Per the Federal Facility Agreement for Iowa Army Ammunition Plant, Article X.B.1, the attached document is the final version of the submitted document.

MISCELLANEOUS MILITARY/CIVIL HTW PROJECTS FOR U. S. ARMY CORPS OF ENGINEERS OMAHA DISTRICT

ACTION MEMORANDUM
FOR THE
THE LINE 800 PINKWATER LAGOON,
FORMER LINE 1 IMPOUNDMENT
AT THE
IOWA ARMY AMMUNITION PLANT
MIDDLETOWN, IOWA

CONTRACT NO. DACW45-93-D-0004
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Action Memorandum for the Removal Actions at the Line 800 Pinkwater Lagoon and the Former Line 1 Impoundment at the Iowa Army Ammunition Plant

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Commanding

ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BGS	Below Ground Surface
CAMU	Corrective Action Management Unit
CM/SEC	Centimeters/Second
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DERA	Defense Environmental Restoration Account
DNT	2,4- and 2,6-Dinitrotoluene
EE/CA	Engineering Evaluation/Cost Analysis
EPA	Environmental Protection Agency
FFA	Federal Facility Agreement
FS	Feasibility Study
HI	Hazard Index
HMX	Cyclotetramethylenetetranitramine
HQ	Hazard Quotient
IAAP	Iowa Army Ammunition Plant
IDA	Inert Disposal Area
IDNR	Iowa Department of Natural Resources
IRP	Installation Restoration Program
KG	Kilograms
LAP	Loading, Assembling, and Packaging
LDR	Land Disposal Restrictions
mg/kg	Milligrams/Kilogram
mg/L	Milligrams/Liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ND	No Detection
NPDES	National Pollution Discharge Elimination System
ppb	Parts Per Billion
PRG	Preliminary Remediation Goal
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramine
ROD	Record of Decision
TNB	1,3,5-Trinitrobenzene
TNT	2,4,6-Trinitrotoluene
TSD	Treatment, Storage, and Disposal
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
YD	Yard

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MIDDLETOWN, IOWA

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IOWA ARMY AMMUNITION PLANT, MIDDLETOWN, IOWA.
FORMER LINE 1 IMPOUNDMENT AND LINE 800 PINK WATER LAGOON
ACTION MEMORANDUM

1.0 PURPOSE

This Action Memorandum is the primary decision document supporting the execution of the non-time critical removal action of contaminated soils at the Line 800 Pinkwater Lagoon and the former Line 1 Impoundment. These two sites constitute the most contaminated areas at the Iowa Army Ammunition Plant (IAAAP) in Middletown, Iowa. The purpose of this removal is to prevent the soil contaminants from leaching to the groundwater. The migration of contaminated groundwater to nearby residential drinking water wells may result in unacceptable human health risks.

Contaminated soils from the Line 1 and Line 800 sites will be excavated and will be either permanently disposed in an onsite soil repository at Trench 6 of the IAAAP Inert Landfill, or will be temporarily stored in a Corrective Action Management Unit (CAMU) near the Inert Landfill. Soils stored in the CAMU will ultimately be treated pending determination of the appropriate remedial action in the IAAAP Soils Operable Unit Record of Decision (ROD).

The subject removal actions will be performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). All actions will be performed in accordance with the terms of the IAAAP Federal Facility Agreement (FFA) and pursuant to Executive Order 12580.

The action will be funded by the Defense Environmental Restoration Account (DERA) through the Army's Installation Restoration Program (IRP).

2.0 SITE CONDITIONS AND BACKGROUND

The IAAAP is located in Des Moines County, Iowa, near the city of Middletown. It encompasses 19,127 acres. The IAAAP is a Government-Owned, Contractor-Operated installation under the

command of the U. S. Army Industrial Operations Command, Rock Island, Illinois. The onsite contractor is Mason and Hanger-Silas Mason Company Inc. The IAAAP began production in 1941 and is still in operation.

The primary operation at the IAAAP is to load, assemble, and pack (LAP) ammunition items, including: projectiles, mortar rounds, warheads, demolition charges, anti-tank mines, and anti-personnel mines. Components of these munitions are also handled at the facility, including: primers, detonators, fuses, and boosters. The LAP operations use lead-based initiating compounds and explosive materials (JAYCOR 1993).

This Action Memorandum addresses the excavation and stockpiling (with ultimate treatment) or disposal (landfilling) of an estimated 101,200 cubic yards of explosives contaminated soils from the Line 800 Pinkwater Lagoon and the Line 1 Impoundment. The removal will also address an additional 950 cubic yards of explosives-contaminated soil which was generated during a previous removal action. These contaminated soils, which were excavated in June 1995, are currently stored in a lined stockpile located at the IAAAP Inert Disposal Area.

2.1 SITE DESCRIPTION

2.1.1 REMOVAL SITE EVALUATION - PINKWATER LAGOON

The Line 800 Pinkwater Lagoon received explosives wastewater and sludges from various locations at the IAAAP from 1943 to the 1970's. It is no longer actively used for waste disposal at the IAAAP. The lagoon area currently consists of an unlined five-acre impoundment, four feet deep, surrounded by an earthen berm. No known wastewater treatment processes were employed prior to disposal at the lagoon. Approximately 80,000 cubic yards (CY) of soils and sediments above site remediation goals are present at the Pinkwater Lagoon. A leaching field and evaporation furrows, approximately five acres in size, were originally constructed in 1943 and received waste until 1955. The leaching field and evaporation furrows were located within the boundaries of the current Pinkwater Lagoon. The leaching field was later converted to the current Pinkwater Lagoon by constructing berms around the field. The Lagoon, constructed in the mid 1960s, was used for

disposal of explosive-contaminated wastewater from Line 800 operations and sludges trucked in from other operations around IAAAP (Dames & Moore 1989). The Lagoon served a settling pond to reduce particulates prior to discharge into Brush Creek. There were five settling basins north of the lagoon which were used to reduce particulates before the lagoon was constructed. According to the Preliminary Assessment (PA) for IAAAP, another major source of chemical wastes disposed at the Pinkwater Lagoon was the metal treatment facilities in Line 800. However, when personnel familiar with the IAAAP operations of that period of time were interviewed, they could not recall that metal treatment wastes were disposed of at the Pinkwater Lagoon. Soil and surface water samples will be collected at the Line 1 Impoundment and Line 800 Pinkwater Lagoon to evaluate the possible presence of metals and VOCs, in addition to explosives, as part of the removal action.

2.1.2 REMOVAL SITE EVALUATION - LINE 1 IMPOUNDMENT

The former Line 1 Impoundment was an impoundment on Brush Creek which received explosives wastewater discharge from the Line 1 LAP facilities from 1948 to 1957. Explosives soil and sediment contamination extends for approximately 8 acres at the site. The impoundment dam was breached in 1957, allowing impounded wastewater and sediment to flow into Brush Creek. Approximately 20,000 CY of soils above the site remediation goals are present at the former impoundment. It is reported that the Line 1 facility generated the greatest volume of explosive waste and pinkwater at IAAAP during the period of 1948 to 1975. In 1948, a 1,300-foot long continuous embankment was constructed along the upper reaches of Brush Creek to impound effluent discharged from Line 1 (through an unidentified conveyance mechanism) (Dames & Moore 1989). A previous study conducted by SCS Engineers (SCS) estimated that under normal flow this impoundment extended 1,300 feet upstream. During high streamflow, the impoundment may have reached 2,400 feet upstream (SCS 1981). The embankment was breached in 1975 and the area is now overgrown with vegetation and small trees. Brush Creek currently flows through the Line 1 Impoundment area. There is currently no water impounded in the Line 1 area.

2.1.3 PHYSICAL LOCATION

The IAAAP facility is located on a 19,127-acre area. Surrounding land use is either agricultural or industrial. The nearest population center is Burlington, Iowa, approximately 5 to 10 miles from the IAAAP. Figures 1 and 2 show the location of the Pinkwater Lagoon, Line 1 Impoundment and the relative location of IAAAP within the State of Iowa.

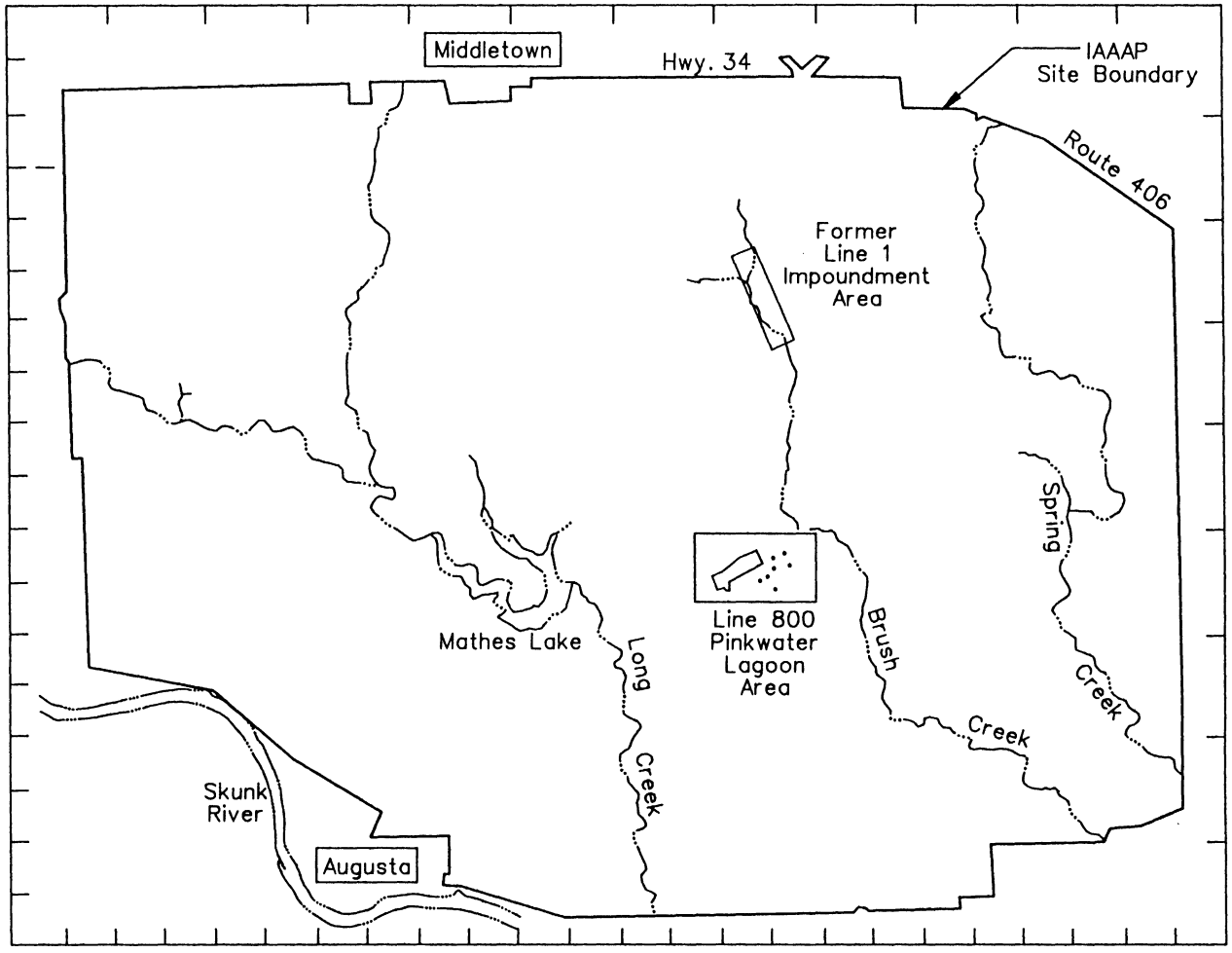
The Line 800 Pinkwater Lagoon is located adjacent to Line 800 and an intermittent tributary to Brush Creek (Figure 1).

The Line 1 facilities are located in the northeastern portion of the IAAAP installation, aligned approximately north-to-south along the upper reaches of Brush Creek (Figure 1).

The explosive-contaminated soil removed from the sumps has been temporarily stockpiled adjacent to the Inert Landfill area.

2.1.4 SITE CHARACTERISTICS

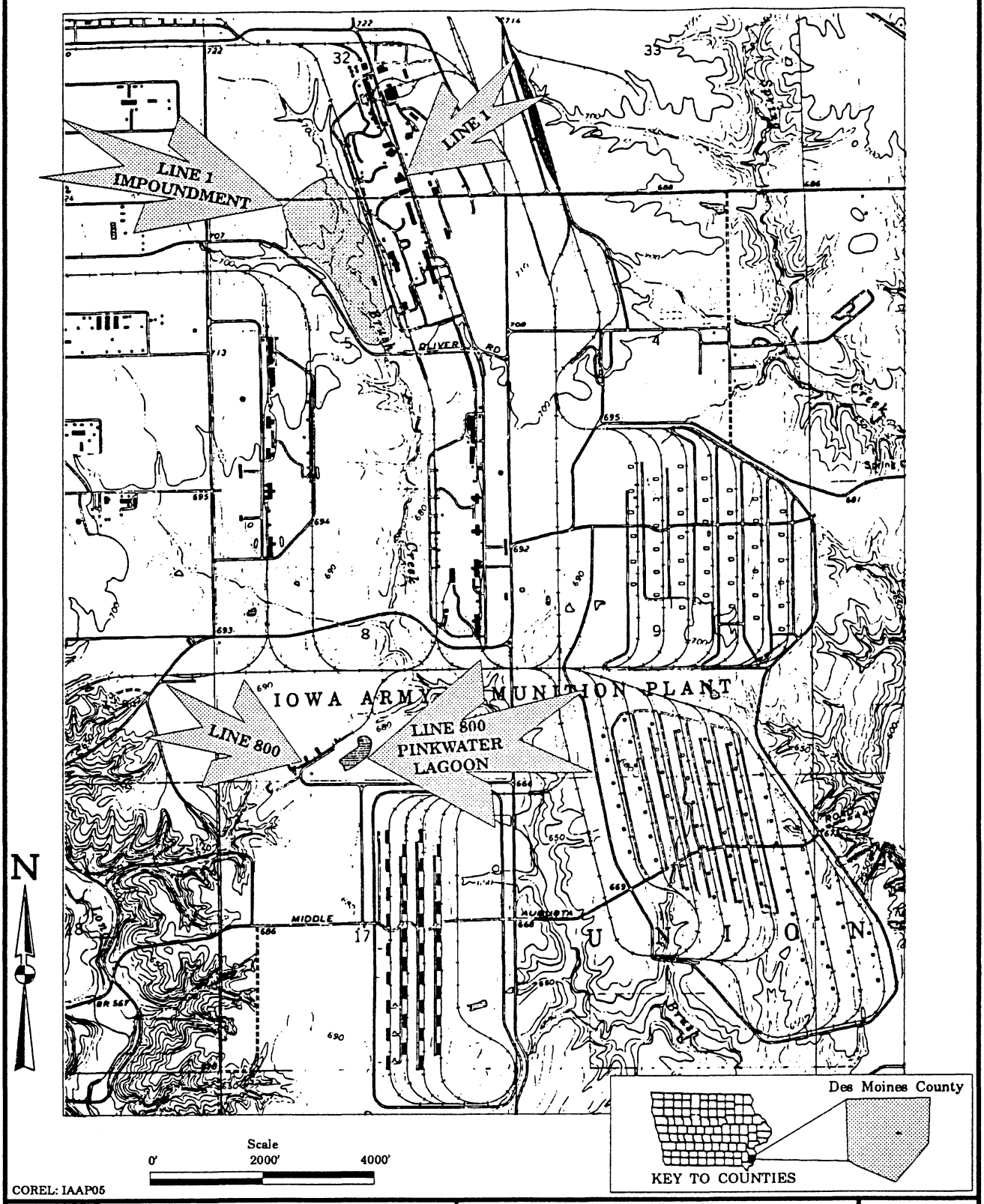
The IAAAP is located in the Dissected Till Plain section of the Central Lowland Province of the Southern Iowa Drift Plain region. The overburden at the Pinkwater Lagoon consists of 20 to 58 feet of clay-rich till with some sand and silt. The clays in the overburden are very stiff with relatively low permeability. A layer of sand ranging from 11 to 19 feet thick was encountered in several boreholes. The bedrock underlying this area consists of fossiliferous limestone interbedded with layers of shaley clay and silt. The bedrock surface appeared weakened and the upper portion of the limestone bedrock exhibits enhanced permeability. The depth to bedrock is between 65 and 80 feet below ground surface (bgs). The water level measurements in the vicinity of the Line 800 Pinkwater Lagoon generally indicate a pattern of radial flow away from the lagoon toward the natural water table (5-6 feet bgs), in response to the greater hydraulic head in the Pinkwater Lagoon (containing precipitation and recharging the water table).



Not to Scale

Source: Dames & Moore

MCS FILE: IAAP02	Project No.: 6102-012	Iowa Army Ammunition Plant Middletown, Iowa CDM FEDERAL PROGRAMS CORPORATION a subsidiary of Camp Dresser & McKee Inc.	Locations of Former Line 1 Impoundment and Line 800 Pinkwater Lagoon Areas Relative to Entire IAAAP	Figure No.: 1 10/96



COREL: IAAP05

Project No. 6102-012	Iowa Army Ammunition Plant Middletown, Iowa	Site Topography Map	Figure No.: 2
	CDM FEDERAL PROGRAMS CORPORATION a subsidiary of Camp Dresser & McKee Inc.		10/96

At the Line 1 Impoundment sediment material is observed at a minimum of 2 to 5 feet underlain by sandy, silty clay till, and silty clay loess to 50 feet, with alluvial deposits in the valley bottom. Limestone outcrops have been observed in the creek valley south of the former Line 1 Impoundment. Depth to bedrock in the vicinity of Line 1 is estimated at 100 feet. Observations of water levels from the shallow wells located in the vicinity of the Former Line 1 Impoundment indicate that shallow groundwater in the drift aquifer generally flows toward, and discharges into, Brush Creek. Depth to groundwater ranges from 0 to 5.4 feet in the monitoring wells drilled in the area of Line 1.

2.1.5 RELEASE OR THREATENED RELEASE INTO THE ENVIRONMENT OF A HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT

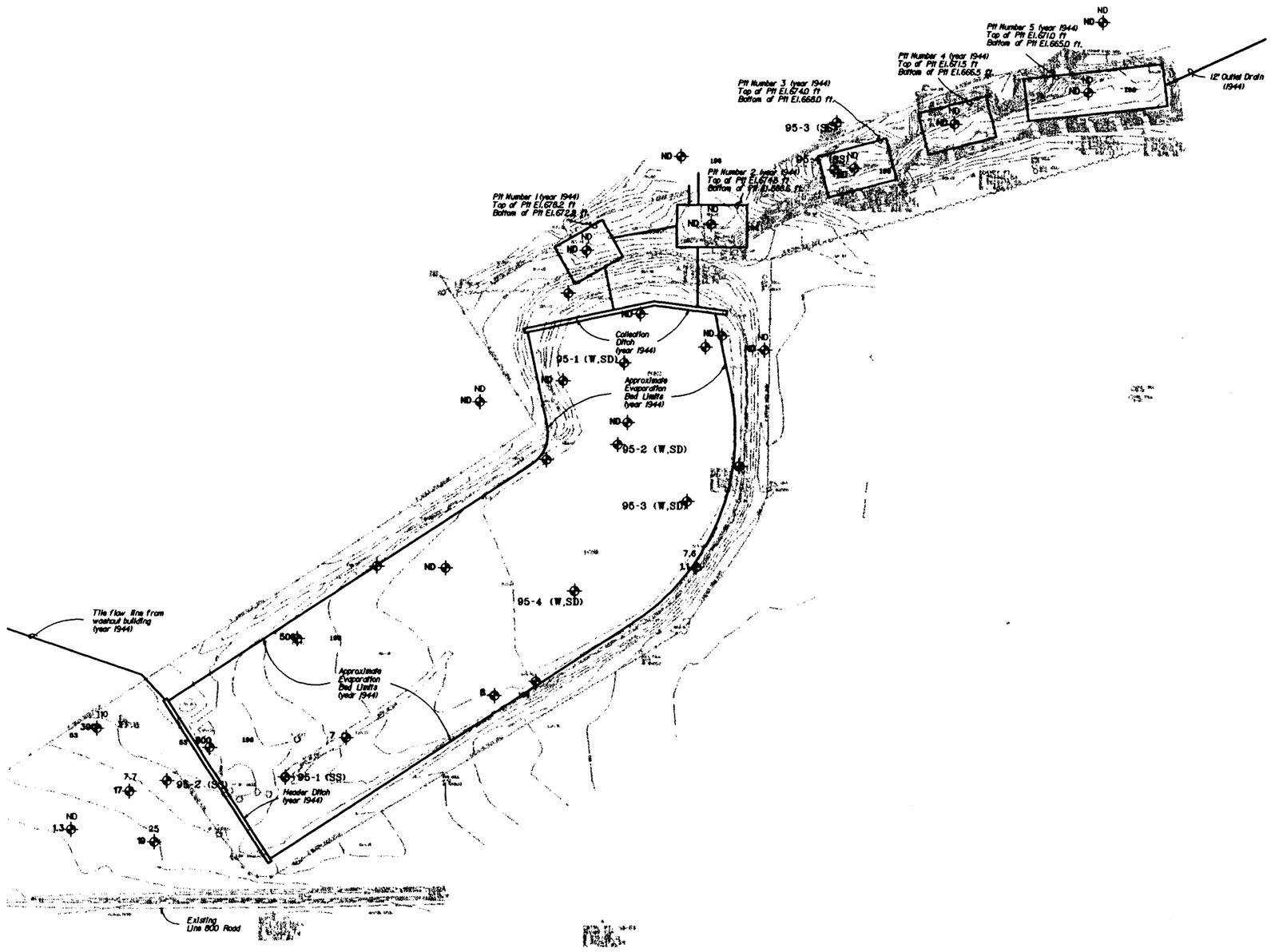
Pinkwater Lagoon

Explosives were detected in soils and sediments at the Line 800 Pinkwater Lagoon at levels of concern to human health and the environment, see Table 2-1. The surface water in the Lagoon was also sampled and the maximum contaminant levels are shown in Table 2-1. Contaminants were predominantly present in the upper two feet of the lagoon sediments, with contamination decreasing with depth (Figure 3).

TABLE 2-1
Maximum Contaminant Levels Found at the Line 800 Pinkwater Lagoon

Contaminant	*Maximum Levels Found in Soil (mg/kg)*	*Soil Excavation Criteria (Summers Model) (mg/kg)*	*Soil PRGs (mg/kg)*	*Maximum Levels Found in Surface Water (µg/L)*	*Water Discharge Criteria (µg/L)*
TNT	33,700**	47	196	0.55 *[1]	2
RDX	2,900 *	1	53	41.84 *	2
HMX	860 *		51,000	6.03 *	400
1,3,5- TNB	134 *		102	u	1.8
DNT mix	8.48 *		8.4	u	-
2-Am-4,6-DNT	-		-	1.78 *	
2-Am-2,6-DNT	-		-	3.34 *	

* Multiple Removal Actions EE/CA - IAAAP Vol II CDM, May 1995.
** Uptake of Explosives from Contaminated Soil by Existing Vegetation at the IAAAP AEC, Feb 95.
[1] Unconfirmed due to matrix interference.
u Undetected



ALLOWABLE		LEGEND
		NOT DETECTED (APPLIES TO ALL FONT SIZES)
196		2,4,6, TNT CONCENTRATION (mg/kg) FOR 0 - 18 INCH DEPTH
196		2,4,6, TNT CONCENTRATION (mg/kg) FOR 5 - 6.5 FOOT DEPTH
53	390	RDX CONCENTRATION (mg/kg) FOR 0 - 18 INCH DEPTH
61,000	1.6	HMX CONCENTRATION (mg/kg) FOR 0 - 18 INCH DEPTH
108		1,3,5 TNB CONCENTRATION (mg/kg) FOR 0 - 18 INCH DEPTH
95-1 (W,SD)		WATER & SEDIMENT SAMPLE LOCATIONS FROM LAGOON (FEB 95) USACE TEAM
95-1 (SS)		SURFACE SOIL SAMPLE (FEB 95) USACE TEAM

NOTES:

1. ALL HALF-TONED WORK APPROXIMATELY REPRESENTS THE EXISTING SITE CONDITIONS.

LINE 800 SURFACE SOIL SAMPLING RESULTS
USACE SAMPLING EFFORT, FEB. 1995

SAMPLE LOCATION	TNT mg/kg	RDX mg/kg	HMX mg/kg
95-1 (SS)	9290	2950	880.1
95-2 (SS)	0.93	0	0
95-3 (SS)	4.66	0.397	0
95-4 (SS)	41.3	0.447	19.1

NOTE: SS=SURFACE SOIL SAMPLE

LINE 800 LAGOON SURFACE WATER SAMPLING RESULTS
USACE FIELD EFFORT, FEB. 1995

SAMPLE LOCATION	TNT ug/l	RDX ug/l	HMX ug/l
95-1 (W)	0.55	37.74	5.43
95-2 (W)	0.39	40.73	6.03
95-3 (W)	0.42	41.84	6.0
95-4 (W)	0.54	40.84	5.85

NOTE: W=WATER

LINE 800 LAGOON SEDIMENT SAMPLING RESULTS
USACE FIELD EFFORT, FEB. 1995

SAMPLE LOCATION	TNT mg/kg	RDX mg/kg	HMX mg/kg
95-1 (SD)	9.18	0.44	7.68
95-2 (SD)	1.94	0	0
95-3 (SD)	1.12	0	0
95-4 (SD)	1.28	0	0

NOTE: SD=SEDIMENT

N

180 0 180 360

SCALE FEET

Source: Corps of Engineers, Omaha District

Previous Sample Locations and Contaminant Concentrations Line 800 Lagoon Area

Iowa Army Ammunition Plant
Middletown, Iowa

Project No.: 6102-012

Figure No.: 3

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10/96

MCS FILE: SHEET16

The southwest portion of the lagoon, a former sludge dumping area, exhibited the highest explosives concentrations. Elevated levels of explosives were also observed at three of the five settling basins (Figure 3). The total volume of contaminated soil at the Line 800 Pinkwater Lagoon exceeding the Preliminary Remediation Goals (PRGs) is estimated at 77,000 CY. A detailed discussion of the volume calculation is presented in Section 1.2.2 and 3.0 of the Engineering Evaluation/Cost Analysis (EE/CA) dated May 15, 1995.

Remediation Goals (RGs) for the Pinkwater Lagoon were established using the Summers Model. The Summers Model is a conservative method for estimating the maximum contaminant levels that may be present in the soil, before leaching into the groundwater at unacceptable levels. The Summers Model RGs (RDX - 1 ppm, TNT - 47 ppm) are more conservative than the soil RGs based on a carcinogenic risk to human health of 10^{-6} assuming an industrial land use scenario. Summers Model RGs will delineate the extent of the excavations at the Pinkwater Lagoon and Line 1 Impoundment. RGs for all contaminants of concern at the Pinkwater Lagoon and Line 1 Impoundment are listed in Table 5-3 (Section 5.1.5). A Summers Model calculation of these soil contaminant concentrations which can impact groundwater is provided in Appendix J of the EE/CA dated May 15, 1995. Following excavation, the contaminated soils and sediments will be segregated into three groups based upon carcinogenic risk to determine the ultimate disposition of the excavated soil.

Currently, there is one to four feet of standing water in the 5-acre impoundment at the Pinkwater Lagoon. Prior to excavation of contaminated soils, the contaminated water will be pumped out and treated using a Granular Activated Carbon (GAC) unit. The treated water will be discharged to a tributary of Brush Creek. Contaminant levels in the treated water will not exceed criteria specified in Table 2-1. The discharge levels have been established based upon risks associated with direct human consumption of the treated water, and are considered protective. These values are Maximum Contaminant Levels (MCLs), Health Advisory Levels (HALs), or risk-based calculated values (10^{-6}) in the absence of MCLs or HALs. The discharge levels established for this removal action are several orders of magnitude more stringent than the levels established in the IAAAP National Pollutant Discharge Elimination System (NPDES) permit for discharge of similar constituents. Further, the issue of surface water discharge has been coordinated with the State of Iowa Department of Natural Resources (IDNR), which administers the NPDES permit. The IAAAP has identified to IDNR potential variances to the substantive requirements of the permit primarily related

to increases in the volumetric flow rate of the water to be discharged during the removal action. The total volume of water in the lagoon is estimated at 4,075,000 gallons. The IAAAP is exempted from the requirements for obtaining a permit to conduct onsite CERCLA response actions as stated in Section 121(e) of CERCLA. The facility is required, however, to meet the substantive requirements of any such permits which would otherwise be required in the absence of such an exemption.

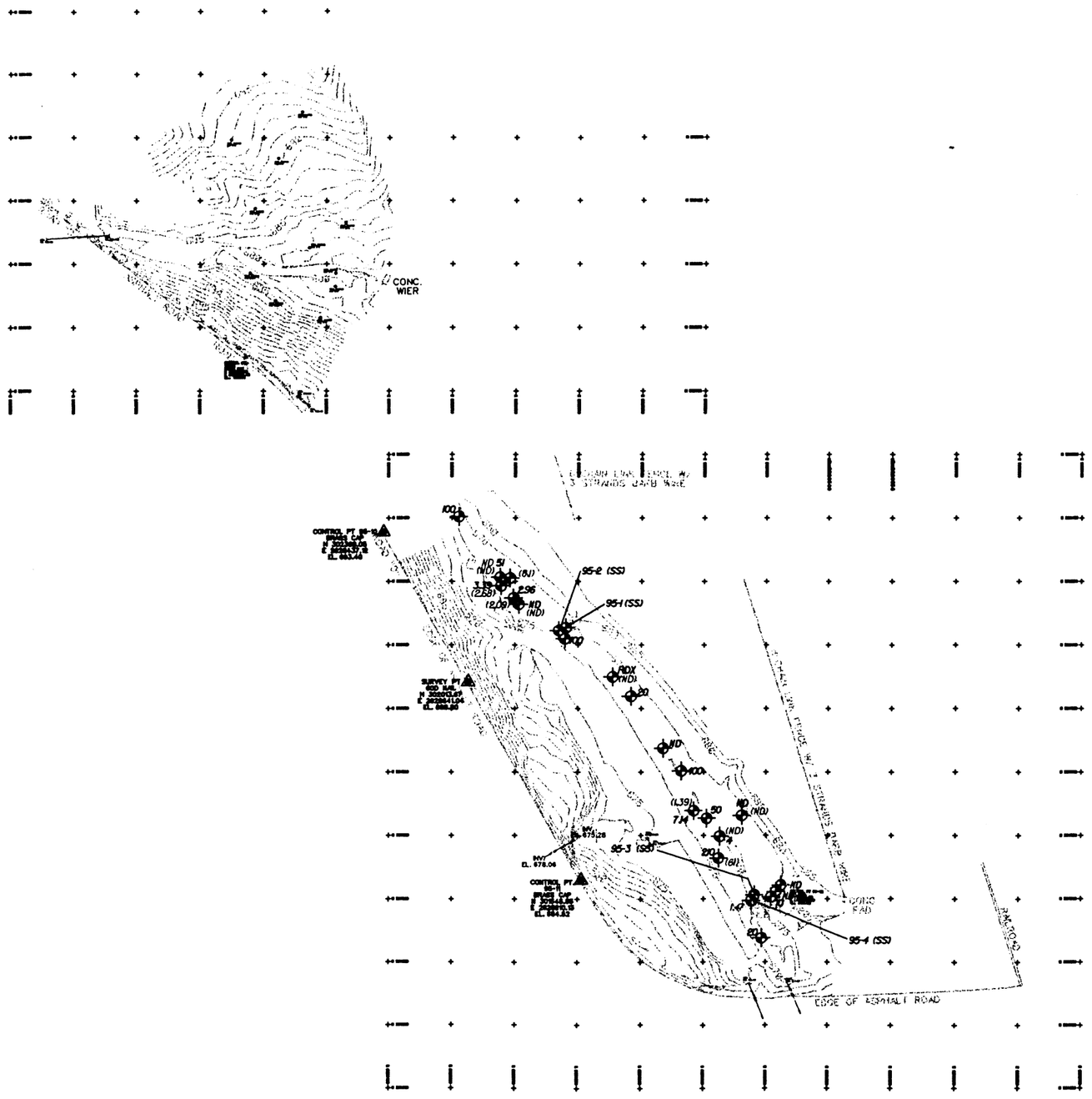
Line 1 Impoundment

Explosives were detected in soils and sediments at the former Line 1 Impoundment at levels of concern to human health and the environment. The maximum contaminant levels detected at the Line 1 Impoundment were RDX - 400 mg/kg and HMX - 61 mg/kg. Concentrations of RDX and HMX decrease laterally along Brush Creek, but exceed the Summers Model RGs 75 feet west of the creek. Explosive soil contamination appears to be confined within the 0 to 4-foot depth interval. Figure 4 shows RDX and HMX concentrations. The total volume of contaminated soil exceeding Summers Model RGs at the Line 1 Impoundment is estimated at 24,222 CY. HMX is not present at concentrations that pose a significant risk. A detailed discussion of the volume calculation is presented in Sections 1.2.1 and 3.0 of the EE/CA dated May 15, 1995.

Exposure Pathways

There is currently industrial/commercial or agricultural land use in the immediate area of the Line 800 Pinkwater Lagoon and the Line 1 Impoundment. Future land use scenarios at these sites have been estimated to include potential industrial development and usage. The possible pathways of exposure to the local onsite or offsite population include:

- Ingestion by onsite workers or site visitors of windblown surface soils that may be contaminated
- Inhalation of windblown surface soil that may be contaminated, by onsite workers or site visitors.
- Ingestion of contaminated groundwater.



ALLOWABLE		LEGEND
	ND	NOT DETECTED (APPLIES TO ALL FONT SIZES)
196	120	2,4,6, TNT CONCENTRATION (mg/kg) FOR 0 - 18 INCH DEPTH
196	(4.2)	2,4,6, TNT CONCENTRATION (mg/kg) FOR 5 - 6.5 FOOT DEPTH
63	390	RDX CONCENTRATION (mg/kg) FOR 0 - 18 INCH DEPTH
51,000	1.8	HMX CONCENTRATION (mg/kg) FOR 0 - 18 INCH DEPTH
102	◇◇◇	1,3,5 TNB CONCENTRATION (mg/kg) FOR 0 - 18 INCH DEPTH
95-1 (SS)		SURFACE SOIL SAMPLE (FEB 95) USACE TEAM

LINE 1 SURFACE SOIL SAMPLING RESULTS
USACE FIELD EFFORT, FEB. 1995

SAMPLE LOCATION	TNT mg/kg	RDX mg/kg	HMX mg/kg
95-1 (SS)	0	0.325	0
95-2 (SS)	0.55	10.02	4.149
95-3 (SS)	0	2.107	0
95-4 (SS)	1.47	0.924	0

NOTE: SS=SURFACE SOIL SAMPLE

N

300 0 300 600

SCALE FEET

Source: Corps of Engineers, Omaha District

Previous Sample Locations and Contaminant Concentrations Line 1 Impoundment Area

Iowa Army Ammunition Plant
Middletown, Iowa

Project No.: 6102-012

Figure No.: 4

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MCS FILE: SHEET13

2.1.6 NPL STATUS

The Iowa Army Ammunition Plant was included on the National Priority List on August 22, 1990. The notice of placement was published in the August 30, 1990, Federal Register.

2.1.7 MAPS, PICTURES, AND OTHER GRAPHICAL REPRESENTATION

Figures from the EE/CA depicting the Line 800 Pinkwater Lagoon, Line 1 Impoundment are included throughout this Action Memorandum. Figures 1 and 2 show the the location of the Pinkwater Lagoon, Line 1 Impoundment within the IAAAP installation boundaries, and the relative location of IAAAP within the State of Iowa. Figures 3 and 4 show the presence of various contaminants at the Pinkwater Lagoon and Line 1 Impoundment. Figure 5 shows the Inert Landfill Area, the location of the Trench 6 Soil Repository, RCRA Stockpile and the Explosive-Contaminated Soil Stockpile. An example of a grid with calculations of cumulative risk is shown on Figure 6. Figures 7 and 8 show the grid layout for the Line 800 Pinkwater Lagoon and Line 1 Impoundment, respectively. A flow chart depicting the logic of segregation is included as Figure 9. Figure 10 shows the location of the Borrow Area at the Line 1.

2.2 OTHER ACTIONS

2.2.1 EXPLOSIVES-CONTAMINATED SUMPS REMOVAL

A total of 57 explosives contaminated sumps and the adjacent soil were removed in June of 1995 from Lines 1 through 9 as part of a non-time-critical removal action. This action was documented in an EE/CA dated October 11, 1994, and an Action Memorandum dated November 3, 1995. Of the 57 sumps, 21 were stainless-steel, with the remaining 36 sumps constructed of reinforced concrete ranging in size from 2 by 2 feet to 14 by 20 feet. A large metal tank half submerged into the ground, (22 feet long and 10 feet in diameter) known as the West Recirculation Tank, was also removed along with the associated contaminated soil. The metal tank was cut into small sections and flashed at the IAAAP facility. The excavated explosives-contaminated soil was placed in a temporary storage stockpile located at the Inert Landfill. The stockpile contains an estimated 950 CY of material with

the sections of concrete sumps stored in the center. The soil is contaminated with RDX, TNT, DNT, and lead. The estimated contaminant concentrations that exist in the pile are TNT (ND to 1,743 mg/kg), RDX (ND to 1,526 mg/kg), DNT (ND to 7.5 mg/kg) and lead (ND to 1,061 mg/kg). The stockpiled soils will be segregated and disposed of according to the methods outlined in Section 5.1, similar to soils associated with Line 1 and Line 800. However, due to the presence of lead at levels which may potentially fail the numerical treatment standard of 0.37 mg/l TCLP lead (i.e., K046), stockpiled soils from the explosives sumps removal action may require an additional treatment step prior to placement in a landbased unit offsite or within Trench 6 onsite. Like other explosives-contaminated soils being managed onsite, stockpiled materials from the explosives sump removal must meet the numerical treatment standards identified in 40 CFR 268.40 prior to final disposal. The disposition of these stockpiled soils will effectively conclude the previously initiated removal action as specified in the Action Memorandum dated November 3, 1995.

2.3 STATE AND LOCAL AUTHORITIES ROLE

Remediation of the Pinkwater Lagoon, Line 1 Impoundment, and Explosive-Contaminated Soil Stockpile is being addressed under CERCLA removal authority and a Federal Facility Agreement (FFA) between the Army and EPA. State and local authorities have deferred to EPA Region 7 to provide regulatory oversight for the subject removal action. The purpose of the FFA is to provide a procedural framework for implementing CERCLA and RCRA corrective action and to facilitate cooperation and communications among the FFA signatories. The State of Iowa has declined to participate in the agreement in a formal manner. The IAAAP has provided and will continue to provide copies of relevant FFA primary and secondary documents to the Iowa Department of Natural Resources for informational purposes.

3.0 THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

3.1 THREATS TO PUBLIC HEALTH OR WELFARE

A current health risk which may be attributable to the Line 1 and Line 800 sites has been observed in the form of offsite groundwater contamination at levels exceeding Health Advisory Levels

(HALs) for RDX. This risk has prompted the Army to provide alternate water supplies to over 150 residents living south of the IAAAP. Due to possible contaminant leaching and groundwater migration from the two sites in question, it is reasonable to consider that each source area may contribute to unacceptable risks.

The future use Reasonable Maximum Exposure (RME) values employed in the Baseline Risk Assessment (BLRA) were developed to estimate risks to current and (potential) future workers at the IAAAP. The workers exposure scenarios developed in the BLRA were:

> Worker 1 is defined as an individual employed at an active line. This worker performs some outside activities, such as loading and unloading railroad cars and transport trucks. This individual moves around the site and may be exposed to contaminants at all site locations. Worker 1 is likely to have more frequent exposure to site contaminants than other workers at the line who work exclusively indoors in an office or factory setting.
>
> Worker 2 is defined as an individual who performs testing of munitions at the firing site. This individual performs activities outdoors and may be exposed to contaminants in all areas of the site.

The total estimated cancer risks for hypothetical future workers range from 3×10^{-6} to 1×10^{-3} for Worker 1 and from 7×10^{-6} to 2×10^{-3} for Worker 2. Excess cancer risks are based on the future-use RME are estimated to exceed 1×10^{-4}, which is defined as an unacceptable carcinogenic risk in the NCP at section 300.430(e)(2).

The potential of windblown dust being generated from the areas surrounding the Pinkwater Lagoon and Line 1 Impoundment is negligible. The soil surrounding these areas, is covered with vegetation providing protection from wind erosion. Dust generated during the removal activities will be minimized by dust abatement procedures outlined in the USACE Contractor's Work Plan.

3.2 THREATS TO THE ENVIRONMENT

The nature of ecological risks associated with contaminated soils, sediments, and surface water at the former Line 1 Impoundment and Line 800 Pinkwater Lagoon have not been well quantified. It is noted that the Line 800 Lagoon provides an attractive habitat for deer, waterfowl, and amphibious

creatures which inhabit the IAAAP. Based on the relatively high levels of explosives found in sediments at this site, it can be estimated that potential negative impacts to ecological receptors may occur. The magnitude and significance of these impacts are unclear.

4.0 RISK ASSESSMENT

Actual or threatened releases of pollutants and contaminants from this site, if not addressed by implementing the response action selected in this Action Memorandum, may potentially present an unacceptable risk to public health or the environment. The BLRA is discussed in Section 3.1

5.0 SELECTED ACTIONS AND ESTIMATED COSTS

5.1 SELECTED ACTION DESCRIPTION

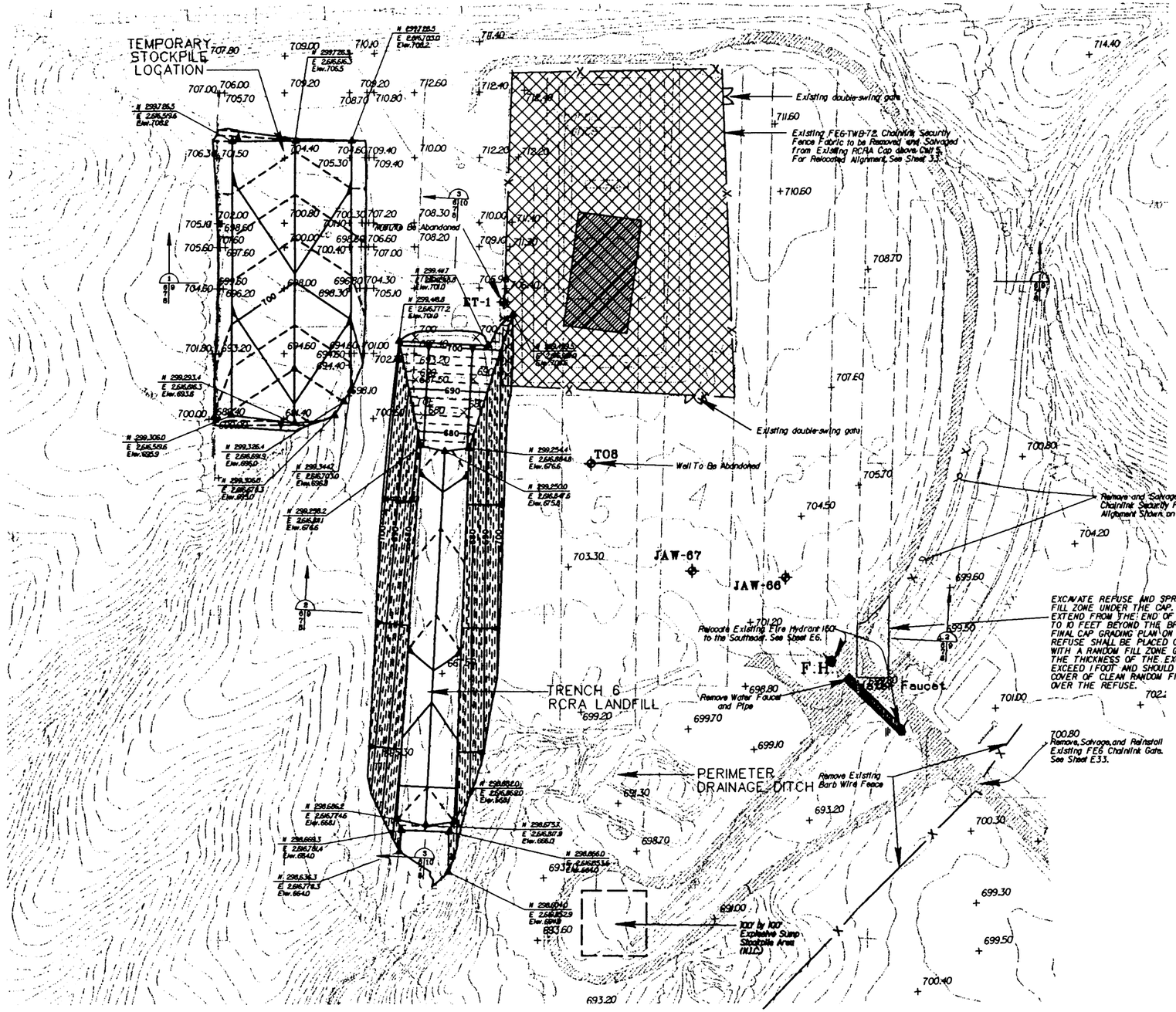
The removal alternative selected for the former Line 1 Impoundment and the Line 800 Pinkwater Lagoon calls for the excavation of an estimated 100,000 CY of explosive-contaminated soils and sediments, with various options for onsite disposal and storage of the material. The criteria for delineating the excavation limits will be based on the Summer's model RGs (RDX 1 ppm, TNT 47 ppm). These RGs provide protection from further groundwater contamination associated with contaminants leaching from soils, and are also protective of direct human contact/exposures to the soil.

The lowest level contaminated soils will be disposed in the IAAAP's 14-acre Inert Landfill. The Inert Landfill is currently closed with a soil cover. The low-level contaminated soils associated with Line 1 and Line 800 will be used as fill material to bring the Inert Landfill to an appropriate grade, upon which it will be capped with a geosynthetic liner. These soils pose a potential risk of additional groundwater contamination, but do not pose a carcinogenic risk to human health exceeding 10^{-6}, based on a future industrial use exposure scenario. Since these soils pose no unacceptable risk to human health and the environment, EPA has determined that these remediation wastes do not contain K047 wastes and are not subject to management according to the Hazardous Waste regulations found in subtitle C of RCRA (see correspondence of June 23, 1995; S. Marquess - EPA to L. Baxter - IAAAP).

The second tier of contaminated soils to be excavated from the two sites at the IAAAP is defined as those at contaminant levels corresponding to a 10^{-5} to 10^{-6} potential human health risk. These soils will be disposed in the Trench 6 Soil Repository. The Trench 6 Soil Repository will be constructed onsite adjacent to the Inert Landfill as part of the non-time-critical removal action. It will include low permeability liners and leachate collection systems which meet RCRA requirements of 40 CFR 264, Subpart N. The new landfill will have a capacity of approximately 80,000 CY, with capability for expansion. Again, based on risk considerations, EPA has determined that the remediation wastes to be disposed in the Trench 6 Soil Repository at the IAAAP do not contain K047 wastes.

The highest level contaminated soils excavated from the impoundment and lagoon sites will be temporarily stored in a RCRA waste pile unit that will be constructed at the Inert Landfill Area, adjacent to the existing Inert Landfill. These facilities are depicted on Figure 5. The temporary stockpile will be constructed pursuant to requirements of 40 CFR Part 264, Subpart N, and will include low permeability liners and leachate collection systems similar to the Trench 6 Soil Repository. The purpose of this temporary stockpile unit is to facilitate site-specific evaluation of innovative treatment technologies, primarily biotreatment, as a potential final remedial action, while enabling significant incremental risk reduction during the period of evaluation. Soils to be managed in the temporary stockpile unit will be those: 1) posing a carcinogenic human health risk exceeding 10^{-5}, 2) found to be characteristic wastes according to TCLP methods (see 40 CFR 261.24), 3) containing listed hazardous wastes, and 4) for which constituents are detected at levels which exceed Land Disposal Restriction (LDR) treatment standards found at 40 CFR Part 268, Subpart D. Soils that are determined to be reactive shall not be managed in the stockpile unit and will require special handling precautions. The Army estimates that approximately 10,000 CY of soil will be managed at the stockpile unit for eventual treatment. It is estimated that the 10,000 CY will contain approximately 80% of the total mass of contaminants from the 100,000 CY of soil to be excavated from the impoundment and the lagoon. The stockpile design capacity is 20,000 CY with expansion capability. The stockpile will effectively contain remediation wastes while treatment alternatives are evaluated.

The EPA Regional Administrator has designated the temporary waste stockpile as an onsite Corrective Action Management Unit (CAMU) pursuant to the RCRA regulations found in 40 CFR 264.552 (see Memorandum of March 8, 1996; Appendix A). The ultimate disposition of stockpiled remediation wastes will be determined in the ROD for the Soils operable unit at the IAAAP. The



LEGEND

- Trench Cells
- Existing Fence
- F.H. / 6-7 — Existing Monitoring Wells
- Existing RCRA Cap
- Existing RCRA Waste Cell

NOTE:
PERIMETER DRAINAGE DITCH PLAN AND DETAILS ARE SHOWN ON SHEETS 11 THROUGH 11C.

EXISTING WELLS TO BE ABANDONED
T02
T03
T07
T08
ET-1
ET-2
ET-3
JAW-66
JAW-67

N

180 0 180 360

SCALE FEET

Source: Corps of Engineers, Omaha District

Initial Grading & Removal Plan Inert Landfill Area

Iowa Army Ammunition Plant
Middletown, Iowa

Project No.: 6102-012

Figure No.: 5

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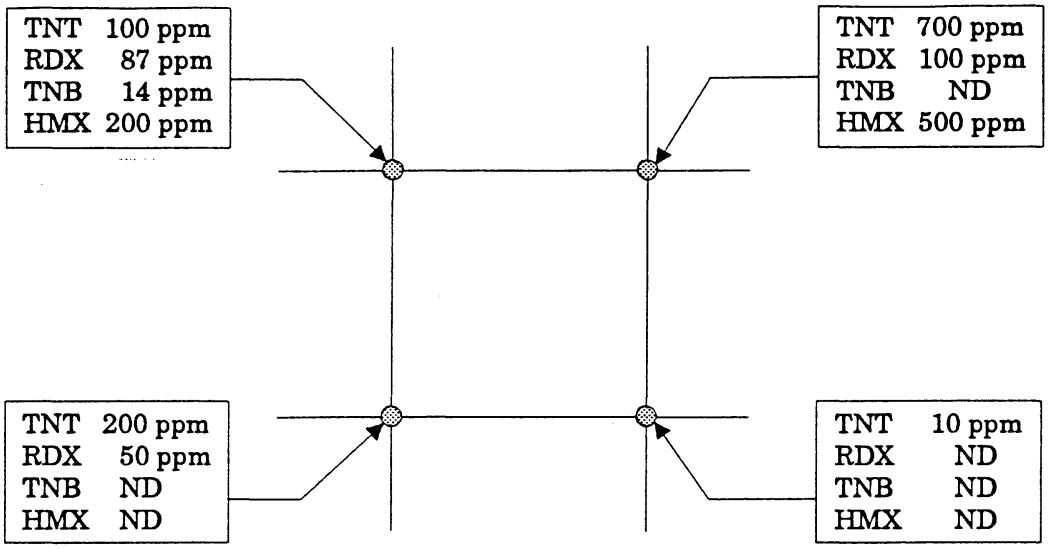
MCS FILE: SHEET7

Draft ROD for the Soils operable unit is to be submitted by the Army to EPA pursuant to the IAAAP FFA. This ROD will specify treatment and management of the stockpiled remediation wastes along with the eventual closure procedures for the CAMU.

A critical element of the removal action is the goal to stockpile and ultimately treat a minimum of 50% of the total contaminant mass associated with the action. This 50% treatment goal can be accomplished most cost-effectively by stockpiling/treating the most highly contaminated soils, thereby achieving maximum contaminant mass reduction in minimum volume. This treatment goal has been established to be consistent with the preference for treatment discussed in Section 121(b) of CERCLA. The integration of the stockpile/treatment and containment strategy provided by the selected removal alternative provides significant cost benefits.

Soils to be excavated at the Pinkwater Lagoon and Line 1 Impoundment will be sampled and analyzed to verify excavation limits and to determine proper disposition of the excavated materials dependent upon the established risk. A variable size grid system will be established in the excavated areas to determine sampling locations. Samples will be obtained from each grid node and subsequently analyzed. Sample results for the various explosive constituents of concern will be averaged from the four data points of the grid. The average concentration of each constituent found in the four grid points will be used in calculating the cumulative risk. An example of a grid with calculations of cumulative risk is shown on Figure 6. Figures 7 and 8 show the grid layout for the Line 800 Pinkwater Lagoon and Line 1 Impoundment, respectively. A flow chart depicting the logic of segregation is included as Figure 9. Table 5-1 shows the volumes and the contaminant mass that are currently anticipated to result from implementation of the decision logic in the flow chart.



Note 1:

A sampling grid will be utilized for each vertical lift of excavated material. A 1 foot lift height (approx.) is currently anticipated.

Note 2:

Soil PRG (10^{-6})

TNT	196 ppm
RDX	53 ppm
TNB	102 ppm
HMX	51,000 ppm

Cumulative Risk Index	Cumulative Risk
1	10^{-6}
1-10	10^{-6} - 10^{-5}
10 or Greater	$> 10^{-5}$

Note 3:

Example Calculation

AVERAGE

TNT $\frac{100 + 700 + 10 + 200}{4} = 253$ ppm

TNB $\frac{14 + 0 + 0 + 0}{4} = 4$ ppm

RDX $\frac{87 + 100 + 0 + 50}{4} = 59$ ppm

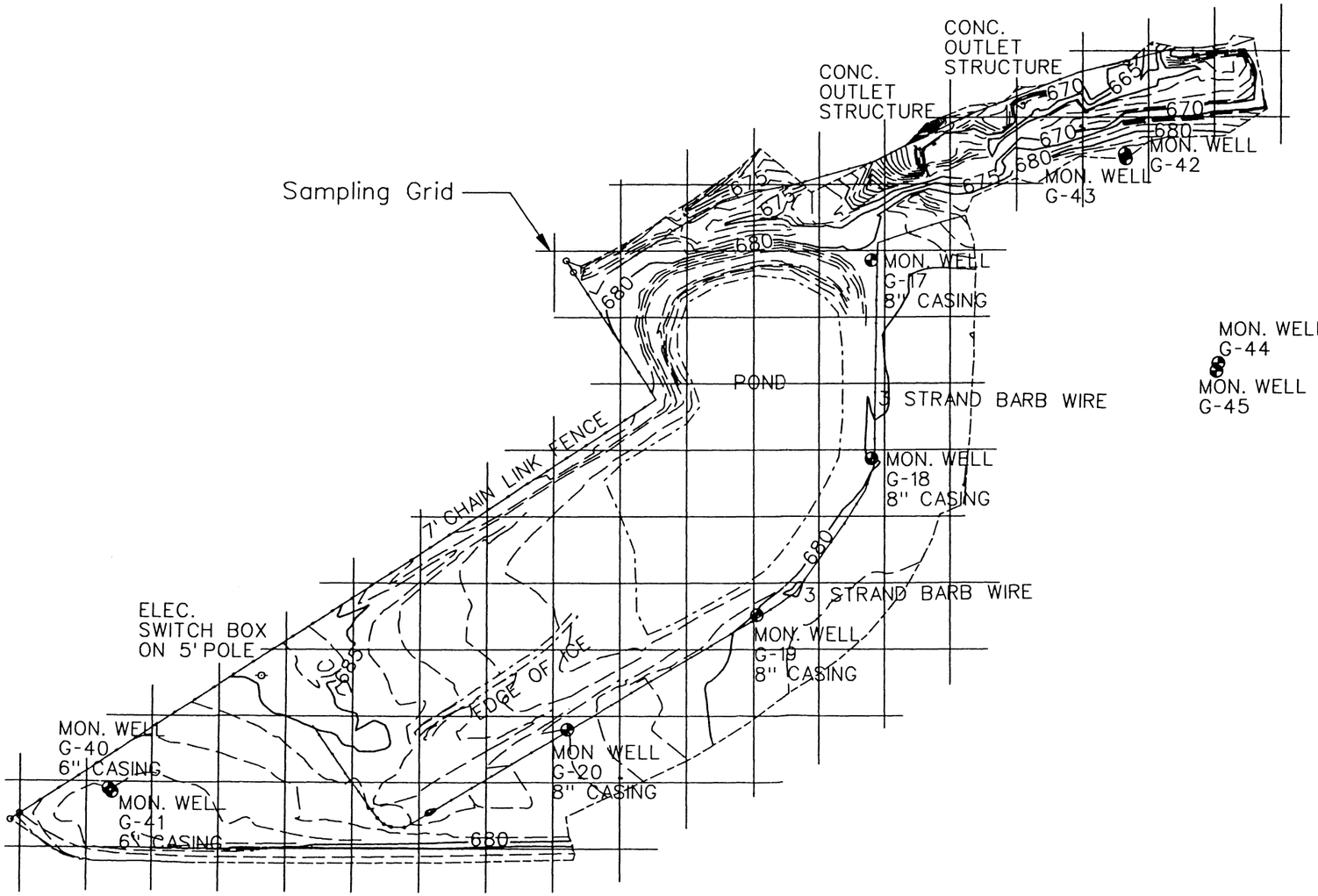
HMX $\frac{200 + 500 + 0 + 0}{4} = 175$ ppm

CUMULATIVE RISK INDEX $\frac{253}{196} + \frac{59}{53} + \frac{4}{102} + \frac{175}{51{,}000} = 2.45$

Cumulative Risk is Between 10^{-6} and 10^{-5}

COREL: GRID1

Project No. 6102-012	Iowa Army Ammunition Plant Middleton, Iowa CDM FEDERAL PROGRAMS CORPORATION a subsidiary of Camp Dresser & McKee Inc.	Example Grid With Segregation Determinations Made	Figure No.: 6 10/96



LEGEND:

ELEC. SWITCH BOX ON 5' POLE

G-44 MONITORING WELL LOCATION

NOTE:

SAMPLING GRID WILL BE CONSTRUCTED FOR EACH 1 FOOT LIFT OF EXCAVATION TO VERIFY CONTAMINANT CONCENTRATIONS.

N

200 0 200 400

SCALE FEET

Example Confirmation Sampling Grid Line 800 (Pinkwater Lagoon)

Iowa Army Ammunition Plant
Middletown, Iowa

Project No.: 6102-012

Figure No.: 7

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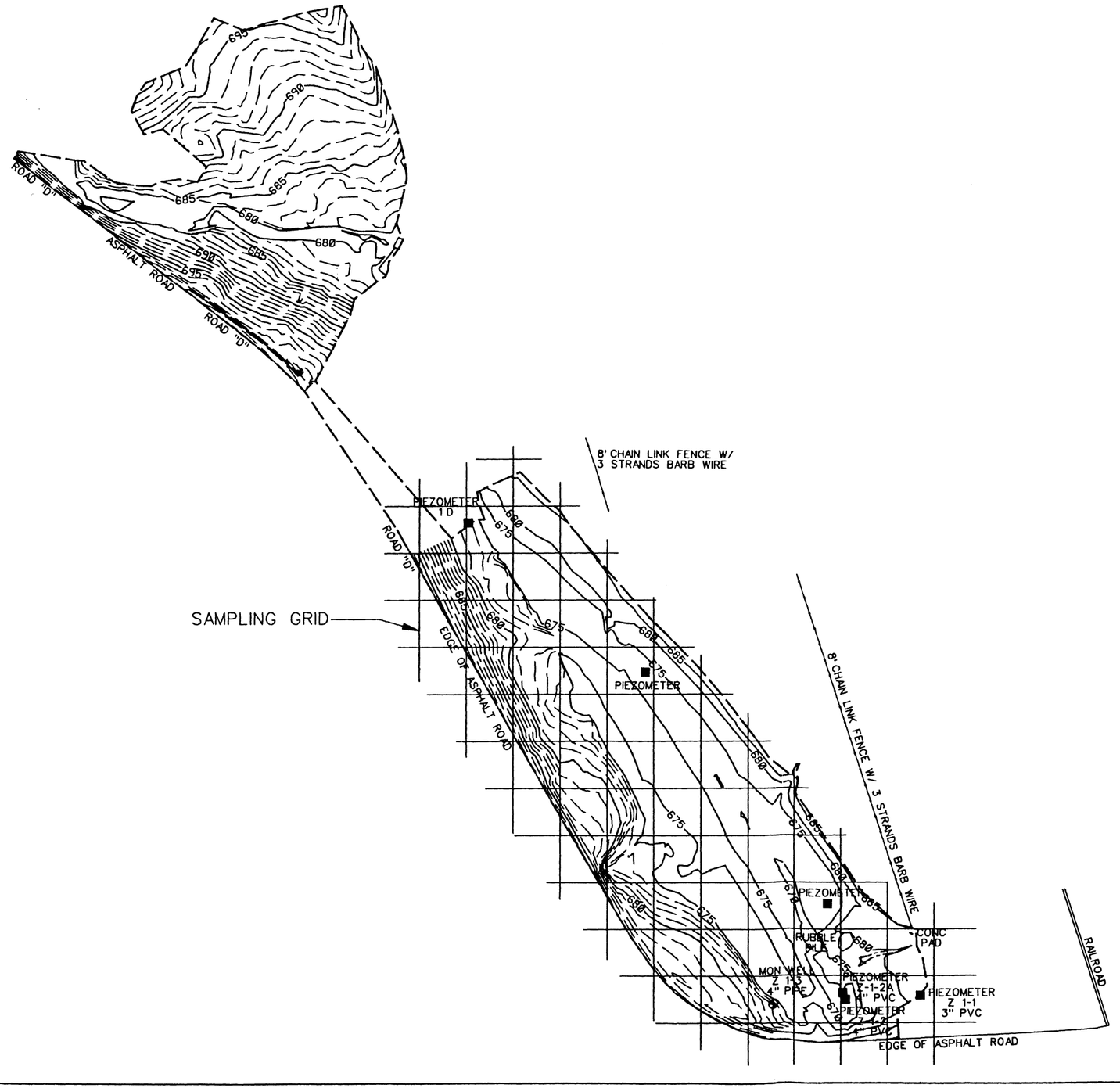
MCS FILE: BURBGRID



LEGEND:

- ■ PIEZOMETER LOCATION
- ⊙ MONITORING WELL LOCATION

Z 1-3 4" PIPE

NOTE:

SAMPLING GRID WILL BE CONSTRUCTED FOR EACH 1 FOOT LIFT OF EXCAVATION TO VERIFY CONTAMINANT CONCENTRATIONS.

N

250 0 250 500

SCALE FEET

Example Confirmation Sampling Grid Former Line 1 Impoundment

Iowa Army Ammunition Plant
Middletown, Iowa

Project No.: 6102-012

Figure No.: 8

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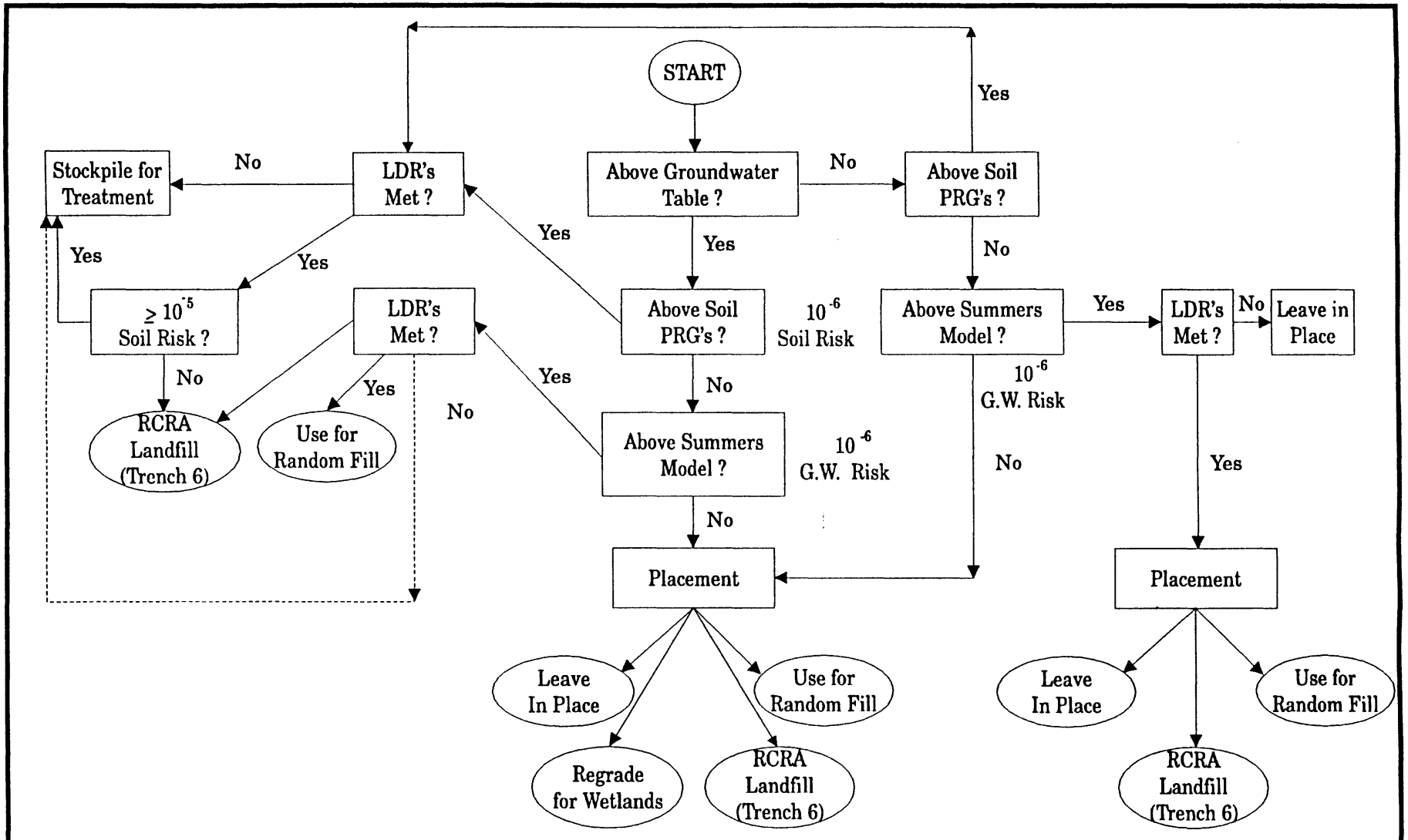
MCS FILE: BURDGRID



COREL: REMOVAL

Project No.: 6102-012

Iowa Army Ammunition Plant
Middleton, Iowa

CDM FEDERAL PROGRAMS CORPORATION
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Line 1 & 800 Removal Action Decision Flow Chart

Figure No.: 9

10/96

TABLE 5-1
Materials Management Matrix

Options	*Stockpile* $\geq 10^{-5}$		*Trench 6* $> 10^{-6} < 10^{-5}$		*Trench 6 or Under IDA Cap* $< 10^{-6}$		*Total Contaminant Mass*
RDX	≥530 mg/kg		53 - 529 mg/kg		<53 mg/kg		
	Line 1	Line 800	Line 1	Line 800	Line 1	Line 800	
	0 kg	25,452 kg	4,404 kg	1,486 kg	480 kg	858 kg	32,681 kg
TNT	≥1,960 mg/kg		196 - 1,959 mg/kg		<196 mg/kg		
	Line 1	Line 800	Line 1	Line 800	Line 1	Line 800	
	0 kg	76,629 kg	0 kg	13,616 kg	0 kg	6,264 kg	96,509 kg
RDX & TNT Contaminant Mass	102,081 kg		19,506 kg		7,603 kg		129,190 kg
Soil Volume to be Removed	10,000 cy^3		23,000 cy^3		68,000 cy^3		101,000 cy^3

*This matrix assumes LDRs will be met. If this assumption is incorrect, see Lines 1 and 800 Removal Action Decision Flow Chart.

Management of excavated material will be of paramount concern. Cradle to grave tracking of contaminated soils excavated at Line 1 and Line 800 will be provided. A manifest system will be established to track specific truckloads of soils excavated at either Line 1 or 800 until disposition at the either the Inert Landfill, Trench 6 Soil Repository, or the CAMU. For each load of excavated material, the grid location, time and date of excavation, disposal location, and waste mass and volume will be identified on the manifest.

Current plans call for use of an onsite laboratory for the analysis of soil samples to identify the excavation limits at Line 1 and Line 800, and in segregating excavated soils for disposition in either the Inert Landfill, the Trench 6 Soil Repository, or the CAMU. The onsite laboratory will employ the standard EPA Method SW-846/8330 for explosive analysis of the soil samples. The onsite laboratory method will be validated by duplicate analysis of 10% of the samples at an offsite laboratory using standard SW-846/8330 protocols.

The excavated areas at the Line 1 Impoundment and the Line 800 Pinkwater Lagoon will be left open after the contaminant sources are removed. The open areas will not be backfilled to facilitate the creation of wetland areas. The soils remaining in place at the excavations will not contain explosives at levels exceeding the Summers Model RGs, and as such, pose no unacceptable risks to human health and pose no threat of additional groundwater contamination. However, explosives-

contaminated groundwater at Line 1 recharges Brush Creek, therefore, the excavated area at Line 1 has the potential to intercept this contaminated groundwater. To minimize potential impacts from contaminated groundwater seepage into the excavated areas, Brush Creek will be diverted to flow parallel on the west side of its current path. A permanent diversion dam to be constructed upstream will provide the necessary hydraulic control. After the excavation is complete, the hydraulic structure will provide control of surface water flow entering the newly engineered wetland system. Vegetation will be planted in the wetland areas that is capable of "phytoremediating" the explosive-contaminated water entering the open excavation. "Phytoremediation" refers to the enzymatic capabilities of certain plant species to remediate contaminants such as explosives. In addition to wetland phytoremediation, upland vegetation, such as poplar trees, will be used to intercept and potentially phytoremediate contaminated groundwater that is adjacent to and seeping into the wetlands. A phytoremediation plan is currently being developed by an interagency team from the EPA, the US Army Corps of Engineers Waterways Experiment Station, and the University of Iowa. The phytoremediation plan will include operational, contingency, and monitoring plans. The phytoremediation efforts in the wetlands at Line 1 and Line 800 will serve as a "pilot study" to evaluate an application of this technology in the field for possible additional applications at the IAAAP and other sites with similar groundwater contamination. A final decision regarding appropriate groundwater remedial actions for the IAAAP will be determined in the Groundwater Operable Unit Record of Decision, as specified in the FFA.

The proposed action also includes the development of borrow sources for clay, random fill, select fill, topsoil, and wetland seed bank. The primary borrow sources are Stump Lake and an area off Brush Creek near Line 1. The impacts of mining borrow material from the areas will be offset by reclaiming the areas as wetlands which will include shallow and deep water habitats for aquatic life. Hydraulic control structures will also be built at these locations.

The excavated soil from the explosives contaminated sumps are currently stored at the Inert Disposal Area. The stockpile contains an estimated 950 CY of material with the sections of concrete sumps stored in the center. The estimated contaminant concentrations that exist in the pile are TNT (ND to 1,743 mg/kg), RDX (ND to 1,526 mg/kg), DNT (ND to 7.5 mg/kg) and Lead (ND to 1,061 mg/kg). The stockpiled soils will be segregated and disposed of according to similar methods as those used for the Line 1 and Line 800 Pinkwater Lagoon.

The proposed removal alternative can be readily implemented onsite since the plant has restricted access. Public endangerment will be limited during implementation of the removal action. The appropriate State and federal regulatory officials will be notified prior to beginning any work.

5.1.1 WETLANDS CREATION

a) Line 1/Line 800 Wetlands

Wetlands will be developed in the excavated areas of both Line 800 and Line 1. The wetlands will be created to evaluate possible phytoremediation of explosive-contaminated groundwater in and around these wetland areas. The wetlands will also be designed to enhance wildlife habitat. The wetlands will not only provide an opportunity to evaluate innovative technologies and enhance wildlife habitats, but will also result in a savings of approximately $200,000 relative to backfilling the excavations. In addition, the primary borrow sources will be developed into wetlands that will include both shallow water emergent/submergent habitat and deep water fisheries habitat.

The wetlands at the Line 1 Impoundment will be developed by impounding water within the excavations limits. Brush Creek will be permanently relocated west of its current path. Embankments will be constructed upstream and downstream of the excavated area. Conduits will be placed through each embankment to regulate the flow of water into and out of the wetland area. The actual design of the Line 1 wetland will occur after the excavation of the contaminated soil is completed. The hydraulic retention time required for the wetland vegetation to phytoremediate the contaminated materials will be controlled by regulating the amount of water allowed to flow through the wetland. Upland plants, specifically poplar trees, will be used to intercept and phytoremediate the contaminated groundwater that could seep into wetland area. Emergent and submergent vegetation will be planted in the impoundment to phytoremediate the pond water. Wetland vegetation native to the IAAAP will be transplanted for this purpose. Researchers at the Waterways Experiment Station (WES) and at the USEPA-Athens are conducting treatability studies to assess the nitroreductanse activity of local plants. WES has completed initial testing of various plants with the capabilities of phytoremediating explosive constituents. The wetland plants that have been selected for additional studies include Hornwort (Ceratophyllum demersum), Arrowhead (Segittaria latiflolia), and Pondweed (Potamogeton nodosus). Initial testing has shown that TNT is removed at a much higher rate than RDX by wetland

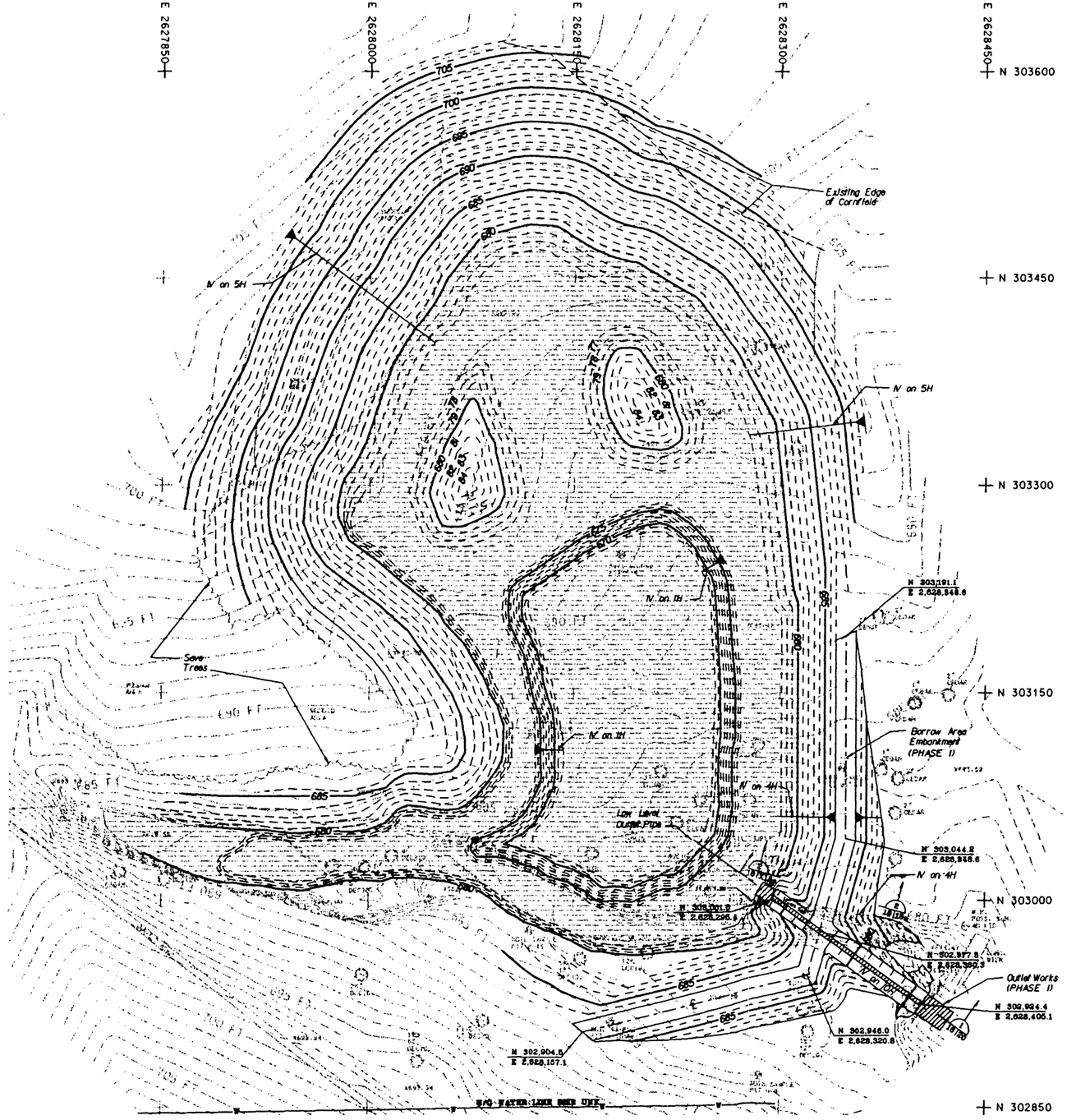
plants. Representatives of the University of Iowa have conducted a botanical inventory of the IAAAP and are working with the Corps of Engineers to ensure that local plant communities are not threatened during the transplanting portion of this project.

Similarly, the wetlands at the Line 800 lagoon will be developed by impounding water within the limits of the excavation area. There is insufficient runoff into the Line 800 lagoon to maintain the water surface elevation necessary to maintain the wetlands. Therefore, deeper openings will be created by excavating below the groundwater levels to assure that the wetlands are maintained during dry periods. As with Line 1, the actual design of the Line 800 wetland will occur after the excavation of the contaminated soil is complete and treatability study results are available. Including the Line 1 and Line 800 areas, approximately 10 acres of previously contaminated grounds will be developed into wetlands and adjacent upland habitat. Both of these wetlands will be designed with islands, wetlands vegetation, and other environmental features.

b) Line 1 Borrow Source Wetland

The Line 1 borrow source is located just north of the Line 1 excavation area (Figure 10). The borrow obtained from this site will be used as random fill under the Inert Landfill cap. This site will also provide topsoil for the Line 1 diversion dam embankments. The borrow has been sampled and analyzed to assure the material is not contaminated.

Following borrow activities, this site will be developed into a multipurpose wetland containing approximately 0.5 acres of deep water fisheries habitat, as well as approximately 2.5 acres of shallow water habitat. The deep water habitat will range from seven to ten feet in depth and will contain structure in the form of staked down tree trunks that will be set aside during clearing and grubbing. The shallow water habitat will consist of an undulating bottom with depth ranging from 0.5 feet to 3 feet. This portion of the wetland will also include two waterfowl nesting islands and will expose the undulating bottom in random locations. An upland seed mix has been established to vegetate the shore areas which will not support wetland vegetation.



NOTE:

1. THE CONTRACTOR SHALL CONSTRUCT THE OUTLET WORKS & EMBANKMENT PRIOR TO EXCAVATION OF THE BORROW AREA.
2. THE CONTRACTOR SHALL STOCKPILE TOPSOIL FROM ENTIRE BORROW AREA.
3. THE LOCATION OF THE WATER LINE IS APPROXIMATE, THE CONTRACTOR SHALL COORDINATE WITH IAAAP PERSONNEL TO IDENTIFY THE EXACT LOCATED OF THE WATER LINE BEFORE EXCAVTION BEGINS.
4. OUTLET WORKS DETAILS ARE SHOWN ON SHEETS 20 THROUGH 23.
5. BORROW EXCAVATION IS PHASE 1 AND 2.

N

90 0 90 180

SCALE FEET

Source: Corps of Engineers, Omaha District

Grading Plan-Borrow Area (Wetland Area) Line 1

Iowa Army Ammunition Plant
Middletown, Iowa

Project No.: 6102-012

Figure No.: 10

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c) **Stump Lake**

Top soil and a wetland seed bank will be mined from Stump Lake, a highly eutrophic lake on the IAAAP. Stump Lake is located just south-southwest of the Inert Landfill and has suffered severe sedimentation over the last fifty years. The original lake surface and depth have been reduced by half due to this sedimentation. The reservoir will be dewatered to facilitate mining of the topsoil material. The sediment from Stump Lake has been sampled for the eight RCRA metals in addition to explosives, with the results indicating no contamination present. The sediments contain high organic levels and are rich in nutrients which are necessary for the seed bank layer of the engineered wetlands. The wetland plants require a nutrient rich soil layer to survive, as does the turf that will be planted on the landfill cover and in all disturbed areas. The impact of mining borrow material from the reservoir will be minimized by reclamation of the mined areas. A hydraulic control structure will be built at Stump Lake to allow the creation of both deep and shallow water habitats. Dewatering of the existing reservoir has been coordinated with the U.S. Fish & Wildlife Service. The Corps of Engineers, U. S. Fish and Wildlife Service, and the Iowa Army Ammunition Plant will develop a multi-purpose plan that will include a grading plan suitable for the development of Stump Lake for game fisheries, waterfowl breeding, and wildlife use.

5.1.2 CONTRIBUTION TO REMEDIAL PERFORMANCE

The subject removal of contaminated soil from the Line 800 Pinkwater Lagoon and Line 1 Impoundment areas will eliminate the pathways that pose a threat to human health and the environment. Since the soils that are contaminated at levels exceeding the Summers Model RGs are to be removed, no further actions to address soil contamination at the Pinkwater Lagoon and Line 1 Impoundment areas are anticipated. Groundwater remediation, due to previous releases from the Pinkwater Lagoon and Line 1 Impoundment, may be required. Containment of low-level contaminated soils combined with stockpiling and eventual treatment of the most highly contaminated soils provides for a cost-effective remediation strategy for the Line 1 and Line 800 sites. The need for further response actions at the Pinkwater Lagoon and Line 1 Impoundment beyond that which is to be accomplished in the subject removal action, will be assessed in the

Feasibility Study Reports (and RODs) for the soil and groundwater operable units at the IAAAP, which will be conducted pursuant to the FFA.

5.1.3 DESCRIPTION OF ALTERNATIVE TECHNOLOGIES

Various technologies were proposed in the EE/CA for the management of explosive-contaminated soil at Line 1 and Line 800. These technologies included incineration, bioremediation, engineered landfill, and segregation. The excessive costs of implementing the incineration alternative ($65,000,000) did not justify its selection. The bioremediation alternative (about $40,000,000 for composting) was not selected at this time, due to the absence of site-specific treatability data, in addition to the higher costs relative to landfilling. Composting will be further evaluated as a potential remedial alternative in the Feasibility Study associated with the explosive-contaminated soils stored in the CAMU. The engineered landfill ($4,600,000) and segregation (Landfill/CAMU) alternative ($4,800,000) was selected due to its reasonable cost and ease of implementation. Contaminated soils will not be treated as part of this removal action, but will be either permanently contained in a soil repository or temporarily stored in a CAMU. Soils stored in the CAMU will be treated in a manner to be specified in the IAAAP Soils Operable Unit ROD, as required in the FFA.

5.1.4 ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)

The EE/CA supporting this Action Memorandum was completed on May 15,1995. The EE/CA provides additional details regarding the subject removal action and the alternatives which have been considered. It is available for public review at the Burlington Public Library, the Danville City Hall, and the Administration Building of the IAAAP. A press release was published on May 17, 1995, in the Burlington Hawkeye advising the public of the availability of the EE/CA document and soliciting public comment. An availability session was held near the site on June 7, 1995. The public comment period ended June 15, 1995. There were no public comments received on the EE/CA for the subject removal action. Comments from EPA regarding the draft EE/CA have been incorporated into this Action Memorandum.

5.1.5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

A list of Federal and State ARARs that are deemed practicable for the subject removal action is provided as follows:

TABLE 5-2
Applicable or Relevant and Appropriate Requirements (ARARs)

FEDERAL	
Standard	***Description***
40 CFR 50	Treatment technology standards for emissions to air: incinerators, surface impoundments, waste piles, and landfills.
40 CFR 122, 125	Requires permits for the discharge of pollutants from any point source into water of the United States.
40 CFR 257	Establishes criteria for use in determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health and thereby constitute prohibited open dumps.
40 CFR 261	Defines those solid wastes which are subject to regulation as hazardous waste under 40 CFR Parts 263-265 and Parts 124, 270, and 271.
40 CFR 264	Establishes minimum national standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose hazardous waste.
40 CFR 268	Establishes a timetable for restriction of land disposal of waste and other hazardous materials.
40 CFR 270.14(b)	Establishes building criteria for TSD facilities located in floodplain.
40 CFR 300.415	Outlines criteria for implementation of Removal Actions.
29 CFR 1910.120	Regulates worker health and safety.
STATE	
Iowa Air Pollution Control Regulation Chapter 567-23 & 24	Governs the release of fugitive dust in quantities creating nuisance during site activities.
Iowa Water Pollution Control Regulations Chapter 567-39, 49	Contain the procedure for retaining effluent limits.
Iowa Solid Waste Disposal Regulations Chapter 567-100, 101, 102, 103, 110	Establishes standards for sanitary disposal projects and by regulating the dumping of solid waste through a system of general rules and specific permits. Deals with excavation of closed landfills in dumps, operation, cover, and monitoring of landfills.
Iowa Responsible Parties Cleanup Regulations	These rules establish the procedures and criteria the IDNR will use to determine the parties responsible and cleanup actions necessary to meet the goals of the State pertaining to the protection of groundwater. These rules pertain to the cleanup of groundwater itself and soils and surface water where groundwater may be impacted.

A primary issue of concern regarding ARARs associated with this removal action was defining whether the contaminated soil/sediment at the Pinkwater lagoon and Line 1 Impoundment contain RCRA hazardous waste and would, therefore, be subject to management according to Subtitle C of RCRA. EPA's "contained-in" policy regarding the management of environmental media, such as soil, which has been contaminated with RCRA hazardous waste addresses this issue. The soil itself is not considered hazardous but is managed as hazardous waste under RCRA Subtitle C regulations if it contains hazardous waste. At some contaminant level, soil that has been contaminated with

hazardous waste is no longer considered to contain hazardous waste. Upon this determination, the soil no longer needs to be managed as RCRA regulated waste. The point at which this occurs or may be determined is dependent on whether the hazardous waste containing the soil is a characteristic hazardous waste or a listed hazardous waste.

Soils which may be considered potentially characteristic hazardous waste are regulated under RCRA Subtitle C only if the contaminated soil exhibits a hazardous waste characteristic, such as "toxicity". For such potentially "toxic " characteristic wastes, this means that the waste contaminated soil is not regulated as RCRA hazardous waste unless TCLP analysis shows that TC contaminant concentrations meet or exceed the defining level set out in 40 CFR 261.24. Contaminated soil ceases to be regulated as RCRA hazardous waste when the concentration is reduced below the defining regulatory level and therefore ceases to exhibit a characteristic.

Soil which is contaminated with listed hazardous waste must be managed as RCRA regulated hazardous waste "as long as the material contains the listed hazardous waste." This determination is outlined in the "Contained-in Interpretation" (OSW Memorandum dated November 13, 1986), cited in Superfund LDR Guide # 5, Directive 9347.3-05FS, July 1989. Under the EPA "contained-in policy",

> the EPA or an authorized state has the discretion to determine contaminant-specific health-based levels, such that if the concentrations of the hazardous waste constituents were below those levels, the media would no longer be considered to contain the waste. The health-based levels used in making contained-in determinations are made on a site-specific basis (Letter from Michael Shapiro, Director, Office of Solid Waste, EPA, to T.L. Nebrich, OSWER 9441.1994(04), March 22, 1994).

This is sometimes called a "contained-out" determination. EPA has usually specified conservative, risk-based "contained-out" levels using standard conservative exposure assumptions or site specific risk assessments (See Memorandum from Sylvia K. Lowrance to Jeff Zelikson, EPA Region IX, January 24, 1989).

The Line 1/Line 800 EE/CA indicates that the soil at the Pinkwater Lagoon and the Line 1 Impoundment was contaminated primarily by the discharge of pink/red water from TNT operations.

As defined at 40 CFR § 261.32, pink/red water from TNT operations is included in the RCRA List of Hazardous Wastes from Specific Sources as K047. K047 waste is a listed hazardous waste. It is listed as RCRA hazardous solely on the basis of the characteristic of reactivity (See 40 CFR § 261.30 and § 261.32). The Army has sampled the soils at the Pinkwater Lagoon and the Line 1 Impoundment and found that, even though the soils are contaminated with TNT, they do not exhibit the characteristic of reactivity.

In cases where the waste is listed only for reactivity, and the contaminated soil is not reactive and does not exhibit any other characteristics, the contaminated soil may contain hazardous "constituents" and thereby contain the listed waste. Consistent with the contained-in policy previously outlined, an authorized state or EPA may establish health-based levels for any hazardous constituents present in the contaminated soil below which the contaminated soil would no longer contain the listed waste. No hazardous constituents are identified in Appendix VII to Part 261 as a basis for listing K047 as a hazardous waste.

There are no hazardous constituents for K047 identified in the LDR treatment standards provisions at 40 CFR § 268.40 ff. The only treatment standard identified for K047 waste is technology based--deactivation (40 CFR § 268.42). According to the tests conducted to date on soil samples from the Line 1 Impoundment and the Pinkwater Lagoon, the soils are already "deactivated" because they do not exhibit the characteristic of reactivity.

EPA's "contained-out" determination concludes that contaminated soil which is not reactive, does not exhibit any other characteristic, and whose concentrations of hazardous constituents do not exceed health based levels, does not contain RCRA hazardous waste. The RCRA regulations including the LDRs do not apply to soil which does not contain hazardous waste. EPA believes that LDRs are relevant, but do not consider them appropriate for the response action under consideration. EPA's rationale is again largely supported by the preceding discussion of the "contained-in" policy. The soil for which the "contained-out" determination was made is not solid waste, is not characteristic waste, and does not contain any RCRA hazardous constituents above health based levels. Further, the EPA has stated a presumption that the treatment for as-generated wastes are generally inappropriate or unachievable for soils contaminated with hazardous wastes,

within the meaning of 40 CFR 268.44(a). In addition, as set out in the preamble to the NCP, there is an established presumption that the existing Best Demonstrated Technology (BDAT) treatment standards are inappropriate for hazardous soils and debris.

As defined in correspondence of June 23, 1995, from S. Marquess - EPA to L. Baxter - IAAAP, EPA concurs with this approach for segregation and management of contaminated media from Lines 1 and 800. EPA's determination is that soils which are below the 10^{-5} cumulative risk level, do not exhibit any RCRA characteristics (reactivity or toxicity), and do not exceed LDR levels, do not pose a substantial threat to human health and the environment and should not be considered to contain RCRA hazardous waste. As such, these soils would not require management as RCRA hazardous waste, but will be managed in an alternative, protective manner.

The EE/CA anticipates the possibility that some excavated soil might exhibit a characteristic such as reactivity or contain 2,4-DNT (D030) or nitrobenzene (D036) at concentrations making them Toxicity Characteristic hazardous wastes subject to RCRA regulation. Soil containing such hazardous wastes will be sent to the stockpile for storage. The temporary stockpile has been designated by EPA as a CAMU and will, therefore, not be subject to RCRA Land Disposal Restrictions.

5.1.6 REMEDIATION GOALS

PRGs were calculated for an estimated excess cancer risk of greater than 1×10^{-6} and/or the hazard index (HI) greater than one. PRGs were calculated by rearranging the equations used for the risk calculations at the site:

$$\text{Cancer Risk} = C \times HIF \times SF$$

and

$$HQ = C \times HIF/RfD$$

where:

C = concentration of a chemical in a medium
HIF = human intake factor
SF = slope factor
RfD = reference dose
HQ = hazard quotient

To calculate the concentration of each chemical in each medium associated with a particular risk level or HQ, the following equations were used:

C = Target Cancer Risk/(HIF x SF)

and

C = Target Hazard Quotient x RfD/HIF

In addition to risk based values for protection of human health, impact to groundwater must be considered. The Summers Model is a conservative method of estimating what level of contamination left in the soils would leach in sufficient quantities to impact groundwater. Table 5-3 contains the PRGs established for the IAAAP concentrations resulting from the Summers Model.

TABLE 5-3
Action Levels
Iowa Army Ammunition Plant
Middletown, Iowa

Contaminants	*Soil Excavation Criteria (Summers Model) (mg/kg)*	*Soil PRGs* (mg/kg)*	*Water Discharge Criteria (µg/L)*
HMX		51,000	400**
RDX	1.34	53	2**
2,4,6-TNT	47.57	196	2**
1,3,5-TNB		102	1.8*
1,3 DNB		204	1**
NB		1022	3.4*
DNT mix		8.4	
NT		20440	
TETRYL		20440	

* From Risk-Based Concentration Table, Industrial Soil Criteria USEPA Region III, January 7, 1994.
** USEPA Health Advisory Limits

5.1.7 PROJECT SCHEDULE

The removal activities will start on or around March 1996. Following is an approximate schedule of activities.

- Mobilization . . . . . March 1996
- Construction of Trench 6 Soil Repository and CAMU . August 1996
- Line 1 and 800 Soil Excavation . . . . . October 1996
- Capping Inert Landfill . . . . . September 1997
- Post-Action Report Submittal . . . . . November 1997

5.2 ESTIMATED COSTS

The total cost for the selected alternative was estimated to be $ 4,832,500. A cost breakdown for the subject removal action is included in Appendix B. This cost estimate summary includes a breakdown of direct and indirect capital costs. Actual costs of the removal action will not be known until the project has been completed.

6.0 EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Due to the observed offsite groundwater contamination beyond the immediate areas of the Pinkwater Lagoon and Line 1 Impoundment, the potential impacts to human health and the environment due to delay of action is considered major. Since groundwater at the IAAAP is contaminated at significant levels with constituents similar to those found at the Pinkwater Lagoon and Line 1 Impoundment, threats posed by potential future consumption of contaminated groundwater and incidental ingestion of soils by current site workers exists for the site.

7.0 OUTSTANDING POLICY ISSUES

There are no outstanding policy issues related to this action.

8.0 RECOMMENDATIONS

The selected removal alternative for the treatment of explosive contaminated soil is excavation, segregation, storage in an RCRA waste pile, and permanent placement in a soil repository. The selected alternative reflects an increasing sensitivity to cost considerations by all FFA parties. Due to the tremendous volume of soil which is expected to be associated with this action (> 100,00 CY),

costs associated with even the least expensive treatment option may have been prohibitive. Containment alternatives with selective treatment provides a cost effective remedy as an integrated response action. The presence of an existing landfill onsite (Inert Landfill) with an open, unfilled trench (Trench 6) makes onsite containment extremely viable. The selected alternative provides for an immediate risk reduction, provides a permanent remedy for a significant fraction of the soils to be managed, and provides a cost effective approach to address the CERCLA preference for treatment. The concept of treating the most highly contaminated soils to achieve the greatest reduction in total contaminant mass is extremely desirable. The Army's estimates suggest that treatment of 10% of the contaminated soil volume may yield an 80% reduction in the contaminant mass, thus providing a high return on capital funds associated with treatment. Treatment actions are not specified as part of this removal action, but will be addressed in subsequent ROD(s) for the IAAAP.

The selected alternative provides an opportunity to evaluate innovative treatment technologies for both the soil and water mediums. Bioremediation of explosives-contaminated soils at the IAAAP may prove to offer a permanent, effective, and less costly means of soils treatment than is presently available. Phytoremediation of explosives-contaminated groundwater may prove to be an effective alternative to pump and treat technologies.

Any current or future unacceptable risks attributable to the site following the implementation of this non-time-critical removal action will be addressed in the soil and groundwater operable unit Feasibility Study (FS) Reports, RODs, and subsequent response actions, if necessary.

This alternative will control any further migration of contaminants while treatment options are considered for soils that present a potential risk to human health and the environment. The creation of wetlands in lieu of backfilling the excavated areas is a beneficial component of the selected alternative. The wetlands are to be designed to support plants that are active in the phytotreatment of explosives.

This removal action is effective in eliminating potential releases of hazardous substances to the environment, is readily implementable, is cost effective, and satisfies the criteria of Section 300.415 of the NCP regarding removal actions.

REFERENCES

Dames & Moore. 1989. Endangerment Assessment/Feasibility Study, Line 1 Impoundment and Line 800 Pinkwater Lagoon. Iowa Army Ammunition Plant.

JAYCOR. 1993. Draft Remedial Investigation Report for the Iowa Army Ammunition Plant, Middletown, Iowa. Contract No. DAAAA 15-90-D-0006. Vienna, Virginia.

SCS. 1982. Underground Pollution Investigation at Iowa Army Ammunition Plant, Burlington, Iowa. SCS Engineers, Long Beach, California.

ATTACHMENT A

CAMU

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

MAR 8 1996

MEMORANDUM

SUBJECT: Designation of Corrective Action Management Unit - Iowa Army Ammunition Plant Site, Middletown, Iowa

Category of Removal: Non-time critical
CERCLIS ID #: IA7213820234

FROM: Michael J. Sanderson, Director
Superfund Division

TO: Dennis Grams, P.E.
Regional Administrator

I. Purpose

The purpose of this Memorandum is to designate a Corrective Action Management Unit (CAMU) at the Iowa Army Ammunition Plant (IAAP) Superfund site in Middletown, Iowa, located in Des Moines County in southeastern Iowa. This designation is made pursuant to the RCRA regulations found at 40 CFR 264.552.

II. Site Conditions and Background

The IAAP is a 20,000 acre Load, Assembly, and Pack (LAP) munitions facility located in southeastern Iowa, 10 miles west of Burlington (see Attachment 1). The IAAP is owned by the U.S. Government and operated by a contractor, currently Mason & Hanger-Silas Mason Co. Inc., for the Department of Army. Since 1941, the IAAP has produced projectiles, warheads, demolition charges, anti-tank weapons, primers, and fuses. The primary source of contamination at the site is attributable to past operating practices where explosives-contaminated wastewaters and sludges were discharged to uncontrolled lagoons and impoundments on-site. Pink/red wastewaters from TNT operations are considered K047 listed RCRA wastes pursuant to 40 CFR 261.32.

The site was listed on the NPL in 1990, with a Federal Facilities Agreement (FFA) negotiated between EPA and the Army effective December 10, 1990. The state of Iowa is not a party to

the FFA. The Remedial Investigation/Feasibility Study (RI/FS) was initiated in 1992. The Draft Final RI was completed in April 1994. A Revised RI report has been prepared by the Army and is currently under review and revision by the FFA parties.

The primary contaminants at the site are explosives (RDX, TNT), metals, and VOCs, which are found in soils, groundwater and surface water at the site. The facility operates pursuant to RCRA and NPDES permits. The NPDES permit allows for discharge of explosives constituents to surface water on-site. The Army has previously implemented a time critical removal action to provide alternate water supplies to approximately 150 residents immediately south of the installation whose private groundwater supply wells were potentially impacted by explosives contamination originating on the IAAP.

The Army has prepared an Engineering Evaluation/Cost Analysis (EE/CA) dated May 15, 1995, in support of a proposal to execute a non-time critical removal action at two of the most highly contaminated source areas at the IAAP - the former Line 1 Impoundment and the Line 800 Pinkwater Lagoon. The EE/CA was made available for public comment from May 15, 1995 to June 15, 1995, with a public availability session held near the site on June 6, 1995. No substantive public comments were received by the Army during the public comment period.

The former Line 1 Impoundment was an impoundment on Brush Creek which received explosives wastewater discharge from the Line 1 LAP facilities from 1948 to 1957. Explosives soil and sediment contamination extends for approximately 8 acres at the site. The impoundment dam was breached in 1957, allowing impounded wastewaters and sediment to flow into Brush Creek. Approximately 20,000 cubic yards (CY) of soils above the site remediation goals are present at the former impoundment.

The Line 800 Pinkwater Lagoon received explosives wastewater and sludges from various locations at the IAAP from 1943 to the 1970's. It currently holds approximately 6 acres of standing water and contaminated sediments. Approximately 80,000 CY of soils and sediments above site remediation goals are present at the Pinkwater Lagoon.

The Army's proposed removal action calls for excavation of the estimated 100,000 CY of explosive-contaminated soils and sediments from the Impoundment and the Pinkwater Lagoon with various options for on-site disposal of the material. The lowest level contaminated soils will be disposed in the IAAP's existing landfill, the 14 acre Inert Landfill, which will be capped with a geosynthetic liner. These soils pose a potential risk of additional groundwater contamination, but do not pose a carcinogenic risk to human health exceeding 10^{-6}, based on a

future industrial use exposure scenario. Since these soils pose no unacceptable risk to human health and the environment, EPA has determined that these remediation wastes do not contain K047 wastes and are not subject to management according to the Hazardous Waste regulations found in subtitle C of RCRA (see correspondence of June 23, 1995; S. Marquess, EPA to L. Baxter, IAAP).

The second tier of contaminated soils to be excavated from the two sites at the IAAP is defined as those at contaminant levels corresponding to a 10^{-5} to 10^{-6} potential human health risk. These soils will be disposed in the Trench 6 Soil Repository. The Trench 6 Soil Repository will be constructed on-site adjacent to the Inert Landfill as part of the non-time critical removal action. It will include liners and leachate collection systems which meet RCRA requirements of 40 CFR 264, Subpart N. The new landfill will have a capacity of approximately 80,000 CY, with capability for expansion. Again, based on risk considerations, EPA has determined that the remediation wastes to be disposed in the Trench 6 Soil Repository at the IAAP do not contain K047 wastes.

The highest level contaminated soils excavated from the impoundment and lagoon sites will be temporarily stored in a RCRA waste pile unit which will be constructed at the Inert Landfill Area, adjacent to the existing Inert Landfill. These facilities are depicted on Attachments 2 and 3. The temporary stockpile will be constructed pursuant to requirements of 40 CFR Part 264, Subpart L. The purpose of this temporary stockpile unit is to facilitate site-specific evaluation of innovative treatment technologies, primarily biotreatment, as a potential final remedial action, while enabling significant incremental risk reduction during the period of evaluation. Soils to be managed in the temporary stockpile unit will be those: 1) posing a carcinogenic human health risk exceeding 10^{-5}, 2) found to be characteristic wastes according to TCLP methods (see 40 CFR 261.24), 3) containing listed hazardous wastes, and 4) for which constituents are detected at levels which exceed Land Disposal Restriction (LDR) treatment standards found at 40 CFR Part 268, Subpart D. Soils which are determined to be reactive shall not be managed in the stockpile unit and will require special handling precautions. The Army estimates that approximately 10,000 CY of soil will be managed at the stockpile unit for eventual treatment. It is estimated that the 10,000 CY will contain approximately 80% of the total mass of contaminants from the 100,000 CY of soil to be excavated from the impoundment and the lagoon. The stockpile design capacity is 20,000 CY with expansion capability. The stockpile will effectively contain remediation wastes while treatment alternatives are evaluated. The ultimate disposition of stockpiled remediation wastes will be determined in the Record of Decision (ROD) for the Soils operable unit at the IAAP. The Draft ROD for the Soils operable unit is

to be submitted by the Army to EPA pursuant to the IAAP FFA. This ROD will specify treatment and management of the stockpiled remediation wastes along with the eventual closure procedures for the stockpile unit.

The stockpile/CAMU may receive remediation wastes associated with other CERCLA response actions or RCRA Corrective Actions at the IAAP facility. The nature of other remediation wastes which may be temporarily stored in the stockpile will be determined in subsequent RODs for appropriate operable units. These remediation wastes may include environmental media contaminated with volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, and/or explosives. Incompatible remediation wastes - those which may exhibit cross-reactivity - shall not be co-mingled. Additionally, media contaminated with constituents that may require different treatment methods shall be kept separate and identifiable while stored in the CAMU.

Since the stockpile unit may receive media containing listed wastes, or media which may be determined to be characteristic RCRA waste, it is appropriate that the Regional Administrator designate the RCRA waste pile unit at the Inert Landfill area at the IAAP as a CAMU for temporary management of remediation wastes at the site.

III. Requirements

The temporary RCRA remediation waste pile at the IAAP Inert Landfill area is appropriately designated a CAMU, in accordance with 40 CFR 264.552(c), for the following reasons:

> The temporary RCRA waste pile unit is included as a component of the proposed removal action involving the former Line 1 Impoundment, the Line 800 Pinkwater Lagoon, and the Inert Landfill. The RCRA waste pile unit may be designated to temporarily store remediation wastes associated with subsequent operable unit RODs at the IAAP. Soils which may contain hazardous waste will be placed in the remediation waste pile unit. Placement of remediation waste, including hazardous contaminated media, into a remediation waste pile designated as a CAMU shall not constitute land disposal for the purposes of section 3004(k) of RCRA. Since the unit will serve only as a temporary unit prior to the ultimate treatment of the remediation wastes, and since the remediation wastes will be managed in a protective manner in the interim prior to treatment, it is not appropriate to apply LDRs in management of these wastes. The operational duration of the remediation waste pile shall be consistent with the final remedial action for the soils

to be managed therein, as will be specified in the Soils operable unit ROD for the IAAP. The Draft Soils operable unit ROD shall be submitted by the Army to EPA according to the IAAP FFA.

The designation of a CAMU at the IAAP Inert Landfill Area: 1) Will facilitate a reliable, effective, protective, cost-effective remedy at the IAAP in conjunction with the proposed removal action and the ultimate remedial action; 2) Will not create unacceptable risks to human health and the environment; 3) Will include uncontaminated areas of the facility only when including such areas provides for more protective management of remediation waste than management of such wastes at contaminated areas of the facility; 4) Will minimize potential for future releases of hazardous substances from the site; 5) Will expedite the timing of a remedial action; 6) Will enable the use of innovative treatment technologies to enhance the long-term effectiveness of the remedial action; 7) Will minimize the land area of the facility upon which contamination will remain in place after CAMU closure.

If a CAMU were not used at the site, any excavated soil that contained RCRA waste or exhibited the toxicity characteristic would have to be treated prior to placement. Due to the potentially large volumes of contaminated soil involved, such treatment would be potentially cost-prohibitive at this point in time. By designating the CAMU, site risks are significantly minimized while innovative technologies are evaluated to ultimately provide for effective treatment of the soils at costs significantly reduced relative to presently practicable methods.

The CAMU will be located adjacent to the Inert Landfill at the IAAP, in an area in which the underlying groundwater is contaminated. The surface soils in this area are believed to be uncontaminated. Immediately east of the CAMU is the Inert Landfill, which contains municipal and some quantity of industrial wastes from past IAAP operations, and the Trench 6 Soil Repository, which will be used to contain lower-level remediation wastes. The area of the CAMU is therefore rather isolated and has no other productive foreseeable future land use. The CAMU will serve as a temporary management unit prior to waste treatment, and will not result in permanent contamination of previously uncontaminated areas of the IAAP. The CAMU contributes to the overall remediation strategy for the IAAP by providing for protective waste management while cost-effective treatment technologies are developed.

The Inert Landfill area at the IAAP satisfies the requirements of 40 CFR 264.552(e), described as follows:

> The areal configuration of the CAMU constitutes a portion of the IAAP property which is located adjacent to the Inert Landfill in the west-central portion of the IAAP. The CAMU location is depicted in Attachment 3. The general design, operation, and closure of the CAMU shall be consistent with requirements of 40 CFR Part 264, Subpart L - Waste Piles, and have been described by the Army in the EE/CA of May 15, 1995. Additional details of the CAMU closure shall be specified in the IAAP Soils operable unit ROD. The Draft ROD shall be submitted to EPA by the Army pursuant to terms and conditions of the IAAP FFA. Groundwater monitoring for the CAMU shall be sufficient to detect any unforeseen releases of hazardous substances from the CAMU to the uppermost aquifer. The monitoring program shall, in general, be consistent with the substantive standards of 40 CFR 264, Subpart F - Releases from Solid Waste Management Units. Groundwater monitoring shall be conducted by the Army on a quarterly basis during the operational lifetime of the CAMU, with results reported to EPA within 45 days of receipt by the Army. Additional details of the groundwater monitoring plan are to be described in the Action Memorandum for the former Line 1 Impoundment and Line 800 Pinkwater Lagoon removal action.

IV. Summary of Public Comment

The EPA published notice seeking public comment on the proposed CAMU Designation in three local newspapers - "The Daily Democrat" (Fort Madison, IA) - December 13, 1995, "The Burlington Hawkeye" (Burlington, IA) - December 13, 1995, and "The Shopper Spree" (Burlington, IA) - December 13, 1995. The CAMU proposal was released to the IAAP Administrative Record file found at three information repositories located near the site prior to the public notice. A public comment period was designated from December 13, 1995, to January 19, 1996. The EPA received no comments regarding the CAMU proposal during the comment period. The CAMU is designated as was proposed during the public comment period with no modifications.

V. CAMU Designation

The information presented in this Memorandum supports the designation of property adjacent to the IAAP Inert Landfill as a Corrective Action Management Unit for the Iowa Army Ammunition Plant Superfund Site. This designation is made in accordance with 40 CFR Part 264, Subpart S - Corrective Action for Solid Waste Management Units. This CAMU will serve as a temporary

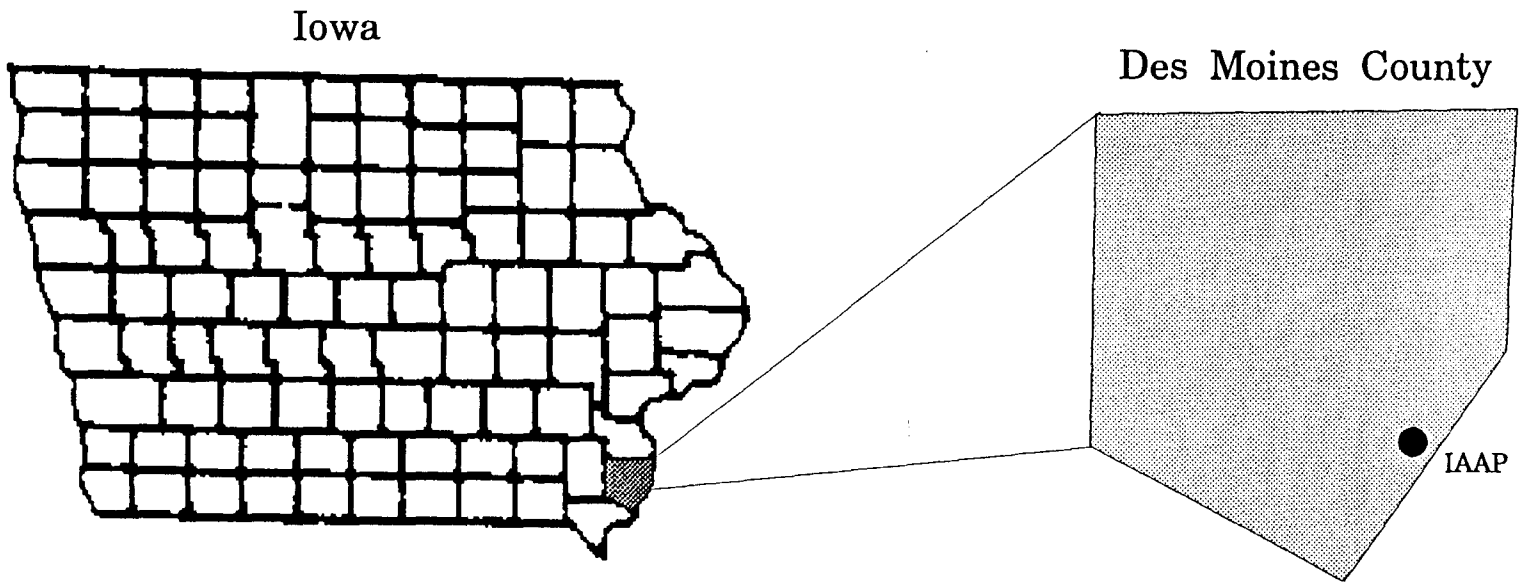
waste management unit for contaminated soils generated as a result of the non-time critical removal action for the former Line 1 Impoundment and the Line 800 Pinkwater Lagoon at the site, and as specified in subsequent operable unit RODs.

Attachments

APPROVED:

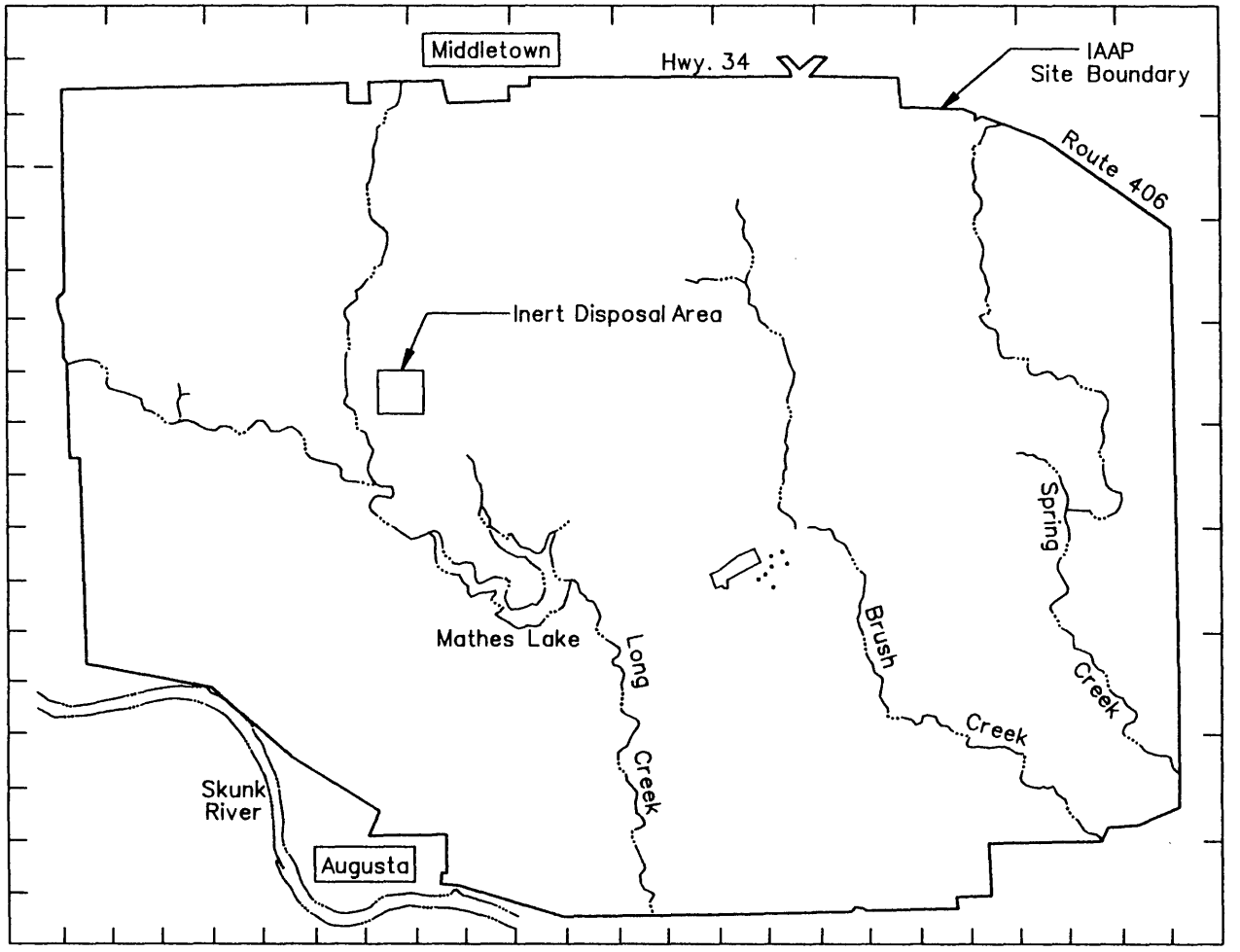
Dennis Grams, P.E.
Regional Administrator
EPA Region VII

3-7-96
Date



KEY TO COUNTIES

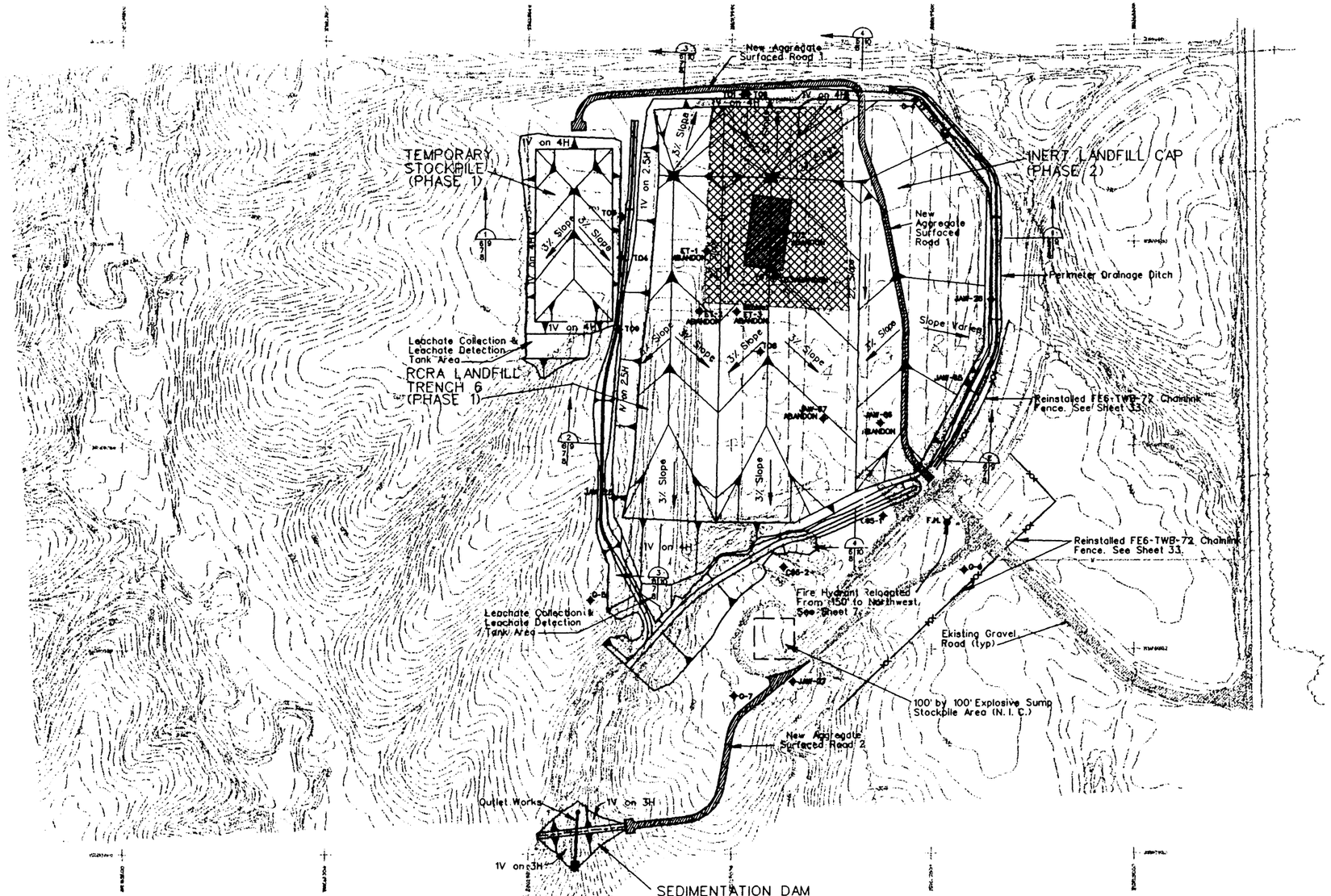
COREL:IASTATE	Project No.: 6102-012	Iowa Army Ammunition Plant Middletown, Iowa CDM FEDERAL PROGRAMS CORPORATION a subsidiary of Camp Dresser & McKee Inc.	Location of IAAP in Relation to the State of Iowa	Attachment 1 10/96



Not to Scale

Source: Dames & Moore

WCS FILE: IAAP02	Project No.: 6102-012	Iowa Army Ammunition Plant Middletown, Iowa CDM FEDERAL PROGRAMS CORPORATION a subsidiary of Camp Dresser & McKee Inc.	Inert Disposal Area	Attachment 2 10/96



MONITORING WELL REPLACEMENT SCHEDULE				
EXISTING WELLS TO BE ABANDONED	REPLACEMENT WELL	REPLACEMENT LOCATION	REPLACEMENT COORDINATES	
			EAST	WEST
T02	N/A	N/A	N/A	N/A
T03	N/A	N/A	N/A	N/A
T07	N/A	N/A	N/A	N/A
T08	N/A	N/A	N/A	N/A
ET-1	N/A	N/A	N/A	N/A
ET-2	N/A	N/A	N/A	N/A
ET-3	N/A	N/A	N/A	N/A
JAW-66	C96-2	15' NORTH, 660' WEST OF C-2	2,617,130.22	298,701.33
JAW-67	C96-1	135' NORTH, 200' WEST OF C-2	2,617,378.24	298,826.83

LEGEND

- Trench Cells
- F.H. Fire Hydrant
- Monitoring Wells
- Existing RCRA Cap
- Existing RCRA Waste Cell

NOTE:
1. SEE SHEET 33 FOR ADDITIONAL GRADING AND LAYOUT OF AGGREGATE SURFACED ROADS 1 AND 2.
2. SEE SHEET 7 FOR INITIAL GRADING AND REMOVAL PLAN FOR INERT LANDFILL AREA.
3. SEE SHEET 8 FOR FINAL GRADING PLAN FOR INERT LANDFILL AREA.
4. SEE SHEET 11 FOR PLAN OF PERIMETER DRAINAGE DITCHES.
5. TOE OF CAP AND BACKSLOPE OF DRAINAGE DITCH SHALL NOT INTERFERE WITH MONITORING WELLS T04, T05, T09, JAW-26, JAW-28, JAW-65, C-5.
6. TOE OF CAP AND AGGREGATE ROAD SHALL NOT INTERFERE WITH MONITORING WELLS T01& T08.
7. ALL EXISTING MONITORINGS WITHIN THE CAP AREA SHALL BE ABANDONED.

N

300 0 300 600

SCALE FEET

Source: Corps of Engineers, Omaha District

Temporary Stockpile of Explosive Contaminated Soil

Iowa Army Ammunition Plant
Middletown, Iowa

Project No.: 6102-012

Figure No.: Attachment 3

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

10/96

MCS FILE: SHEET6

ATTACHMENT B

COST

ATTACHMENT B
Summary of Costs for RCRA Cell/Stockpile

RCRA STOCKPILE

Contaminated Soil Handling	
Excavation/Hauling/Placement of Soil 101,210 yd^3 @ $ 8.95/yd^3	$ 905,800.00
Lagoon Water Treatment	31,440.00
Field Screening Sampling	50,000.00
Confirmation Sampling - 69 Samples @ $ 500.00	34,500.00
TOTAL CONTAMINATED SOIL HANDLING COST	$ 1,021,500.00
Waste Pile Bottom Liner Construction	
3′ Clay Liner - 12,960 yd^3 @ $8.95/$yd^3$	$ 115,992.00
60 mil Geomembrane - 116,640 ft^2 @ $0.50 ft^2 Installed	58,324.00
Geonet 116,640 ft^2 @ $0.23/$ft^2$ Installed	26,827.00
Geotextile 116,640 ft^2 @ $0.14/$ft^2$ Installed	16,330.00
3/4″ Aggregate - 252 yd^3 @ $ 19.05/yd^3	4,801.00
4″ PVC 1,512 lf plus Elbows and Tees	5,031.00
Leachate Trench Excavation	1,462.00
TOTAL COST FOR BOTTOM LINER	$ 229,000.00
Waste Pile Cover Construction Cost	
2′ Clay Liner - 8,040 yd^3 @ $8.95/$yd^3$	$ 71,958.00
40 mil Geomembrane - 108,540 ft^2 @ 0.47 ft^2 Installed	51,014.00
Geonet 108,540 ft^2 @ $0.23/$ft^2$ Installed	24,964.00
Geotextile 108,540 ft^2 @ $0.14/$ft^2$ Installed	15,196.00
18″ Select Fill - 6,030 yd^3 @ $8.95/$yd^3$	53,969.00
6″ Topsoil - 2,010 yd^3 @ $8.20/$yd^3$	16,482.00
TOTAL COST FOR WASTE PILE COVER	$ 233,500.00
Miscellaneous	
Decon	$ 2,850.00
Trailers	620.00
Fence	44,911.00
Vegetation Seeding - 161,200 ft^2 @ $ 43.50/1,000 ft^2	12,876.00
Landscaping - Borrow Area	6,821.00
TOTAL MISCELLANEOUS COST	$ 68,000.00
Oversight	
540 days X 10 hrs/day X $70.00/hr	$ 378,000.00
Per diem 540 days @ $90.00/day	48,600.00
Travel 700 mile/wk for 72 wk @ $0.30/mile	15,120.00
TOTAL OVERSIGHT COST	$ 441,500.00
Site Restoration	
Wetlands Creation (in lieu of backfilling 101,210 yd^3)	$ 700,000.00
TOTAL SITE RESTORATION COST	$ 700,000.00
Leachate Treatment Cost	
Carbon Treatment Plus Treatment House	$ 9,315.00
TOTAL COST FOR LEACHATE TREATMENT	$ 9,315.00
Borrow Pit Restoration	
Borrow Pit Grading and Restoration	$ 493,000.00
TOTAL BORROW PIT RESTORATION COST	$ 493,000.00

ATTACHMENT B (Continued)
Summary of Costs for RCRA Cell/Stockpile

Capital Costs - Groundwater Monitoring	
Install 4 monitoring wells - 30' @ $100/LF	$ 12,000.00
Well development - 5 hrs/well X 2 persons X 2 wells/day X $55/person-hr X 2 days	2,200.00
Mob/Demob, cuttings disposal	1,200.00
Subtotal	$ 15,400.00
TOTAL CAPITAL COSTS FOR RCRA STOCKPILE	$ 3,211,000.00
Operation and Maintenance Cost - Groundwater Monitoring	
Long-Term Monitoring/Cost per Event - Sample and Analyze 4 new wells - Total No. of Samples 4 wells @ 4 samples/well = 16 samples - 2 QA/QC Sample	
Explosives $270/sample X 18 samples	$ 4,860.00
Labor/Event	
4 wells/event X 2 persons X 1 day/10 wells X 10 hrs./day X $50/person-hrs.	$ 1,000.00
Per Diem	
2 persons X 1 days X $90/day	$ 180.00
Transportation	
Transporting equipment and personnel and shipping sample containers	$ 800.00
Reporting	2,000.00
Administrative	600.00
TOTAL ANNUAL GROUNDWATER MONITORING COST	$ 9,440.00
Lifetime Monitoring Cost	
Assuming 5% discount rate, present worth (10 years)	72,893.00
SUBTOTAL OF LIFETIME MONITORING COST	$ 72,893.00
SUBTOTAL	$ 3,284,000.00
Design/Investigations (15%)	492,500.00
Scope Contingencies (10%)	328,500.00
Permitting/Legal (5%)	164,000.00
TOTAL COST FOR RCRA STOCKPILE, SOIL EXCAVATION, WETLANDS CREATION, AND CONSTRUCTION OVERSIGHT	**$ 4,269,000.00**

ATTACHMENT B (Continued)
Summary of Costs for RCRA Cell/Stockpile

RCRA CELL

Capital Costs - Construction	
Trench Construction	
Excavation/Compaction/Placement of Soil for Liner - 3,688 yd^3 @ $ 3.94/yd^3	$ 14,500.00
TOTAL TRENCH CONSTRUCTION COST	$ 14,500.00
Double Liner Construction	
Liner Construction	
3' Clay Liner - 979 yd^3 @ $ 6.25/yd^3	8,762.00
2 FMLs - 42,000 ft^2 @ $ 0.50/ft^2	42,000.00
2 Geonets - 42,000 ft^2 @ $ 0.23/ft^2	19,320.00
4 Geotextiles - 42,000 ft^2 @ $ 0.14/ft^2	23,520.00
2 Leachate Collection Systems	
PVC Pipe - 640 LF @ $ 3.02/LF	1,930.00
Aggregate - 53 yd^3 @ $ 19.05/yd^3	1,010.00
Leachate Trench Excavation	307.00
Fittings/Hardware	1,180.00
TOTAL LINER COST	$ 98,000.00
Cover Construction	
Liner Construction	
2' Clay Liner - 2,773 yd^3 @ $ 8.95/yd^3	24,818.00
FML - 37,440 ft^2 @ $ 0.47/ft^2	17,600.00
Geonet - 37,440 ft^2 @ $ 0.23/ft^2	8,610.00
Geotextile - 37,440 ft^2 @ $ 0.14/ft^2	5,240.00
18" Select Fill Layer - 2,080 yd^3 @ $ 8.95/yd^3	18,616.00
6" Topsoil Layer - 693 yd^3 @ $ 8.20/yd^3	5,683.00
TOTAL COVER COST	$ 80,500.00
Miscellaneous	
Trailer	$ 1,368.00
Decon Pad	2,850.00
Vegetation Seeding - 156,640 ft^2 @ $43.50/1,000 ft^2	6,810.00
Landscaping - Borrow Area	10,400.00
TOTAL MISCELLANEOUS COSTS	$ 21,400.00
Leachate Treatment Cost	
Carbon Treatment plus Treatment House	$ 9,315.00
TOTAL COST FOR LEACHATE TREATMENT	$ 9,315.00
Capital Costs - Groundwater Monitoring	
Install 4 monitoring wells - 30' @ $100/LF	$ 12,000.00
Well development - 5 hrs/well X 2 persons X 2 wells/day X $55/person-hr X 2 days	2,200.00
Mob/Demob, cuttings disposal	1,200.00
Subtotal	$ 15,400.00
TOTAL CAPITAL COSTS FOR RCRA CELL	$ 239,000.00

ATTACHMENT B (Continued)
Summary of Costs for RCRA Cell/Stockpile

Operation and Maintenance Cost - Groundwater Monitoring		
Long-Term Monitoring/Cost per Event		
- Sample and Analyze 4 new wells		
- Total No. of Samples 4 wells @ 4 samples/well = 16 samples		
- 2 QA/QC Samples		
Explosives $270/sample X 18 samples		$ 4,860.00
Labor/Event		
4 wells/event X 2 persons X 1 day/10 wells X 10 hrs./day X $50/person-hrs.		$ 400.00
Per Diem		
2 persons X 1 days X $90/day		$ 180.00
Transportation		
Transporting equipment and personnel and shipping sample containers		$ 800.00
Reporting		2,000.00
Administrative		600.00
Contingencies (5%)		442.00
TOTAL COST/SAMPLING EVENT		$ 9,282.00
Annual Monitoring Cost		
Bi-annual first 2 years/year		$ 18,564.00
Annually 3-30/year		9,282.00
Assuming 5% discount rate, present worth years 1 & 2 = 1.8594		
present worth (5% 2 years) = 1.8594 X 37,128.00	69,036.00	
present worth (5% 30 years) = 15.3725		
present worth years (2-30) = (15.3725 - 1.8594) 9,282		125,430.00
Monitoring event present worth cost		$194,500.00
SUBTOTAL		$ 433,500.00
Design/Investigations (15%)		$ 65,000.00
Scope Contingency (10%)		43,500.00
Permitting/Legal (5%)		21,700.00
TOTAL COST FOR RCRA CELL		$ 563,500.00
TOTAL COST FOR ALTERNATIVE 4		$ 4,832,500.00