Propelling for 75MM How M1A1 and M3	MIL-P-46990
Propellant, Mixed Amine Fuel, MAF-1	MIL-P-23741A(1)
Propellant, Mixed Amine Fuel, MAF-3	MIL-P-23686A(1)
Propellant, Mixed Oxides of Nitrogen	MIL-P-27408A
Propellant, Monomethylhydrazine	MIL-P-27404B
Propellant, M1 for Use in Charge Propelling M2 (White Bag) for 8 Inch Howitzer)	MIL-P-46699B
Propellant, M1 for Use in Charge, Propelling, M67 for 105MM Howitzer	MIL-P-60318B
Propellant, M1 for Use in 105MM Cartridges	MIL-P-46252C
Propellant, M1, for Use in Charge Propelling M1 (Green Bag for 8 Inch Howitzer)	MIL-P-46698
Propellant, M1 for Use in Charge, Propelling, 155MM, M3	MIL-P-46913
Propellant, M10 (For Use in Special Applications)	MIL-P-48099A
Propellant M10 for 60MM Mortar M204 Propelling Charge	MIL-P-63194A
Propellant, M15 and M17	MIL-P-668A
Propellant, M17, for Use in Cartridge, 76MM, AP-T, M33, and 76MM TP-T, M340A1	MIL-P-46522(1)
Propellant, M2 and M5	MIL-P-323A
Propellant, M2 and M5 Subsystem Ammunition	MIL-P-60989A(1)
Propellant, M2 for Use in 165MM Cartridges	MIL-P-60045A
Propellant, M2, for Cartridge, 37MM, TP, M63 Mod 1	MIL-P-46663
Propellant, M26 (T28) for Use in Cartridges M344 and M346, in 105MM Rifles	MIL-P-46235A
Propellant, M26A1, for Use in Charge Propelling XM189 and XM190	MIL-P-50472(A)
Propellant, M30 (T36), for Use in Cartridge, 105MM HEAT-T, M456A1 and TP-T M490	MIL-P-46458F(1)
Propellant, M30 for Use in Cartridge 105MM APFSDS-T, M735	MIL-P-63105B(1)

TABLE II.A-2

SPECIFICATION REFERENCES FOR PROPELLANTS
(Continued)

TITLE	NUMBER
Propellant, M30 for Use in Cartridge, 105MM, APDS-T, M392A2	MIL-P-46489C(1)
Propellant, M30 for Use in Cartridges 76MM, AP-T, M339 and TP-T, M340A1	MIL-P-60389A
Propellant M30A1 for Use in Charge, Proof, 155MM PXR-6255	MIL-P-48372
Propellant M30A1 for Use in Charge, Proof, 155MM PXR-6297	MIL-P-63387
Propellant, M31 (T34), for Use in Charge Propelling, M45 for Projectiles M365 and M367, for 120MM Gun, M58	MIL-P-46683A(1)
Propellant, M5 (For Use in Special Applications)	MIL-P-48089(1)
Propellant, M5 for Use in Cartridge, 90MM, HEAT, M371 and M371E1	MIL-P-46426A
Propellant, M6 for Use in Cartridge, Canister, 76MM, M363	MIL-P-60098
Propellant, M7	MIL-P-14737(2)
Propellant, M9 (For Use in Base Charge Assemblies)	MIL-P-60363A
Propellant, M9 (For Use in M19A2 Signal)	MIL-P-60354(1)
Propellant, M9, for Use in Increment, M185 for 81MM Mortar	MIL-P-50418
Propellant, M9 for Use in Increment, M5 for 81MM Mortar	MIL-P-50425
Propellant, M9 for Use with Charge, Propelling M36A1 for 4.2 Inch Mortar	MIL-P-60019A(3)
Propellant, M9 for use in Cartridge, Ignition XM702E1	MIL-P-63195(1)
Propellant, Nitric Acid	MIL-P-7245F(2)
Propellant, Nitrogen Tetroxide	MIL-P-26539C(2)
Propellant, Oxygen	MIL-P-25508E(3)
Propellant, Pressurizing Agent, Argon	MIL-P-27415
Propellant, Pyrocellulose	MIL-P-231A(2)
Propellant, Rocket Motor, Rocket, High Explosive, 345MM XM130	MIL-P-53028
Propellant, T36E1, for Use in Charge, Propelling, 155MM, XM119 (Supercharge)	MIL-STD-2100

TABLE II.A-2

SPECIFICATION REFERENCES FOR PROPELLANTS
(Continued)

TITLE	NUMBER
Propellant Solid for Cannon Requirements and Packing	MIL-STD-652D NOTICE 2 NOTICE 4
Propellant, Solventless Type 37 for Projectile 155MM, HE, Rocket Assisted, M549 and M549A1	MIL-P-63201
Propellant, Solid, Gas Generator	MIL-P-47144
Propellant, Solid, Sampling, Examination and Testing	MIL-STD-286B NOTICE 4
Propellant, Spheroidal Ball Powder	MIL-P-48335
Propellant, T2	MIL-P-45460A
Propellant, T36E1, for Use in Charge, Propelling, 155MM, XM119 (Supercharge)	MIL-P-60033B
Propellant, T36E1, for Use in Charge, Propelling, 155MM, M51	MIL-P-46902
Propellant, T36E1 for Use in Charge, Propelling, 155MM, XM115 (White Bag)	MIL-P-46953(2)
Propellant, U.S. Navy Guns, Ballistic Appendix	MIL-P-22314(3)
Propellant, Uns-dimenthylhydrazine - Jet Fuel	MIL-P-26694B(2)
Propellant, Uns-demethylhydrazine	MIL-P-25604D(1)
Propellant, M6 for Use in Charges, Propelling, 175MM, M199 and M86A2B1	MIL-P-46230C

NOTE: THESE SPECIFICATIONS WERE OBTAINED FROM THE DEPARTMENT OF DEFENSE INDEX OF SPECIFICATIONS AND STANDARDS (DODISS) CURRENT AS OF THE DATE OF HANDOUT PUBLICATION. THE DODISS SHOULD BE CONSULTED WHEN COMPLETE, UP-TO-DATE INFORMATION IS DESIRED.

TABLE II.A-3

GENERAL CHEMICAL COMPOSITION OF PEP ITEMS

NAME	CHEMICAL FORMULA	HAZARDOUS WASTE ID NUMBER
Propellants		
Nitrocellulose	$C_{12}H_{14}(ONO_2)_6O_4$	D003
Nitroglycerin	$C_3H_5(ONO_2)_3$	D003
Nitroguanidine	$H_2NC(NH)NHNO_2$	D003
These three primary constituents can be used singularly or in various combinations along with metals, metallic salts, and organic polymer binders.		
Primary Explosives		
Lead azide	$Pb(N_3)_2$ (71% Pb)	D003, D008
Mercury Fulminate	$HgC_2N_2O_2$ (7.055 Hg)	D003, D009
Diazodinitrophenol (DDNP)	$HOC_6H_3(NO_2)_2N(:N)$	D003
Lead styphnate	$C_6H(NO_2)_3(O_2Pb)$ (44.2% Pb)	D003, D008
Tetracene	$C_{18}H_{12}$	D003
Potassium Dinitrobenzofuroxane (KDNBF)	$C_6H_2N_4O_6K$	D003
Lead Mononitroresorcinate (LMNR)	$C_6H_3NO_2Pb$ (57.5% Pb)	D003, D008
Primary Compositions - mixtures of primary explosives, fuels, oxidizers and binders.		
Fuel - Lead	$Pb(SCN)_2$ (64% Pb)	D008
thiocyanate		
Antimony sulfide	Sb_2S_5	D003
Calcium silicide	$CaSi_2$	D003, D001

TABLE II.A-3

GENERAL CHEMICAL COMPOSITION OF PEP ITEMS
(Continued)

NAME	CHEMICAL FORMULA	HAZARDOUS WASTE ID NUMBER
Oxidizers - Potassium chlorate	$KClO_3$	D003
Ammonium Perchlorate	NH_4ClO_4	D003
Barium nitrate	$Ba(NO_3)_2$	D003, D005
Aliphatic Nitrate Esters		
1,2,4-Butanetriol Trinitrate (BTN)	$C_4H_7N_3O_9$	D003
Diethyleneglycol Dinitrate (DEGN)	$C_4H_8O_3(NO_2)_2$	D003
Nitroglycerine (NG)	$C_3H_5(ONO_2)_3$	D003
Nitrostarch (NS)	$C_{12}H_{12}(NO_2)_8O_{10}$	D003
Pentaerythyritol Tetranitrate (PETN)	$C(CH_2NO_3)_4$	D003
Triethylene Glycoldinitrate (TEGN)	$C_6H_{12}O_4\ 2NO_2$	D003
1,1,1-Trimethylolethane Trinitrate (TMETN)	$C_5H_9O_9N_3$	D003
Nitrocellulose (NC)	$C_{12}H_{14}(ONO_2)_6O_4$	D003
Nitramines		
Cyclotetramethylene-tetranitramine (HMX)	$C_4H_8N_8O_2$	D003
Cyclotrimethylene-trinitramine (RDX)	$C_3H_6N_6O_6$	D003
Ethylendiamine Dinitrate (EDDN Haleite)	$C_2H_6N_4O_4$	D003
Nitroguanidine (NQ)	$H_2NC(NH)NHNO_2$	D003
2,4,6-Trinitrophenyl-methylnitramine (Tetryl)	$(NO_2)_3C_6H_2N(NO_2)CH_3$	D003

TABLE II.A-3

GENERAL CHEMICAL COMPOSITION OF PEP ITEMS
(Continued)

NAME	CHEMICAL FORMULA	HAZARDOUS WASTE ID NUMBER
Nitroaromatics		
Ammonium picrate (Explosive D)	$NH_4C_6H_2N_3O_7$	D003
1,3-Diamino-2,4,6-Trinitrobenzene (DATB)	$C_6H_4N_6O_6$	D003
2,2'4,4'6,6'-Hexanitroazobenzene (HNAB)	$C_{12}N_8O_{12}$	D003
Hexnitrostilbene (HNS)	$C_{14}H_2N_6O_{12}$	D003
1,3,5-Triamino-2,4,6-Trinitrobenzene (TATB)	$C_6H_6N_6O_6$	D003
2,4,6-Trinitrotoluene (TNT)	$(NO_2)_3C_6H_2CH_3$	D003
Ammonium Nitrate	NH_4NO_3	D003
Compositions		
Mixtures of the above		
Plastic Bonded Explosive (PBX)		
Explosives (see above) and polymer binder, plasticizer, and fuel (Aluminum or Iron)		
Pyrotechnics		
Combination of:		
Oxidizer - oxygen or fluorine		
Fuel - powdered Aluminum or Magnesium		
Binding Agents - resins, waxes, plastics, oils, retardants, waterproofing, color intensifier		

TABLE II.A-4

PROPELLENT COMPOSITIONS TREATED IN OB AREA

The information contained in this chart is an approximation only. Specific information regarding percentages and tolerances of components should be obtained from appropriate specifications and standards.

In addition, these sources may provide information about perforation and web thickness applicable to a particular weapon or round of ammunition.

Numbers within chart are percentages by weight.

PROPELLANT MODEL DESIGNATION / COMPONENT	M1	M2	M5	M6	M7	M8	M9	M10	M12	M13	M14	M15	M17
Nitrocellulose	85.0	77.45	81.95	87.0	54.6	52.15	57.75	98.00	97.70	57.30	90.00	20.0	22.0
Nitroglycerin		19.50	15.00		35.5	43.00	40.00			40.00		19.0	21.5
Nitroguanidine												54.7	54.7
Dinitrotoluene	10.0			10.0					Coating		8.00		
Dibutylphthalate	225.0			3.0							2.00		
Diethylphthalate						3.00							
Diphenylamine	1.0*			1.0*				1.0	0.80	0.20	1.00*		
Ethyl Centralite		0.60	0.60		0.9	0.60	0.75			1.00		6.0	1.5
Barium Nitrate		1.40	1.40										
Potassium Nitrate		0.75	0.75			1.25	1.50						
Potassium Perchlorate					7.8								
Lead Carbonate	1.0**												
Potassium Sulfate	1.0**			1.0*				1.0	0.75	1.50			
Tin									0.75				
Carbon black					1.2					0.05*			
Graphite		0.30	0.30					Glaze 0.1					Glaze 0.1
Cryolite												0.3	0.3

* Added basis ** When specified, added basis.

TABLE II.A-4

PROPELLENT COMPOSITIONS TREATED IN OB AREA
(Continued)

PROPELLANT MODEL DESIGNATION COMPONENT	M26	M26 E1	M30	M30 A1	M31	T2	M18	IMR	M30 A2	M31 A1
Nitrocellulose	67.25	68.70	28.00	28.00	20.00	57.50	80.00	100.00	27.00	20.00
Nitroglycerin	25.00	25.00	22.50	22.50	19.00	30.00	10.00		22.50	19.00
Nitroguanidine			47.70	47.00	54.70				46.25	54.00
Dinitrotoluene						2.50		8.00		
Dibutylphthalate					4.50		9.00			4.5
Ethyl Centralite	6.00	6.00	1.50	1.50		8.00			1.5	
Barium Nitrate	0.75									
Potassium Nitrate	0.70								2.75	
Carbon black						0.02*				
Graphite	0.30	0.30	Glaze 0.10							
Cryolite			0.30		0.30					
Lead Stearate						0.50				
2-Dinitrodiphenyldiamine					1.50					
Potassium Sulfate				1.00		1.50		*1.00		1.5
Diphenylamine							1.00	.70		1.00

* Added basis

TABLE II.A-5

WASTES TREATED IN OD AREA

PROPELLANT TYPE	CHEMICAL MAKE-UP	
1. Black Powder	Potassium Nitrate	74.0%
	Charcoal	15.6%
	Sulfur	10.4%
2. TNT	Trinitrotoluene	
3. Composition B	60/40 Cyclotol	
	RDX	60%
	TNT	39%
	WAX	17%
4. PETN	Pentaerythrite Tetranitrate	
	<u>Chemical Formula</u>	
	Carbon	19.0%
	Hydrogen	2.5%
	Nitrogen	17.7%
	Oxygen	60.8%
5. Photoflash	Laminac	96.8%
	Lupersol, DDM	3.0%
	Iron Oxide	.2%
6. Composition C4	RDX	91.0%
	Polysobutylene	2.1%
	Motor Oil	1.6%
	Di-(2-Ethylhexyl) Sebacate	5.3%
7. RDX	(Cylclonite) (Cyclotrimethylene-Trinitramine)	
	<u>Chemical Formula</u>	
	Carbon	16.3%
	Hydrogen	2.7%
	Nitrogen	37.8%
	Oxygen	43.2%

TABLE II.A-5

WASTES TREATED IN OD AREA
(Continued)

PROPELLANT TYPE	CHEMICAL MAKE-UP	
8. Tetryl	Trinitro-Phenylmethyl-Nitramine	
	Chemical Formula	
	Carbon	29.3%
	Hydrogen	1.7%
	Nitrogen	24.4%
	Oxygen	44.6%
9. TPA Incendiary	Triethylaluminum	
10. HMX	(Homecyclonite) (Cycloteramamethylene Tetranitramine)	
	Chemical Formula	
	Carbon	16.2%
	Hydrogen	2.7%
	Nitrogen	37.9%
	Oxygen	43.2%
11. Lead Azide	**Chemical Formula**	
	Nitrogen	28.8%
	Lead	71.2%
12. Lead Styphnate	**Chemical Formula**	
	Carbon	15.4%
	Hydrogen	.65%
	Nitrogen	9.0%
	Oxygen	30.8%
	Lead	44.2%
13. Amatol	Ammonium Nitrate TNT	
14. Ammonium Nitrate	**Chemical Formula**	
	Nitrogen	35%
	Hydrogen	5%
	Oxygen	60%

TABLE II.A-5

WASTES TREATED IN OD AREA
(Continued)

PROPELLANT TYPE	CHEMICAL MAKE-UP	
15. Composition A3	RDX WAX	91% 9%
16. Explosive A4	RDX WAX	97% 3%
17. Explosive D	Ammonium Picrate <u>Chemical Formula</u> Carbon Hydrogen Nitrogen Oxygen	 29.3% 2.4% 22.7% 45.6%
18. Haleite	(EDNA) (Ethylene-Dinitramine) <u>Chemical Formula</u> Carbon Hydrogen Nitrogen Oxygen	 16.0% 4.0% 37.3% 42.7%
19. HBX-1, 3 & 6	RDX TNT Aluminum Densitizer (Comp D2) CACL	39.6% 37.8% 17.1% 5.0% .5%
20. Octol	HMX TNT	75% 25%
21. PBX	RDX Polystyrene Diocylphthalate	
22. Pentolite 50/50	PETN TNT	50% 50%

TABLE II.A-5

WASTES TREATED IN OD AREA
(Continued)

PROPELLANT TYPE	CHEMICAL MAKE-UP	
23. Pentolite 10/90	PETN TNT	10% 90%
24. Picratol	Explosive D TNT	52% 48%
25. Tetrytol	Tetryl TNT	
26. Torpex	RDX TNT Aluminum	42% 40% 18%
27. Tritonal	Aluminum TNT	
28. Nitroglycerin	<u>Chemical Formula</u> Carbon Hydrogen Nitrogen Oxygen	 15.9% 2.2% 18.5% 63.4%
29. Nitroguanidine (Picrate)	Picrate <u>Chemical Formula</u> Carbon Hydrogen Nitrogen Oxygen	 11.5% 3.9% 53.8% 30.8%
30. Military Dynamite - Medium Velocity	RDX TNT Starch SAE No. 10 Oil Polysobutylene	75% 15% 5% 4% 1%

TABLE II.A-5

WASTES TREATED IN OD AREA
(Continued)

PROPELLANT TYPE	CHEMICAL MAKE-UP	
31. Military Dynamite - Low Velocity	RDX/DYE*	17.5%
	TNT	67.8%
	Tripentaery-Thritol	8.6%
	Binder**	4.1%
	Cellulose Acetate	2.0%

* The dye is 96% pure 1 - Methylamino - Anthraquinone (1-MA) used in the amount of .5% of the RDX mixture.

** The binder is vistac No. 1 consisting of polybutene and Diotyseabacate.

TABLE II.A-6

THERMOCHEMICAL CHARACTERISTICS OR EXPLOSIVES

			PRODUCTS OF EXPLOSION	
MATERIAL	HEAT OF COMBUSTION, CALORIES PER GRAM AT CONSTANT PRESSURE	HEAT OF FORMATION, KILOGRAM CALORIES PER MOLE	HEAT CALORIES PER GRAM (H_2O) GAS	GAS, MILLIMETERS PER GRAM
Primary explosives				
Lead azide	—	-112 to -126.3	367	308
Mercury fulminate	938	-221 to -22[a]	427	315
Diazodinitrophenol	—	956	820	
Lead styphnate	1,251	92.3	460	440
Tetracene	—	270	658	1,190
Aliphatic nitrate esters				
BTN	2,167	368	1,458	—
DEGN	2,792	-99.4	1,161	—
Nitrocellulose				
Pyroxlyn (12% N)	—	-216	1,020	—
Guncotton (13.35%)	2,313	-200	1,020	883.2
High nitrogen (14.14% N)	—	-191	1,810	—
Nitroglycerin	1,603	-90.8	1,486	715
PETN	1,957	-128.7	1,510	790
TEGN	3,428	-603.7	750	—
TMETN	2,642	-422	—	—
Nitramines	2,231 to 2,253	11.3 to 17.93	1,480	—
HMX	2,259 to 2,264	14.71	1,480	908
RDX	2,013	156.1	128 to 159	—
EDDN	2,477	20.11	1,278	908
Haleite	2,021	20.29	880	1,077
Nitroguanidine	2,914	4.67 to 7.8	1,450	760
Tetryl				
Nitroaromatics				
Ammonium picrate	2,745	95.82	800	—
DATB	—	-97.1 to -119	910	—
HNAB	—	-58 to -67.9	1,420	—
HNS	3,451	-13.9 to 1.87	1,360	—
TATB	2,850	-33.46 to -36.85	1,018	—
TNT	3,563 to 3,598	-10 to -19.99	1,290	730
Ammonium nitrate	—	88.6	381	980

- "Piles" as used in EOD operating procedures refers to very temporary placement of PEP or initiator material before OB/OD treatment. It is not intended as a designation for storage of waste, but as a way of ensuring that PEP off-loaded for OB/OD treatment is kept in separate, safe quantities while being prepared for treatment.

II.B WASTE ANALYSIS PLAN [40 CFR 270.14(b)(3), 264.13(b) and (c)]

Tables II.A.-1 through II.A-5 of this permit application list PEP formulations that are or may be thermally treated at this facility. Table II.A.-6 contains physical properties of PEP materials demilitarized at this site. Analysis of the waste received is not conducted because:

1. Its reactive nature is known to be hazardous, and suitable for thermal treatment.

2. It would be dangerous to sample the waste PEP, and to delay treatment pending laboratory analyses.

3. The constituents of the PEP are very well documented, and unknown PEP wastes are accepted for treatment.

Documentation of the amount and type of PEP waste treated in the past two years is maintained by the 41st EOD at Ft. Bliss.

To determine potential impacts to human health and the environment, soils in and around the treatment unit will be sampled. If contaminants are released to the air the resulting particulate will settle near the source and be detected by soil sampling. Similarly, if groundwater is impacted it will be by leaching of contaminants through the soil and, therefore, soil sampling will indicate the impact. Surface water runoff is not anticipated, but soil sampling would indicate any potential runoff contamination. Therefore, the waste analysis plan is focused on soil sampling as presented in Section II.C. The following items are included in Section II.C:

- Parameters and Rationale [40 CFR 264.13(b)(1)]

- Test Methods [40 CFR 264.13(b)(2)]

- Sampling Methods [40 CFR 264.13(b)(3) & Part 261, Appendix I]

- Frequency of Analysis [40 CFR 264.13(b)(4)]

The following items are not addressed in the sampling and analysis plan:

- **Additional Requirements for Waste Generated Off-Site [40 CF 264.13(c)]**

  No waste generated off of Ft. Bliss is accepted for treatment at the OB/OD facility and will not be without informing NMED.

- **Additional Requirements for Ignitable, Reactive, or Incompatible Wastes [40 CFR 64.13(b)(6), 264.17]**

  The PEP materials treated are known to be ignitable and/or reactive without testing. Therefore special requirements are directed to safety and they are summarized in the EOD operating procedures in Appendix A. For example, potentially hazardous substances are transported directly to the OB/OD facility; smoking is expressly forbidden and sources of ignition are eliminated; and emergency equipment is maintained on the transport vehicle.

  Waste materials treated by OB/OD at this facility are treated in lots of similar materials. Therefore, incompatible wastes do not mix.

II.C RESIDUE ANALYSIS PLAN (NOT A LISTED NOD ITEM)

As discussed, the PEP materials treated since 1965 may have varied, and analysis of currently treated materials is unnecessary because the character is known and chemical analysis is impractical from a safety standpoint. Therefore, sampling and testing of soils and the residue that may be included with the soil will be the method of characterizing the unit and its potential impact on human health and the environment.

II.C.1 Parameters and Rationale

The configuration of the OB/OD area is such that there is a large containment excavation that contains two pits and a shallow trench. The pits are used for detonation while the trench is used for burning propellants from rocket motors. If waste residues (ash) are found in these areas they shall be tested for RCRA hazardous waste characteristics (ignitability, reactivity, corrosivity and metals toxicity). The residue is subjected to the reactivity tests (Gap Test and Deflagration/Detonation Transition Test) to determine if hazardous quantities of the PEP material remain. The residues will also be tested for explosive residues, method SW 846 8330. These tests serve as a measure of the effectiveness of thermal treatment for this waste.

The RCRA toxicity characteristics test for metals is conducted on the ash after negative results are obtained from the reactivity tests. The rationale for this is to minimize the potential for laboratory hazards associated with testing an explosive sample. The metals analysis is performed because several heavy metals are used in PEP formulations.

The waste analysis plan flow scheme is shown in Figure II.C.-1.

The test procedures described in this section are listed in Table II.C.-7 along with analytical method numbers and sample volume requirements. All methods referenced are from Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, (EPA, 1986) unless otherwise noted. The laboratory performing these analyses is to operate in accordance with an acceptable Quality Assurance Project Management Plan (QAPMP) plan (Appendix B).

II.C.2 Sampling Methods

Because of the inherent hazardous nature of the PEP materials and the potential for unexploded ordnance (UXO), no sampling will be done at the site until a sweep has been conducted for UXO. The UXO sweep will be done by a 41st EOD specialist using established procedures.

Discreet soil samples will be collected from the OB/OD area. All samples will be taken using a non-sparking (plastic or brass) scoop or other sampling device if so directed by the EOD. Sampling personnel will record the location of each sample with respect to permanent stations, the date, names of sampling personnel, and other pertinent information. Appendix B presents the Quality Assurance Project Management Plan.

Soil samples will be collected from a depth between 6 in (15.2 cm) and 1 ft (0.3 m) at the following locations:

- 1 discreet sample at the bottom of each of the OD pits,
- 2 discreet samples from the bottom of the OB trench,
- 3 discreet samples from the sides of each pit and the trench (9 total),
- 4 discreet samples around the perimeter of each of the OD pits (outside of the pits) and trench to evaluate the effect of kickout (12 total),
- 3 discreet background samples from an area of the site that has not been impacted by operation of the EOD.

Soil samples will be collected from a depth of surface to 6 in (15.2 cm), and 6 in (15.2 cm) to 1 ft (0.3 m) at the following locations:

- 8 discreet random samples in the bottom of the treatment unit (but not in the pits or trench),
- 8 discreet samples from the perimeter (outside of the treatment unit), and

In addition, soil samples will be taken on 5 ft (1.5 in) intervals from a 50 ft (15.2 m) boring place approximately in the middle of the treatment unit. This will produce 20 samples.

TABLE II.C-1

SOIL SAMPLE ANALYSES
EXPLOSIVES ORDNANCE DEMOLITION AREA
FORT BLISS, MCGREGOR RANGE
OTERO COUNTY, NEW MEXICO

ANALYTE	ANALYTICAL METHOD[1]	SAMPLE VOLUME
pH	SW846 9040	10g
Reactivity	GAP Test - Appendix III	10g
Reactivity	Deflagration/Detonation Test - Appendix III	20g
Nitrate/Nitrite (as N)	EPA 353.3	10g
METALS:		
Arsenic	SW846 7060	100-500g
Barium	SW846 7080	100-500g
Beryllium	SW846 6010	100-500g
Cadmium	SW846 7130	100-500g
Chromium	SW846 7190	100-500g
Lead	SW846 7421	100-500g
Mercury	SW846 7471	100-500g
Selenium	SW846 7740	100-500g
Silver	SW846 7760	100-500g
ORGANICS:		
Picric Acid	SW846 8270	100-500g
HMX	SW846 8330	100-500g
RDX	SW846 8330	100-500g
2,4,6-Trinitrotoluene	SW846 8330	100-500g
2,4-Dinitrotoluene	SW846 8330	100-500g
2,6-Dinitrotoluene	SW846 8330	100-500g
Nitroglycerine	SW846 8332	100-500g

[1] SW846 = "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," Environmental Protection Agency, SW846.

EPA = "Methods for Chemical Analyses of Water and Wastes," Environmental Protection Agency, 1979, Revised 1983.

All samples will be examined for physical evidence of UXO or unburned materials. The samples will then be subjected to the reactivity tests (Gap Test and Deflagration/Detonation Transition Test). Upon completion of these tests, the soils will be placed into a cleaned mixing bowl, mixed thoroughly and placed into the appropriate sample containers.

Sample containers will be placed into a cooler with ice. When sampling is completed for the day, all samples will be shipped by overnight courier to a qualified laboratory, under appropriate chain-of-custody procedures, for analysis.

During the Initial Site Characterization Sampling only one boring in the treatment unit will be made to determine if downward migration of PEP materials has occurred. It will be made after the soil samples are taken and analyzed in order to not place it in an area of surface contamination that may be carried downward with the boring. Samples will be taken on 5 ft (1.5 m) intervals for logging (visual classification) and chemical analysis for 50 ft (15.2 m). Quality assurance and decontamination procedures are discussed in the Quality Assurance Project Management Plan (QAPMP), Appendix B.

II.C.3 Frequency of Analysis

Initial site characterization sampling will be conducted within six months of approval of this application. Results will be reported six months after sampling. Similar sampling will be conducted at closure.

II.C.4 Monitoring Non-Reactive Waste

Wastes that are not destroyed by OB/OD treatment will remain in the soil and be discovered by the proposed sampling.

II.C.5 Location of Plan and Responsible Position

The soil sampling plan will reside with and be updated by:

Chief, Hazardous Waste Branch, EMD
HQ, USAADACENFB
Attn: ATZC-DOE-M
Ft. Bliss, TX 79916-0058
Ph: (915) 568-7930/1051

III. PROCEDURES TO PREVENT HAZARDS

III.A INSPECTION SCHEDULE

All OB/OD operators will follow all the general safe practices for handling and transporting explosives as to prevent the accidental reaction of ignitable, reactive or incompatible waste as prescribed in Technical Manual (TM) 9-1300-200, and TM 9-1300-206 "Ammunition and explosive Standards."

The operator will conduct inspections according the General Inspection Schedule and logs will be kept for a period of at least three years. Corrective action will be initiated immediately upon the detection of a deficiency. Operations will cease if communication systems or safety equipment show deteriorations or malfunctions.

Table 3 (replaced by Table III.A-1) *presents the General Inspection schedule for inspecting safety and emergency equipment, security devices, operating equipment, communication equipment, and mobile equipment.*

There are two categories of items to inspect, the treatment unit and the equipment transported to the unit by the 41st EOD for each OB/OD operation. The integrity of the treatment unit will be inspected before each operation (usually 2 to 3 times per quarter), as will the transported equipment (Table III.A-1). Additionally, the transported equipment will be inspected during routine and surprise military inspections. Inspection records will be kept in the Environmental Management Office.

Most of the equipment which would be used at this site in an emergency is maintained and inspected for military operations in general, not specifically for this treatment unit. For example, Ft. Bliss has a fully equipped Fire Department (Section III.B.3), hospital (William Beaumont Medical Center), air evacuation unit, etc. The inspections of these functions are conducted and records are kept by the responsible military commands.

III.B PREPAREDNESS AND PREVENTION

The site will be maintained and operated in a manner that will minimize the possibility of a fire, unplanned or sudden explosion, or any release of hazardous waste or constituents to air, soil, or surface water which could threaten human health or the environment.

Excessive dry grass, leaves, and other flammable materials within a radius of approximately 200 feet from the point of destruction will be removed. Firefighting equipment for combating grass fires will be kept readily available. Fires will be fought as they occur.

Before each operation and upon arrival to the demolition site, the unit will establish communication with Range Control. If communications cannot be established with Range Control or if during operations communication is lost, demolitions/disposal operations will cease immediately until contact is made.

TABLE III.A-1

EMERGENCY EQUIPMENT, TESTING AND MAINTENANCE MCGREGOR RANGE, OTERO COUNTY, NEW MEXICO

PORTABLE EQUIPMENT	MAINTENANCE FREQUENCY	ITEMS CHECKED/MAINTAINED
Extinguisher, fire (ABC Multipurpose)	Before each OB/OD operation	Pressure of contents Hose condition Safety pin inn place Canister condition
Kit, First Aid (25 man with blood borne pathogen equipment)	Before each OB/OD operation	Contents Complete Contents expiration dates Clasp secure Properly located
Telephone Set, TA 312/PT	Before each OB/OD operation	Equipment complete Batteries charged Equipment functional
FACILITIES		
Berms	Before each OB/OD operation	Breaches, eroded section
Flammable materials within the unit.	Before each OB/OD operation	Dry vegetation that may be ignited and escape the unit.
Reduced depth of pits or trench	Before each OB/OD operation	Settled material that requires removal
Warning signs	Before each OB/OD operation	Standing and legible

Prevention of injuries during OB/OD treatment is accomplished by taking great care during placement of the material to be treated, and retreating a safe distance from the unit before treatment. The EOD specialist retreat westward on the access to at least the distances prescribed on Table III.B-1.

III.B.1 Internal Communication/Instructions

All personnel engaged either directly or indirectly in open burn/open detonation operations shall notify Range Control and obtain clearance. Range Division or Range Command is located at Ft. Bliss. Range Control is located at Davis Dome at the McGregor Demolition Range.

Prior to departing to the unit area the following will be accomplished:

1) Communications check with range Division.

2) Vehicles will be inspected and meet the criteria outlined in Annex A (Range Procedures) to 41st EOD demolition Range Safety Operations SOP (Appendix A).

3) At least two persons will be dispatched in designated vehicles to pick up required explosives from the EOD Bunker.

4) The following items will be placed in the vehicle prior to departure:

   a) Telephone set, TA 312/PT (with batteries)
   b) First Aid Kit (with bloodborne pathogens protective equipment)
   c) Fire Fighting Equipment
   d) Other equipment as required

Upon arrival at McGregor Range, establish communication with Range Control. If communications cannot be established with Range Control or if during operations communications is lost, as stated demolition operations will cease. The primary means of communication with Range Control will be a telephone set, TA 312/PT, in an electrical firing system operation. However, two-way radios may be used in an electric environment if the minimum safe distance for transmission, listed in Table III.B-1, is observed. Two-way radios or vehicle transmitters can be used in a nonelectric environment. Communication checks with Range Control will be made at least once an hour.

III.B.2 Access to Communications Equipment

As noted above either a telephone set or two-way radio is to be in any vehicle in use at the EOD during operations. Telephones and two-way radios will also be available in Range Control at Davis Dome. Communications are to be maintained between field vehicles and Range Control, as specified above, during EOD operations. Loss of communications will require that all EOD operations cease immediately and may not resume until communications are reestablished.

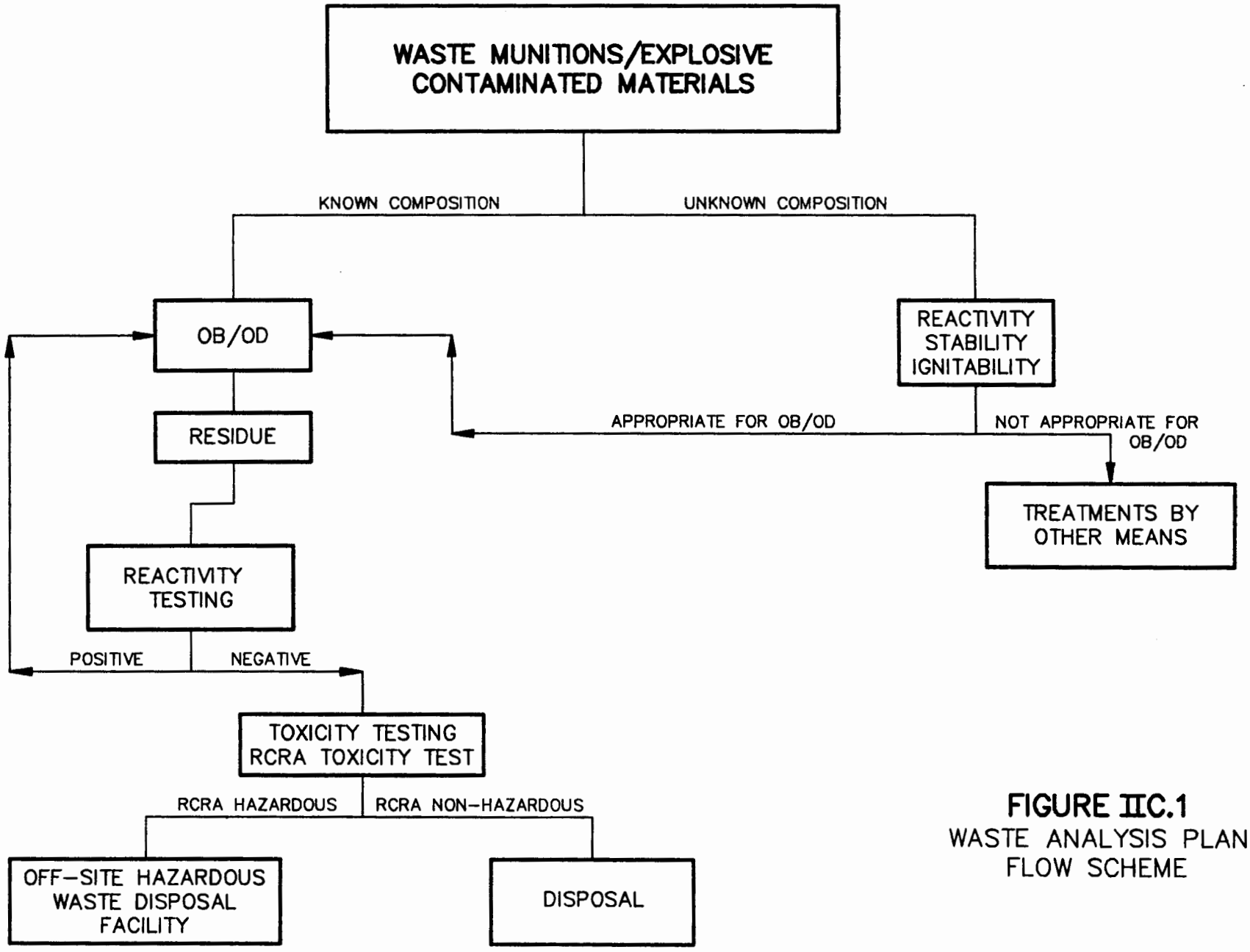


FIGURE IIC.1
WASTE ANALYSIS PLAN
FLOW SCHEME

TABLE III.B-1

MINIMUM SAFE DISTANCES

Explosives minimum safe distances

EXPLOSIVES KG (LB)	SAFE DISTANCE, M (FT)	EXPLOSIVES KG (LB)	SAFE DISTANCE, M (FT)
.45 to 12.3 (1 to 27)	300 (900)	68.0 (150)	534 (1,590)
13.6 (30)	311 (930)	79.8 (175)	560 (1,680)
16.3 (35)	327 (980)	90.7 (200)	585 (1,750)
18.1 (40)	342 (1,020)	102.4 (225)	609 (1,820)
20.8 (45)	356 (1,070)	113.8 (250)	630 (1,890)
22.7 (50)	369 (1,100)	125.1 (275)	651 (1,950)
27.2 (60)	392 (1,170)	136.0 (300)	670 (2,000)
31.8 (70)	413 (1,240)	147.8 (325)	688 (2,070)
36.3 (80)	431 (1,290)	158.8 (350)	705 (2,100)
40.8 (90)	449 (1,330)	170.5 (375)	722 (2,160)
45.4 (100)	465 (1,390)	181.4 (400)	737 (2,210)
57.1 (125)	500 (1,500)	193.2 (425)	750 (2,250)
		227.3 (500)	800 (2,400)

For charges over 227.30 kg (500 lb),
distance in feet = 300 $\sqrt[3]{\text{Pounds of explosives}}$

Safe distance in meters = 100 x $\sqrt[3]{\text{Pounds of explosives}}$

Minimum distance of personnel in a missile-proof shelter is 91.4 m (300 ft).

Premature detonation by induced currents

MINIMUM SAFE DISTANCE FROM TRANSMITTER ANTENNAS	
AVERAGE OR PEAK TRANSMITTER POWER	MINIMUM DISTANCE TO TRANSMITTER
WATTS (NOTE)	M (FT)
0-30	30 (96.4)
30-50	50 (164.1)
50-100	110 (360.9)
100-250	160 (524.9)
250-500	230 (754.6)
500-1,000	305 (1,000.6)
1,000-3,000	480 (1,574.8)
3,000-5,000	610 (2,001.3)
5,000-20,000	915 (3,001.9)
20,000-50,000	1,530 (4,921.2)
50,000-100,000	3,050 (9,824.1)

NOTE: When the transmission is a pulsed or pulsed continuous wave type and its pulse width is less than 10 microseconds. The left hand column indicates average power for all other transmissions, including those with pulse widths greater than 10 microseconds. The left hand column indicates peak power.

Electric power lines. Electric firing should not be performed within 155 meters of energized power transmission lines. When it is necessary to conduct blasting operations at distances closer than 155 meters to electric power lines, nonelectric firing systems should be used or the power lines deenergized.

CAUTION: If electric blasting caps are to be transported near operating transmitters or in vehicles (including helicopters) in which a transmitter is to be operated, the caps will be placed in a metal can, the cover of which must be snug fitting and lap over the body of the can to a minimum depth of one-half inch. Caps will not be removed from container in proximity to operating transmitter unless the hazard has been evaluated and estimated to be acceptable (ammo can).

III.B.3 Fire Control

Ft. Bliss has extensive fire fighting facilities and one unit is located at McGregor Camp. The total fire fighting force is 61 persons and they operate 12 pieces of major pieces of equipment including:

- 1,000 gpm Structural Pumper Truck
- 1,200 gpm Crash (P-19) Fire Rescue Truck
- Fully Equipped Personnel Rescue Unit
- Fully Equipped HAZMAT Unit
- Various Tank Trucks, for Water Transport

The McGregor Camp unit is typically assigned one pumper and one tank truck and the unit is staffed on a 24-hour basis. A full compliment of hand help equipment and personal protective equipment is provided for use by the McGregor Camp Fire Fighters.

III.B.4 Emergency Equipment - Testing and Maintenance

All emergency equipment will be inspected and, if applicable, tested prior to departing to the area of operations. The following first echelon maintenance schedule is provided in Table III.A-1.

III.B.5 Arrangements

All emergency response personnel equipment and facilities are located on the base. Because the base facilities are adequate for emergency response, no arrangements for outside assistance are required. The Ft. Bliss emergency response contacts are listed below.

Police - Military Police Officer In Charge 568-2404, 568-2651, 568-2114, 568-2117.

Fire Department - Fire Chief 568-8887 or 568-8401

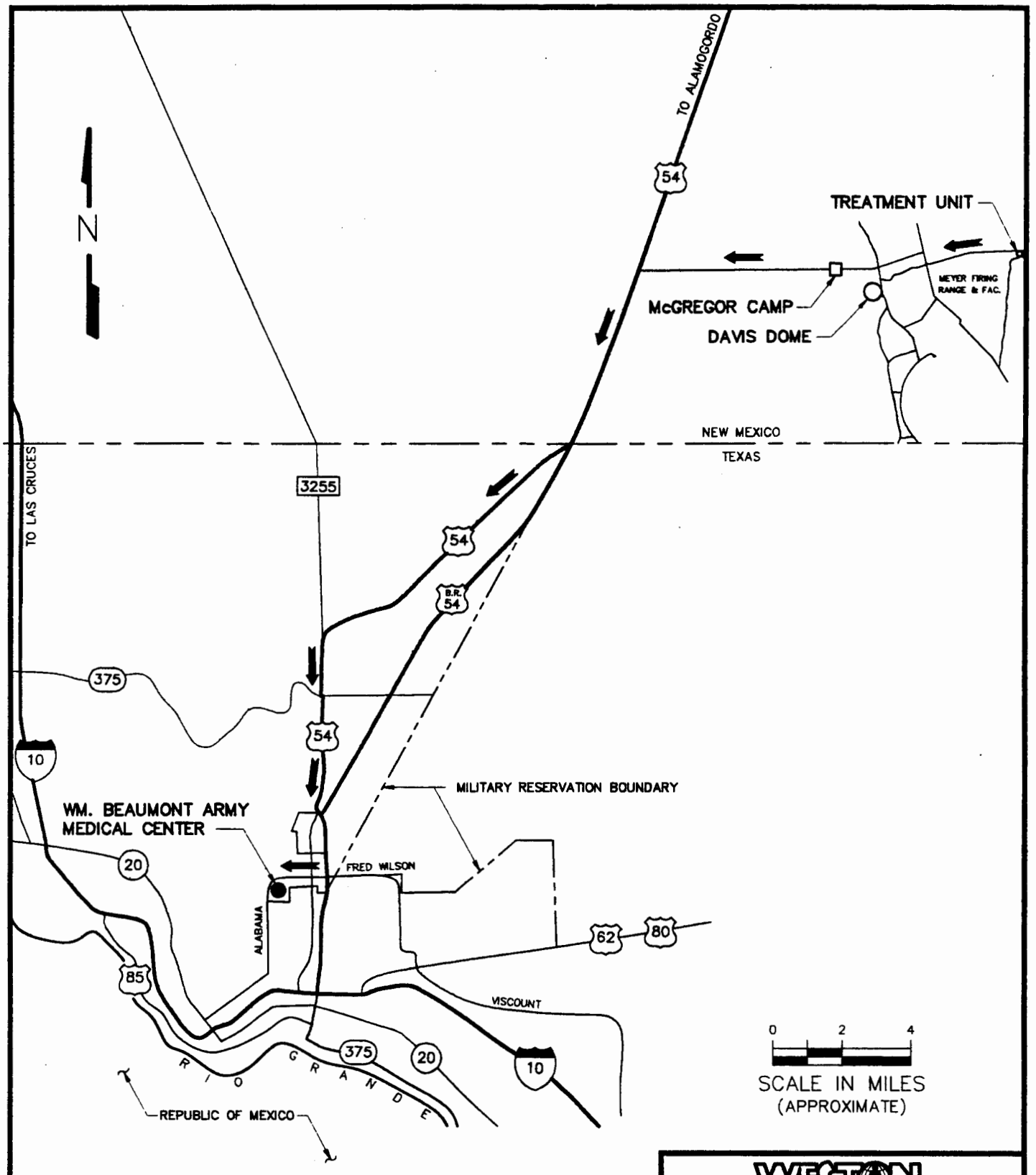
Directorate of Environment - 568-7930

Emergency Response Team Fire Chief - 568-8887 or 568-8401

Local Hospital - Emergency Room 569-2201

Map to William Beaumont Army Medical Center - Figure III.B-1.

All information relevant to emergency response at the EOD site and will be provided to these emergency response departments. The information provided includes EOD operating procedures, copies of emergency response plans and any other pertinent information.



WESTON
MANAGERS DESIGNERS/CONSULTANTS

FIGURE III.B-1

U.S. ARMY CORP OF ENGINEERS
FORT BLISS
HOSPITAL ROUTING MAP
FORT BLISS, TEXAS

DATE	PROJECT NO.	SCALE
AUG 93	03886086001	AS SHOWN

J:\DRAWINGS\GENERAL\GENER827.PB 1=1 08-18-93

IV. CONTINGENCY PLAN (40 CFR 264.52, 264.53, 264.56, and 40 CFR 270.14(b)(7)

The provisions of this plan will be carried out immediately whenever there is a fire, unplanned explosion, or release of hazardous waste constituents which could threaten human health or the environment.

1. *In case of an emergency, Range Control will be notified immediately.*

2. *In case of injuries, aeromedical evacuation from range location to William Beaumont Army Medical Center will be available on a continuous basis. Requests for aeromedical evacuation from the range is to be relayed to Range Control who in turn will contact the 2nd Platoon, 507th Medical Company (AA). An area will be cleared immediately of all hazardous materials and marked for landing. To establish adequate preparation for the evacuation the following is required:*

   a. *Pick up location and destination*
   b. *Number of patients*
   c. *Urgency of mission*
   d. *Brief description of patients' condition*
   e. *Call sign and frequency at pick up point*
   f. *Special equipment necessary*

3. *In case of a hazardous material/hazardous waste release which could threaten human life or the environment, the Fire Department will be notified immediately, the Fire Department in turn will notify the On-scene Coordinator. Persons qualified to act as the On-scene Coordinator are listed below. The alternates are listed in the order in which they will assume responsibility* (table in Section IV.B.)

The reporter will be prepare to provide the following information:

   a. *Name of reporter*
   b. *Exact location of incident*
   c. *Time and type of incident*
   d. *Name and quantity of material*
   e. *Action being taken*

IV.A <u>LOCATION OF CONTINGENCY PLAN</u>

The original copy and revisions will be maintained in the office of the Directorate of Environment at Fort Bliss. A copy of this contingency plan and all revisions to this plan will be maintained at Range Control and submitted to William Beaumont Army Medical Center, the Military Police, and the Ft. Bliss Fire Department (which also provides the emergency response team).

IV.B ON-SCENE COORDINATOR AND EMERGENCY EQUIPMENT

At all times, there will be an On-scene Coordinator (or alternate) either on base or on call (i.e., available to respond to an emergency by reaching the area within a short period of time) with the responsibility for coordinating all emergency response measures. This On-scene Coordinator will be familiar with all aspects of this plan, all burn/detonation operations and activities in the area of operations, the location and characteristics of waste handled, and the location of all related records. The On-scene Coordinator and alternates are as follows:

	TITLE	OFFICE PHONE NO.
Primary	Branch Chief, Hazardous Waste Branch	(915) 568-1051/7930
Alternate	Chief, Environmental Management Division	(915) 568-1041/7930
Alternate	Director, Directorate of Environment	(915) 568-1386/1064

(This list of telephone numbers is used for official government purposes only. The list will not be provided to outside parties. Such release will be a violation of the Privacy Act.)

The On-scene Coordinator, or alternate, has the responsibility and authority to commit the resources needed to carry out the contingency plan for emergency response.

The emergency equipment available to the On-scene Coordinator includes the following:

- Fire fighting equipment and personnel, as described in III.B.3
- Medical air evacuation by helicopter
- Full equipped hospital (William Beaumont Army Medical Center)
- HAZMAT Unit (Ft. Bliss Fire Department)

IV.C PLANS TO IDENTIFY THE CHARACTER, SOURCE AND EXTENT OF AN UNPLANNED EXPLOSION

Policies and procedures for minimizing the threat of fires, unplanned explosions, and/or releases of hazardous materials/hazardous waste during normal handling, shipping, and storing of explosive ordnance materials are included in the Department of the Army 41st Ordnance Detachment (EOD) FORSCOM (Forces Command) Field Operation Activity's Standard Operating Procedures (SOP) (Appendix A).

In the event of an unplanned explosion, the On-scene Coordinator will determine the source of the explosion and assess the extent of the impact of the explosion. The On-scene Coordinator will review the available records on materials in the explosion area to determine what may have

exploded, the amount of material that could have been involved, and the potential for subsequent detonations. A visual inspection of the incident site may be performed, if safe to do so.

IV.D ASSESSMENT OF HAZARD POTENTIAL RESULTING FROM AN UNPLANNED EXPLOSION

After determining source and extent of an unplanned explosion, the On-scene Coordinator will assess the hazard potential for impacts to human health and the environment. Based on the amount of material involved in the unplanned explosion and a review of the hazards of the exploded material, the On-scene Coordinator will determine what possible direct and indirect effects of the unplanned explosion, if any, have resulted.

If the On-scene Coordinator determines that an unplanned explosion has occurred, he will notify the National Response Center and the New Mexico Environment Department of the event. The report will include his name, the name and location of the unplanned explosion, site telephone number, type and time of the incident, name and quantity of materials involved, extent of any injuries, and any possible hazards to human health or the environment outside the facility as a result of the unplanned explosion.

IV.E EMERGENCY PROCEDURES

This section addresses medical emergencies; fire, explosion, or release; and site excavation.

IV.E.1 Medical Emergencies

In the case of a medical emergency requiring more than minor first aid, the following procedure will be implemented:

1) Call Range Control
   - Identify location (include grid coordinates).
   - Request medical assistance.
   - Identify number of patients.
   - Identify urgency of mission (see Table IV.E-1)
   - Provide brief description of patient(s) condition.
   - Call sign and frequency at pick up point.
   - Special equipment necessary.

2) A first aid/CPR trained person will provide first aid until medical personnel arrive. A first aid kit will be located on the vehicle.

3) Range Control will contact the 2nd Platoon, 507th Medical Company for aeromedical evacuation from the range.

4) An area will be cleared immediately of all hazardous materials and marked for landing.

5) Injured person(s) will be evacuated to William Beaumont Army Medical Center, Ft. Bliss.

IV.E.2 Fires, Explosion, or Release

In cases of a fire, unplanned explosion, or a hazardous material/hazardous waste release, the following procedure will be implemented:

1) Call Range Control. Range control in turn will notify the Fire Department and the On-scene Coordinator.
   - Identify location (include grid coordinates).
   - Give time and type of incident.
   - Name and quantity of material.
   - Action being taken.

2) Providing it can be done safely, site personnel will use the fire extinguishers located in the vehicles to control or extinguish a small fire. Because of the relatively barren surrounding area, a large fire is not anticipated.

3) Remove or isolate flammable or other hazardous materials that may contribute to the fire.

4) Begin containment and recover any spilled materials.

5) In the event of an unplanned explosion, DA Form 3265-R (Explosive Ordnance Incident Report) will be filled out in accordance with Appendix C of FM 9-15 *Explosive Ordnance Disposal Service and Unit Operations*.

6) The On-scene Coordinator, upon arrival, will assess possible hazards to human health or the environment that may have resulted from the release, fire, or unplanned explosion. This assessment will consider both direct and indirect effects of the release, fire, or unplanned explosion.

   Immediately after the emergency, the On-scene Coordinator must provide for treating, storing, or disposing of recovered waste.

7) All emergency equipment will be clean and fit for its intended use before operations are resumed.

IV.E.3 Site Evacuation Plan

During the operation of the thermal treatment unit, only EOD personnel are present at the site. EOD personnel are trained to manage the detonation operation and to respond to potential emergencies related to the operation. No site evacuation plan is required for this site since EOD personnel would be involved in any required emergency response.

IV.F SCHEDULE OF REMEDIAL ACTION

The On-scene Coordinator assess the site as soon as possible after an incident. The Coordinator will determine the appropriate action, then determine if NMED should be informed before action is taken. When appropriate, action will be taken as soon as possible to reduce impact on human health and the environment.

TABLE IV.E-1

MEDICAL EVACUATION (MEDEVAC)

PRECEDENCE	ACTION REQUIRED
URGENT	Evacuation is required as soon as possible but not later than two hours to save life, limb, or eyesight.
PRIORITY	Evacuation is required within four hours if the patient's medical condition could deteriorate to an URGENT precedence.
ROUTINE	Evacuation is required within 24 hours.

V. PERSONNEL TRAINING

Destruction of ammunition will not be attempted by inexperienced or untrained personnel. All personnel will have successfully completed the Department of Navy, six month, EOD Training Course before engaging in such operations.

V.A. TRAINING OUTLINE

The course is based at the U.S. Naval School, EOD Detachment, Indian Head, MD.

This training includes:

- Applied physical principles
- Chemical procedures
- Explosive ordnance identification and hazards
- EOD tools and equipment
- Basic demolition tools and techniques
- EOD reconnaissance and locating surface and buried explosive ordnance
- U.S. and foreign ordnance identification, render safe procedures, and disposal procedures for:
  - ground ordnance
  - air ordnance
  - improvised explosive devices
  - U.S. nuclear weapons
- Associated protective equipment

An annual review of the initial training or refresher training is required for all personnel that continue in EOD assigned duties.

In addition to the aforementioned formal training, EOD personnel receive unit training that integrates individual training with crew drills and other collective training in accordance with STP 9-55D14-SM-TG **Soldier's Manual/Trainer's Guide** ***Explosive Ordnance Disposal Specialist***. Emergency response training is accomplished in unit training.

V.B. TRAINING RECORDS

Records of personnel training in the unit are documented using DA Form 4164-R (Hands-On Evaluation) and kept on file with the 41st EOD.

V.C. IMPLEMENTATION

Daily safety meetings are conducted to assure that training is implemented during activities during the daily operations.

VI. CLOSURE PLAN

VI.A. INCLUSION OF CLOSURE PLAN

The Closure Plan has been updated and is provided as Appendix C. The following information (presented in italics) is from the original permit application and, unless specifically noted, still applies.

CLOSURE PLAN (40 CFR 270.14 (b)(13))

The Explosive Ordnance Disposal Demolition Area is approximately 10 acres. Attachment No. 2 is an aerial photograph of the area (replaced by Exhibit 4). *This area is located approximately 5 miles Northeast of Meyer Small Arms Range in McGregor Range (UTM Coordinates 982506). This demolition area has been active since early 1965. The closure plan for this site is being enclosed (see Appendix D)* replaced by Appendix C) *in spite of the fact that the site is not scheduled to be closed in the near future.*

DEED NOTICE (40 CFR 270.14 (b)(14))

If it is determined that reactive, EP toxic or any hazardous materials will remain at the site after closure, the USAADACENFB will comply with recording and deed recordation requirements as specified in the closure plan.

Notice will be provided in accordance with 40 CFR 264.19

CLOSURE COST ESTIMATE AND FINANCIAL ASSURANCE (40 CFR 270.14 (b)(15))

United States Government installations are exempt from these requirements.
(40 CFR 264.140 (c))

POSTCLOSURE COST ESTIMATE AND FINANCIAL ASSURANCE (40 CFR 270.14 (b)(16))

United States Government installations are exempt from these requirements.
(40 CFR 264.140 (c))

INSURANCE POLICY AND LIABILITY COVERAGE (40 CFR 270.14 (b)(17))

United States Government installations are exempt from these requirements.
(40 CFR 264.140 (c))

PROOF OF COVERAGE BY STATE FINANCIAL MECHANISM (40 CFR 270.14 (b)(18))

United States Government installations are exempt from these requirements.
(40 CFR 264.140 (c))

VI.B. MAXIMUM EXTENT OF UNCLOSED PORTION

The treatment unit will remain open until complete closure. It is not anticipated that any of the three areas (two OD pits, and an OB trench) will be closed individually. However, if the soil sampling proposed herein indicates that a particular operation or area is a threat to human health and the environment, the applicant may opt to amend the closure plan in order to reduce the threat. This may require closure of part of the treatment unit. Appropriate regulatory approvals will be obtained if this option is necessary.

VI.C. REMOVAL OF WASTE/RESIDUE/CONTAMINATED SOIL

Waste, residue, or soil are not being removed from the treatment unit. If the results of the soil sampling proposed herein indicate that human health and the environment are threatened by these materials, and removal is the most cost-effective corrective measure, then the necessary regulatory approvals will be sought.

VI.D. METHOD OF SAMPLING SURROUNDING SOIL

The Closure Plan (Appendix C) describes the soil sampling methods. They are a continuation of the methods proposed for the Initial Characterization and Annual Sampling described in Section II.B.

VI.E. YEAR OF CLOSURE

The treatment unit capacity is not being physically consumed at a measurable rate (i.e., it is not fill up). Therefore, no operationally required closure is anticipated and there is no anticipated limit to Ft. Bliss/McGregor Range operations (e.g., base closure) which would necessitate closure. Therefore, the year 2090 is selected arbitrarily as a potential closure date.

As discussed, if the soil sampling proposed in Section II.B indicates that there is an environmental or human health reason to initiate closure (partial or total), the closure date will be modified appropriately.

VI.F. CLOSURE SCHEDULE

As presented in the Closure Plan, when closure is initiated it is anticipated to take 180 days notice of intent to close and receipt of closure plan approval. This assumes no requirements for extensive corrective measures.

VI.G. LOCATION OF PLAN

The Closure Plan will be kept in the Directorate of Environment and Environmental Management Division, Fort Bliss, Texas.

VI.H. RESPONSIBILITY FOR PLAN UPDATE

The Chief, Environmental Management Office will be responsible for updating the Closure Plan.

VII. PROTECTION OF GROUNDWATER

The site is located just west of the Hueco Mountains on the Tularosa Basin. The basin-fill deposits consist predominantly of playa, lacustrine, and alluvial-fan sediments. The water table is at approximately 600 feet. The water encountered in this area is not potable. The water is highly mineralized with up to 9000 ppm total dissolved solids. The nearest well with drinking water quality is approximately 30 km away, in Dona Ana County. This well is pumping water from the Hueco Bolson. The Hueco Bolson and the Tularosa Basin are not hydraulically connected.

The remaining residues contain no free liquids. This coupled with climatological (The average annual precipitation in the area is 9 inches. The annual pan evaporation is 80 inches.) and hydrologic conditions in the area, greatly reduces the wastes ability to migrate to the groundwater.

Furthermore, minimum amounts of ash are generated following a detonation. The vast majority of the surface residues remaining after a detonation consist of metallic fragments and occasional pieces of PEP which were not thermally treated during the explosion. Therefore, if any subsurface contamination were to occur resulting from an OD event, the source of the contamination would be the metallic shard and unburned PEP. Metallic fragments are removed after each detonation, thus reducing the potential for contamination from this source.

VII.A. HYDROLOGY

As indicated above and discussed in Section I.C.3., the hydrogeology in the area of the treatment unit has been studied for other purposes (e.g., potential drinking water, geothermal energy, Taylor, 1981) and the following are reported:

1. The Hueco Bolson produces drinking water from the west side of the Bolson, but not from this area on the east side.

2. Groundwater at the site is about 600 ft (183 m) from ground surface.

3. The 600 ft (183 m) water is not potable due to TDS concentration of about 9,000 ppm.

4. There is potentially perched water in the area, but apparently not at the treatment unit.

5. Evaporation limits, and may preclude, recharge from the treatment unit area.

Because the treatment unit is designed for containment and there is no runoff from the excavation, the potential migration pathway to groundwater is through the soil in the base of the unit. Groundwater at the treatment unit is expected to be 600 ft (182.9 m) deep and EOD operations cause seismic disturbance which preclude installation of monitoring wells. Therefore, the need for more aggressive groundwater protection will be assessed based on soil monitoring described in Section II.B and below.

VII.B. Soil Monitoring

Two soil sampling programs are proposed in Section II.C:

- Characterization Sampling - to determine the results of past OB/OD operations.
- Closure Sampling - to determine the necessary closure operations, and provide a record of "clean" or "waste-in-place" closure.

VII.B.1 Describe Sample Collection, Shipment, Etc.

As described in Section II.C. and the QAPMP (Appendix B), soil samples will be taken from the OB trench, the OD pits, the floor of the treatment unit, and outside the treatment unit (around the rim). Also, to monitor downward migration, a 50 ft (15.2 m) boring will be made in the treatment unit and samples taken at 5 ft (1.5 m) intervals.

VII.B.2 Analytical Parameters and Methods

Soil samples will be analyzed for the parameters discussed in Section II.C, Table II.C-7.

VII.B.3 Background Values

As described in Section II.C., three background soil samples will be taken near the treatment unit in the Range impact area. Care will be taken to not sample near observed debris. Even so, Range operations may make establishment of background values difficult. Literature values are available for metals and these will be consulted if analytical results of background samples are inconclusive.

VII.B.4 Statistical Comparison

Soil samples are non-homogenous and analytical can vary greatly. Therefore, conventional statistical tests tend to fail with soil samples. This problem is compounded when naturally occurring constituents are involved (e.g., metals), and when other sources are possible (e.g., BAT remains from target practice). Therefore, statistical comparisons will not be used. Instead direct comparison to the arithmetic mean will be used.

A sample will not be considered contaminated unless the analytical value for any site-related constituent is at least three times the arithmetic mean of the background.

For naturally occurring constituents, the background levels may range from below detection limit to several orders of magnitude higher than the detection limit. Naturally occurring constituents

will be evaluated on an individual basis either in comparison with published background ranges, by comparison with risk-based levels, or statistically as the data permit.

VIII. SPECIFIC REQUIREMENTS FOR OPEN DETONATION ON THE GROUND SURFACE

VIII.A. Air Quality Assessments

VIII.A.1 Potential for Emission

There is minimal potential for the release of any gases, aerosols, or particulates in air that would adversely effect human health or the environment. There is at least a five mi (8 km) radius surrounding the burn pit area that is barren, undeveloped, and uninhabited. The primary concern is the impact of the waste constituents in soil around the treatment area.

However, since minimal potential exists for particulates in soil to be released in air, perimeter soil samples will be collected (see Section II.B of this application) surrounding the area of operation. If detectable levels above background are reported, air sampling will be initiated. Notwithstanding, because of previous DOD soil studies at other ordnance demolition facilities, it is anticipated that air sampling is not necessary.

VIII.A.2 Effectiveness of Control

Current control systems are conducted of OB/OD operations within designated areas (OB trench and OD pits) within the excavated treatment unit, and conduct of OB/OD operations only during favorable wind conditions (greater than 3 knots (5.6 km per hr)). OB/OD treatment efficiency is sufficient that these control systems should protect human health and the environment. To prove this the waste analysis plan described in Section II.B will be implemented to establish soil quality and potential spread of contamination.

VIII.A.3 Operational Conditions

No treatment operation will be conducted during an electrical storm or when such a storm is approaching within 3 mi (4.8 km). Additionally, disposal by detonation using an electrical firing system will not be conducted during sand, dust, or snow storms.

It is recognized that weather factors are interdependent. Therefore, in order to evaluate the weather conditions for disposal operations, the weather factors must be considered collectively. The following will be observed:

1) Wind speed will not be less than 3 knots and will not exceed 15 knots (3.5 to 17.3 mph (5.6 to 27.8 km per hr).

2) Cloud cover will not be greater than 50%.

3) Demilitarization operations should occur only during lapse temperature gradient conditions.

The temperature gradient is the difference obtained by subtracting the air temperature 1.6 ft (0.5 m) above ground from the air temperature 13.1 ft (4 m) above the ground. Estimation of temperature gradient is as follows:

- Strong lapse conditions (temperature gradient -2° to -3°F (-18.9° to -19.4°C)) will occur near midday when the sky is clear of clouds, the sun is bright, and the wind speed is low.

- Weak lapse conditions (temperature gradient 0° to -1°F (-17.8° to -18.3°C)) will occur during midmorning and midafternoon provided that the sky is clear, the sun is bright, and the wind speed is low. They will also occur on partly cloudy days and when the wind speed is moderate.

- Neutral conditions (temperature gradient 0°F (-17.8°C)) generally will occur at sunrise and sunset on clear days and will exist throughout the day whenever the sky is overcast or any time there are strong winds.

- Inversion conditions (temperature gradient 0°F to +3°F (-17.8° to -16.1°C)) generally will occur throughout the night when the sky is clear and the wind speed is low.

VIII.A.4 Existing Air Quality/Other Sources/Receptors

The current air quality in the vicinity of the Fort Bliss EOD is varied. El Paso County, to the south is an air quality non-attainment area for ozone and is rated as serious. Additionally, an area in the City of El Paso is also a non-attainment area for particulate matter (PM-10) and carbon monoxide. This area is bounded on the north by Interstate Highway 10, on the south by the Rio Grande River, on the east by Avenue of the Americas, and on the west by Executive Center. PM-10 is rated as Class I non-attainment and the carbon monoxide level is rated as moderate.

The air quality in Otero County, New Mexico where the site is located, is in compliance with air quality standards. There are no areas of non-attainment in Otero County and no major air emission sources.

Operations at the OB/OD site are not expected to adversely impact the air quality of Otero County, nor to contribute to the non-attainment areas in El Paso County. OB/OD treatment is very efficient and, particularly at this remote site, are not expected to degrade air quality so as to impact the environment or human health.

The potential public receptors in the area are far removed (at least 5 mi (8 km)) from the site. And the 41st EOD team members who will conduct the treatment operations will be at the required distances for the EOD team (given in Table III.B-1).

Vehicle traffic due to OB/OD operations has negligible impact of air quality. Diesel truck traffic is estimated at less than 30 hauls per calendar quarter.

In conclusion, OB/OD operations are very efficient due to the reactive nature of the PEP materials, and there are no receptors in close proximity to the site. Current air quality is excellent and OB/OD operations will not significantly impact it.

VIII.B. POTENTIAL EXPOSURE PATHWAYS

As discussed, the public is denied access to the treatment unit by a number of mechanisms (e.g., Range Control, location in a firing range impact area, remoteness). Access is only provided to 41st EOD personnel during OB/OD operations. No one is allowed at the treatment unit during Range Operations (target practice).

VIII.B.1 Time Before Detonation

PEP materials are not stored at the treatment unit. As described, they are transported by truck through McGregor Camp to the floor of the treatment unit, expeditiously placed in the appropriate treatment area (pit or trench), initiation materials are applied, and after retreat to a specified distance) the ignition is accomplished. The precise times between PEP arrival and placement, initiator placement and ignition, vary. However, because no waste is stored at the unit all activities occur between dawn and dusk of the same day.

VIII.B.2 Time After Detonation

After the OB/OD operation, EOD personnel return to the treatment unit to inspect for UXO and kick-out, as described. The time between ignition and reentry varies, but is at least the drive time for the distances shown on Table III.B-1. This drive time and the required wind speed (greater than 3 knots (5.6 km per hr)) is considered sufficient by EOD procedures to protect the EOD specialists from any gases, vapors, or airborne particulates resulting from the operations.

VIII.B.3 Management of Residues

The treatment unit currently has no visual indication of ash or other chemical residue. There are a few metal fragments identifiable within the unit, and the impact area of the Range in general has remnants of Range operations (e.g., BATs, large caliber slugs). EOD personnel report that residues are not buried in the unit and are not removed for burial elsewhere on the site.

Therefore, visual indications is that OB/OD operations are very efficient and residue management is not required. However, if the waste analysis plan (Section II.B) indicates that residue management is necessary to protect human health and the environment, a residue

management plant will be developed and implemented. This plan will be specific to the quantity and quality of the residue discovered.

IX. REFERENCES

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APPENDIX A

FORSCOM FIELD ACTIVITY SOP

DEPARTMENT OF THE ARMY

41ST ORDNANCE DETACHMENT (EOD)

FORSCOM FIELD OPERATION ACTIVITY (DCSOPS)

FORT BLISS, TEXAS

DEPARTMENT OF THE ARMY
41ST ORDNANCE DETACHMENT (EOD)
FORSCOM FIELD OPERATING ACTIVITY (DCSOPS)
FORT BLISS, TEXAS 79916-6803

MEMORANDUM FOR: All personnel, 41st Ord Det (EOD) 29 Mar 88

SUBJECT: Safety SOP

1. Purpose: To establish policies and procedures cocerning demolition and Unservicable Ammunition Disposal Operations at FAW Site 10 on McGregor Range, Ft Bliss, Texas.

2. References:

a. AR 385-63.

b. TM 60-A-1-1-22.

c. TM 60-A-1-1-31.

d. TM 9-1300-206.

3. Applicability: This SOP applies to all EOD personnel assigned or attached to the 41st Ord Det (EOD).

4. General:

a. Improper, rough, and careless handling of explosives may result in undue accidents which result in loss of life, injury or property damage. The history of accidents which have occurred in the use, handling, shipping, and storing of ammunition shows that in many instances where the cause was determined, the accidents have been due to human error and circumstances which were avoidable.

b. The absence of a safety requirement in this SOP does not necessarily indicate that no safeguards are needed. If hazardous conditions are present immediate danger to life and property, operations will <u>not</u> be continued until the hazard has been removed.

5. Responsibilities:

a. Detachment Commander: The Detachment Commander is responsible to insure all EOD personnel assigned to this unit read, understand, and adhere to the procedures outlined in this SOP.

b. Detachment Noncommissioned Officer:

(1) Insures SOP is updated as required.

(2) Assumes responsibility of commander in his absence.

c. Senior EOD person present during demolitions/disposal operations:

(1) Insures that personnel are briefed on the safety aspects of the operation that will take place.

(2) Insures that personnel comply with provisions outlined in this SOP.

d. Assigned or attached EOD personnel will read and comply with the provisions outlined in this SOP.

6. Personnel and Explosives limits.

NOTE: All demolition/disposal operations will be analyzed with view toward reducing personnel and quantity of explosives that could be subjected to an incident.

a. Personnel limits: A minimum of two EOD qualified personnel will be exposed for a minimum time to the smallest quantity of explosives consistent with safety and efficiency. One person will be available near the hazard area during explosive operations to give warning and assist in rescue activities in the event of an accident. The safe area will be determined by the senior EOD person present.

b. Explosive Limits: Explosive limits shall be established for each disposal operation rather than on an overall basis, so that each EOD Team Leader will be charged with the responsibility of not exceeding the established limit. The established explosive limit for demolition operations will be set by the individual SOP.

7. Transporting Explosives.

a. All ammunition and explosives will be secured in such a manner as to prevent any movement. Dunnage, blocking and tie down straps will be used as required.

b. Vehicles transporting explosives will have the appropriate "EXPLOSIVES" placards showing on the front, rear, and on each side. Signs will be covered when not carrying explosives.

c. Vehicles hauling ammunition and explosives will be equipped with two 5 pound BC-type fire extinguishers in operational condition. This requirement can be satisfied by carrying two portable fire extinguishers.

d. During loading or unloading of vehicles the brakes must be set and if the vehicle is on a grade, at least one wheel must be chocked.

e. No explosives or ammunition will be loaded into or unlocked from vehicles while the motor is running unless the motor is required to provide power to vehicle accessories, such as mechanical handling equipment utilized in the laoding and unloading of the vehicle.

8. Inspection of Vehicles:

a. Inspection before loading. All vehicles will be inspected before loading for compliance with safety regulations prescribed by tranportation regulatory bodies and the Department of Defense. Only vehicles against which no unsatisfactory conditions are noted will be accepted for loading. Vehicles will not be rejected, however, if deficiencies are corrected before loading. Inspection shall be made to determine that:

(1) Fire extinguishers are servicable.

(2) Electric wiring is in good condition and properly attached.

(3) Brakes, steering, and other equipment are in good condition.

(4) The exhaust system is not exposed to accumulations of grease, oil, gasoline or other fuels and has ample clearance from fuel lines and other combustible materials.

b. Inspection before unloading. All vehicles will be inspected before unloading. Deficiencies will be corrected at the time of inspection, if such correction is considered necessary for safe delivery to the unloading point.

9. Handling and Preserving explosives.

a. Explosives and ammunition will be handled and transported carefully. Containers will not be tumbled, dragged, thrown, dropped on each other, rolled or walked over or dropped from tailboards of trucks.

c. Explosives containers should not be opened unnnecessarily and should remain sealed until needed.

10. Range Fire Prevention and Firefighting. (As necessary)

11. Destruction:

a. Methods. Destruction of ammunition and explosive material will be accomplished by detonation or burning.

b. Material used in destroying by detonation.

(1) Demolition blocks of TNT, tetrytol or composition C-2, C-3 or C-4 are set off be a time fuse and a nonelectric blasting cap. The M122 firing device will be used whenever possible, especially at FAW Site 10. In <u>no case</u> will an improvised firing device be used for this purpose.

(2) Commercial dynamite is not authorized for use in destruction of ammunition or explosives.

c. Removal from containers. Explosives and ammunition to be destroyed by burning will be removed from containers, as any attempt to burn explosives or ammunition under even slight confinement may result in an explosion or detonation. Exuding dynamite in boxes is an exception and should be burned without opening the boxes.

d. Collection of unexploded ammunition. As some types of ammunition are comparatively difficult to explode, a search of the surrounding area should be made after each blast and any material which has been thrown from the pit and not detonated should be collected and included with the next charge to be destroyed. Some items of ammunition that have been subjected to an explosion may be hazardous to handle. When such items are encountered, they should be handled accordingly.

e. Servicing of Destruction Site.

(1) Trucks tranporting explosive material to burning or demolition site shall meet the requirements of chapter 6, TM 9-1300-206. No more than two persons shall ride in the cab.

(2) Upon arriving at the demolition site, trucks may distribute explosive containers or explosive items to be detsroyed. As soon as all items have beenremoved, trucks shall be withdrawn from the burning or demolition area to a safe location until destruction is completed. Containers of explosives shall not be opened until the trucks have withdrawn.

(3) Containers of explosives or ammunition items to be detsroyed at the destruction site will be spotted and opened at least ten feet from each other and from explosive material previously laid for destruction to prevent rapid transmission of fire in an event of premature ignition.

(4) Empty containers will be closed and moved away. Empty containers may be picked up by truck on the return trip after delivery of the next quantity to be destroyed.

f. Improvising. The use of improvised methods of detonating blasting caps is prohibited.

g. Use of Trained Personnel. Destruction of ammuntion will never be attempted by inexperienced or untrained personnel. The number of personnel engaged in such operations will be kept at a minimum consistent with safety, but no person will be permitted to engage in such operations alone.

h. Guarding Demolition Area. Guards, safety signals, and warning signals will be used as required to keep unauthorized personnel from danger areas during destruction operations.

12. Accident Reporting and Investigation:

a. Accidents resulting in serious injury, death, or damage to equipment will be reported immediately to Range Control. A serious injury is defined as one which, in occurring, causes fear of loss of life, or causes severe damage to some portion of the body, or causes the individual to be confined to the hospital or quarters past 2400 the day after the injury.

b. Accidents will be investigated immediately by the major subordinate headquarters concerned.

Randall J. Miller

RANDALL J. MILLER
CPT, OD
Commanding

ANNEX A (RANGE PROCEDURES) TO 41ST ORD DET (EOD) DEMOLITION RANGE OPERATIONS SOP

1. Prupose: To establish procedures during demolition operations at FAW site number 10, Ft Bliss, Texas 79916-6803

2. Applicability: These procedures apply to all EOD personnel assigned or attached to the 41st Ord Det (EOD).

3. Procedures.

a. Prior to departing the unit area the following will be accomplished:

(1) DPT Range Division will be notified and clearance obtained.

(2) Communications check, with the unit and Range Division.

(3) Vehicles will be inspected and meet the criteria outlined in para 8a this SOP.

(4) Two persons will be dispatched in designated vehicles to pick up required explosives from the EOD Bunker.

(5) The following items will be placed in the vehicle prior to departure:

(a) Telephone Set, TA 312 (with batteries).

(b) First Aid Kit.

(c) Fire Fighting Equipment.

(d) Other equipment as required.

b. Upon arrival at McGregor Demolition Range the following action will be accomplished:

Establish communication with Range Control and the unit. The following information will be required by Range Control from the senior EOD person present:

(a) Unit.

(b) RTO and OICs name and grade.

(c) Number of personnel involved in the operation.

(d) Actual time of check in and check out with Range Control.

(e) Type of weapon (i.e. TNT, unserviceable ammo, etc.)

(f) Explosive weight of each detonation.

(g) Number of explosions.

NOTE: If communications cannot be established with Range Control or if during operations communication is lost, demolitions/disposal operations will cease immediately until contact is made.

(3) Fire fighting equipment will be placed in a safe area.

(4) An area will be selected for the operations.

c. Actions during operations:

(1) Vehicles will be inspected before unloading.

(2) Vehicle will be unloaded and withdrawn to the safe area (this area will be selected by the senior EOD person present.).

(3) Time fuse will be test burned. This operation will take place at least 100 feet from explosives.

(4) Safety precautions outlined in Appendix 1, this Annex will be observed.

(5) Electric and nonelectric capping procedures will be performed as outlined in Appendix 2 this Annex.

(6) Fires will be fought as they occur.

(7) Range explosive limits will not be exceeded.

(8) All scraps and kickouts will be destroyed.

d. Upon completion of operations:

(1) The area will be checked for fires.

(2) Police the area of all trash.

(3) Contact Range Control, inform them of range to be cleared.

4. Accidents. In case of an accident, Range Control will be notified immediately. When MEDEVAC Helicopter is airborne, one radio will be placed in direct radio communications with the pilot. An area will be cleared immediately of all hazardous materials and marked for landing. MEDEVAC procedures are covered in Appendix 3, this Annex.

APPENDIX 1 (SAFETY) TO ANNEX A (RANGE PROCEDURES) TO 41ST ORD DET (EOD) DEMOLITION RANGE OPERATIONS SOP

1. General. All personnel engaged either directly or indirectly in operations in which ammunition, explosives and hazardous material is involved shall be thoroughly trained in explosive safety. They shall be capable of recognizing hazardous situations and of taking prompt and effective corrective action. Thinking safety and working safely must be a firmly established habit when working with or in the vicinity of items which are potentially dangerous by reason of their explosive, flammable, or toxic characteristics.

2. Safety criteria:

a. Prompt action will be taken to control any hazard. If an immediately dangerous situation is encountered, all operations in the vicinity will be shut down and personnel evacuated to a safe location. EOD qualified personnel will then proceed to eliminate the hazard. Operations in the area will not resume until the hazard has been eliminated.

b. EOD operations will be conducted under the supervision and control of the senior EOD technician present.

c. Disposal/demolition operations will be restricted to daylight hours. Only on a critical basis will operations be performed during the hours of darkness.

d. No less than two qualified personnel will be present on the Demolition Range during operations involving explosives.

e. Operations will immediately cease upon discovery of any unsafe situation to include the following:

(1) Range Fire.

(2) Unauthorized personnel in the demolition area.

(3) Aircraft in dangerous proximity to the demolition area.

(4) Electrical storm within ten miles.

(5) Loss of communications with Range Control or unit.

f. Caps and explosives will be seperated by at least twenty-five feet.

g. Firing trains will be prepared at least twenty-five feet from explosives charges.

h. Smoking will only be permitted in the safe area (at least 300 meters from the pit).

i. There will be no running on the range.

j. There will be no "horseplay" on the rnage at any time.

k. Objects found on the range will be left alone (NON-EOD personnel).

l. Non-EOD personnel finding any object on the range will point the item out to an EOD Technician.

m. Animals on the range will not be bothered whether it be mammal, reptile or insect.

n. There will be no talking at the initiation point.

o. The last person to leave the demolition pit upon ignition of time fuse has taken place will be an EOD Technician.

p. No person will be closer to the pit than the established safe distance for that amount of explosives being disposed of.

q. Any unsafe act detected by the EOD personnel present will be brought to the attention of the individual concerned and the OIC.

r. Any person found in violation of the above safety rules will be evicted from the range and reported in writing to their commander/supervisor.

APPENDIX 2 (DEMOLITION PROCEDURES) TO ANNEX A (RANGE PROCEDURES) TO 41ST ORD DET (EOD) DEMOLITION RANGE OPERATIONS SOP

1. Purpose: To establish procedures for the preparation of nonelectric and electric priming.

2. Applicability: This appendix is applicable to all EOD personnel assigned or attached to the 41st Ord Det (EOD). This appendix also applies to personnel undergoing demolition procedures training provided by the 41st Ord Det (EOD).

3. Preparation and priming, nonelectric. A nonelectric system is one in which an explosive charge is prepared for detonation by means of a nonelectric blasting cap. The basic priming materials consist of a nonelectric blasting cap which provides the shock adequate to detonate the explosive and the safety fuse which transmits the flame that fires the blasting cap. If more than one charge must be detonated simultaneous, the nonelectric system must be combined with detonating cord to insure simultaneous firing.

a. Procedure.

(1) Cut and discard approximately a 6 inch length from free end of safety fuse to prevent a misfire caused by exposed powder absorbing moisture from air. Then cut off a 3 foot length of safety fuse to check burning rate.

(2) Ignite fuse and note time required for fuse to burn. Then compute burning rate per foot by dividing time in seconds by length in feet.

NOTE: All fuses in the same roll should burn at the same rate. In older types of fuse coils, the rate should be approximately 30 to 45 seconds per foot. New safety fuse (M700) should burn uniformly at 40 seconds per foot.

(3) Cut fuse long enough to permit person detonating charge to reach a safe distance by walking at a normal pace before the explosion. Use a minimum of 6 feet under normal conditions. This cut should be made squarely across fuse.

NOTE: Insure that the safety fuse is cut smoothly and squarely before inserting it into a blasting cap. If a clean - cutting crimper is not available, use a sharp knife, taking care to insure a square end cut by cutting against a smooth, hard, wooden surface. A jagged or rough cut may cause a misfire.

(4) Attach M60 waterproof fuse igniter.

(5) If primer adapter is used, pass end of safety fuse through priming adapter. Fuze should move through adapter easily.

(6) Take one blasting cap from cap box and inspect it by looking into open end. If any foreign matter or dirt is present, hold it with open end down and shake it gently or lightly bump hand holding it against other hand. If foreign matter does not come out, discard cap.

(7) Hold safety fuse vertically with square cut end up and slip the blasting cap gently down over it so that flash charge is in contact with end of the fuse; if not in contact it may misfire. If end is flattened or is too large to enter blasting cap freely, roll it between thumb and fingers until size is reduced to permit free entry.

(8) After the blasting cap has been seated, hold cap firmly against fuse.

(9) Slide second finger down outer edge of blasting cap to guide crimpers and thus obtain accurate crimping, even in darkness.

(10) Crimp blasting cap at a point approximately 1/8 to 1/4 inch from open end. Complete crimpimg while holding cap. Then pull cap into adapter, if used, until it stops.

NOTE: If EOD operations are conducted during inclement weather, a second crimp in close proximity to the first may be used to further waterproof/seal the blasting cap.

(11) Insert cap into explosives and if cap well is present, srew adapter into place.

(12) Lay out safety fuse in a straight line and secure it at each end in such a way as to prevent safety fuse from recoiling itself after ignition.

(13) To fire M60 igniter, remove safety pin, hold barrel in one hand and pull on pull ring with other taking up slack before making the final strong pull. In event of a misfire, the M60 igniter can be reset quickly without disassembly by pushing plunger all the way in and attempting to fire as before.

(14) If a safety fuse igniter is not available, light safety fuse with a match by splitting fuse at end, placing head of unlighted match in powder train and then lighting the inserted match head with a flaming match or rubbing the abrasive on a match box against it.

b. Nonelectric misfires.

(1) Prevention. A misfire should be extremely rare if the following procedures are followed carefully:

(a) Prepare all primers properly.

(b) Load charges carefully.

(c) Place primers properly.

(d) Perform any tamping operation with care to avoid damage to an otherwise carefully prepared charge.

(e) Fine charge according to proper technique.

(f) If possible, use dual firing systems. If both systems are properly assembled, possibility of a misfire is reduced to a minimum.

(g) Do not use blasting caps underground; use detonating cord.

2. Clearing nonelectric misfires. For charges primed with nonelectric blasting caps and safety fuse, the procedure is as follows:

a. Allow a minimum of 30 minutes to elapse after maximum delay predicted for any part of disposal shot has passed before starting to investigate.

b. When pratical, insert a new fused blasting cap into charge if this can be done without distribing old blasting cap or prime and place a new charge close enough to original charge to insure detonation of both. When necessary, a misfire blasting cap may be removed and a new fused blasting cap inserted.

4. Preparation and priming, electric. An electric firing system is one in which electricity is used to fire the primary initiating element. An electric impulse supplied from the power source, usually on electric blasting machine, travels through the firing wire and cap lead wires to fire an electric blasting cap. The chief components of the system are the electric blasting cap/electric squib, firing wire and the blasting machine. The preparation of the explosive charge for detonation by electric means is called electric priming. The proper methods and sequence of operations of electric priming are desdribed below.

NOTE: These procedures, pertaining to preparation and priming of high explosives with electric blasting caps, also pertains to preparation and priming of low explosives with electric blasting squibs.

a. Procedures.

(1) Placing charges. Prepare and place all explosive charges as prescribed for appropiate type or types of charges.

(2) Lay out firing wire.

(a) After locating a firing position a safe distance away from the charges, lay out firing wire.

(b) Test the firing wire.

(c) Twist free ends of firing wire together to prevent an electric charge from building up in firing wire.

(3) Testing blasting caps.

(a) Test each blasting cap to be used in electric firing system.

(b) After each cap has been tested, twist free ends of cap lead wires together to prevent an electric charge from building up in cap lead wires.

(4) Connecting the circuit.

(a) If two or more electric blasting caps are used, connect their lead wires into one of the circuits described in paragraph 3-3c, TM 60A-1-1-31.

NOTE: At the firing position, keep the free ends of the firing wire twisted together until ready to connect the blasting machine.

A continuity check may be made of the firing wire and blasting cap circuit before inserting caps into charges.

(b) Splice free cap lead wires to firing wire.

(5) Inserting caps into charges. Place blasting caps into charges and fasten caps securely to charge.

(6) Testing the entire circuit.

(a) Move to firing position and test the entire firing circuit with the galvanometer or test set.

(b) Twist free ends of the firing wire together.

(7) Exercise blasting machine. Test blasting machine by actuating it several times with nothing attached to terminals. Self test M32/Mkl Mod 1/M34 machine by observing area between terminals after actuating several times. Indicator lamp should glow. If it does not glow, reject and replace balsting machine.

(8) Connecting blasting machine. Untwist ends of firing wire and fasten them to two posts of the blasting machine.

(a) Release blasting machine handle by rotating the D-ring until handle springs outward from the body of the blasting machine.

(b) Hold machine in upright position (terminals up) in either hand, so that plunger end of handle rests under base of thumb and fingers grasps machine body.

(c) Squeeze hand sharply several times in succession until charge fires.

b. Electric misfires.

(1) Prevention of elecrtic misfires. In order to prevent misfires insure that:

(a) All blasting caps are included in the firing circuit.

(b) All coonections between blasting caps and firing wires, connecting wires, and firing wires are properly made.

(c) Short circuits are avoided.

(d) Grounds are avoided.

(e) Number of blasting caps in any circuit does not exceed the rated capacity of power source at hand.

(2) Cause of electric misfires. Common specific causes of electric misfires include:

(a) Inoperative or weak blasting machine or power source.

(b) Improperly operated blasting machine or power source.

(c) Defective and damaged coonections, causing either a short circuit, a break in the circuit or high resistance with resulting low current.

(d) Faulty blasting caps.

(e) The use in the same circuit of blasting caps (other than M6) made by different design.

(f) The use of more blasting caps than power source rating permits.

(3) Clearing electric misfires. If charge is primed electrically, proceed as follows:

(a) Make several successive attempts to fire.

(b) Check firing wire connections to blasting machine terminals to be sure that contacts are good.

(c) Make two or three more attempts to fire charge.

(d) Disconnect blasting machine and short firing wire.

(e) Allow minimum of 30 minutes to elapse before starting to investigate.

NOTE: Wait 30 minutes unless it can be ascertained that the blasting cap failure is strictly electrical. A malfunctioned cap may have initiated a burning explosive charge. If the misfire is strictly electrical in nature, corrective action may be taken immediately.

(f) Test firing circuit with circuit tester for breaks and short circuits and correct any defects discovered.

(g) Remove and disconnect old blasting cap(s) to firing circuit and reprime charge.

(h) Reconnect firing wire ends to blasting machine and fire charge(s).

APPENDIX 3 (MEDEVAC) TO ANNEX A (RANGE PROCEDURES) TO 41ST ORD DET (EOD) DEMOLITION RANGE OPERATIONS SOP

1. Purpose: To establish procedures concerning the evacuation of injured personnel by Helicopter Ambulance from McGregor Demolition Site.

2. Procedures.

a. A qualified medical technician, with ambulance, will be available through Range Control during inclement weather or when the 507th Medical Company (AA) Is not on strip alert. Unit will transport personnel to a pickup point designated by Range Control when ambulance support is requested. When checking into the range, unit should check with Range Control as to air evacuation status.

b. For emergenecies, aeromedical evacuation from range location to Beaumont Army Medical Center will be available on a continuous basis. Requests for aeromedical evacuation from the range is to be relayed to Range Control who in turn will contact the 2nd Platoon, 507th Medical Company (AA). To establish adequate preparation for the evacuation the following is required:

(1) Pick up location and destination (grid coordinates with common name should be given, if available).

(2) Number of patients.

(3) Urgency of mission. (Care should be employed in determining the urgency. Routine or nonemergency cases should utilize ground ambulance or organic transportation).

(4) Brief description of patients condition to include whether he is litter or ambulatory patient.

(5) Call sign and frequency at pick up point, if radio is available or name of person to contact in the event aircraft is met.

(6) Any special equipment necessary.

c. Unit will select a helicopter landing zone (LZ) as follows:

(1) LZ should be away from overhead powerlines, trees, high bushes and boulders.

(2) LZ should be as flat as possible and free of depressions and ditches.

(3) Any obstacle should be observable from the air. (If panel markers or other day or nightime site identification device are available, they should be utilized and well staked down).

(4) LZ will be free of all loose objects which could be blown up into the helicopter rotor blades.

APPENDIX B

QUALITY ASSURANCE PROJECT MANAGEMENT PLAN

QUALITY ASSURANCE PROJECT MANAGEMENT PLAN
FOR
41ST EXPLOSIVE ORDNANCE DEMOLITION TREATMENT UNIT
FT. BLISS/McGREGOR RANGE, OTERO COUNTY, NEW MEXICO

Prepared for:

Directorate of Environment
Ft. Bliss, Texas
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AMENDMENT
AUGUST 1993

QUALITY ASSURANCE PROJECT MANAGEMENT PLAN
FOR
41ST EXPLOSIVE ORDNANCE DEMOLITION TREATMENT UNIT
FT. BLISS/McGREGOR RANGE, OTERO COUNTY, NEW MEXICO

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QUALITY ASSURANCE PROJECT MANAGEMENT PLAN
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SECTION 1

INTRODUCTION

The purpose of the Quality Assurance Project Management Plan (QAPMP) is to establish procedures for verifying the quality of work conducted for the Fort Bliss sampling and closure plans. The scope of this QAPMP includes field sampling, analytical testing, equipment maintenance, data reduction and reporting. This QAPMP is consistent with EPA's "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," QAMS 005/80, EPA's "Data Quality Objectives Manual for Remedial Response Activities," OSWER Directive 9355.D-7B, and EPA's "Characterization of Hazardous Waste Sites - A Methods Manual, Volume I and II -Site Investigations."

The documents associated with this QAPMP include the Part B Permit Application and the Closure Plan for the OB/OD unit at Fort Bliss.

The specific goals of the QAPMP are to:

- Verify that acceptable QA methods and protocols are in place.
- Verify that such protocols are actually applied.
- Take corrective action, if procedures are found to be "out of compliance."
- Provide a framework for stepwise corrective action to return procedures to compliance within stated limits.

SECTION 2

LABORATORY QA/QC OBJECTIVES FOR ANALYTICAL DATA

2.1 OVERVIEW

Quality Assurance/Quality Control (QA/QC) objectives for the analytical data are a means of checking and controlling the sources of an error in analytical data results. These objectives are generally expressed in the following terms:

Accuracy: Accuracy refers to the ability of the system to measure a sample's true value. Accuracy is expressed as a percent recovery equal to the difference between the average of the sample's true values and the average of the laboratory determined values. Because the sample's true value is relative to the sample collection procedures, inferences are drawn from the analysis of field and trip blanks and laboratory matrix-spiked samples.

Precision: Precision measures the replicability and repeatability of the analytical results. Precision is generally monitored using the results of duplicate and spiked samples. Precision is expressed as the relative percent difference between the percent recovery of two individual sample values. Any variability of known or established precision limits may be a result of improper sampling, handling, or laboratory procedures.

Representativeness: Representativeness is the degree to which a data set accurately reproduces the characteristics of the population samples within the subject matrix. Analytical data are considered representative of the sample matrix if results are statistically distributed within the defined limits of the compound's percent recovery and relative percent difference.

Completeness: Completeness is a record of the amount of data collected, analyzed, and validated compared to the amount specified in the site specific sampling plan. Completeness is composed of field and laboratory activities. Field completeness is measured by the number of samples collected compared to the number specified in the sampling plan. Laboratory completeness is measured by the number of samples analytically validated compared to the number of samples received in the laboratory. Completeness will be measured by the ratio of validated samples compared to the number of samples planned, expressed as a percentage.

Specific QA/QC procedures to be used for sampling, chain-of-custody, calibration, analytical methods, reporting, internal QC, audits, and preventative maintenance are described herein.

2.2 ANALYTICAL LABORATORY QA OBJECTIVES

The selected analytical laboratory's QA program must certify the precision and accuracy of their analytical data, and confirm by documentation all phases of sample handling, data acquisition and transfer, report preparation, and report review. In addition, the QA program will provide for storage and retrieval of samples and data.

The laboratory's QA program will specify that detailed instructions be available for performing all activities affecting the quality of analytical data.

2.3 ANALYTICAL PROCEDURES

Laboratory procedures and methods to be used contain the following information:

- Scope - A description of the scope of applicability of the procedure.

- Principal - A brief description of the steps to be taken and/or the theory involved in the laboratory analysis.

- Interference - A description of known interfering agents which would cause difficulty in performing the laboratory analysis or would lead to erroneous results.

- Apparatus - A listing or description of equipment required to perform the laboratory analysis.

- Reagents - A listing of the reagents required, a description of the steps involved in preparing the reagents, and instructions on storage requirements and retention times.

- Procedure (instructions) - An enumeration of the sequence of activities to be followed. The topics include sample preparation or pretreatment, sample storage requirements, instrument set-up, standardization or calibration, sample analysis, calculations, and glassware cleaning procedures. The procedure includes any precautions, explanation, or clarifications as needed to properly perform the analysis. These include safety precautions, the frequency of standardization required, the acceptance criteria or procedures for determining the acceptability of standard curves, clarifications or special techniques critical to the analysis, and how the analyst determines the reliability of sample results based on the standard curves.

- Quality Control Requirements - A listing of the Quality Control (QC) checks to be performed and the acceptance criteria used to evaluate the QC data.

- References - A listing of the publications from which the information was derived in preparing the laboratory method. All references pertain to these documents. As a rule, laboratory methods are derived from the following publications:

  - Standard Methods for the Examination of Water and Wastewater, American Public Health Association.

  - Annual Book of Standards, American Society for Testing and Materials.

  - Methods for Chemical Analysis of Water and Waste, Environmental Protection Agency.

- Test Methods for Evaluating Solid Waste, SW-846, Environmental Protection Agency.

Editions used are those currently specified in 40 CFR, as updated.

SECTION 3

SAMPLING PROCEDURES

3.1 SAMPLE COLLECTION

Sample descriptions, including the number of samples and the rationale for sampling are presented in the Part B Permit Application. Specifics regarding the sampling procedures are presented below.

Efforts will be made to collect samples representative of the site and avoid contamination of samples during collection. To this end, the following procedures will be followed for all sampling:

- Samplers will change gloves between sampling.
- Clean, unused sample jars will be used to contain all samples.
- Sample jars will be labelled immediately prior to collection. Samples will be assembled and catalogued prior to shipping.
- Samples jars will be immediately sealed in individual ziploc bags stored in a cooler with sufficient ice to maintain a temperature of 4°C or less.
- Sample points will be located by reference to a surveyed grid datum, prominent site features, or from some stated reference point.

3.1.1 Access and Location Clearance

All sampling activities will conform to 41st EOD operating procedures, which include:

1. Scheduling with Range Control,
2. Obtain clearance from an EOD specialist at the location of each sample. For drilling operations this may include frequent down-hole monitoring by EOD personnel.
3. Clearing each sample for shipment to the laboratory by an EOD specialist, and
4. Checking out with Range Control.

3.1.2 Surface Soil Sampling

Sample locations will be staked and numbered. Samples will be collected by scraping aside loose debris, litter, etc., and collecting soil from the appropriate interval (i.e. 0-6 in. or 6 in.-12 in.). Samples will be obtained using brass or disposable plastic hand trowels, hand augers, or

similar equipment. Non-sparking equipment will be used whenever indicated by EOD personnel. Reusable equipment will be decontaminated between sample locations. Samples for laboratory analyses will be placed in coolers with ice. Cuttings generated from each surface soil sampling location will be used to backfill the sample hole.

3.1.3 Procedure for Completion of Boring and Subsurface Soil Sampling

A single soil boring will be installed in the unit. Experience indicates that hollow stem auger techniques will not work in this geology; therefore, air or mud rotary techniques will be used. Samples will be collected using either thin-walled, split spoon samplers, or rock core barrels, as appropriate based on the soils encountered. The borings will be visually logged and measured using a photoionization detector (PID) for total organic vapors. (Flame ionization detectors will only be used if specifically approved by an EOD specialist.) For each sample, a core section, of not more than 6 inches in length will be placed in clean sample jars. The sample portion for laboratory analyses will be placed in a cooler with ice.

Cuttings and drill mud will be retained pending results of soil analyses. The boring will not be converted to a monitoring well and, therefore, will be grouted from the bottom up with a cement/bentonite mixture. The mixture will consist of one 94 pound bag of cement to 5 pounds sodium-montmorillonite bentonite (granular or powdered) to approximately 7 to 8 gallons of water.

3.2 QUALITY ASSURANCE/QUALITY CONTROL SAMPLING

3.2.1 QA/QC Sample Definitions

Quality Assurance/Quality Control (QA/QC) samples will be collected or prepared during the sampling. QA/QC samples may be of the following types:

1. Blanks
   a. Equipment or rinse blanks
   b. Trip blanks

2. Duplicates

Equipment or rinse blanks will consist of distilled water poured over decontaminated equipment used in collecting samples. Equipment blanks are intended to identify sources of contamination from incomplete decontamination of equipment or from the decontamination solutions or procedures.

Trip blanks will consist of deionized water poured into vials in the laboratory, shipped to the field and handled with the shipping containers. Trip blanks are intended to identify sources of contamination from the sample jars or sample handling in the field and laboratory. It may also identify possible cross-contamination of samples during shipping. If water samples are not taken trip blanks will not be used.

Duplicates will be collected from 20 percent of the soil sample locations. These samples will be taken at the same soil sampling location and split from the sample using standard sample splitting techniques. These samples are intended to verify the contaminant concentration at the sampling point.

3.2.2 QA/QC Sampling Procedures

Reasonable effort will be made to collect samples representative of the site and to avoid contamination of samples during collection. To this end, the following procedures will be followed:

- Samples will be collected with decontaminated equipment.
- Samplers will change gloves between sampling locations.
- Clean, unused sample jars will be used to contain all samples.
- Sample jars will be labelled immediately after collection to avoid confusion.
- Samples will be assembled and catalogued prior to shipping.

3.3 EQUIPMENT DECONTAMINATION PROCEDURES

Sampling equipment will be decontaminated before use. Any equipment coming into direct contact with sample media will be decontaminated. The following decontamination procedure will be used for reusable sampling equipment:

1. Wash in phosphate free detergent (e.g., in Liquinox®)/potable or distilled water solution to remove dirt.
2. Rinse with potable or distilled water.
3. Rinse with ethanol or isopropyl alcohol,
4. Rinse with distilled water.

3.4 SAMPLE AMOUNT, PRESERVATION, CONTAINER, AND HOLD TIMES

Samples will be kept on ice in coolers while at the site. The samples will be preserved (if necessary) and shipped by overnight courier to the designated laboratory. Samples will be kept refrigerated at $4^{o}C$ at the laboratory until analyzed.

Samples subject to laboratory analyses will be prepared, containerized, and preserved according to the guidelines shown in Table 3-1.

TABLE 3-1

SAMPLE AMOUNT, CONTAINER, PRESERVATION, AND MAXIMUM ALLOWABLE SAMPLE HOLDING TIMES

FORT BLISS

PARAMETER	MATRIX	MINIMUM REQUIRED AMOUNT	NO. OF CONTAINERS	CONTAINER	PRESERVATION[1]	MAXIMUM ALLOWABLE HOLDING TIME[2]
Metals						
Total	Soil	500 g	1	500 ml Amber, wide-mouth Glass Teflon lined cap	Cool, 4°C	6 months
Organics						
Volatile Organic Compounds	Soil	200 g	1	120 ml (4 oz.) Glass, wide-mouth Jar Teflon lined cap	Cool, 4°C	14 days
Semivolatile Organic Compounds	Soil	500 g	1	250 ml (8 oz.) Amber, wide-mouth Glass Bottle Teflon lined cap	Cool, 4°C	14 days extraction 40 days analysis after extraction

1 Sample preservation should be performed shortly after sample collection.

2 The periods listed are the maximum times that samples may be held before analysis and still be considered valid.

SECTION 6

ANALYTICAL METHODS

Analytical methods will be performed in accordance with those listed in Table 6-1 below:

TABLE 6-1
SOIL SAMPLE ANALYSES
EXPLOSIVES ORDNANCE DEMOLITION AREA
FORT BLISS, MCGREGOR RANGE
OTERO COUNTY, NEW MEXICO

ANALYTE	ANALYTICAL METHOD[1]	SAMPLE VOLUME (g)
METALS:		
Arsenic	SW846 7060	100-500
Barium	SW846 6010	100-500
Beryllium	SW846 6010	100-500
Cadmium	SW846 6010	100-500
Chromium	SW846 6010	100-500
Lead	W846 6010	100-500
Mercury	SW846 7471	100-500
Selenium	SW846 7740	100-500
Silver	SW846 6010	100-500
ORGANICS:		
Picric Acid	SW846 8270	100-500
HMX	SW846 8330	100-500
RDX	SW846 8330	100-500
2,4,6-Trinitrotoluene	SW846 8330	100-500
2,4-Dinitrotoluene	SW846 8330	100-500
2,6-Dinitrotoluene	SW846 8330	100-500
Nitroglycerine	SW846 8332	100-500
INORGANICS:		
Nitrate/Nitrite (as N)	EPA 353.3	10

[1] SW846 = "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," Environmental Protection Agency, SW846.

EPA = "Methods for Chemical Analyses of Water and Wastes," Environmental Protection Agency, 1979, Revised 1983.

SECTION 4

DOCUMENTATION

After collection and identification, samples will be maintained under chain-of-custody procedures.

4.1 FIELD DOCUMENTATION

All field activities will be recorded in a bound notebook with sequentially numbered pages. Entries will be made in blue or black ink, in chronological order. Errors to field documentation are to be deleted by marking through the incorrect entry with a single, horizontal line. The deletion will be initialled and dated by the person making the change.

The minimum information to be included on each page of field notes will include:

- Date of the field activities.
- Time of each entry, in military time.
- Name of scribe.
- Identification of the project or field activities being chronicled.
- Scribe's signature at the end of each day's activities or when scribe's duties change to another person.
- Blanks at the end of lines and at the bottom of a page will be marked through with a single line.

All entries must be complete and legible. Entries will include the full names and affiliations of persons referenced. No entries will be made in the log book margins or between written lines.

4.2 SAMPLE ACQUISITION, IDENTIFICATION, AND DOCUMENTATION

Samples will be identified according to the following approach:

DATE - LOCATION NUMBER

For example, a sample collected from a surface soil sample location on 3 June 1995 would be labeled:

950603SS07

The following field custody procedures will be adhered to:

- When collecting samples, as few people as possible should handle the samples.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched to the laboratory.

- Sample tags or labels will be completed for each sample using waterproof ink, or covered by transparent waterproof tape.

Information included on the sample tags or labels will be:

- Sample Identification Number,
- Date and Time,
- Type of Laboratory Analysis Required,
- Preservation Required,
- Collector's Initials, and
- Other Remarks.

In addition to the above, a chain-of-custody record as in Figure 4-1 will be completed each time a group of samples is prepared for shipment to the laboratory. The record will repeat the information on each of the sample labels, and will serve as documentation of handling during shipment. A copy of this record will remain with the shipped samples at all times, and another copy will be retained by the member of the sampling team who originally relinquished the samples.

Samples relinquished to the laboratory will be subject to the following procedures for transfer of custody and shipment:

- Samples will be accompanied by the chain-of-custody record. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of sample custody from the sampler to another person or to the laboratory.

- Samples will be properly packed for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be custody-sealed for shipment to the laboratory.

- Whenever samples are split with a facility or government agency, a separate chain-of-custody record will be prepared for those samples and marked to indicate with whom the samples are being split.

- All packages will be accompanied by the chain-of-custody record showing identification of the contents. The original record will accompany the shipment, and a copy will be retained by the sampler.

- If sent by common carrier, a bill of lading will be used.

FIG 4-1

CHAIN -OF-CUSTODY FORM

Custody Transfer Record/Lab Work Request

WESTON

Page _____ of _____

WESTON Analytics Use Only

Client _____

Est. Final Proj. Sampling Date _____

Work Order # _____

Project Contact/Phone # _____

AD Project Manager _____

QC _____ Del _____ TAT _____

Date Rec'd _____ Date Due _____

Account # _____

Refrigerator #																		
#/Type Container	Liquid																	
	Solid																	
Volume	Liquid																	
	Solid																	
Preservatives																		
ANALYSES REQUESTED →		ORGANIC								INORG								
		VOA	BNA	Pest/ PCB	Herb					Metal	CN							

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓)	Matrix	Date Collected															

Special Instructions:

DATE/REVISIONS:

_____ 1. _____

_____ 2. _____

_____ 3. _____

_____ 4. _____

_____ 5. _____

_____ 6. _____

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time

Discrepancies Between Samples Labels and COC Record? Y or N

NOTES:

WESTON Analytics Use Only

Samples were:
1) Shipped ___ or Hand Delivered ___
Airbill # _____
2) Ambient or Chilled
3) Received In Good Condition Y or N
4) Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N

COC Record Present Upon Sample Rec'd Y or N

RFW 21-21-001/A-8/90 _____ L372 _____ L373 _____ L375 _____ L377 _____ L378 Ref# _____ Cooler# _____ 381-596a

4.3 LABORATORY OPERATIONS

The analytical laboratory assumes the responsibility for the integrity and security of the samples after proper custody transfer is completed. The laboratory will implement the following steps to maintain integrity of samples:

- Log-in personnel will receive the samples and provide a sample tracking number for each sample received. Then they will log samples into a hard bound sample log book or other appropriate document by recording the appropriate information.

- An internal chain-of-custody for samples will be maintained by the laboratory on the custody record. Internal chain-of-custody for sample extracts and digestates should be maintained in the laboratory. All samples and extracts should be signed for by the person retaining custody of these items. On completion of all analyses, these custody sheets will be placed in the file.

- All samples will be held until the results have been reported and accepted by the client.

- When samples are transferred from the lab to any other destination, chain-of-custody protocols will be followed.

- The laboratory will maintain documentation procedures for the preparation of reagents and supplies which become an integral part of the sample.

SECTION 5

FIELD AND LABORATORY CALIBRATION PROCEDURES AND FREQUENCY

5.1 FIELD EQUIPMENT CALIBRATION

PIDs (and flame ionization detectors, FIDs, if EOD approved) will be calibrated in accordance with manufacturer's directions. Various calibration standards may be used to calibrate these instruments, depending on the site and constituents of concern.

Any additional equipment or instrumentation utilized in the field will be calibrated at least daily. Calibrations will be performed in accordance with the manufacturer's directions.

Calibration of field equipment will be documented in the field logbook and maintained in the project files.

5.2 LABORATORY EQUIPMENT CALIBRATION

Laboratory equipment calibration will be in accordance with the most currently accepted versions of the following:

> Statement of Work for Organic Analysis, Multi-Media Multi-Concentration. Office of Solid Waste and Emergency Response. U.S. Environmental Protection Agency. Washington, D.C.
>
> Statement of Work for Inorganic Analysis, Multi-Media Multi-Concentration. Office of Solid Waste and Emergency Response. U.S. Environmental Protection Agency. Washington, D.C.

5.3 SUPPLEMENTAL LABORATORY PROCEDURES

5.3.1 Reference Materials

Whenever possible, primary reference materials will be obtained from the National Bureau of Standards (NBS) or the U.S. Environmental Protection Agency (EPA). In the absence of available reference materials from these organizations, other reliable sources will be sought. These reference materials will be used for instrument calibration, quality control spikes, and/or performance evaluations. Secondary reference materials may be used for these functions provided that they are traceable to an NBS standard or have been compared to an NBS standard within the laboratory.

5.3.2 Reagents

Laboratory reagents will be of a quality to minimize or eliminate background concentrations of the analyte to be measured. Reagents must not contain other contaminants that will interfere with the analyte of concern.

5.3.3 Corrective Action

An analysis or analytical system is considered to be out-of-control when it does not conform to the conditions specified by the method or standard operating procedures which apply. To confirm that an analysis or analytical system is in-control, the laboratory routinely performs instrument calibration checks, analysis of method blanks and method blank spikes, and compares the results of quality control samples to laboratory control charts or analytical protocol criteria.

When an analysis or analytical system is determined to be out-of-control, the person who identifies that there is a problem is responsible for documenting the occurrence and notifying their and/or Laboratory Manager. The analyst, working with their supervisor or Laboratory Manager, will attempt to determine the cause of the problem and take appropriate corrective action. Analysis may not resume until the problem has been corrected and it is determined that the analysis is back in control.

Demonstration of the restoration of analytical control will normally be accomplished by generating satisfactory calibration and/or quality control sample data. This documentation will be maintained in the project files at the laboratory.

Data generated concurrently with an out-of-control system will be evaluated for usability in light of the nature of the deficiency. If the deficiency does not impair the usability of the results (e.g., blank contaminated but all samples not detected), data will be reported and the deficiency noted in the case narrative. Where sample results are impaired, the appropriate corrective action is taken. This action may include repreparation and reanalysis of the affected samples.

SECTION 7

DATA MANAGEMENT

7.1 DATA COLLECTION

In addition to the data collected in the field and recorded on the chain-of-custody forms, data describing the processing of samples will be accumulated in the laboratory and recorded in laboratory notebooks. Laboratory notebooks will contain:

- Date of processing,
- Sample numbers,
- Client (optional),
- Analyses or operation performed,
- Calibration data,
- Quality control samples included,
- Concentrations/dilutions required,
- Instrument readings,
- Special observations (optional), and
- Analyst's signature.

7.2 DATA REDUCTION

Data reduction will be performed by the individual analyst and will consist of calculating concentrations in samples from the raw data obtained from the measuring instruments. The complexity of the data reduction will be dependent on the specific analytical method and the number of discrete operations (extractions, dilutions, and concentrations) involved in obtaining a sample that can be measured.

For those methods utilizing a calibration curve, sample responses will be applied to the linear regression line to obtain an initial raw result which is then factored into equations to obtain the estimate of the concentration in the original sample. Rounding will not be performed until after the final result is obtained to minimize rounding errors, and results will not normally be expressed in more than two (2) significant figures.

Copies of all raw data and the calculations used to generate the final results will be retained on file to allow reconstruction of the data reduction process at a later date, if required.

7.3 DATA REVIEW AND VALIDATION

System reviews will be performed at all levels. The individual analyst will review the quality of data through calibration checks, quality control sample results, and performance evaluation samples. These reviews will be performed prior to submission to the Analytical Project Manager.

The Analytical Project Manager will review data for consistency and reasonableness with other generated data and determine if program requirements have been satisfied. Selected hard copy output of data (chromatograms, spectra, etc.) will be reviewed to ensure that results are interpreted correctly. Unusual or unexpected results will be reviewed, and a decision will be made as to whether the analysis should be repeated. In addition, the Analytical Project Manager will recalculate selected results to verify the calculation procedure. The final routine review will be performed by the Laboratory Manager prior to reporting the results to the client.

7.4 DATA REPORTING

Reporting will contain final results (uncorrected for blanks and recoveries), methods of analysis, levels of detection, surrogate recovery data, and method blanks data. In addition, special analytical problems, and/or any modifications to referenced methods will be noted. The number of significant figures reported will be consistent with the limits of uncertainty inherent in the analytical method. Consequently, most analytical results will be reported to no more than two (2) significant figures. Data will be reported in units commonly used for the analyses performed. Concentrations in liquids are expressed in terms of weight per unit volume (e.g., milligrams per liter). Concentrations in solid or semi-solid matrices are expressed in terms of weight per unit weight of sample (e.g., micrograms per kilogram).

Reported detection limits will be the concentration in the original matrix corresponding to the low level instrument calibration standard after concentration, dilution, and/or extraction factors are accounted for.

7.5 DATA ARCHIVING

The laboratory will maintain on file all of the raw data, laboratory notebooks, and other documentation pertinent to the work on a given project. This file will be maintained for five (5) years from the date of invoice unless a written request is received for an extended retention time.

Client confidentiality will be maintained for any retrieved data. Consequently, the laboratory will honor only those requests for data authorized by the original client.

SECTION 8

LABORATORY QUALITY CONTROL CHECKS

The following analyses will be completed in the laboratory as measures of accuracy and precision of the analytical process.

- Laboratory Duplicates - Laboratory duplicate samples shall be analyzed to monitor for intralaboratory precision of data generated. These samples shall be analyzed on no less than a 5% basis with at least one replicate if fewer than ten samples are analyzed for any particular parameter.

- Spiked Samples - Shall be analyzed to monitor for accuracy of data due to interferences which may be present in the sample and thus influence the reported results. These spiked samples shall be tested on no less than a 5% basis for any particular parameter. At least one spiked sample shall be run if fewer than ten samples are analyzed.

- Control Charts - Shall be utilized to effectively monitor and periodically review the accuracy of the data generated as a result of spike analyses. These charts also aid in observing trends in data so as to take corrective actions before data generated are out of control.

- Methods Blanks - Are accomplished by treating purified water or ultra-cleaned sand in the same manner as samples to monitor potential contamination of samples due to contamination in solvents, reagents, glassware or laboratory equipment. Method blanks are included with each set of samples.

- Laboratory Equipment Blanks - Shall be analyzed to monitor potential contamination of samples due to improper or ineffective cleaning of equipment.

- Quality Control Samples - Shall be analyzed to monitor for accuracy of data generated. EPA check samples or samples purchased from a reputable independent source will be analyzed at the beginning of the project and also at regular intervals during the project.

- Surrogate Samples - Shall be analyzed in accordance with EPA guidelines for GC/MS analysis. Deuterated standards will be utilized as a measure of the recovery of the target compounds (that may be similar to the compounds in the standards) during analyses.

- Reagent Checks - Are accomplished by treating known laboratory blanks in the same manner as samples and reviewing data to verify that contamination has not been introduced as a result of reagents.

- Internal Standards - Are prepared in the laboratory and are referenced against known external standards to measure accuracy.

- Calibration Standards and Devices - Shall be utilized according to the type and method of analysis.

The laboratory should be certified by the U.S. Army Corps of Engineers, Missouri River Division. Laboratory duplicates for QA/QC will be at least 10%.

SECTION 9

PERFORMANCE SYSTEM AUDIT

9.1 EXTERNAL AUDITS

The results of audits performed by regulating agencies will be reviewed for the analytical laboratory selected to analyze samples from Fort Bliss. Documentation of satisfactory performance on such audits will be required prior to submitting samples for analysis.

9.2 INTERNAL AUDITS

The laboratory QA Coordinator will be responsible for monitoring the internal Quality Assurance/Quality Control program. The QA Coordinator, with assistance from support staff, will provide in-house audits, reviews and validate analytical data packages. The QA Coordinator will also be responsible for scheduling and coordinating external systems audits and reviewing data for performance samples received.

The QA Coordinator will supply blind performance samples to the laboratory at least semi-annually. Also, the QA Coordinator will audit laboratory systems and procedures at least once annually. Unique client audit procedures and data requirements will be complied with as contractually specified. The internal audit will consist of a review of laboratory systems, procedures and documentation. Any deficiencies/deviations will be documented and a summary report prepared.

SECTION 10

LABORATORY PREVENTIVE MAINTENANCE

10.1 LABORATORY MAINTENANCE

The analytical laboratory will have in place a procedure which details the steps to be taken to calibrate and standardize instruments to ensure that analytical data produced are accurate. Records of all calibrations, preventative maintenance, and service calls will be readily available from the laboratory files.

A procurement procedure which identifies the methods to be used to document and control the purchase of materials, parts, and services will be implemented by the laboratory. The procedure will include provisions for identifying the quality of laboratory chemicals and equipment, evidence of management approval of procedure items, inspection of shipments for compliance to requirements, and isolation of nonconforming items to be returned to vendors. This procurement procedure will serve to ensure the availability of any spare parts routinely required. The quality of all equipment must conform to the requirements specified in the latest edition of the EPA "Handbook of Analytical Quality Control in Water and Wastewater Laboratories," the Federal Register, or other regulatory agency publications.

10.2 FIELD MAINTENANCE

Field instruments, sampling equipment and machinery will be maintained in accordance with manufacturer's recommendations and normal field practice. All maintenance will be documented in permanent records by the individual responsible for each item. This will include routine, scheduled maintenance and unscheduled maintenance.

SECTION 11

PROCEDURES USED TO ASSESS DATA ACCURACY AND PRECISION

The reliability and credibility of analytical laboratory results are established by the inclusion, as an integral part of any analytical procedure, of a program of randomly selected replicate analyses and analysis of standards or spiked samples.

Precision of analytical results may be established as the standard deviation from true values or from the mean of replicate analyses. Accuracy is reported as the percent recovery of a parameter from a sample of known value with a given analytical procedure.

The procedure described herein is designed to give precise and accurate data for each analytical method. To ensure that reliable data continue to be produced, systematic checks must show that test results remain reproducible and that the methodology is actually measuring the quantity in each sample.

The following procedures will be used to evaluate data accuracy and precision for analyses by the laboratory.

11.1 ACCURACY

Acceptability of data as being accurate is based on intralaboratory limit of 95 percent recovery of spiked compounds. Accuracy calculation from spike recoveries is by:

$$S = \frac{A_T - A_O}{A_F} \times 100\%$$

S = Accuracy
A_T = Total amount found in spiked sample
A_O = Total amount found in unspiked sample
A_F = Amount of spike added to sample

11.2 PRECISION

Precision data are generated by the analysis of duplicate samples. Should the difference of the value of two duplicate samples exceed the method specified value, then the precision is judged to be out of control and the analyst will be responsible for confirming the source of the precision error. Once confirmed and remedied, the analysis will be rerun, and providing acceptable precision limits, the data will then be reported.

- Relative percent difference (RPD) from pairs of duplicate measurements is calculated by:

$$RPD = \frac{d_1 - d_2}{\frac{1}{2}(d_1 + d_2)}$$

where $d_1 - d_2$ is the difference in concentrations of the two measurements.

Relative percent difference can be calculated using duplicate analyses when an analyte is detected above the reporting limits. RPD can also be calculated from the percent recoveries of the matrix spike (MS) and matrix spike duplicate (MSD). RPD's are set by the EPA's Contract Laboratory Program (CLP) protocols for target compounds.

- Standard deviation(s) from many measurements on one sample is calculated by:

$$S = \sum \sqrt{\frac{(x_1 - x)^2}{N - 1}}$$

where x_1 = the values of individual measurements x = the mean of all the measurements; and N = the number of measurements.

The precision for organics is normally about $\pm 40\%$. If the precision is not on target, the sample may not be homogeneous (frequently true of soils). The precision of duplicates, MS/MSDs, and MS/MSD surrogate recoveries will be compared to determine the cause of the precision problem and to determine if the data is valid.

11.3 SURROGATE RECOVERIES

Each organic sample will be spiked with surrogates, or deuterated compounds. Standards for surrogate recoveries are set by CLP. The QA/QC plan does not specify that these recoveries will be met. However, the recoveries will be used as another benchmark to evaluate the validity of the data.

11.4 COMPLETENESS

Completeness is a measure of the relative number of data points which are valid. It is usually a comparison of actual number of valid data points and expected number of valid data points, expressed as a percentage.

Difficulties encountered during sample handling in the laboratory as well as unforeseen complications regarding analytical methods may affect completeness during sample analysis. For

example, the analytical methods proposed for use (particularly for the organics analyses) are intended for analysis of "environmental samples" (low- and medium-level), and the applicability of these methods to unknown or high-level samples may result in poor method performance and have, therefore, an adverse impact on achieving the data completeness goal.

APPENDIX C

CLOSURE PLAN

CLOSURE PLAN
FOR
41ST EXPLOSIVE ORDNANCE DEMOLITION TREATMENT UNIT
FT. BLISS/McGREGOR RANGE, OTERO COUNTY, NEW MEXICO

Prepared for:

Directorate of Environment
Ft. Bliss, Texas
and
U.S. Army Corps of Engineer
Tulsa District

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AMENDMENT
AUGUST 1993

CLOSURE PLAN
FOR
41ST EXPLOSIVE ORDNANCE DEMOLITION TREATMENT UNIT
FT. BLISS/McGREGOR RANGE, OTERO COUNTY, NEW MEXICO

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CLOSURE PLAN
FOR
41ST EXPLOSIVE ORDNANCE DEMOLITION TREATMENT UNIT
FT. BLISS/McGREGOR RANGE, OTERO COUNTY, NEW MEXICO

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CLOSURE PLAN
FOR
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FT. BLISS/McGREGOR RANGE, OTERO COUNTY, NEW MEXICO

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CLOSURE PLAN
FOR
41ST EXPLOSIVE ORDNANCE DEMOLITION TREATMENT UNIT
FT. BLISS/McGREGOR RANGE, OTERO COUNTY, NEW MEXICO

This section is submitted in accordance with the requirements of 40 CFR 270.14(b) (13-18) and 40 CFR 264.110-115. This plan identifies steps that will be necessary to permanently close the thermal treatment facilities. A post-closure plan is not required because the OB/OD facilities are considered thermal treatment facilities, not disposal facilities. This plan may be revised based on future needs and technologies.

Closure of the treatment unit is not expected before the year 2090. Fort Bliss will notify the New Mexico Environment Department in writing when the decision is made to close the facility. Upon notification to the state of New Mexico of the intent to close the facility, the facility will cease receiving wastes for treatment. An estimated closure schedule is attached in Table 1, which details the intervening closure activities and the total estimated time to complete the facility closure.

The maintenance and update of this plan will be the responsibility of:

Chief, Hazardous Waste Branch
Directorate of Environment
Environmental Management Division

1.0 SITE BACKGROUND

Ft. Bliss is the U.S. Army's primary training center for ground to air missile batteries, including the Patriot. McGregor Range is within the Ft. Bliss military reservation boundary and is the primary missile target practice range for the U.S. Army.

In the interest of national security, enormous inventories of military ordnance items and bulk energetic materials are maintained at various military installations around the country. Because the Explosive Ordnance items and bulk energetic materials held in this military readiness stockpile are subject to deterioration and obsolescence, action has to be taken to safely remove and thermally treat these items on an ongoing basis. The U.S. Army Air Defense Center and Fort Bliss (USAADCENFB) is currently operating an Explosive Ordnance Detachment (EOD) Open Detonation and Open Burn Area. This demolition area has been in operation since 1965. Unlimited amounts of explosive material are treated at this site. However, military chemical warfare agents or related compounds or materials contaminated with or suspected of being contaminated with these agents or compounds have not and will be not open burned or open detonated at this unit.

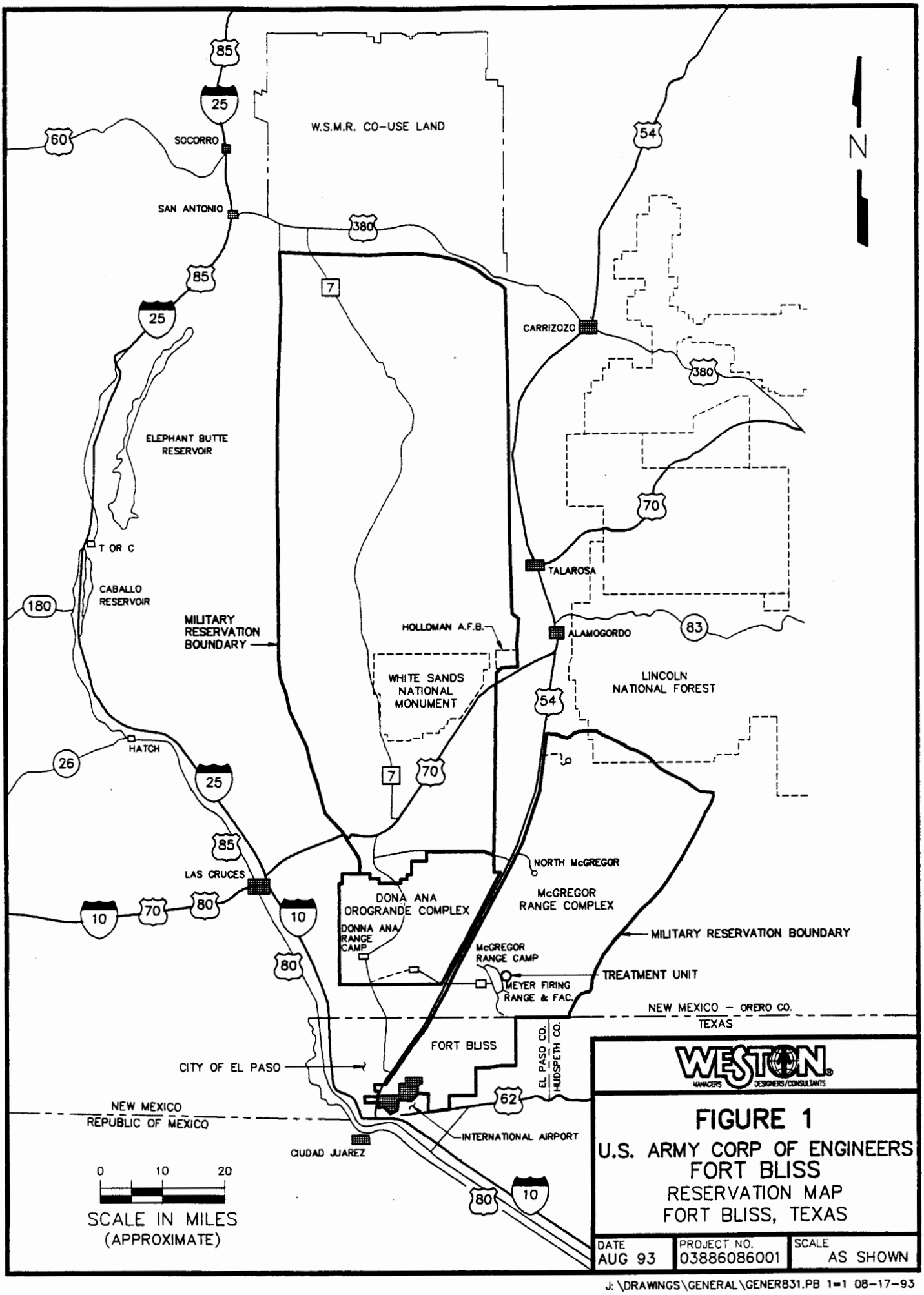
TABLE 1
ESTIMATED CLOSURE SCHEDULE
EXPLOSIVE ORDNANCE DEMOLITION AREA
FORT BLISS, MCGREGOR RANGE
OTERO COUNTY, NEW MEXICO

TASK	DESCRIPTION	CUMULATIVE TIME DAYS
1	Notification of Intent to Close.	0
2	Process final volumes of wastes.	30
3	Completion of site characterization.	60
4	Submission of remediation plan to NMED.	90
5	Completion of remediation activities, if necessary.	165
6	Certification by an independent professional engineer of closure in accordance with the Closure Plan.	175
7	Notification of completion of closure to EPA and NMED.	180

The 41st EOD conducts explosives demolitions at the EOD range approximately 2 to 3 times per quarter. Explosives are blown with C-4 in existing demolition pits, which are visually inspected following each blow. The demolition area is operated under RCRA interim status (40 CFR 265) as a hazardous waste thermal treatment facility. Quantities of explosives destroyed average approximately 1,984 lbs. (900 kg) per quarter, while demonstrations consist of 5 to 10 lbs. (2.3 to 4.5 kg) charges. Powder burning conducted by the 41st EOD ceased in early 1987 and will not occur in the foreseeable future.

As illustrated in Figure 1, the treatment unit is located in the northern portion of Ft. Bliss on McGregor Range. Exhibits 1,2, and 3 (map pockets) provide details of the area and the treatment unit which is located 10 mi. (16.1 km) east of U.S. Hwy 54 at coordinates 32°05'15" lat., 106°04'45" long. As shown on Figure 2, the unit is on an active portion of McGregor Guided Missile Range. It is within the impact area for ballistic aerial targets (BATs), and the large caliber munitions and guided rockets which are used to destroy the BATs. EOD operations at the unit only occur when McGregor Range is inactive.

The surrounding area is owned by the U.S. government (minimum of 5.5 mi. (8.9 km) in any direction), is uninhabited desert, is used as a firing range, and is secured by Range Control at Davis Dome. Access is from Hwy 54, through McGregor Camp, past Davis Dome. The unit is about 4 mi. (6.4 km) east of Davis Dome at the foothills of the Hueco Mountains.



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2.0 TREATMENT UNIT DESCRIPTION

2.1 GENERAL DIMENSIONS

The treatment unit is a man-made excavation with roughly an oval shape. As shown on Exhibit 3 the dimensions are approximately 500 ft. (152.4 m) x 200 ft. (61 m) and 20 ft. (6.1 m) deep. Within this excavation there are two pits (Pit A and Pit B) which are used for Open Detonation (OD), and a shallow trench which is used for Open Burn (OB). Dimensions of the pits are 6 to 7 ft. (1.8 to 2.1 m) deep and 40 ft. (12.2 m) in diameter of the top lip. The trench is approximately 100 ft. (30.5 m) x 40 ft. (12.2 m) and 1 ft. (0.3 m) deep.

All structures at the unit are earthen. The closest non-earthen structure is a viewing stand (covered bleachers) 2.5 mi. (4 km) to the west which is occasionally used when dignitaries are invited to view missile launch operations. Because the site is on the target range, OB/OD operations cannot occur when the range is active. Therefore, no non-EOD personnel will be in the viewing stand or on the range during OB/OD operations. The closest authorized non-EOD personnel during OB/OD operations will be at Davis Dome, 4 mi. (6.4 km) west of the site (Figure 2).

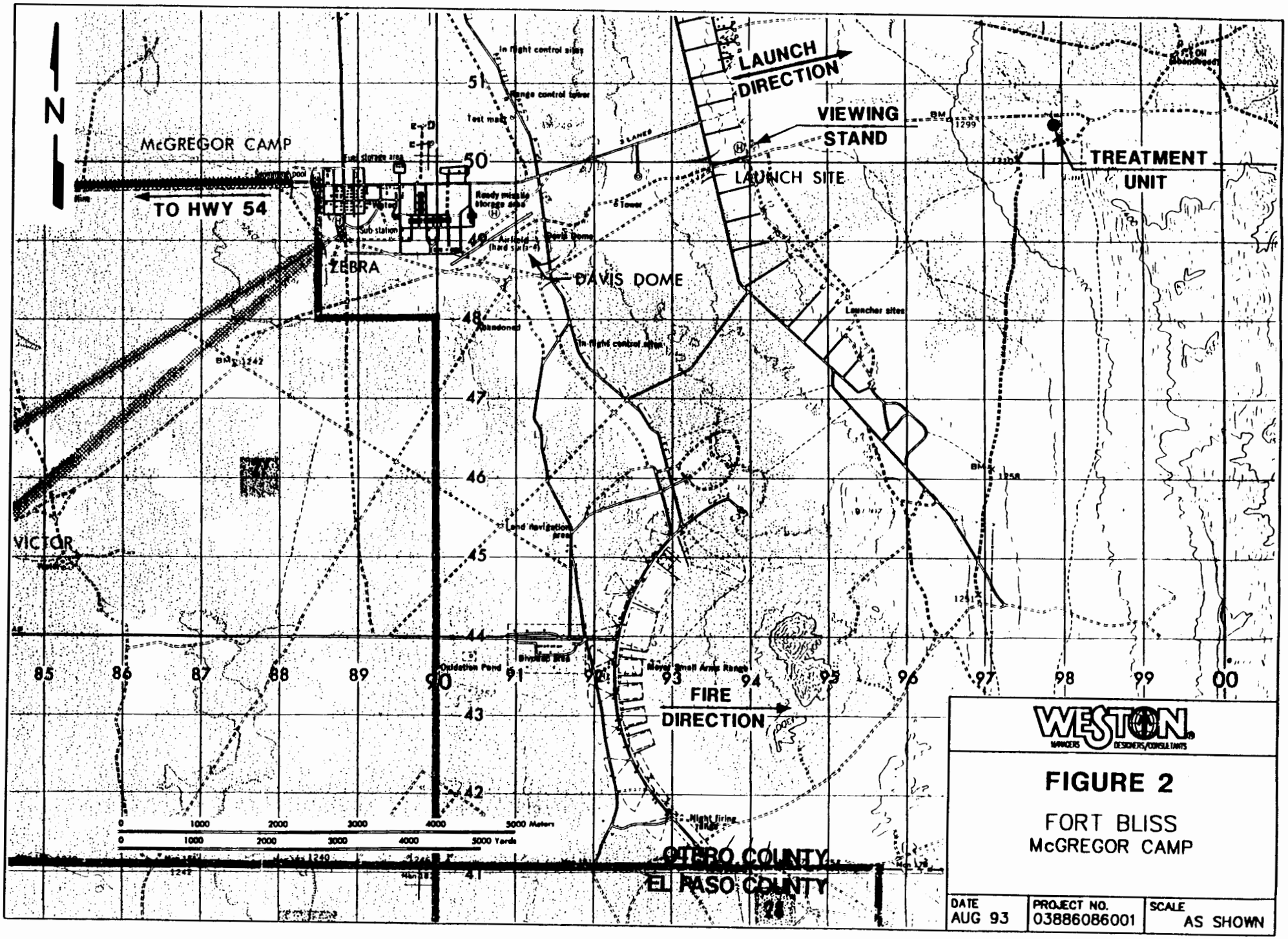
PEP wastes are all transported from bunkers on McGregor Range (i.e., public roads are not used). General access to the site as illustrated in Figures 1 and 2, is by Hwy 54 north from Ft. Bliss, east on an asphalt road (2 lane) approximately 6 mi. (9.7 km) to McGregor Camp, asphalt road about 3 mi. (4.8 km) to check in at Range Control at Davis Dome, about 3 mi. (4.8 km) of asphalt road and about 4 mi. (6.4 km) of one lane unpaved road to the unit. Entry to the unit to place the waste in the appropriate OD pit, or the OB trench is by earthen ramp at the south side of the excavation (Exhibit 3). The waste material is placed in the pit or trench (in conformance with EOD procedures described later), the EOD personnel retreat to a safe distance, and the material is detonated or burned.

2.2 ENGINEERING DRAWINGS

All control structures are earthen (i.e., the unit is an approximately 20 ft. (6.1 m) deep excavation, within the unit are two detonation pits and a burn trench). Therefore, Exhibit 3, Site Contour Map, illustrates the engineered controls. A generalized cross-section of the treatment unit is provided as Figure 3.

2.3 REGIONAL GEOLOGY

The treatment unit area is located in the Hueco Bolson, a part of the transition-zone between the Basin and Range, and Great Plains tectonic provinces in an area referred to as the Rio Grande Rift. The Rio Grande Rift is characterized by evidence of Quaternary faulting, high heat flow, Tertiary volcanic activity, and a minor number of earthquakes.



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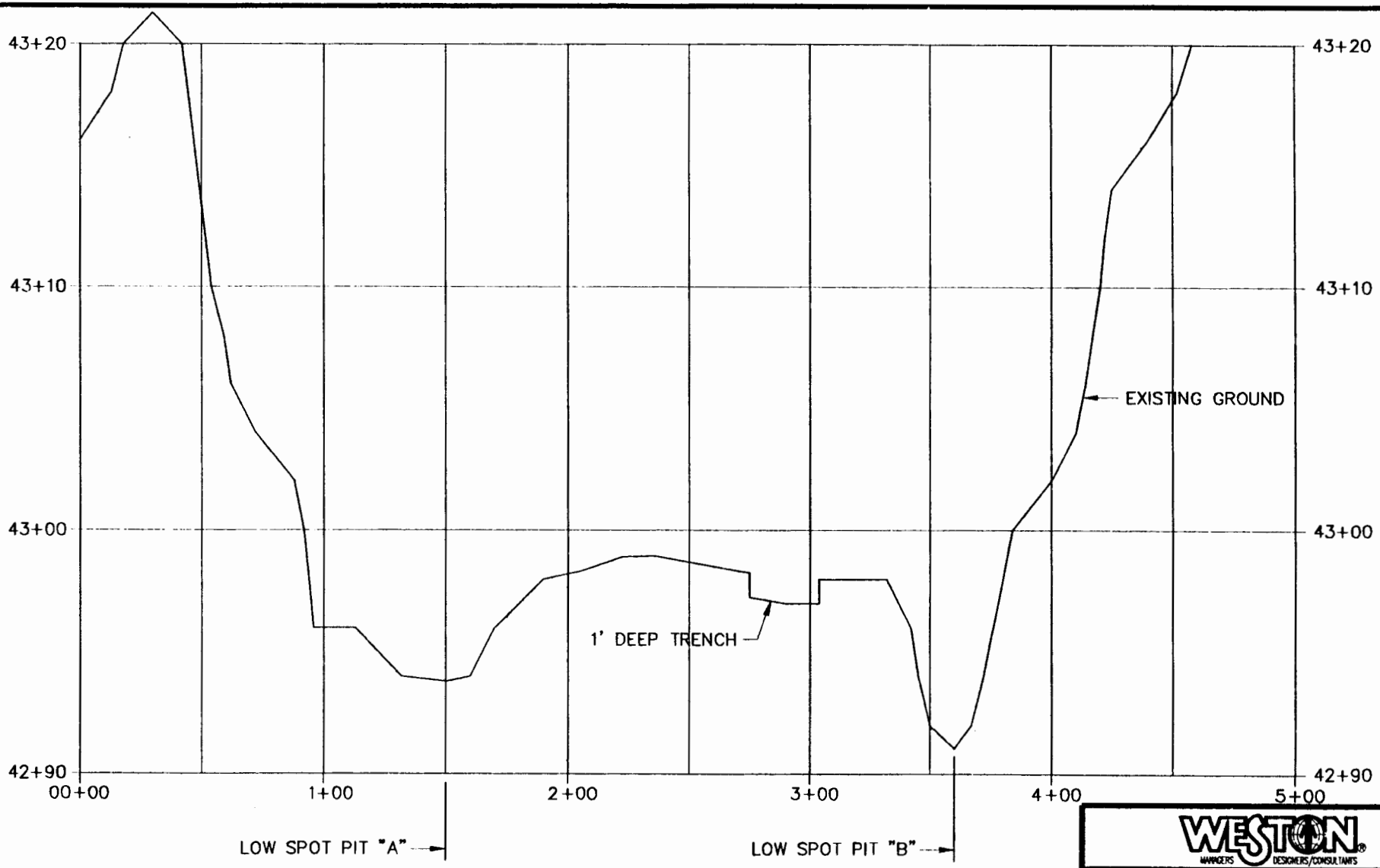

SCALE:

HORIZ. 1"=60'

VERT. 1"=6'

WESTON MANAGERS DESIGNERS/CONSULTANTS

FIGURE 3

U.S. ARMY CORP OF ENGINEERS

FORT BLISS

GENERALIZED CROSS-SECTION

DATE	PROJECT NO.	SCALE
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The Hueco Bolson is a marginal Basin and Range structure, lying between the Franklin and Hueco Mountains and is the southernmost extension of the Tularosa Basin of New Mexico. It is a flat intermontane basin approximately 19 mi. (30 km) in width, with an elevation of about 4,000 ft. (1,220 m) at the base of the Franklin Mountains, rising eastward to about 4,429 ft. (1,350 m) near the Hueco Mountains. The Franklins are a tilted fault-block sequence of Paleozoic rocks underlain by Precambrian granite, totalling approximately 8,000 ft. (2,440 m) of section (Barrie, 1975). Their counterparts on the eastern side of the Bolson, the Hueco Mountains, are described below.

Bolson sediments consist of late Cenozoic Camp Rice and Fort Hancock Formations (fluvial and lacustrine sands, gravels and clays), plus recent valley fill and eolian sand. Deformation of the bolson, so active in its developmental stages in the Tertiary, continues at a much reduced scale. Several north-south trending depressions in the Hueco bolson represent recent faults, which even cut caliche deposits, and minor earth tremors have been reported on the east side of the Bolson.

Geophysical investigations have revealed a deep asymmetric trough, fault-bounded on the west, where the maximum depth of fill is estimated to be approximately 9,000 ft. (2,740m). Three distinct refracting horizons were found within the Bolson fill and are shown on Figure 4. The upper two horizons are relatively uniform in thickness. The third unit is noticeably thicker on the west and thins to the east (Taylor, 1981).

In general, the bedrock surface slopes gently southward until it approaches the Rio Grande Valley, where it drops into a roughly northwesterly-trending trough.

The Hueco Mountains, located east of the treatment unit, are a range of hills, comprising mainly Paleozoic sedimentary rocks, which rise approximately 984 ft. (300 m) above the floor of the Hueco Bolson. They form an impressive escarpment in their northern part. Small hills surrounded by alluvium to the west of the main mountain block would appear to be faulted-off outliers. A series of Tertiary igneous bodies have intruded the sediments around Hueco Tanks State Park. A simplified geologic map of the area is shown in Figure 5.

Precambrian granites are exposed at the southern end of the range. About 1,500 ft. (450 m) of lower Paleozoic sandstone and limestone overlie the granite. These are, in turn, overlain by a thick sequence 3,400 ft. (1,035 m) of Carboniferous and Permian limestones in the northern part of the area; these latter formations also make up the present surface of the plateau (Diablo Plateau) to the east of the Hueco Mountains. Cherty and sandy limestones of the Helms Formation Mississippian are followed by the grey fosiliferous Magdalena Limestone (Pennsylvania); this unit contains a 49 ft. (15 m) thick gypsum bed in the northern part of the area, on McGregor Range. An angular unconformity separates the Magdalena from the Hueco Limestone, which is of Pennsylvanian/Permian age (Wolfcamp Series), and forms the capping rock on the Hueco Mountain escarpment. The Hueco Limestone consists of massive bedded limestones, interbedded with reddish shales, and with a basal conglomerate.

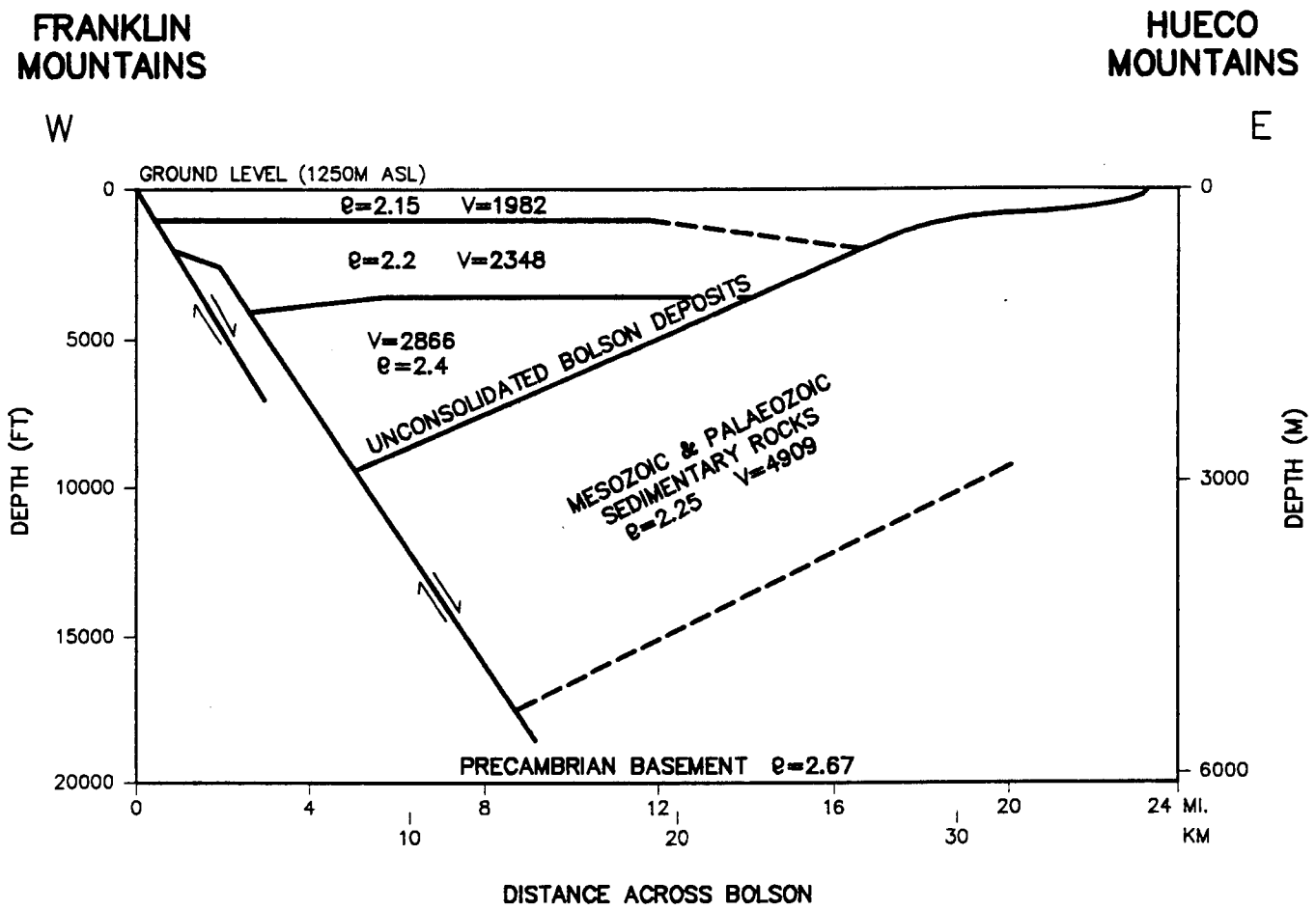

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FIGURE 4

U.S. ARMY CORP OF ENGINEERS
FORT BLISS
GEOPHYSICAL CROSS-SECTION
OF THE HUECO BOLSON
FORT BLISS, TEXAS

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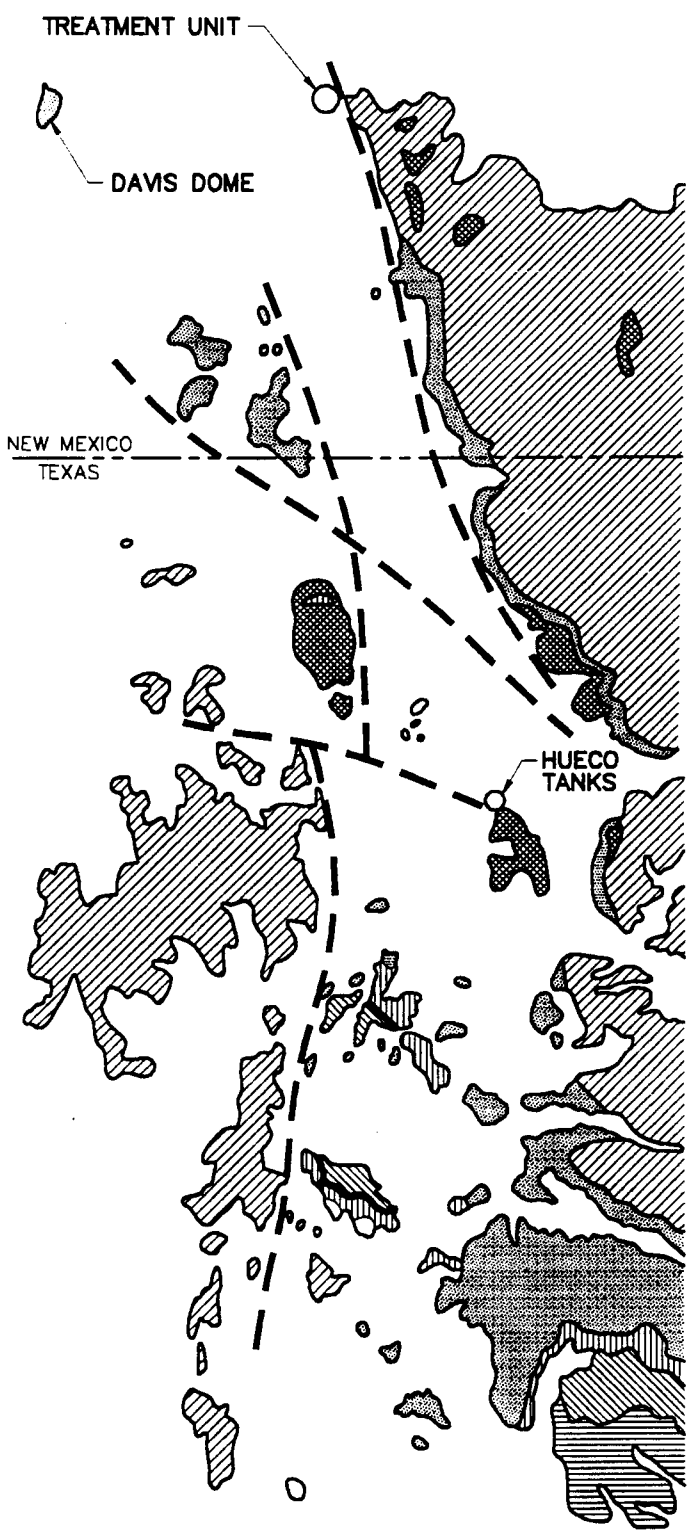

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IGNEOUS INTRUSIVES	– TERT.
HUECO LIMESTONE	– PERM.
MAGDALENA LIMESTONE	– PENN.
HELMS FORMATION	– MISS.
SHALE, LIMESTONE	– DEV.
FUSSELMAN LIMESTONE	– SIL.
MONTOYA, EL PASO LIMESTONES	– ORD.

INFERRED FAULT

0 2 4KM

0 1 2 3 4MI

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FIGURE 5

U.S. ARMY CORP OF ENGINEERS
FORT BLISS
SIMPLIFIED GEOLOGIC MAP
FORT BLISS, TEXAS

DATE	PROJECT NO.	SCALE
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In the northern part of the Hueco Mountains, are several sizeable igneous bodies. Hueco Tanks itself, and the peak of Cerro Alto a little to the east, are probably intrusive plugs or stocks. Other bodies are concordant with the sedimentary strata, some undoubtedly representing erosional remnants of larger intrusions.

The treatment unit is located on alluvial deposits near the northern terminus of the Hueco Mountains.

2.4 REGIONAL HYDROLOGY

Groundwater resources on the eastern side of the Hueco Bolson are sparse and of generally poor quality when compared with those on the west side of the Hueco Bolson, from which the City of El Paso derives its drinking water. Bolson deposits are composed of deep alluvial accumulations washed into intermontane areas from the surrounding highlands. The water bearing sediments which form this aquifer are generally unconsolidated, alternating, and discontinuous beds of silt, clay, sand, gravel, and boulders with associated caliche, gypsum, conglomerate, volcanic ash, tufts, and basalts (Taylor, 1981).

Precipitation and, to a minor extent, infiltration from the Rio Grande and Pecos Rivers, are the principal sources of recharge to the alluvial and bolson deposits. Groundwater movement in this area begins with recharge along the foothills of the mountains and plateaus where the sediments are coarse grained and permeable, and possibly along the channels of ephemeral streams in the basins. Generally, recharge does not occur unless precipitation is sufficient to cause surface flow through the foothill areas in the ephemeral streams, otherwise the water is either directly evaporated or lost from the shallow subsurface by evapotranspiration.

Groundwater moves from recharge areas to discharge in the topographically lower parts of the basins. Fresh water is generally located in recharge areas that flank the topographically higher basin edge and may occur down gradient in distinct lenses intertongued with less permeable sediments which contain older, more saline waters. Total dissolved solids, chloride, and sulfate concentrations increase along the groundwater flow path by interaction with the rock matrix, dissolution of associated evaporite deposits, and/or concentration by evapotranspiration. Basinward, slightly saline to saline groundwater may discharge naturally through evaporation, which can result in accumulation of salts on the land surface; may leave the topographically closed basin through the rocks that underlie the basin; or discharge directly to surface drainage such as the Rio Grande River (Ref: Groundwater Availability in Texas).

Currently, large amounts of groundwater are withdrawn for municipal and industrial use in the El Paso area from the Hueco and lower Mesilla Bolsons. Overproduction of groundwater may result in a rise in dissolved constituents due to mixing of fresh water with slightly saline to saline water withdrawn from the sediments which underlie, overlie, or adjoin the fresh-water bearing zones.

The water table is generally deep, between 230 and 295 ft. (70 and 90 m). Available well data from the area have been summarized, Table 2, and used to construct a water table contour map, Figure 6, (Taylor, 1981). The map shows a water table depression to the east and south of Davis Dome, on McGregor Range, encouraging an easterly movement of water into the northern Hueco Mountains, as compared with a westerly movement, away from the mountains in the south. The water flow in the central part of the Hueco Bolson is southward towards the Rio Grande. The difference in flow regime is probably due in part to a decrease in transmissibility of the bolson sediments (an increase in clay content, for instance) to the immediate east of Davis Dome. The depth to groundwater in the immediate area of the treatment unit may be in excess of 600 feet (182.9 m).

Some water quality data is variable for the area. Test holes drilled by the Army in 1956 to investigate the potential for drinking water beneath McGregor Camp found no water considered potable. In general the hot waters are highly mineralized, with up to 8,980 ppm total dissolved solids (TDS) being recorded, while the cold groundwater of the region has a lower salinity. The two adjacent wells (numbers 24 and 25 in Table 2 and on Figure 6) apparently display both types: the "Hot Well" encountering hot water (presumably originating at depth) at the water table, and the shallower well finding "normal" water in what appears to be a perched zone. Some shallow holes drilled for a geothermal project hit small amounts of water at this same level. A small playa lake located near the "Hot Well" could provide recharge for such a localized perched aquifer (Taylor, 1981). Generally alluvial fans emanating from the Hueco Mountains are the probable source of the low salinity non-thermal waters.

Flow data are almost non-existent for the eastern side of the bolson. Alluvial deposits tend to be coarser-grained at greater depths allowing water movement, although the underlying lake-bed sediments are less permeable, having a considerable clay content. The limestone bedrock is generally fairly compact, often crystalline; and having a low porosity. However, many fractures and solution cavities have been reported by drillers, and this suggests a means by which water may move, especially from depth (Taylor, 1981)

2.5 REGIONAL METEOROLOGY

The climate in the site region is typical of the arid to semi-arid regions of the southwestern United States. Table 3 presents a summary of climatic information for the Alamogordo, Tularosa, Cloudcroft, El Paso, and Orogrande areas. Alamogordo, Tularosa, El Paso, and Orogrande are typical of the central portion of the basin and Cloudcroft is typical of the bordering mountains. The mean annual precipitation in the basin ranges from 8.8 inches (22.4 cm) in the central portion of the basin at Orogrande to 25.4 inches (64.5 cm) at Cloudcroft in the bordering mountains. Precipitation on the slopes of the surrounding mountains produce intermittent stream runoff that drains toward the center of the basin, or flows as groundwater through the alluvial fans as interflow. The intense summer thunderstorms produce high runoff of short duration, most of which flows into the playas or alkali flats and evaporates (New Mexico Water Resources Research Institute, 1976).

TABLE 2

WELL DATA FOR HUECO TANKS AND VICINITY

MAP NO.	NAME	LOCATION	DATE	ELEV. (m)	DEPTH TO BEDROCK (m)	T.D. (m)	DEPTH TO WATER (m)	LITHOLOGY DEPTH (m)	T.D.S. (ppm)
1	Otero Co., *Ernest #1 Fee	New Mexico T25SR7E S20 444	1942	1250	--	1202	127-'fresh' 631-'saline'	421-igneous 665-base fill 704-base Hueco 720-top Penn	--
2	*Bechtel #1 Maris	T25SR8E S23 310	1950	--	146	301	--	bolson fill 146-top Penn 186-porous lmst.	--
3	*Page #1 Maris	T25SR8E S23 340	7949	1225	--	223	--	bolson fill ?198-igneous	--
4	*Wilmoth #1 Federal	T26SR8E S3	--	1260	--	63	--	bolson fill	--
5	*Muldry #1 State	T25SR73	--	1252	--	80	--	bolson fill	--
6	L1, T28 G2	T25SR6E S4 110	1953	1253	--	368	-- --	bolson fill	7000
7	Hueco Camp #, L7	T25SR6E S19 440	1943	1229	--	134	91.5	bolson fill	--
8	Hueco Camp #3, L8	T25SR63 S20 343	1944	1226	--	134	89.3	bolson fill	375
9	M2, T36	T25SR6E S28 444	1953	1219	--	225	82.3	bolson fill	2690
10	Alvarado Well	T25SR7E S16 121	--	1250	--	135	108.4	bolson fill	1160
11	North Well	T25SR7E S24 410	--	1255	--	123	--	bolson fill	--
12	Borego Well	T25SR8E S1 220	--	1265	--	236	154.5	bolson fill?	--
13	N1, T31	T25SR	1953	1241	273	288	--	--	--
14	McMillan Well	T25SR8E S32 333	1956	1241	273	288	--	--	--
15	L13	T26SR5E S24 320	--	1233	--	122	99.8	--	--
16	T5	T26SR6E S23 332	1957	1215	--	116	80.9	bolson fill	1420
17	M6	T26SR6E S34 130	--	1219	--	122	86.4	bolson fill	--
18	T1	T26SR7E S1 241	1956	1250	--	154	112	bolson fill	1140
19	--	T26SR7E S22 122	1936	1241	--	137	99.3	bolson fill	--
20	M5, T6	T26SR7E S32 122	1953	1238	--	366	106.1	bolson fill 265-sandstone?	1680 (3/53, 268m)
21	T2	T26SR8E S2 131	1956	1280	--	215	165.3	bolson fill	2620 (12/56, 215m)
22	"Hot Well"	T26SR8E S5 332	1945	1252	--	138	133.3	bolson fill	8740
23	N6, T8	T25SR8E S32 111	1953	1248	--	252	136.4	bolson fill 216-conglomerate	2670?
24	N8, "Nations Hot Well"	T26SR8E S33 120	--	1249	--	--	138.1 124.6	bolson fill	6200

TABLE 2

WELL DATA FOR HUECO TANKS AND VICINITY
(Continued)

MAP NO.	NAME	LOCATION	DATE	ELEV. (m)	DEPTH TO BEDROCK (m)	T.D. (m)	DEPTH TO WATER (m)	LITHOLOGY DEPTH (m)	T.D.S. (ppm)
25	N7	T26SR8E S33 120	--	1249	--	91.5	53.7 49.4 (perched W.T)	bolson fill	485
26	El Paso Co., *Wilmoth #1	Texas T1Bk1 S6 PSL	--	1273	--	427	--	T.D. in 1mst.	--
27	*Texaco #1 El Paso Fee 23/79/1 (HW-2)	T1Bk79 S23	1965?	1240	793	2077	105	T.D. in 1mst.	--
28	*Jones #1 Sorley	T1 Bk5 S17 PSL	--	1340	--	683	--	T.D. in P/C granite	--
29	HW-1 "Sante Cruz Well"	T1Bk1S6 344	1956	1273	113	180	173.8	bolson fill 113-1mst. 119-fault?	7857
30	"Old Joint Well"	T1Bk78 S6 140	--	1242	--	122	110.9	bolson fill	--
31	"New Joint Well"	T1Bk78 S18 130	--	1242	--	131+	111.8	bolson fill	--
32	HW-4, "Palos Pintos #2"	T1Bk79 S16 220	1968	1241	--	300+	105?	bolson fill	2737
33	--	T2Bk78 S4	--	--	308	310	--	bolson fill 308-1mst.	--
34	"Hueco Estates"	T1Bk77 S9	--	1363	--	260?	120	bolson fill	--
35	Hueco Tanks Park	T1Bk77 S10	1971	1390	137?	175	112.8	bolson fill 137-syenite?	--
36	S9	T1 Bk78 S42	1953	1236	--	305	109.1	bolson fill 139-base, fresh water sands	--
37	Nations East Well	T1Bk78 S43	1943	1238	--	186	110.7	bolson fill	--
38	Deep Well	T2Bk78 S3	1953	1242	--	309	120.2	bolson fill 155-base, fresh water sands	--
39	*Texaco #1 El Paso Fee 45-78-1	T1Bk78 S45	--	--	--	502	--	--	--
40	Navar "Rock Well"	T1Bk1 S19 PSL	1797	1292	10?	155	--	syenite	--
41	HW-3	T1Bk77 S17	--	1341	--	190	200?	--	--
42	CTR-1	T2Bk6 S9 PSL	--	1244	--	--	135	bolson fill	--

Reference: Taylor, B., 1981 - Heat Flow Studies and GeoThermal Exploration in Western Trans-Pecos Texas, unpublished. Ph.D Dissertation, University of Texas at El Paso.

TABLE 3

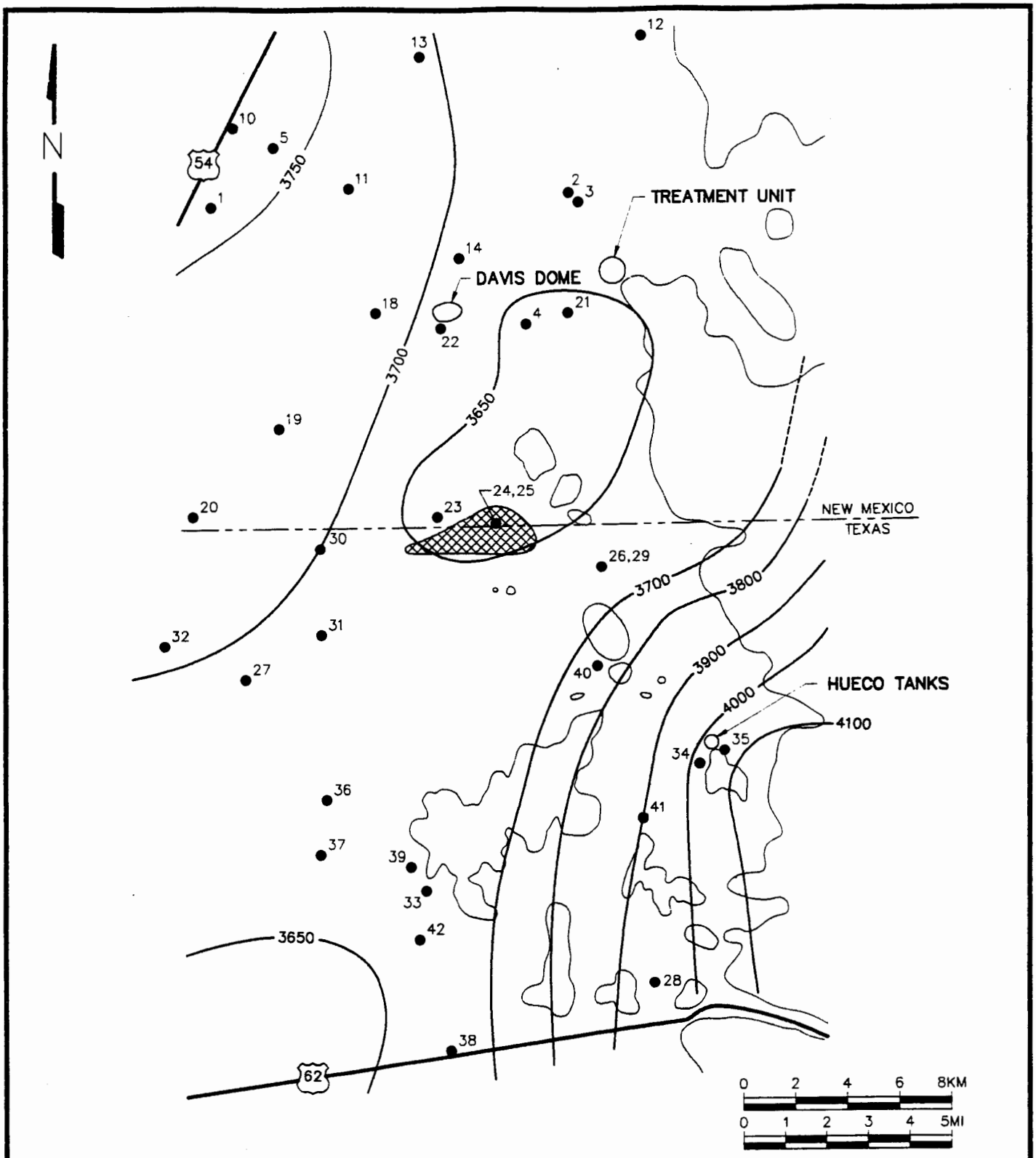
SELECTED CLIMATIC DATA FOR STATIONS WITHIN THE REGION

	UNITS	ALAMOGORDO[a]	TULAROSA[a]	OROGRANDE[b]	EL PASO[b]	CLOUDCROFT[b]
Elevation (above MSL)	feet	4,350	4,460	4,200	--	8,827
Average days above 32°F	days	209	211	NA	--	NA
Average frost-free period	date	Apr. 7 - Nov. 2	Apr. 4 - Nov. 1	NA	--	NA
Mean annual precipitation	inches	9.8	10.1	8.8	8.9	25.4
Maximum mean monthly air temp.	mo-°F	Jul. - 79.7	Jul. - 80.4	Jul. - 81.5	Jul. - 82	Jul. - 59.9
Minimum mean monthly air temp.	mo-°F	Jan. - 42.0	Jan. - 43.4	Jan. - 42.0	Jan - 42	Jan. - 30.0
Average annual air temp.	°F	61.3	61.7	61.9	62	45.0

NA: not available

[a] New Mexico Interstate Stream Commission and New Mexico State Engineer Office, *County Profile-Otero County, Water Resources Assessment for Planning Purposes*, Santa Fe, New Mexico, 1975, pp. 12-13.

[b] U. S. Department of Commerce, NOAA-EDS, *Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1941-70*, Climatography of the U. S. No. 81 (by state), National Climatic Center, Asheville, NC, August 1973.



LEGEND

POTENTIAL PERCHED WATER

1 WELL LOCATION

3650 WATER TABLE CONTOUR

WESTON
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FIGURE 6

U.S. ARMY CORP OF ENGINEERS
FORT BLISS
WELL LOCATIONS AND
WATER TABLE CONTOURS
FORT BLISS, TEXAS

DATE	PROJECT NO.	SCALE
AUG 93	.03886086001	AS SHOWN

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3.0 SITE CLOSURE ACTIVITIES

This closure plan will ensure that the EOD thermal treatment facility will be closed in a manner the will minimize or eliminate any potential adverse impact to human health or the environment. This plan will also eliminate or minimize the potential for the escape of hazardous wastes, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to groundwater, surface water, or to the air upon closure.

It is anticipated that this thermal treatment unit will remain operational until at least the year 2090. It is also anticipated that the unit will be 100 percent in use during the life of the facility. Therefore, there will be no partial closure of this thermal treatment facility and only the complete closure of this facility will be addressed,

Closure of the EOD area thermal treatment facility will be conducted in four phases:

- Phase 1 - Site Characterization
- Phase 2 - Remedial Action, if needed
- Phase 3 - Post-closure Care, if needed

Each of these phases is discussed below.

3.1 PHASE 1 - SITE CHARACTERIZATION

The wastes handled in the EOD area are propellants, explosives, and pyrotechnics (PEP). The maximum amount of PEP wastes on site at any time during the facility's operation to date was approximately 2,000 lbs. (900 kg).

To minimize the need of further maintenance of the EOD thermal treatment facility all visible evidence of the PEP treatment will be removed. This evidence will include, but is not limited to, discolored soils, metal fragments, and any other remnants of the detonated munitions. Additionally, the detonation area and the surrounding areas will be swept with metal detecting equipment. This equipment will be used to detect any metal debris beneath the surface and to ensure that there are no Unexploded Ordnance (UXO) residues in the surface soils. Any fragments or residues detected with this equipment will be removed. All metal fragments, residues, soils, and other wastes removed from the facility will be characterized for hazardous waste constituents and characteristics and properly disposed in accordance with 40 CFR 264.111.

3.1.1 Site Sampling

In addition to the removal of visible remnants of the PEP destruction, surface soils from the detonation and surrounding areas will be collected. Sampling will be conducted in accordance with EPA established protocols. Table 4 lists the analyses for these soil samples.

TABLE 4

SOIL SAMPLE ANALYSES
EXPLOSIVES ORDNANCE DEMOLITION AREA
FORT BLISS, MCGREGOR RANGE
OTERO COUNTY, NEW MEXICO

ANALYTE	ANALYTICAL METHOD[1]	SAMPLE VOLUME
INORGANICS:		
Free Liquids	SW846 9095	100g
Ignitability	SW846 1010	10g
pH	SW846 9040	10g
Reactivity	GAP Test - Appendix III	10g
Reactivity	Deflagration/Detonation Test - Appendix III	20g
Nitrate/Nitrite (as N)	EPA 353.3	10g
METALS:		
Arsenic	SW846 7060	100-500g
Barium	SW846 7080	100-500g
Beryllium	SW846 6010	100-500g
Cadmium	SW846 7130	100-500g
Chromium	SW846 7190	100-500g
Lead	SW846 7421	100-500g
Mercury	SW846 7471	100-500g
Selenium	SW846 7740	100-500g
Silver	SW846 7760	100-500g
ORGANICS:		
Picric Acid	SW846 8270	100-500g
HMX	SW846 8330	100-500g
RDX	SW846 8330	100-500g
2,4,6-Trinitrotoluene	SW846 8330	100-500g
2,4-Dinitrotoluene	SW846 8330	100-500g
2,6-Dinitrotoluene	SW846 8330	100-500g
Nitroglycerine	SW846 8332	100-500g

[1] SW846 = "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," Environmental Protection Agency, SW846.

EPA = "Methods for Chemical Analyses of Water and Wastes," Environmental Protection Agency, 1979, Revised 1983.

Discreet soil samples will be collected from the OB/OD area. All samples will be taken using a non-sparking (plastic or brass) scoop or other sampling device if so directed by the EOD. Sampling personnel will record the location of each sample with respect to permanent stations, the date, names of sampling personnel, and other pertinent information. Appendix B of the Part B Application presents the Quality Assurance Project Management plan.

Soil samples will be collected from a depth between 6 in. (15.2 cm) and 1 ft. (0.3m) at the following locations:

- 1 discreet sample at the bottom of each of the OD pits,
- 2 discreet samples from the bottom of the OB trench,
- 3 discreet samples from the sides of each pit and the trench (9 total),
- 4 discreet samples around the perimeter of each of the OD pits (outside of the pits) and trench to evaluate the effect of kickout (12 total),
- 3 discreet background samples from an area of the site that has not been impacted by operation of the EOD.

Soil samples will be collected from a depth of surface to 6 in. (15.2 cm), and 6 in. (15.2 cm) to 1 ft. (0.3m), i.e. two samples per location, at the following locations:

- 8 discreet random samples in the bottom of the treatment unit (but not in the pits or trench, 16 total),
- 8 discreet samples from the perimeter (outside of the treatment unit, 16 total), and

In addition, soil samples will be taken on 5 ft. (1.5 in.) intervals from a 50 ft. (15.2 m) boring placed approximately in the middle of the treatment unit. This will produce 20 samples.

All samples will be examined for physical evidence of UXO or unburned materials. The samples will then be subjected to the reactivity tests (Gap Test and Deflagration/Detonation Transition Test). Upon completion of these tests, the soils will be placed into the appropriate sample containers.

Sample containers will be placed into a cooler with ice. When sampling is completed for the day, all samples will be shipped by overnight courier to a qualified laboratory, under appropriate chain-of-custody procedures, for analysis.

Analyses will be conducted as shown on Table 4.

Quality assurance and decontamination procedures are discussed in the Quality Assurance Project Management Plan (QAPMP) in the Part B Permit Application.

3.1.2 Sampling Equipment Decontamination Procedures

All sampling equipment that must be reused will be decontaminated by the following process as specified in the QAPMP and summarized below:

1) All surfaces of the equipment that contact the sample will be washed with a Liquinox/water wash, using an scrub brush to remove any remaining soils from the previous sample.

2) After washing, the equipment will be rinsed with distilled water.

3) Following, the distilled water rinse, the equipment will be spray-rinsed with ethanol or isopropyl alcohol to remove any traces of the soap.

4) A final rinse of distilled water will complete the decon procedure.

All decon liquids will be sampled upon the completion of the sampling event and characterized for disposal. These liquids will be properly disposed during the remediation of the site.

3.1.3 Sampling Quality Assurance/Quality Control

To ensure that the data received from the sampling event is representative of the site, quality assurance/quality control samples will be collected as specified in the QAPMP (included with the Part B Permit Application). These samples include:

1) Duplicate Samples

2) Matrix Spike/Matrix Spike Duplicate Samples

3) Equipment Rinsate Blank Samples

4) Trip Blank Samples (for water only)

The required samples are summarized in Table 5.

3.2 PHASE 2 - REMEDIAL ACTION

When the analytical data has been reviewed, the extent and nature of contamination of the thermal treatment unit will be assessed. It is not anticipated that significant amounts of contamination will be reported in the soils collected from the site. However, in the event that detectable levels of contamination are reported at the site, the following activities will be completed.

TABLE 5
QUALITY ASSURANCE/QUALITY CONTROL SAMPLES
EXPLOSIVE ORDNANCE DEMOLITION AREA
FORT BLISS, MCGREGOR RANGE
OTERO COUNTY, NEW MEXICO

SAMPLE TYPE	FREQUENCY	ANALYSES
Duplicate	5%	Metals, Organics, NO_2-NO_3
Matrix Spike/Matrix Spike Duplicate	5%	Metals, Organics, NO_2-NO_3
Rinsate Blank	5%	Metals, Organics, NO_2-NO_3
Trip Blank	1 per day	Organics

3.2.1 Establishment of Clean-up Levels

Appropriate clean-up levels will be determined for the facility at the time of closure, based on the nature of reported contamination at the site, the potential land use for the site, and the surrounding land use. Currently, the area surrounding the facility is uninhabited and not being used for agricultural purposes or otherwise developed. At the time of the facility closure, the status of the area will be incorporated into the determination of the appropriate clean-up levels for the facility and will control, minimize, or eliminate, post closure escape of hazardous waste, hazardous constituents, leachate, or hazardous waste decomposition products to the ground or to the atmosphere for the protection of human health and the environment.

3.2.2 Site Remediation

Based on the analytical results from the soil sampling event and the determination of the appropriate clean-up levels, the site will be remediated, if required. Potential remediation activities may include soil excavation, in situ treatment, or other appropriate technologies. Once a technology for remediation is selected, a plan for the completion of the site remediation will be prepared and submitted to the New Mexico Environment Department for review and approval.

Any wastes generated during the remediation will be disposed in accordance with all applicable regulations during the site remediation. These wastes may include excavated soils, decon liquids from the sampling event, metal fragments removed from the soils, and any other waste materials on-site.

3.2.3 Site Restoration

When remediation of the facility has been completed the site will be returned to as near natural grade as the available soil stock piles allow, and sloped to drain. If a waste in place closure is selected, the site will be fenced and warning signs will be posted on all approaches to the site. These warning signs will be in both Spanish and English. Due to the arid climate at the site, no vegetation will be planted on the remediated area. Rather, the vegetation will be allowed to reestablish itself.

The trust fund for decontamination is not required for Federal Facilities.

3.2.4 Deed Recordation

Upon closure of this facility, if it is determined that reactive, toxic, or hazardous materials remain on-site, Fort Bliss will, within 60 days of completion of the closure activities, complete the following actions.

- Fort Bliss will submit a record of the type, location, and quantity of materials remaining on-site to the NMED, the EPA Regional Administrator, and the local authority with jurisdiction over land use for the site.
- Fort Bliss will add a statement restricting the use of the property to the deed of the facility or other instrument normally examined during title search. This statement will remain in the property description in perpetuity to notify any potential purchaser or user that hazardous wastes remain on-site.

3.3 PHASE 3 - POST CLOSURE CARE

If clean closure is not practical, post-closure care will be conducted.

The geology in the vicinity of the site may minimize the potential for groundwater contamination from activities at the site. Also, the groundwater level is approximately 600 ft. (182.9 m) below the surface in this area. Based upon the geology and the depth to groundwater, no groundwater monitoring is anticipated at this site. Soil analyses will be used to make the determination.

If a clean closure is not achieved, fences, containment systems around the site, and warning signs will be used and inspected at least once every six months. Any deficiencies will be corrected as soon as possible, and within no more than 30 days from the date of discovery of the deficiency.

All records for the facility during the post closure care period will be maintained by the Directorate of Environment. Any inquiries relating the closure of this facility and post closure care should be directed to:

Chief, Hazardous Waste Branch
Fort Bliss, Texas 79916-0058
(915) 568-7930

3.4 SUMMARY

The following steps provide a summary of the potential closure process for this facility.

1) The OD/OB unit is the only hazardous waste management unit at this facility and will be closed when the facility ceases operation. If the analytical results indicate there is no residual contamination on the property, the site will be returned to approximately natural contours using earth moving equipment (i.e. bulldozers). No decontamination of the equipment will be required.

2) If the analytical data indicates that residual contamination is present at the time of closure, the property will be deed recorded and the site will be returned to approximately natural contours using earthy moving equipment.

The entire site will be graded at the time of closure; no partial closure is anticipated.

3) It is estimated that the maximum inventory of hazardous wastes (PEP) on site was approximately 2000 lbs. (900 kg) All PEP wastes will be thermally treated prior to initiation of remediation activities. Therefore, there will be no requirements to remove, transport, treat, store or dispose of PEP wastes or use of off-site hazardous waste management units once remediation activities are started.

4) There are no permanent structures or equipment at the OD/OB unit to be decontaminated. The only decontamination potentially required will be the earth moving equipment. If necessary, the equipment will be washed over an impervious surface with pressurized water to remove any traces of potentially contaminated soils. Water will be collected, sampled for hazardous waste characteristics, and properly disposed. It is not anticipated that removal of contaminated soils or additional sampling or testing of soils will be required.

5) It is not anticipated that additional activities will be necessary to ensure that closure of the facility meets all requirements. There is no need for groundwater monitoring, leachate collection a run-on/run-off control, as discussed previously.

6) An estimated closure schedule is provided on Table 1 and is as follows:

Task Description	Cumulative Time (Days)
• Notification of Intent to Close and Receipt of Final Waste	0
• Process final volumes of wastes	30
• Completion of site characterization	60
• Completion of remediation	165
• Certification of closure by independent professional engineer	175
• Notification of completion of closure to NMED and EPA	180

7) This facility is a government property and will not use trust funds to establish financial assurance.

8) The expected year of final closure is 2090.

4.0 REFERENCES

Code of Federal Regulations, Title 40, Part 264, published by the Office of the Federal Register, National Archives and Records Administration, July 1992.

New Mexico Hazardous Waste Management Regulations, Part V, New Mexico Environmental Improvement Board, Revised effective October 30, 1988; Amended July 9, 1989; March 13, 1991.

"Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," Environmental Protection Agency, SW846.

"Methods for Chemical Analyses of Water and Wastes," Environmental Protection Agency, 1979, Revised 1983.