

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.

**ACTION MEMORANDUM
FOR THE
EXPLOSIVE-CONTAMINATED SUMP REMOVAL
AT THE
IOWA ARMY AMMUNITION PLANT
MIDDLETOWN, IOWA**



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

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

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FOR THE
EXPLOSIVE-CONTAMINATED SUMP REMOVAL
AT THE
IOWA ARMY AMMUNITION PLANT
MIDDLETOWN, IOWA**

**CONTRACT NO. DACW45-93-D-0004
Delivery Order No. 012**

Prepared by:

**CDM Federal Programs Corporation
8215 Melrose Drive, Suite 100
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November 3, 1995



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a subsidiary of Camp Dresser & McKee Inc.

November 3, 1995

Department of the Army
Corps of Engineers, Omaha District
215 N. 17th Street
Omaha, Nebraska 68102-4978

ATTN: Maria Hurtado - CEMRD-ED-EA

Project: Contract No. DACW45-93-D-0004, Delivery Order 012
Subject: Draft Action Memorandum for the Explosive-Contaminated Sump Removal at the
Iowa Army Ammunition Plant, Middletown, Iowa

Dear Ms. Hurtado:

CDM Federal Programs Corporation (CDM Federal) is pleased to provide eight (8) copies of the Draft Action Memorandum for the Explosive-Contaminated Sump Removal.

If you have any questions regarding this Action Memorandum, please contact me or Mr. Thomas Mathew at (913) 492-8181.

Sincerely,

CDM FEDERAL PROGRAMS CORPORATION

Jacqueline M. Mosher, P.E.
Project Manager

Enclosures

cc: S. Marquess - EPA (4 copies)
L. Baxter - IAAP (2 copies)
D. Romitti - AEC
IDNR - Water Quality Division (1 copy)
W. Fisher - Fish & Wildlife (1 copy)
T. Howard - HQAMCCOM (1 copy)
K. Preston - Waterways Experiment Station
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**ACTION MEMORANDUM
FOR THE
EXPLOSIVE-CONTAMINATED SUMP REMOVAL
AT THE IOWA ARMY AMMUNITION PLANT**

1.0 PURPOSE

This Action Memorandum serves as the primary decision document supporting a non-time-critical removal action at numerous explosive-contaminated sumps at the Iowa Army Ammunition Plant (IAAP) near Middletown, Iowa. The non-time critical removal action will be performed in accordance with the terms of the IAAP Federal Facility Agreement (FFA) and pursuant to Executive Order 12580. This Action Memorandum identifies the proposed action and explains the rationale for the removal. The subject removal action 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). 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 IAAP is in Des Moines County, Iowa near the city of Middletown. The IAAP began production in 1941 and is still in operation. The IAAP encompasses 19,127 acres. The IAAP is a Government-Owned, Contractor-Operated installation under the command of the U. S. Army Armament, Munitions, and Chemical Command, Rock Island, Illinois. The onsite contractor is Mason and Hanger-Silas Mason Company Inc.

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

This Action Memorandum addresses the removal and offsite disposal of 36 concrete sumps, the removal and recycling of 21 stainless steel sumps, the removal and disposition of a steel

“recirculation” tank, and the removal and disposition of asbestos materials associated with piping related to the subject sumps/tanks. This Action Memorandum also addresses the excavation and disposition of approximately 650 cubic yards of contaminated soils associated with the subject sump/tank removals. Those soils are expected to be contaminated with various explosives-related compounds and/or with some heavy metals. All 57 sumps and the recirculation tank are currently inactive.

2.1 SITE DESCRIPTION

2.1.1 REMOVAL SITE EVALUATION

The sumps collected washwater from daily cleaning operations and regular washdowns of load, assemble and pack (LAP) facilities. The washwater contained metals and explosive residues associated with LAP operations. The sumps served as a settling basin to collect solid contaminants. During operations, any overflow from the sumps contaminated the soil surrounding the sumps. A Contamination Assessment Report of Concrete Sumps was completed by JAYCOR in 1993. The report summarized the level of contamination found from samples collected by JAYCOR in 1992.

Initially, 36 sumps were to be addressed during this removal, of which 31 are concrete sumps and the remaining 5 constructed of stainless steel. Since the writing of the Engineering Evaluation/Cost Analyses (EE/CA), 16 stainless steel and 5 concrete sumps have been added for a total of 21 stainless steel and 36 concrete sumps. Also, a large tank identified as the west recirculation tank has been added to this removal action. The sumps are located next to buildings. All the sumps that are constructed of concrete appeared structurally sound at the time of survey, with no obvious evidence that the bottoms have been breached (JAYCOR 1993). At the time the survey was conducted, several of the sumps had water in them. The additional tanks identified in this section have not been included in any studies to date.

2.1.2 PHYSICAL LOCATION

The facility is located on a 19,127-acre secured area. Surrounding land use is either agricultural or industrial. The nearest population center is Burlington, Iowa, approximately 5 to 10 miles from the IAAP. There are no known sensitive populations near the facility.

Locations of sumps are provided as attachments to this memorandum. Sumps 1-50N, 1-50S, 1-08-1, 1-05-1U, 1-05-1N, 1-05-1NE, 1-05-1S, 1-05-1SE, 1-05-2U, and 1-40 are located at Line 1 (Figure 1-4). Sumps 2-06-1, 2-50S, 2-05-2U, 2-05-1U, 2-05-1NM, 2-05-1W, and 2-05-1S are located at Line 2 (Figure 1-5). Sumps 3-05-1N, 3-05-1U, and 3-50S, are located at Line 3 (Figure 1-6). Sumps 5B-55N, 5B-55S, 5B-21, 5B-56, 5B-25, 5B-27 5B-140-3W, 5B-140-3E, 5B-140-1, and 5B-140-2 are located at Line 5B (Figure 1-7). Sumps 5A-21, 5A-56, 5A-25, 5A-140-1, 5A-28SW, 5A-28SE, 5A-28N, and 5A-140-2 are located at Line 5A (Figure 1-8). Sumps 6-19, 600-86-2, and 6-98 are located at Line 6 (Figure 1-9). Sumps 7-18, 7-67, 7-54-1, 7-19-1, 7-19-2, 7-54-2, 7-64-C, 7-64-S, 7-66, and 7-36 are located at Line 7 (Figure 1-10). Figures for sumps in Line 9 indicated in Table 2-1 were not available during the writing of this Action Memorandum.

2.1.3 SITE CHARACTERISTICS

There are numerous sumps throughout the IAAP. The IAAP is located in the Dissected Till Plain section of the Central Lowland Province of the southern Iowa Drift Plain region. The site is immediately underlain by fill material consisting of silty clay and deposits of windblown nonstratified silts and clays (loess). Underlying the loess is the Kellersville Till member of the Glasford formation, a glacial till consisting of clay and silt with discontinuous sand and gravel seams. The generalized groundwater flow at the IAAP is to the south and southeast. However, due to the presence of sand seams and clay lenses in the glacial layers and, dissection by surface drainage ways, the localized groundwater flow direction in the unconsolidated material varies across the site. Perched water conditions are common. Depth to groundwater at IAAP is approximately 3 to 40 feet below ground surface depending on location and season (JAYCOR 1993).

The sumps are generally found in proximity to any of the LAP facilities. The primary purpose of the sumps was to serve as a setting basin to collect solid contaminants. Table 2-1 shows sump locations and estimated excavation volumes. A detailed discussion on the rationale of the volume calculations is presented in the EE/CA for explosive-contaminated sumps in Section 1.3 dated August 16, 1994. Table 2-2 shows the average soil contaminant concentrations at each sump.

TABLE 2-1
Sump Location and Excavation Summary
Iowa Army Ammunition Plant
Middletown, Iowa

<i>Line</i>	<i>Sump No.</i>	<i>Size (Ft.)</i>	<i>Est. Excavation (Yd³)</i>
1	1-40	14 x 20 c	75
1	1-05-1N	2 x 2 c	2
1	1-05-1NE	2 x 2 c	1
1	1-05-1S	2 x 2 c	2
1	1-05-1SE	2 x 2 c	13
1	1-05-1U	7 x 7 c	8
1	1-08-1	6 x 9 c	23
1	1-50N	6 x 9 c	12
1	1-50S	6 x 9 c	33
1	1-05-2U	7 x 7 c	30
1	1-12	5' dia. s	10
2	2-05-2U	7 x 7 c	8
2	2-05-1U	7 x 7 c	18
2	2-05-1NM	9 x 9 c	9
2	2-05-1W	3 x 6 c	8
2	2-05-1S	9 x 9 c	16
2	2-06-1	9 x 6 c	13
2	2-50S	9 x 6 c	8
2	West Tank	10' dia. x 22	19
3	3-05-1N	4 x 7 c	6
3	3-05-1U	7 x 7 c	46
3	3-50S	4 x 6 c	6
5	5A-21	2 x 2 c	1
5	5A-25	2 x 2 c	1
5	5A-56	2 x 2 c	1
5	5A-140-1	5' dia. s	14
5	5A-28SW	4 x 12 s	10
5	5A-28SE	4 x 12 s	10
5	5A-28N	4 x 12 s	10
5	5A-140-2	5' dia. s	14
5	5B-21	2 x 2 c	2
5	5B-25	2 x 2 c	2
5	5B-27	2 x 2 c	1
5	5B-55N	2 x 2 c	1
5	5B-55S	2 x 2 c	1
5	5B-56	2 x 2 c	2
5	5B-140-3W	4 x 10 s	3
5	5B-140-3E	4 x 10 s	9
5	5B-140-1	5' dia. s	14
5	5B-140-2	5' dia. s	14
6	6-19	2 x 2 c	1
6	6-98	2 x 2 c	1
6	600-86-2	5' dia. s	14
7	7-18	2 x 2 c	1
7	7-19-2	5' dia. s	14
7	7-54-1	2 x 2 c	1
7	7-19-1	5' dia. s	21
7	7-54-2	5' dia. s	14
7	7-64C	2 x 2 c	2
7	7-64S	5' dia. s	14
7	7-66	2 x 2 c	1
7	7-67	2 x 2 c	1
7	7-36	4 x 10 s	15
9	9-14A	5' dia. s	6
9	9-14B	5' dia. s	9
9	9-57	5' dia. s	26
9	9-58A	5' dia. s	20
9	9-58B	5' dia. s	9
TOTAL			646 Yd³

Note: c = concrete
s = steel

TABLE 2-2
Average Concentration of Contaminants in Soil
Iowa Army Ammunition Plant
Middletown, Iowa

Sump No.	Average Concentration of Contaminants (µg/g)																	
	HMX	RDX	2,4,6-TNT	1,3,5-TNB	2,6-DNT	2,4-DNT	Nitrobenzene	Cadmium	Copper	Lead	Chromium	Silver	Antimony	Mercury	Barium	Nickel	Tetryl	Arsenic
1-50N	---	---	---	---	---	---	---	2.3	72.2	447	57	---	---	---	---	---	---	---
1-50S	---	---	2	---	---	---	---	---	---	65	---	---	---	---	---	---	---	---
1-08-1	525	1,323	5.4	---	---	---	---	2.1	284	354	65	0.8	23	---	---	---	---	---
1-05-1U	---	---	---	---	---	---	---	2.1	---	92	---	---	---	---	---	---	---	---
1-40	112	92.3	10.4	106	0.6	7.5	68	1.2	---	---	---	---	---	---	---	---	---	---
2-06-1	---	---	---	---	---	---	---	1.6	---	1,061	---	---	---	---	---	---	---	---
2-50S	---	---	268	---	---	---	---	---	---	---	---	---	---	---	---	---	3,981	---
2-05-2U	688	1,400	515	348	2.6	2.8	---	1.3	---	253	---	---	16	---	---	---	---	---
2-05-1S	104	288	105	18.5	---	---	---	2.3	---	329	61	---	---	94	---	---	---	---
2-05-1U	560	1,526	1,743	13	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2-05-INM	80	313	14.1	1.4	---	---	---	11	83.3	618	155	---	---	3.9	---	---	---	---
2-05-1W	---	7.2	1.6	---	---	---	---	6.3	39	---	---	---	---	---	---	---	---	---
3-05-1N	3.5	3.2	4.3	---	---	---	---	1.6	---	255	---	---	---	---	---	---	---	---
3-05-1U	12	64	32	1.1	---	---	---	---	---	76.2	---	---	---	---	---	---	---	---
5B-55N	---	---	---	---	---	---	---	1.7	---	111	---	---	---	---	---	---	---	---
5B-55S	---	---	---	---	---	---	---	11.5	---	277	---	---	---	---	---	---	---	---
5B-21	---	---	---	---	---	---	---	4.0	57.3	395	---	---	---	---	---	---	---	---
5B-56	---	---	---	---	---	---	---	2.1	---	233	---	---	---	---	---	---	---	---
5B-25	---	---	---	---	---	---	---	3.0	---	139	---	---	---	---	---	---	---	---
5B-27	---	---	---	---	---	---	---	1.6	---	164	---	---	---	---	---	---	---	---
5A-21	---	---	---	---	---	---	---	2.9	35.2	753	---	---	---	---	---	---	---	92
5A-56	---	---	2.0	---	---	---	---	2.3	---	171	---	---	---	---	---	---	---	---
5A-25	---	---	---	---	---	---	---	1.6	---	137	---	---	9	---	---	---	---	---
6-19	---	1.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6-98	---	---	---	---	---	---	---	1.4	526	749	73	---	57	727	---	---	---	---
7-18	---	---	4.1	---	---	---	---	---	---	76	---	1	---	---	---	---	---	---
7-67	---	---	---	---	---	---	---	---	922	167	---	1.3	11.2	---	---	---	---	---
7-54-1	---	1	---	---	---	---	---	1.8	---	122	---	1.1	---	---	---	---	---	---
7-18	---	---	4.1	---	---	---	---	---	---	76	---	1.0	---	---	---	---	---	---

Note: There is no analytical data available for the remaining sumps or the recirculation tank.
 Numbers in bold indicate concentrations above PRGs.

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

The contaminants that were found above the Preliminary Remediation Goals in and around the sumps consisted of RDX, 2,4,6-TNT, 1,3,5-TNB, lead, mercury, and arsenic. The rationale used to estimate the volume of soil (168 cubic yards) to be removed is discussed in the EE/CA and in the USACE contractor's Work Plan. With the new addition of the West Recirculation Tank, the total volume of soil has now increased to approximately 650 cubic yards. The information on the sumps is based primarily on the Contamination Assessment Report of Concrete Sumps prepared by JAYCOR in June 1993.

The potential migration routes for exposure to the population are:

- Ingestion, inhalation, or dermal absorption of windblown surface soil that is contaminated, by workers or visitors of the site.
- Ingestion of groundwater that could potentially be contaminated from the leaching of contaminants contained in the soil.

2.1.5 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.

2.1.6 MAPS, PICTURES, AND OTHER GRAPHICAL REPRESENTATION

Figures from the EE/CA depicting sump locations scheduled for removal on the various lines at the IAAP are included as Attachments. Figures 1-1 through 1-10 show the location of the IAAP within the State of Iowa and the locations of the sumps at various lines.

2.2 OTHER ACTIONS

No other remedial activities of any kind have been done at any of the 57 sumps discussed above.

2.3 STATE AND LOCAL AUTHORITIES ROLE

The role of state and local authorities at this site has been minimal. The purpose of the FFA is to provide a procedural framework for implementing CERCLA and RCRA corrective action and facilitating communications and cooperation between the Army and EPA. The State of Iowa has declined to participate in the agreement in a formal manner. However, the IAAP is providing copies of relevant FFA primary and secondary documents to the Iowa Department of Natural Resources. Since remediation of the explosive-contaminated sumps is being addressed under CERCLA authority, they have deferred to the Environmental Protection Agency (Region VII) to provide regulatory oversight for the subject removal action.

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

3.1 THREATS TO PUBLIC HEALTH OR WELFARE

The current human health risks attributable to the site are limited due to the absence of current exposures. However, the nature of exposures at the site may change in the future based on potential land use changes. Since groundwater at the IAAP is contaminated at significant levels with constituents similar to those found at the sumps, the threat of potential future consumption of contaminated groundwater and incidental ingestion of soils by current site workers exists for the site. The contaminants migrating from the soil into the groundwater is possible, but will be limited due to the significant clay content of the parent material, which has a permeability of approximately 10^{-8} cm/sec.

The potential of windblown dust being generated from the areas surrounding the sumps is negligible. The sumps are protected from wind by being next to the buildings. The soil surrounding the sumps is covered by vegetation providing additional protection from wind erosion. Dust generated during removal activities will be controlled as discussed in the USACE contractor's Work Plan.

3.2 THREATS TO THE ENVIRONMENT

There are currently no serious threats to the environment from the explosive/metals-contaminated soils. The low levels of contamination combined with the low permeability soils makes for minimal migration, thus reducing the threat. Threats to potential environmental receptors are minimal since there are no exposures and no receptors impacted by the sumps in proximity to the LAP facilities.

4.0 ENDANGERMENT DETERMINATION

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 endangerment to public health or the environment.

5.0 PROPOSED ACTIONS AND ESTIMATED COSTS

5.1 PROPOSED ACTION DESCRIPTION

The proposed action has been slightly changed from what was recommended in the Engineering Evaluation/Cost Analysis (EE/CA). The EE/CA recommended offsite incineration for explosive-contaminated soils and encapsulation for metals-contaminated soils and disposal. This recommendation was made due to the high capital costs associated with any potential onsite treatment alternative and the small amount of soil to be treated (650 cubic yards). Since the initial recommendation was made, additional removal actions have been identified at the IAAP. The following three removal actions are scheduled in addition to the subject action:

- Removal of the Pink Water Lagoon explosive-contaminated sediments.
- Removal of the explosive-contaminated soils from the Former Line 1 Impoundment.
- Capping of the Inert Disposal area.

The non-time critical removal at the Pink Water Lagoon and former Line 1 Impoundment involve excavation and stockpiling (with ultimate treatment) or disposal (landfilling) of an estimated 101,200 cubic yards of contaminated soils, far in excess of that associated with the sump removal. Due to the potential economies of scale associated with combining the sump removal action with

the proposed Pink Water Lagoon/Line 1 Impoundment removals, the scope of potential alternatives under consideration for the sump removal is increased relative to those evaluated in the EE/CA. Therefore, the method of disposal of contaminated soils originally proposed in the sump EE/CA has been modified. The proposal to incinerate explosive-contaminated soils offsite has been modified so that these soils will now be stockpiled to await final disposition in conjunction with larger quantities of soils from other response actions at the IAAP. The nature of the sump removal is summarized as follows:

- (1) Excavate sumps and associated soils at levels exceeding preliminary remediation goals.
- (2) Asbestos materials to be disposed of in an approved offsite solid waste landfill.
- (3) Dispose of mercury-contaminated soils offsite in an approved hazardous waste landfill following appropriate stabilization.
- (4) Stockpile explosives-contaminated soils and concrete sumps onsite in a waste pile constructed to satisfy RCRA requirements. The stockpile area will be located at the IAAP Inert Landfill Area.
- (5) Dispose/treat soils referenced in Item No. 5 above in conjunction with a planned response action for the Pink Water Lagoon and Line 1 Impoundment. The Army shall afford an opportunity for public review and comment regarding the nature of any such action consistent with the requirements of CERCLA and the NCP.
- (6) All other materials to be turned over to Mason and Hanger to be flashed and disposed.

Excavation of the contaminated soil and disposal of the stainless steel sumps in a solid waste landfill will mitigate the public health threat posed by direct human contact and inhalation of airborne particles and possibly alleviate impacts to groundwater. The contaminated soil will be excavated dependent upon the level of contamination at each sump as discussed in the EE/CA, Section 1.3. Confirmatory sampling will be conducted to ensure that sufficient material has been removed to be below the Preliminary Remediation Goals (PRGs) or Action Levels established for IAAP prior to backfill.

The proposed remedial option is easily implemented onsite and since the plant is a restricted access area, traffic or public endangerment is very limited while the remedial action is being done. The appropriate State and Federal regulatory officials will be notified prior to beginning any work.

5.1.1 CONTRIBUTION TO REMEDIAL PERFORMANCE

The removal of contaminated soil from the sump area will eliminate the pathways that pose a threat to human health and the environment. Once this remedial action is completed, no further action is expected to be required at the sump areas. Storing the contaminated soil until additional explosive-contaminated soil is treated allows a cost savings to be realized. The soil will still be treated to be protective of human health and the environment. The need for further response actions at the sumps beyond that which is to be accomplished in non-time critical removal will be addressed in the Feasibility Study Reports (and RODs) for the soil and groundwater operable units.

5.1.2 DESCRIPTION OF ALTERNATIVE TECHNOLOGIES

Various technologies were proposed in the Engineering Evaluation/Cost Analysis for the treatment of explosive-contaminated soil. These technologies included bioremediation, chemical treatment, soil washing and incineration. The treatment alternatives require the expense of treatability studies (ranging from \$50,000 - \$100,000) and mobilization (ranging from \$300,000 - \$500,000). The original estimated volume of soil to be treated (650 yd³) does not justify these costs. Therefore, the most viable and cost-effective method of treating the contaminated soil is by storing it onsite until additional soil volume will be treated. The final disposition of explosive-contaminated soil generated by the subject removal action will be decided at a later date. However, the proposed remedial action will be available for public comment prior to implementation.

5.1.3 ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)

The EE/CA was completed in the fall of 1994. The document is available at the Burlington Public Library, the Danville City Hall, and the Administration building of the IAAP. A press release was published on September 19, 1994, advising the public of the availability of the EE/CA document and soliciting public comment. The public comment period ended October 30, 1994. There were no public comments received on the EE/CA for the subject removal action.

5.1.4 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:

FEDERAL	
<i>Standard</i>	<i>Description</i>
40 CFR 50	Treatment technology standards for emissions to air: incinerators, surface impoundments, waste piles, and landfills.
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 262 and 263	Establishes standards which apply to persons transporting hazardous waste within the U. S. if the transportation requires a manifest under 40 CFR part 262.
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 300.415	Outlines criteria for implementation of Removal Actions.
40 CFR 300.440	Applies to any remedial or removal actions involving the offsite transfer of any hazardous substance, pollutant, or contaminant defined under CERCLA Sections 101 (14) and 101 (33), whether it is conducted by EPA, other Federal Agencies, states, or private parties.
29 CFR 1910.120	Regulates worker health and safety.
STATE	
<i>Standard</i>	<i>Description</i>
Iowa Air Pollution Control Regulation Chapter 567-23 & 24	Governs the release of fugitive dust in quantities creating nuisance during site activities.
Iowa Hazardous Waste Disposal Penalty Law	Establishes penalties for unlawful transportation and disposal of hazardous waste.
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.

The risk-based PRGs established for IAAP removal action are presented in Table 5-1.

TABLE 5-1 Action Levels Iowa Army Ammunition Plant Middletown, Iowa		
<i>Contaminants</i>	<i>Soil (mg/kg)</i>	<i>Water (mg/L)</i>
HMX	51,000**	5.1*
RDX	53*	0.002*
2,4,6-TNT	196*	0.0095*
1,3,5-TNB	102*	0.005*
2,6-DNT	8.7	0.00042*
2,4-DNT	8.7*	0.00042*
Nitrobenzene	510**	0.05*
Cadmium	510**	0.05*
Copper	38,000**	1,400**
Lead	500	0.005
Chromium	5,100**	0.005*
Silver	5,100**	0.5*
Antimony	816*	0.04*
Mercury	310**	0.031*
Barium	72,000**	7.1*
Nickel	20,000**	2*
Tetryl	10,000**	1*
Arsenic	3.4*	0.00016*

* PRGs calculated at IAAP.

** From Risk-Based Concentration Table, Region III.

PRGs were calculated for an estimated excess cancer risk of greater than 1E-06 and/or the hazard index (HI) is greater than 1E+00. PRGs were calculated by rearranging the equations used for the risk calculations at the site:

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

and

$$\text{HQ} = C \times \text{HIF} / \text{RfD}$$

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:

$$C = \text{Target Cancer Risk} / (\text{HIF} \times \text{SF})$$

and

$$C = \text{Target Hazard Quotient} \times \text{RfD} / \text{HIF}$$

5.1.5 PROJECT SCHEDULE

The removal action will start on or around March 20, 1995, with the following sequential durations after that date:

- Mobilization March 20, 1995
- Excavation and Laboratory Analyses March 25 - June 2, 1995
- Backfilling May 12 - June 9, 1995
- Demobilization July 1, 1995
- Transportation and Disposal (Mercury Soils) November 6, 1995

5.2 ESTIMATED COSTS

A cost estimate summary for the subject removal action, extracted from the EE/CA, is attached to this Action Memorandum (Table 5-2). The cost table has been modified since the submission of the EE/CA which was originally proposed for offsite incineration. Table 5-2 shows the estimated

TABLE 5-2
Summary of Costs for Contaminated Soil Handling and Sump Removal

Contaminated Soil Handling and Sump Removal

Remove Concrete Sumps by Jackhammer & Machine	=	\$ 6,960.00
Add 40% for Hazardous Site Work	=	2,785.00
SUBTOTAL	=	9,745.00

Excavate Contaminated Soil	=	671.70
Add 40% for Hazardous Site Work	=	268.70
SUBTOTAL	=	\$ 940.40

Decontamination & Decon Pad

Decontaminate Concrete/Steel	=	\$ 4,150.00
Decontamination Pad	=	6,700.00
SUBTOTAL	=	\$ 10,850.00

Stockpile Storage Pad Facility

To Store 125 yd ³ of Material	=	\$ 10,000.00
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Disposal of Mercury-Contaminated Soil

Macro Encapsulation of Metal-Contaminated Soil 40 yd ³ - 20 yd ³ /Rolloff Box @ \$5,700/Box X 3	=	11,400.00
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Disposal of Concrete Sumps

70 Tons @ \$22.60/Ton	=	\$ 1,582.00
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Confirmatory Sampling

2 Samples/Sump X 68 @ \$270.00	=	\$ 36,720.00
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Site Preparation

Trailer Rental and Site Recon	=	\$ 810.00
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Backfill

Backfill with Clean Soil	=	\$ 4,950.00
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Granular Activated Carbon

Sump water treatment	=	\$ 2,880.00
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Oversight

8hrs/Day X 5 Day/Wk X 4 Wks X \$70.00	=	\$ 11,200.00
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Travel

0.25 X 600 Miles X 4 Trips	=	\$ 600.00
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Per Diem

\$26.00 X 24 Day	=	\$ 624.00
SUBTOTAL	=	\$ 91,417.00

Work Plan & Final Report

10%	=	\$ 9,142.00
SUBTOTAL	=	\$100,559.00

Contingencies (30%)	=	\$ 30,168.00
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TOTAL	=	\$140,987.00
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cost for the removal action, and to stockpile the explosive-contaminated soil to await final disposition in conjunction with larger quantities of soils from other areas of IAAP. This cost estimate summary includes a breakdown of direct and indirect capital costs. No operation and maintenance costs are associated with the selected remedy. However, since the EE/CA was written, the U. S. Army Corps of Engineers (USACE) has awarded a cost-reimbursable contract to execute the selected remedy. Pending modifications to that contract, the estimated cost of the subject action is \$131,000.00. Actual cost 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 limited possibility of contaminant migration beyond the immediate areas of the surrounding subject sumps and tanks, the potential impact to human health and the environment due to delay of action is considered minor and limited due to the absence of current exposures. However, the nature of exposures at the site may change in the future based on potential land use changes. Since groundwater at the IAAP is contaminated at significant levels with constituents similar to those found at the sumps, threats posed by potential future consumption of contaminated groundwater and incidental ingestion of soils by current site workers exists for the site.

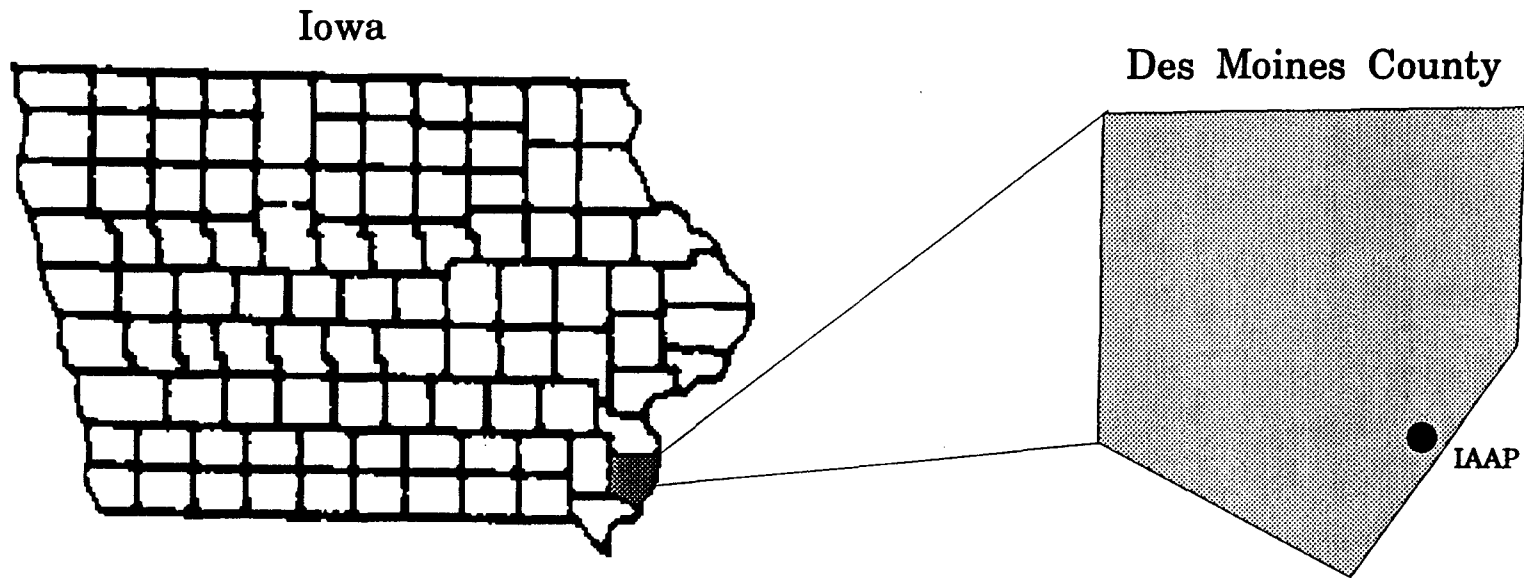
7.0 OUTSTANDING POLICY ISSUES

There are no outstanding policy issues related to this action.

8.0 RECOMMENDATION

The selected removal alternative for the treatment of the explosive/metal-contaminated soil and associated sumps/tanks is excavation, confirmatory sampling, hauling, and storage in a contained waste pile to await treatment and/or disposal. Decisions regarding eventual treatment and/or disposal will be made at a later date and subject to public review and comment. Any current or future risks attributable to the site following the non-time critical removal will be addressed in the soil and groundwater operable unit FS Reports (and RODs) and subsequent response actions, if necessary. The concrete and stainless steel sumps will be disposed of at a solid waste landfill.

Any asbestos, associated with the sumps encountered during removal, will be disposed of in accordance with current regulations. Therefore, this removal action is effective in eliminating potential exposures to hazardous substances/wastes, is readily implementable, is cost effective, and satisfies criteria of Section 300.415 of the NCP regarding removal actions.



KEY TO COUNTIES

COREL:ASTATE

Project No.:
6102-012

Iowa Army Ammunition Plant
Middletown, Iowa



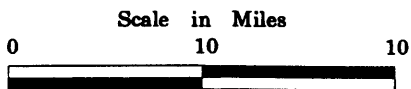
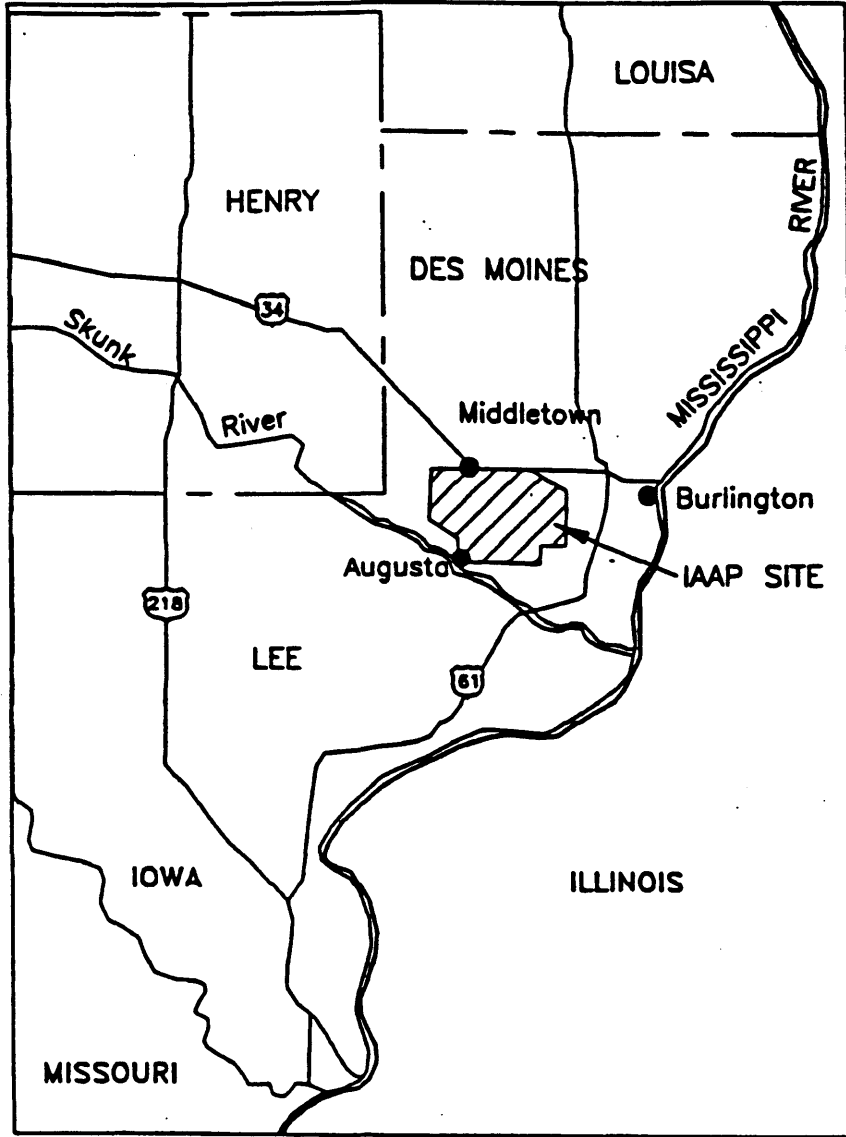
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Location of IAAP
in Relation to
the State of Iowa

Figure No.:


1-1

11/95



Source: Dames & Moore

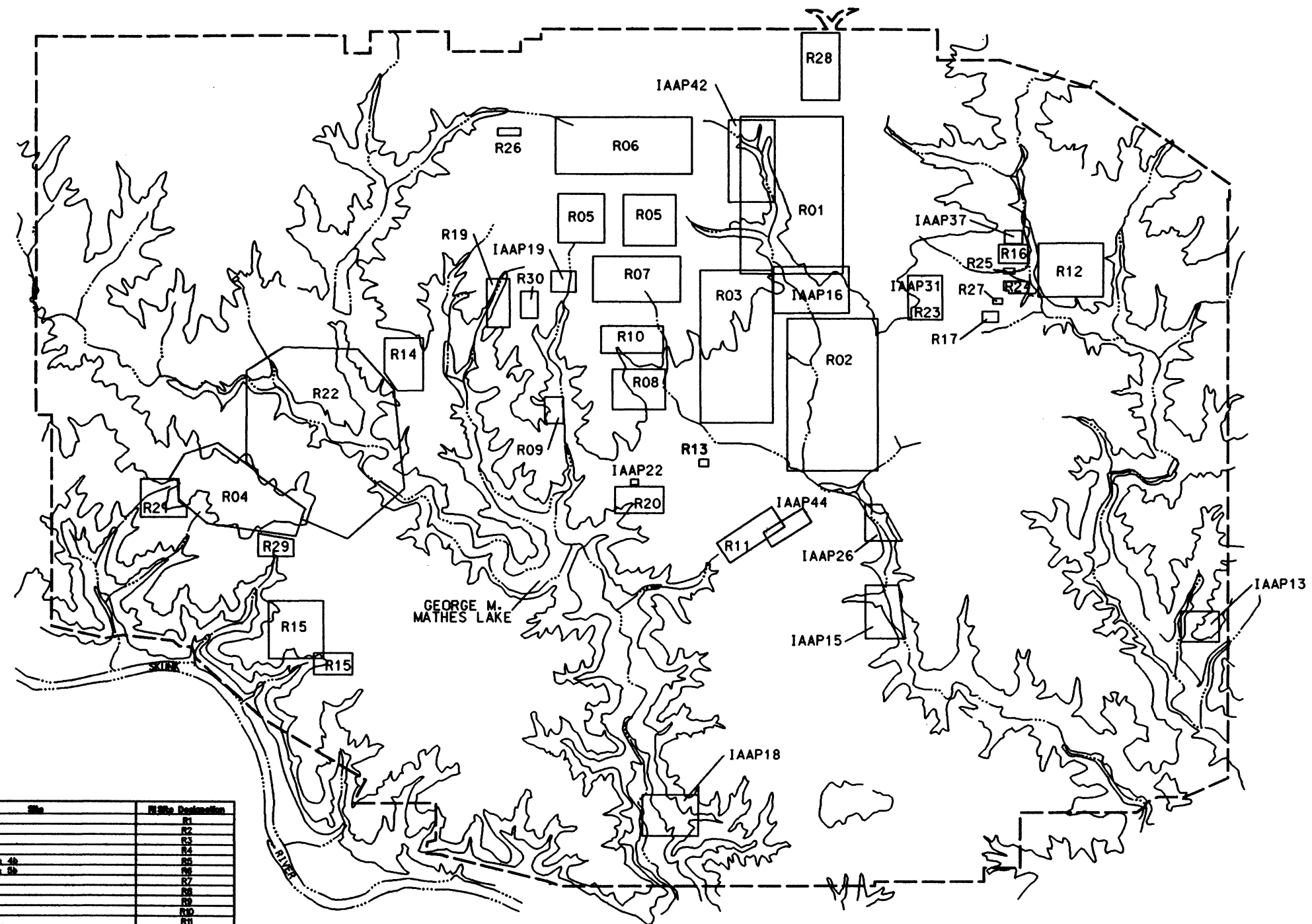
COREL: SITE

Project No. 7150-100	Iowa Army Ammunition Plant Middletown, Iowa
	 CDM FEDERAL PROGRAMS CORPORATION <small>a subsidiary of Camp Dresser & McKee Inc.</small>

Site Location Map

Figure
1 of 2

11/95



LEGEND:
 --- INTERMITTENT STREAM
 --- 690 --- TOPOGRAPHIC CONTOUR
 --- CONTOUR INTERVAL = 50 FEET



7000 0 7000 14000
 SCALE FEET

Source: Jaycor Environmental

Iowa Army Ammunition Plant
 Middleton, Iowa

IAAP#	Site	R# Site Destination
IAAP-1	Line 1	R1
IAAP-2	Line 2	R2
IAAP-3	Line 3	R3
IAAP-4	Line 3a	R4
IAAP-5	Line 4a & 4b	R5
IAAP-6	Line 5a & 5b	R6
IAAP-7	Line 6	R7
IAAP-8	Line 7	R8
IAAP-9	Line 8	R9
IAAP-10	Line 9	R10
IAAP-11	Line 800	R11
IAAP-12	EDA East Burn Pads	R12
IAAP-17	Pesticide PR	R13
IAAP-20	Inert Disposal Area	R14
IAAP-21/23	Demolition Area/Disinfection Furnace	R15
IAAP-24	Contaminated Waste Processor	R16
IAAP-25	Explosive Waste Incinerator	R17
IAAP-26	STP/Sludge Drying Beds	R18
IAAP-27	Fly Ash Landfill	R19
IAAP-28	Construction Debris Landfill	R20
IAAP-29	Line 3a STP/Sludge Beds	R21
IAAP-30	Filling Site Area	R22
IAAP-31	Ammo Box Chassis Disposal Pit	R23
IAAP-32/33	Burn Cases/Burn Cases Landfill	R24
IAAP-34/35	W. Burn Pads/W. Burn Pads Landfill	R24
IAAP-36	North Burn Pads	R25
IAAP-38	Building 600-86 Septic System	R26
IAAP-39	Fires Training PR	R27
IAAP-40	Roundhouse Transformer Storage Area	R28
IAAP-41	Line 3A Pond	R29
IAAP-43	Fly Ash Disposal Area	R30

MCS FILE: IAMP18TR

IAAP Facility
 Showing Basewide
 Site Locations

Project No.:

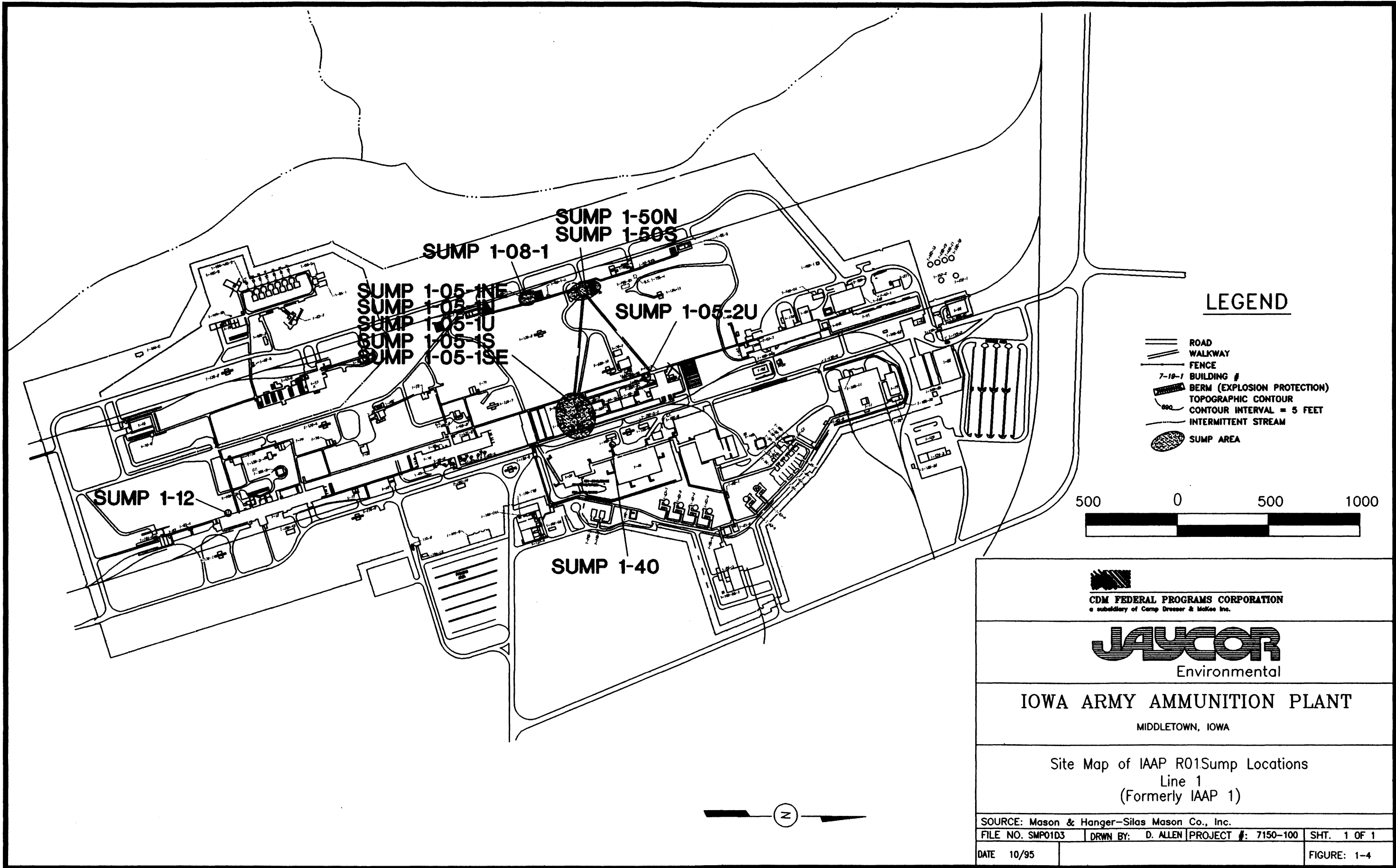
7150-100

Figure:

1-3


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11/95



LEGEND

- ROAD
- WALKWAY
- FENCE
- BUILDING #
- BERM (EXPLOSION PROTECTION)
- TOPOGRAPHIC CONTOUR
- CONTOUR INTERVAL = 5 FEET
- INTERMITTENT STREAM
- SUMP AREA



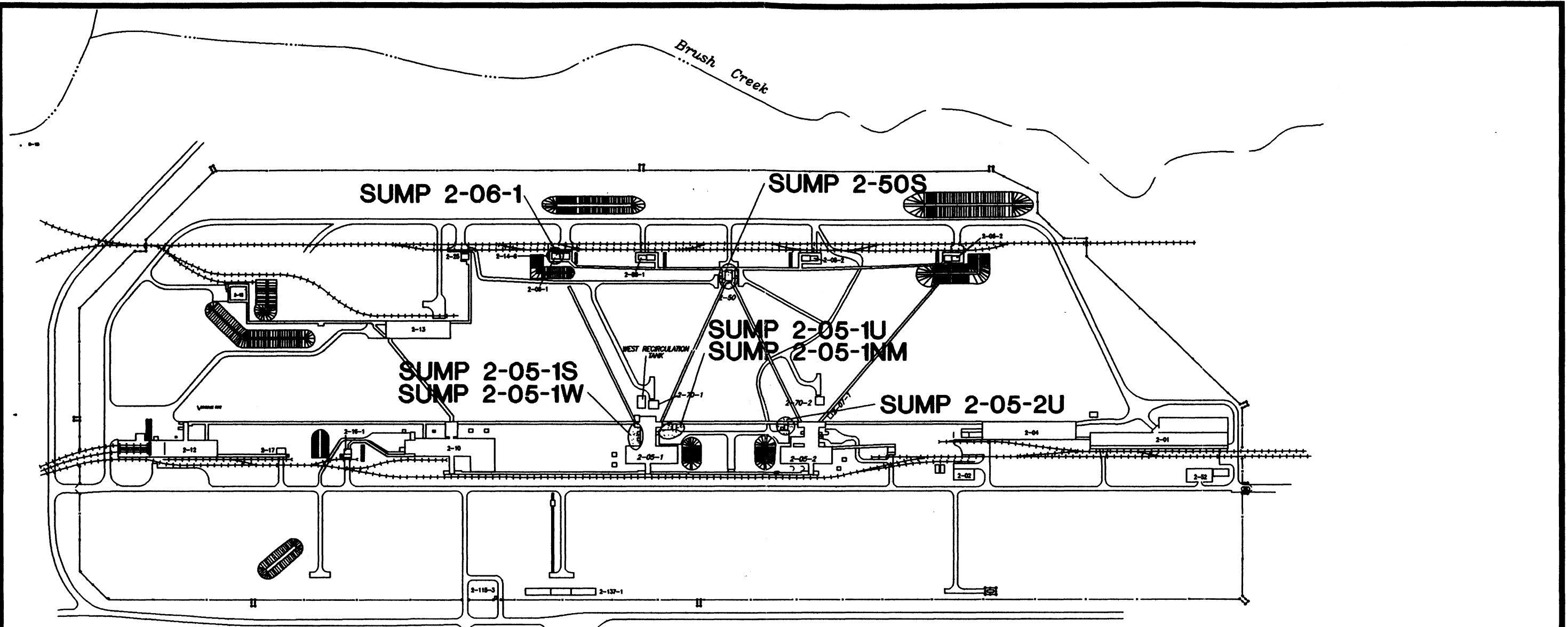
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IOWA ARMY AMMUNITION PLANT
 MIDDLETOWN, IOWA

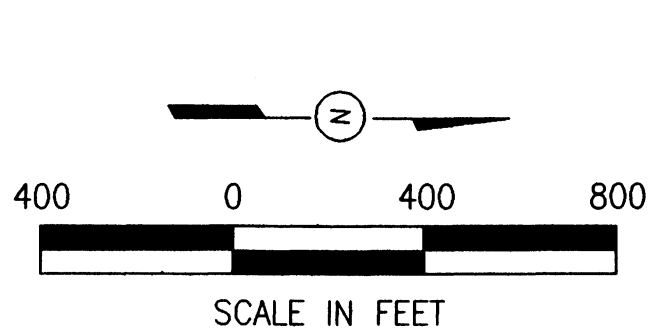
Site Map of IAA R01 Sump Locations
 Line 1
 (Formerly IAA 1)

SOURCE: Mason & Hanger-Silas Mason Co., Inc.			
FILE NO. SMP01D3	DRWN BY: D. ALLEN	PROJECT #: 7150-100	SHT. 1 OF 1
DATE 10/95			FIGURE: 1-4



LEGEND

SAMPLE KEY



- ROAD
- WALKWAY
- FENCE
- BUILDING #
- BERM (EXPLOSION PROTECTION)
- TOPOGRAPHIC CONTOUR
- CONTOUR INTERVAL = 5 FEET
- INTERMITTENT STREAM
- SUMP AREA

- MONITORING WELL
- SOIL SAMPLE
- SUBSURFACE SOIL SAMPLE
- SUBSURFACE & SURFACE SOIL SAMPLE
- SURFACE WATER SAMPLE
- SEDIMENT SAMPLE
- SURFACE WATER & SEDIMENT SAMPLE
- GEOPROBE SAMPLE
- PIEZOMETER SAMPLE
- GEOPROBE & PIEZOMETER SAMPLE

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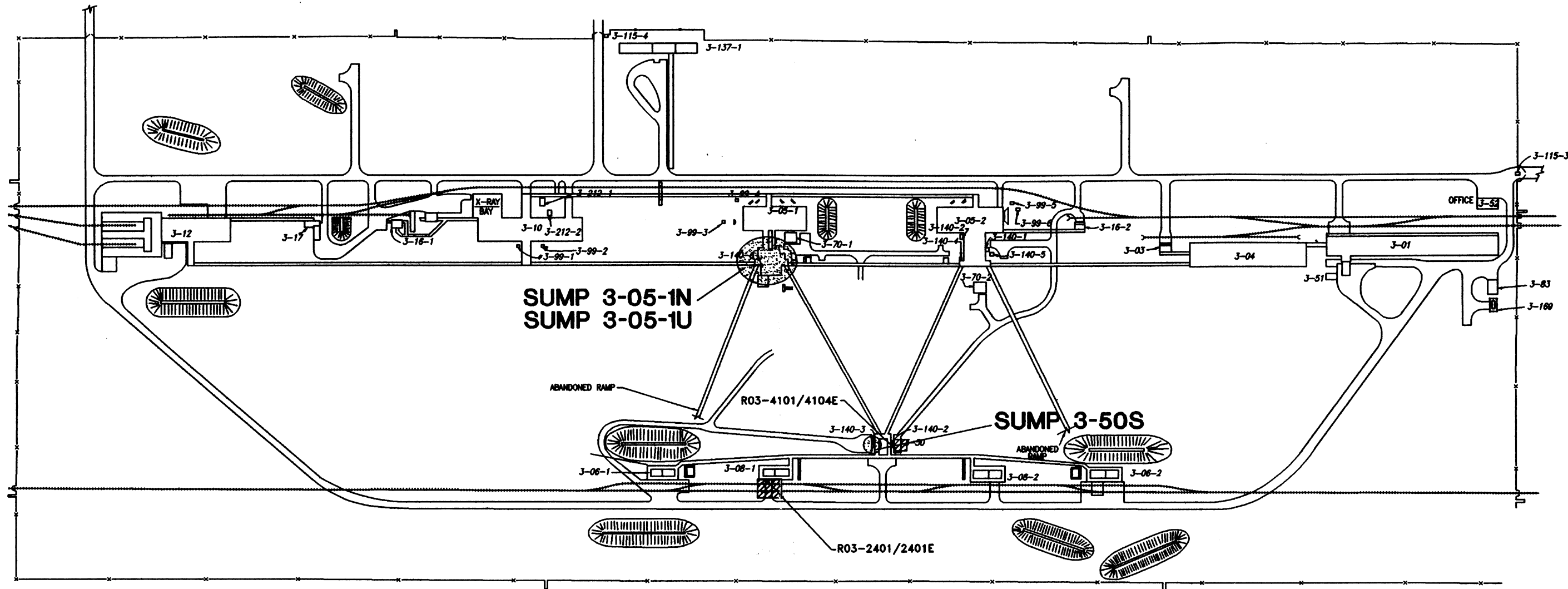
JAYCOR
 Environmental

IOWA ARMY AMMUNITION PLANT

MIDDLETOWN, IOWA

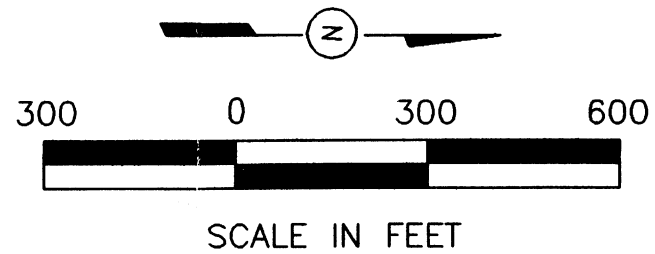
Site Map of IAP R02
 Line 2
 (Formerly IAP 2)

SOURCE: Mason & Hanger-Silas Mason Co., Inc.			
FILE NO. IA02_D1	DRWN BY: D. ALLEN	PROJECT #: 7150-100	SHT. 1 OF 1
DATE 11/95			FIGURE: 1-5



LEGEND

- ROAD
- WALKWAY
- FENCE
- 7-10-1 BUILDING #
- BERM (EXPLOSION PROTECTION)
- TOPOGRAPHIC CONTOUR
- CONTOUR INTERVAL = 5 FEET
- INTERMITTENT STREAM
- MONITORING WELL
- SUMP AREA



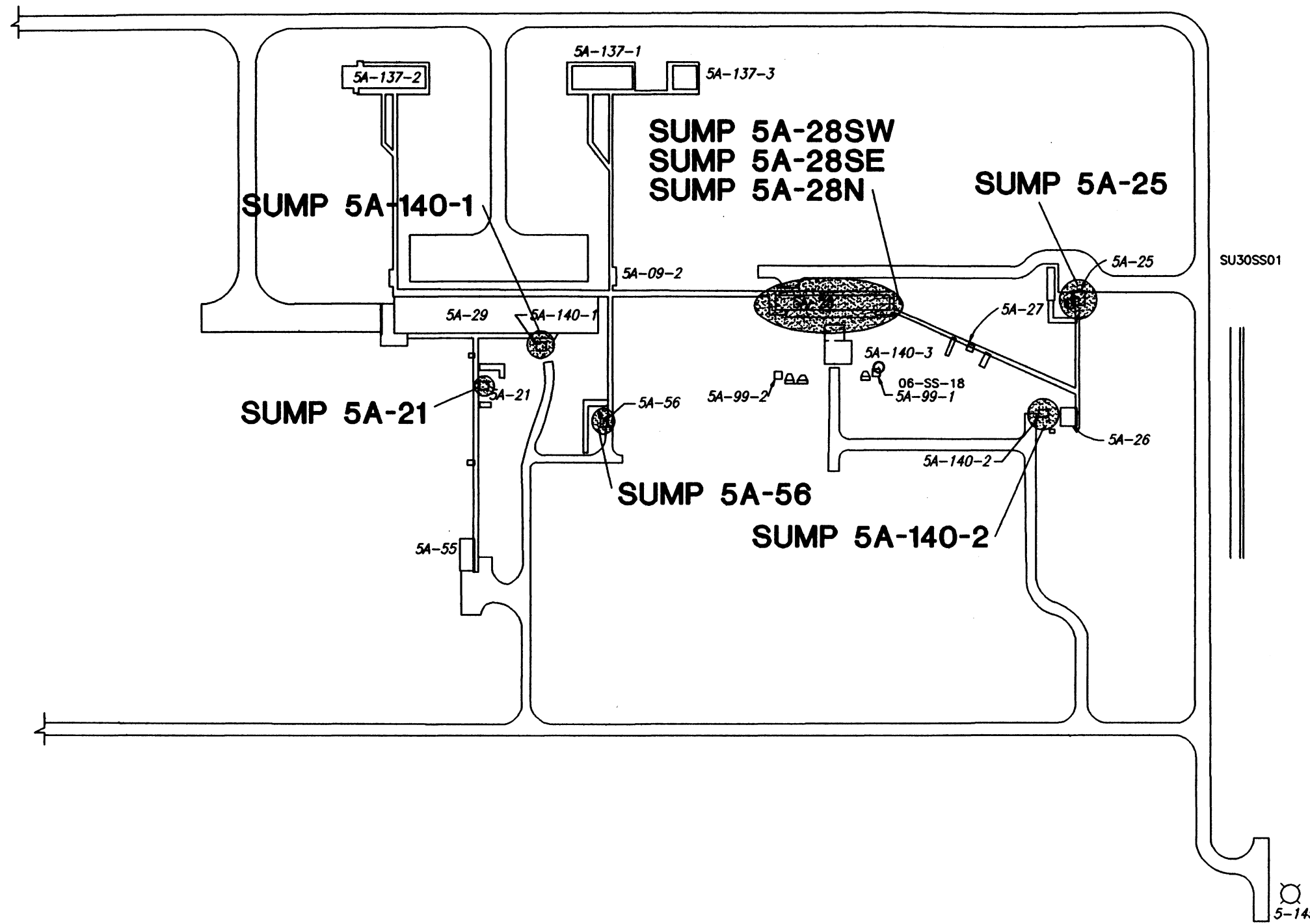
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IOWA ARMY AMMUNITION PLANT
MIDDLETOWN, IOWA

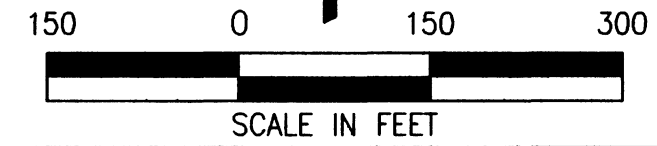
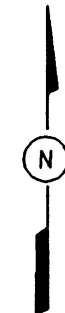
Site Map of IAP R03 Sump Locations
Line 3
(Formerly IAP 3)

SOURCE: Mason & Hanger-Silas Mason Co., Inc.		
FILE NO. SMP03D1	DRWN BY: D. ALLEN	PROJECT #: 7150-100
DATE 11/95		SHT. 1 OF 1
		FIGURE: 1-6



LEGEND

- ROAD
- WALKWAY
- FENCE
- BUILDING #
- BERM (EXPLOSION PROTECTION)
- TOPOGRAPHIC CONTOUR
- CONTOUR INTERVAL = 5 FEET
- INTERMITTENT STREAM
- SUMP AREA



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IOWA ARMY AMMUNITION PLANT
 MIDDLETOWN, IOWA

Site Map of IAAP R06 Sump Locations
 (Line 5)
 (Formerly IAAP 6)

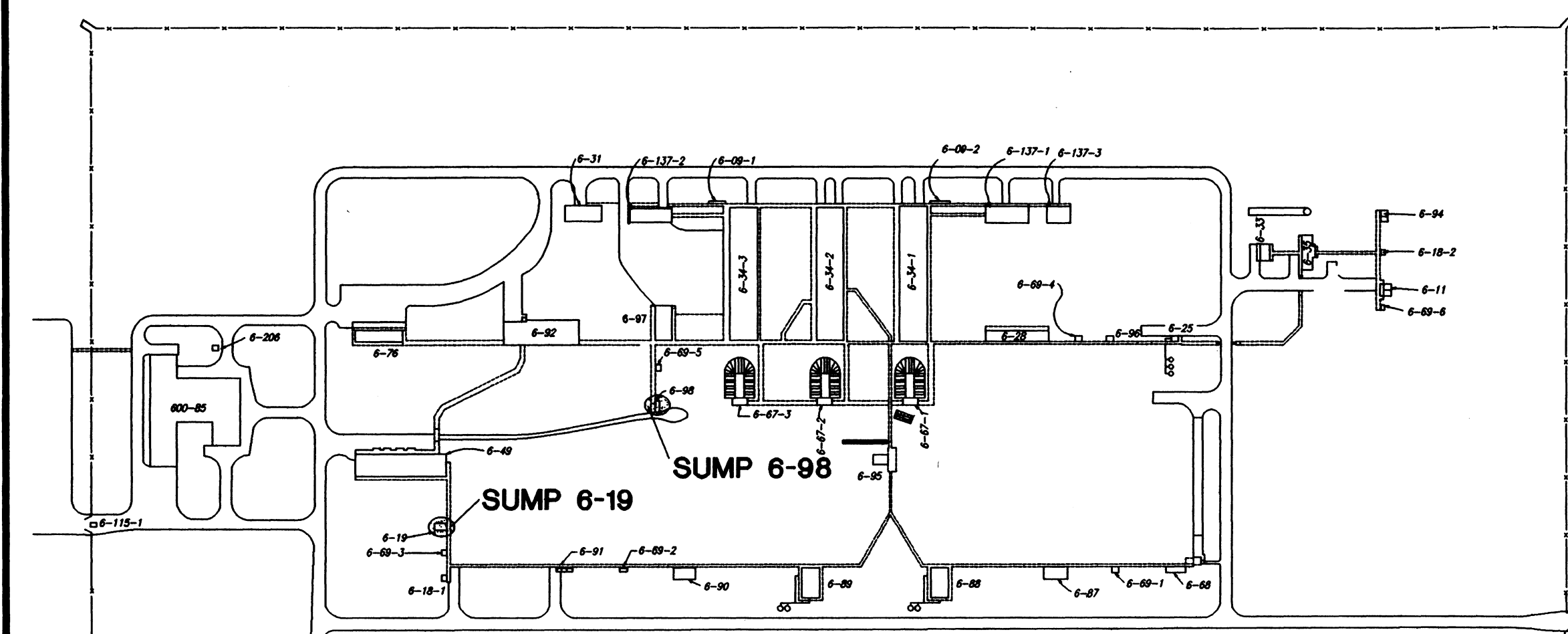
SOURCE: Mason & Hanger-Silas Mason Co., Inc.			
FILE NO. SMPO6AC	DRWN BY: D. ALLEN	PROJECT #: 7150-100	SHT. 1 OF 1
DATE 11/95			FIGURE: 1-8

LEGEND

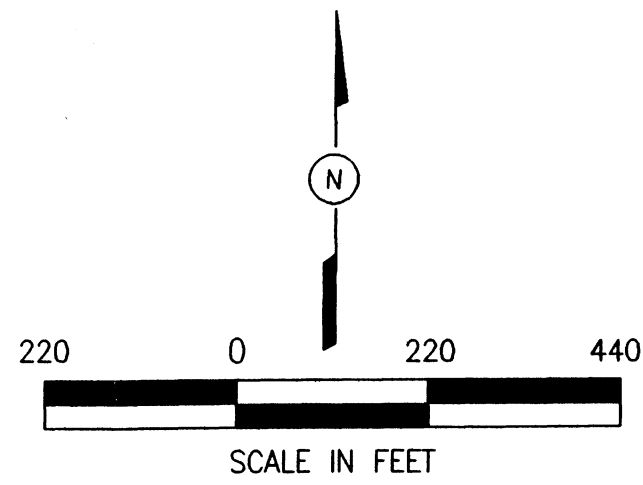
- == ROAD
- == WALKWAY
- FENCE
- 7-19-1 BUILDING #
- ▭ BERM (EXPLOSION PROTECTION)
- TOPOGRAPHIC CONTOUR
- CONTOUR INTERVAL = 5 FEET
- ~ INTERMITTENT STREAM
- SUMP AREA

SAMPLE KEY

- ⊕ MONITORING WELL
- SOIL SAMPLE
- SUBSURFACE SOIL SAMPLE
- ⊗ SUBSURFACE & SURFACE SOIL SAMPLE
- △ SURFACE WATER SAMPLE
- ▽ SEDIMENT SAMPLE
- ☆ SURFACE WATER & SEDIMENT SAMPLE
- SCREENING SAMPLE
- ⊕ GEOPROBE SAMPLE
- ⊕ PIEZOMETER SAMPLE
- ⊕ GEOPROBE & PIEZOMETER SAMPLE



SUMP 600-86-2



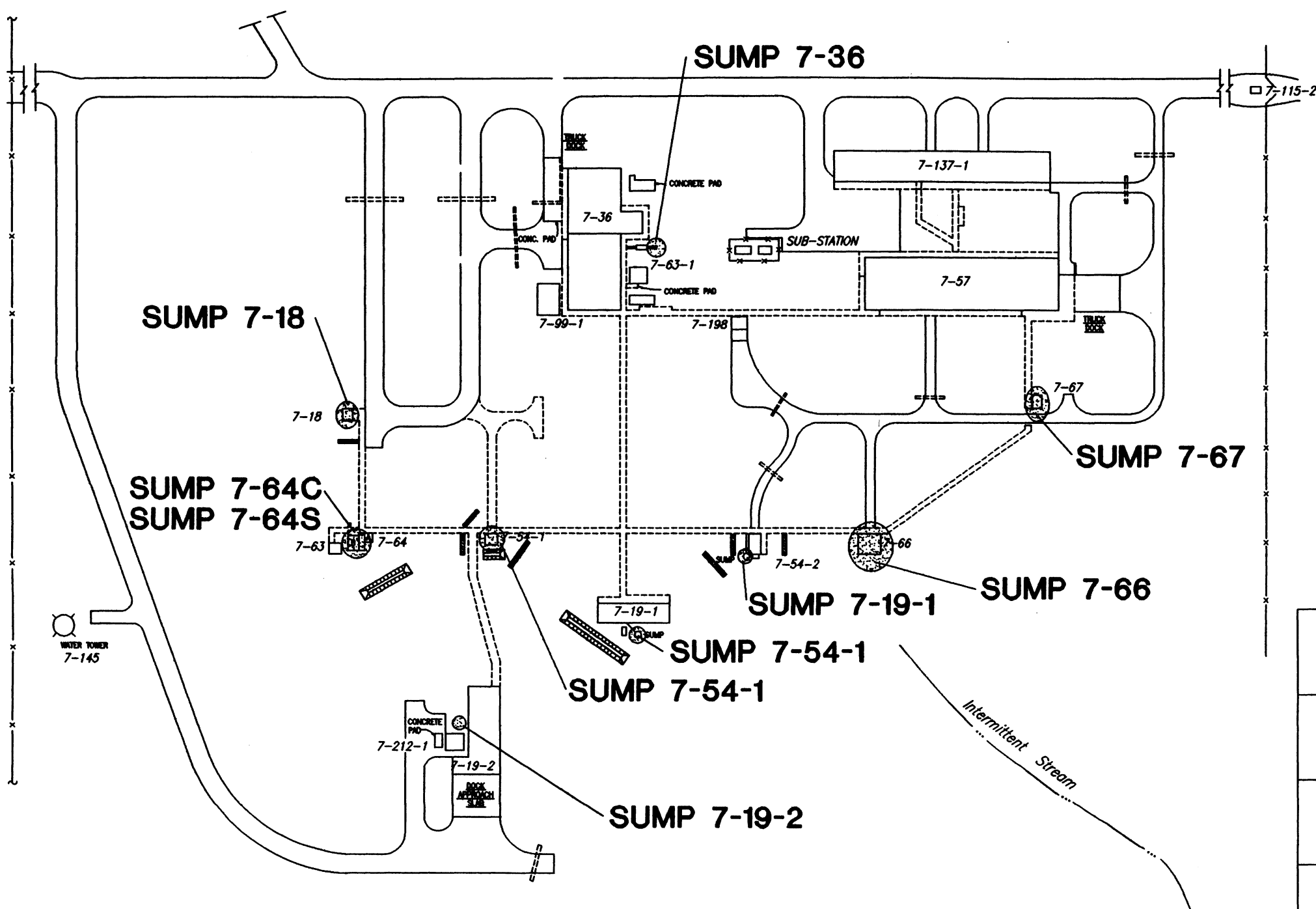
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 MIDDLETOWN, IOWA

Site Map of laap R07 Sump Locations
 Line 6
 (Formerly IAAP 7)

SOURCE: Mason & Hanger-Silas Mason Co., Inc.			
FILE NO. SMP07B	DRWN BY: D. ALLEN	PROJECT #: 7150-100	SHT. 1 OF 1
DATE 11/95			FIGURE: 1-9

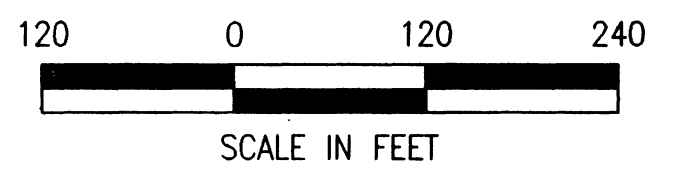


LEGEND

- ROAD
- WALKWAY
- FENCE
- BUILDING #
- BERM (EXPLOSION PROTECTION)
- TOPOGRAPHIC CONTOUR
- CONTOUR INTERVAL = 5 FEET
- INTERMITTENT STREAM
- SUMP AREA

SAMPLE KEY

- MONITORING WELL
- SOIL SAMPLE
- SUBSURFACE SOIL SAMPLE
- SUBSURFACE & SURFACE SOIL SAMPLE
- SURFACE WATER SAMPLE
- SEDIMENT SAMPLE
- SURFACE WATER & SEDIMENT SAMPLE
- SCREENING SAMPLE
- GEOPROBE SAMPLE
- PIEZOMETER SAMPLE
- GEOPROBE & PIEZOMETER SAMPLE




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IOWA ARMY AMMUNITION PLANT
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Site Map of IAP R08 Sump Locations
 Line 7
 (Formerly IAP 8)

SOURCE: Mason & Hanger-Silas Mason Co., Inc.			
FILE NO. BIA_08-C	DRWN BY: D. ALLEN	PROJECT #: 7150-100	SHT. 1 OF 1
DATE 11/95			FIGURE: 1-10