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**U.S. Army
Environmental
Center**

**FINAL SAMPLING AND ANALYSIS PLAN
FOR BACKGROUND SAMPLING
FORT SHERIDAN, ILLINOIS**

Contract No.: DAAA15-90-D-0017
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May 26, 1995

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U.S. ARMY ENVIRONMENTAL CENTER
Aberdeen Proving Ground, MD 21010-5401

Prepared by:



Environmental
Science &
Engineering, Inc.

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**Final Sampling and Analysis Plan
for Background Sampling
Fort Sheridan, Illinois**

**Prepared for:
Commander
U.S. Army Environmental Center
Edgewood Area
Aberdeen Proving Ground, Maryland**

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May 25, 1995

ESE Project No. 490-2087-0110

Table of Contents

<u>Section</u>	<u>Page</u>
1.0 PROJECT DESCRIPTION	1-1
1.1 <u>Background Information</u>	1-1
1.2 <u>Project Purpose</u>	1-4
1.3 <u>Report Format</u>	1-4
 2.0 SITE MANAGEMENT	 2-1
2.1 <u>Mobilization</u>	2-1
2.2 <u>Site Access and Control</u>	2-3
2.3 <u>Documentation</u>	2-3
2.4 <u>Field Instrumentation</u>	2-3
2.5 <u>Decontamination</u>	2-3
2.6 <u>Control and Disposal of IDW</u>	2-4
 3.0 REMEDIAL INVESTIGATION DATA COLLECTION	 3-1
 4.0 CHEMICAL ANALYSIS PROGRAM	 4-1
 5.0 SITE SPECIFIC EXPLORATIONS	 5-1
5.1 <u>Background Area North</u>	5-4
5.1.1 Site Description	5-4
5.1.2 Sampling Program	5-4
5.2 <u>Background Area East</u>	5-7
5.2.1 Site Description	5-7
5.2.2 Sampling Program	5-7
5.3 <u>Background Area South</u>	5-11
5.3.1 Site Description	5-11
5.3.2 Sampling Program	5-11
5.4 <u>Background Area West</u>	5-11
5.4.1 Site Description	5-11
5.4.2 Sampling Program	5-11

5.5 Lake Michigan Bluff Area 5-14

 5.5.1 Site Description 5-14

 5.5.2 Sampling Program 5-14

5.6 Background Surface Water And Sediment Sampling 5-14

 5.6.1 Sampling Area Description 5-14

 5.6.2 Sampling Program 5-15

List of Tables

<u>Table</u>	<u>Page</u>
ES-1 Summary of Sampling and Analysis Program	ES-5
5-1. Summary of Sampling and Analysis Program - Sampling and Analysis Plan for Background Sampling - Fort Sheridan, Illinois	5-8
5-2. QA/QC Program and Sampling Rationale - Sampling and Analysis Plan for Background Sampling - Fort Sheridan, Illinois	5-9

List of Figures

<u>Figure</u>	
ES-1 Background Sampling Locations	ES-3
1-1. Site Location Fort Sheridan Military Reserve	1-3
2-1. Field Office and Sample Management Trailer Location	2-2
5-1. Background Sampling Areas	5-2
5-2. Background Area North - Sampling Location	5-5
5-3. Background Area East and Lake Michigan Bluff - Sampling Locations	5-10
5-4. Background Area South - Sampling Location	5-12
5-5. Background Area West - Sampling Location	5-13
5-6. Background Surface Water & Sediment Sampling Location	5-16

List of Appendices

Appendix

- A. Equipment List
- B. Technical Requirements for Hazardous Waste Containment

List of Acronyms and Abbreviations

BCD	Base Closure Division
BCT	BRAC Cleanup team
BEC	BRAC Environmental Coordinator
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
BSAP	Background Sampling and Analysis Plan
CERCLA	Comprehensive Environmental Response Compensation, and Liability Act
DOD OU	Department of Defense OU
DQOs	data quality objectives
ft-bgs	feet below ground surface
HASP	Health and Safety Plan
IDW	investigation derived waste
IEPA	Illinois Environmental Protection Agency
NCP	National Contingency Plan
OQAPP	Overall Quality Assurance Project Plan
OSHA	Occupational Safety and Health Administration
OU	Operable Units
OVM	organic vapor monitor
PCB	polychlorinated biphenyl
PID	photoionization detector
POL	petroleum, oils, and lubricants
QA/QC	Quality Assurance/Quality Control
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
USAEC	U.S. Army Environmental Center
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency

EXECUTIVE SUMMARY

The existing background database for Fort Sheridan is insufficient to permit a determination of background concentrations at acceptable statistical confidence levels. This Background Sampling and Analysis Plan (BSAP) is designed to address this issue through the collection of additional background samples at Fort Sheridan to support the statistical analysis and the Baseline Risk Assessment (BRA).

Some background data have been collected during previous phases of work at Fort Sheridan and are to be validated according to procedures listed in the Overall Quality Assurance Project Plan (OQAPP) (ESE, 1995). It is anticipated that the data collected under this BSAP will be combined with the validated portion of the previously collected data to constitute the complete background database at Fort Sheridan. The scope of work defined under this BSAP will provide adequate data to permit the objectives of the background sampling to be achieved even if none of the previously collected data pass the independent data validation program.

Background Sampling Areas

Areas for the collection of background samples were selected by the Base Realignment and Closure (BRAC) Cleanup Team (BCT) during a site visit on July 19, 1994. These areas were selected because they are believed to be unaffected by activities at Fort Sheridan based on a review of available site records and aerial photographs.

Ten locations for the collection of background samples have been identified. These locations have been grouped into five areas, based primarily on physical proximity, as follows:

- Background Area - North
- Background Area - East
- Background Area - South
- Background Area - West
- Lake Michigan Bluff Area
- Background Surface Water and Sediment Sampling Locations

Background sampling locations are presented in Figure ES-1.

Soil Sampling

At each location, soil borings will be continuously logged and screened with a photoionization detector (PID) or organic vapor monitor (OVM) as drilling advances to qualitatively assess the suitability of the area for background sampling.

Soil boring samples will be collected with a drill rig using hollow-stem augers and an appropriate soil sampling device as described in Subsection 4.4 of the OQAPP. Collection techniques and materials will conform to those presented in Subsection 4.4 of the OQAPP.

Three sets of soil samples will be retained for analysis from each soil boring except as described in the following paragraph. The samples will be collected from the surface and at distinct geologic strata encountered during drilling. This protocol will meet the BSAP objective of collecting data regarding background constituent concentrations in the soil(s) underlying Fort Sheridan. In the absence of variable geologic strata, samples will be obtained from the following intervals in order to provide general coverage along the length of the borehole: 0 to 0.5 feet, 6 to 8 feet, and 12 to 14 feet below ground surface (ft-bgs).

Each soil boring will be advanced to saturation and samples will be collected from unsaturated soils. If the water table is encountered at less than 12 ft-bgs the three sample intervals will be adjusted accordingly. If the unsaturated zone is less than 6 feet thick, only two soil samples will be collected from that location. In any case, a surface sample will be collected at each location.

Monitoring Well Installation and Groundwater Sampling

A four-inch diameter monitoring well will be installed in one of the soil borings drilled at each Background Area, except the bluff areas and surface water and sediment sampling as indicated in Figure ES-1. Each well will be installed according to procedures presented in Subsection 4.5 of the OQAPP. Groundwater samples will be collected from each well for analysis on two occasions. The sampling episodes will coincide with two

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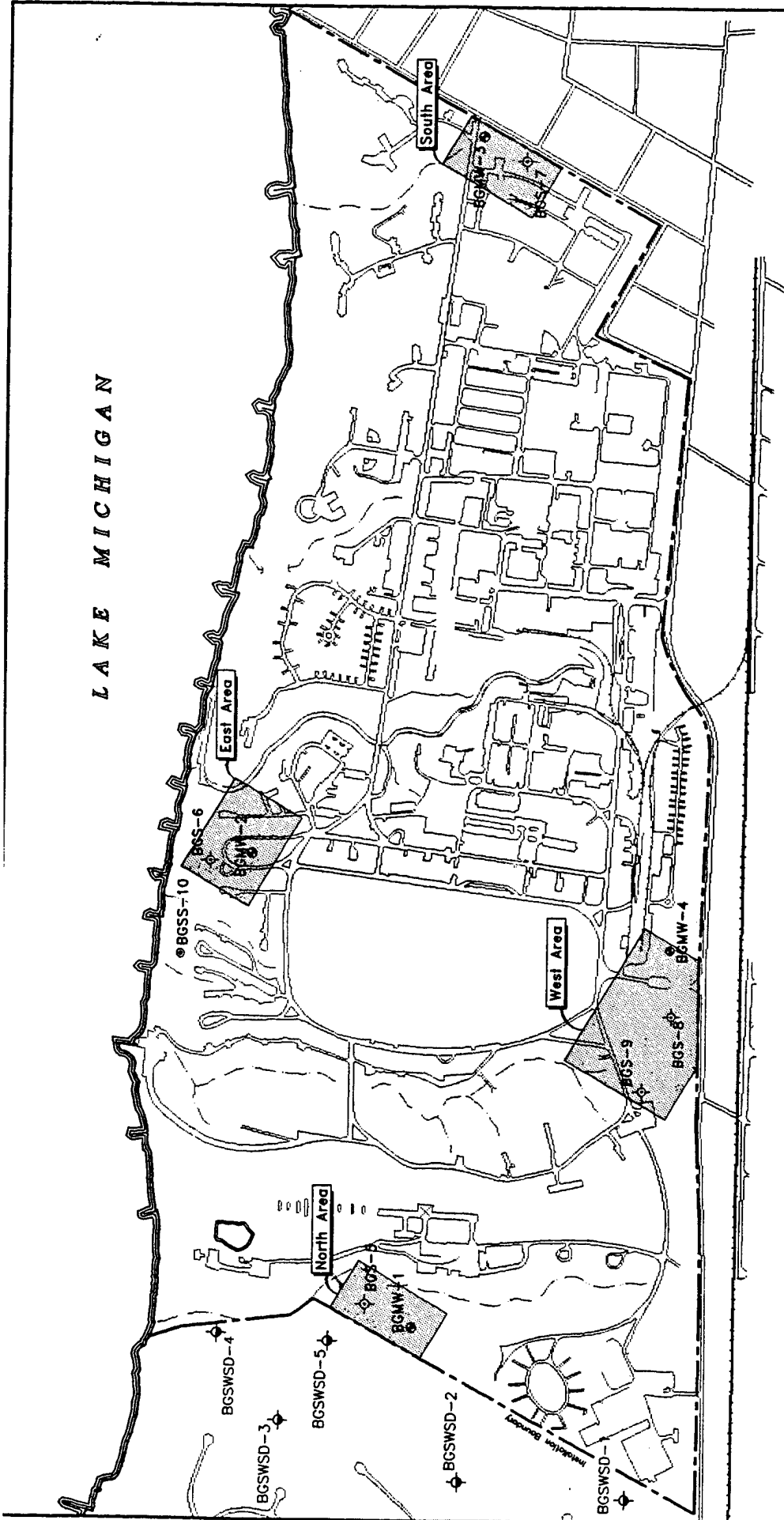


Figure ES-1 Background Sampling Locations

Fort Sheridan
Fort Sheridan, Illinois

Adapted from Official Post Map, Directorate of Engineering and Housing, Fort Sheridan, Illinois, January 6, 1989.

- ◆ Proposed Background Soil Sample Location
- Proposed Background Soil Sample/Monitoring Well Location
- Proposed Background Surface Soil Sample Location
- ⊕ Proposed Background Surface Water/Sediment Sample Location

DVL 11/28/94 490-2087
Revised DVL 05/26/95 FSBKS2S

comprehensive rounds of groundwater sampling; the first to be conducted during the Surplus Operable Unit field work and the second as part of the Department of Defense Operable Unit field work. The samples will be collected according to procedures presented in Subsection 4.5 of the OQAPP.

Surface Water and Sediment Sampling

Background surface water and sediment samples will be collected from the locations indicated on Figure ES-1. There are no indications based on a review of historical data that these locations have been affected by Fort Sheridan mission or surrounding community activities. The analytical data from the sample analyses will be used in support of the BRA. The surface water and sediment samples will be collected according to procedures presented in subsections 4.6 and 4.7 of the OQAPP, respectively. Access to these locations will be from the Lake Michigan beach.

Sample Analyses

Samples will be analyzed according to the program presented in Table ES-1 and by the methods specified in Section 7.0 of the OQAPP.

Investigation Derived Waste Handling

Soil cuttings from background areas are presumed to be unaffected by installation mission activities. However, soils from locations with PID/OVM readings above background will be containerized and handled appropriately. Cuttings from unaffected soil borings will be mixed with pelletized bentonite and placed back in the boring. Cuttings from unaffected borings in which wells are constructed will be spread on the ground.

Groundwater from monitoring well purge and development activities at background areas is presumed to be unaffected until laboratory data are available to demonstrate otherwise. Consequently, this water will be discharged to the ground near the monitoring well.

Liquids from decontamination activities will be containerized and a single composite sample will be analyzed for the parameters required by the local publicly owned treatment works prior to discharge to their system.

TABLE ES-1
Summary of Sampling and Analysis Program
Sampling and Analysis Plan for Background Sampling
Fort Sheridan, Illinois

SAMPLE LOCATION	SAMPLE POINT	SAMPLED MEDIA	ANALYTICAL PARAMETERS*										LDP/soil or SLP water		
			TCL Metals (Total)	TCL Metals (Filtrd)	VOCs	SVOCs & TRPH	Pesticide/PCBs/Herbicide	Explosives	TCLP	Cyanide					
Background	BGS/MW-1X	Soil/Groundwater	y	y	y	y	y	y	y	y	y	y	y	y	y
Area North	BGS-5X	Soil	y	-	y	y	y	y	y	y	y	y	y	-	-
Background	BGS/MW-2X	Soil/Groundwater	y	y	y	y	y	y	y	y	y	y	y	y	y
Area East	BGS-6X	Soil	y	-	y	y	y	y	y	y	y	y	y	-	-
Background	BGS/MW-3X	Soil/Groundwater	y	y	y	y	y	y	y	y	y	y	y	y	y
Area South	BGS-7X	Soil	y	-	y	y	y	y	y	y	y	y	y	-	-
Background	BGS/MW-4X	Soil/Groundwater	y	y	y	y	y	y	y	y	y	y	y	y	y
Area West	BGS-8X	Soil	y	-	y	y	y	y	y	y	y	y	y	-	-
	BGS-9X	Soil	y	-	y	y	y	y	y	y	y	y	y	-	-
Bluff Surface Sample	BGSS-10	Soil	y	-	y	y	y	y	y	y	y	y	y	-	-
Background Sediment	BGSD/SW-1	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	-	-
and Surface Water	BGSD/SW-2	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	-	-
Samples	BGSD/SW-3	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	-	-
	BGSD/SW-4	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	-	-
	BGSD/SW-5	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	-	-
Waste Char.	COMPOSITE	Water	***	***	***	***	***	***	***	***	***	***	***	***	***

* TCL = Target Compound List, VOC = Volatile Organic Compound, SVOC = Semi-VOC, PCB = Polychlorinated Biphenyl, TRPH = Total Recoverable Petroleum Hydrocarbons, LDP = Landfill Design Parameters, SLP = Standard Landfill Parameters & TCLP = Toxicity Characteristic Leaching Procedure. LDFs include wet & dry bulk density, nitrate, hardness, sulfate, chloride, TOC, Total Organic Carbon (TOC), & cation exchange capacity. SLPs include fluoride, nitrate, hardness, sulfate, chloride, TOC, chemical oxygen demand, boron, alkalinity, and Total Dissolved Solids.
 ** TCLP for Pb will be run on the soil samples from one boring at each of the four background areas (N, E, S, W).
 *** A minimum of one characterization sample will be collected from every 10 containers or fraction thereof. The sample(s) will be tested for the list of analytes required by the POTW before discharge.

Site Restoration

The sampling locations in lawn areas will be restored to their original condition by leveling the area and/or spreading out sand to leave no mounds or depressions. The area will then be seeded and mulched, as necessary.

1.0 PROJECT DESCRIPTION

The U.S. Army Installation Restoration Program (IRP) was designed to identify and control or abate contaminant migration resulting from past operations at the Department of the Army (DA) installations. The IRP is the DA's environmental response under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. As delegated by Executive Order 12580, the DA is responsible for determining response actions, consistent with the National Contingency Plan (NCP) (40 CFR Part 300), necessary for the abatement of contamination resulting from releases of hazardous substances.

The U.S. Army Environmental Center (USAEC), formerly the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), is an operating entity for the DA Staff, under supervision of the Director of Environmental Programs. The task of compiling this document was performed under the auspices of USAEC.

1.1 Background Information

Fort Sheridan was recommended to the Secretary of Defense for closure by the Commission on Base Realignment and Closure (BRAC). To support DA decisions regarding preparation of the property for release, USAEC is responsible for implementing environmental studies and overseeing restoration activities (if needed) before property transfer. The Base Closure Division (BCD) of USAEC plans, directs, coordinates, and controls environmental investigation projects in support of the DA BRAC Program. These studies will comply with CERCLA, SARA, the NCP, and the Fort Sheridan work will be conducted in consultation with the Illinois Environmental Protection Agency (IEPA) and U.S. Environmental Protection Agency (USEPA).

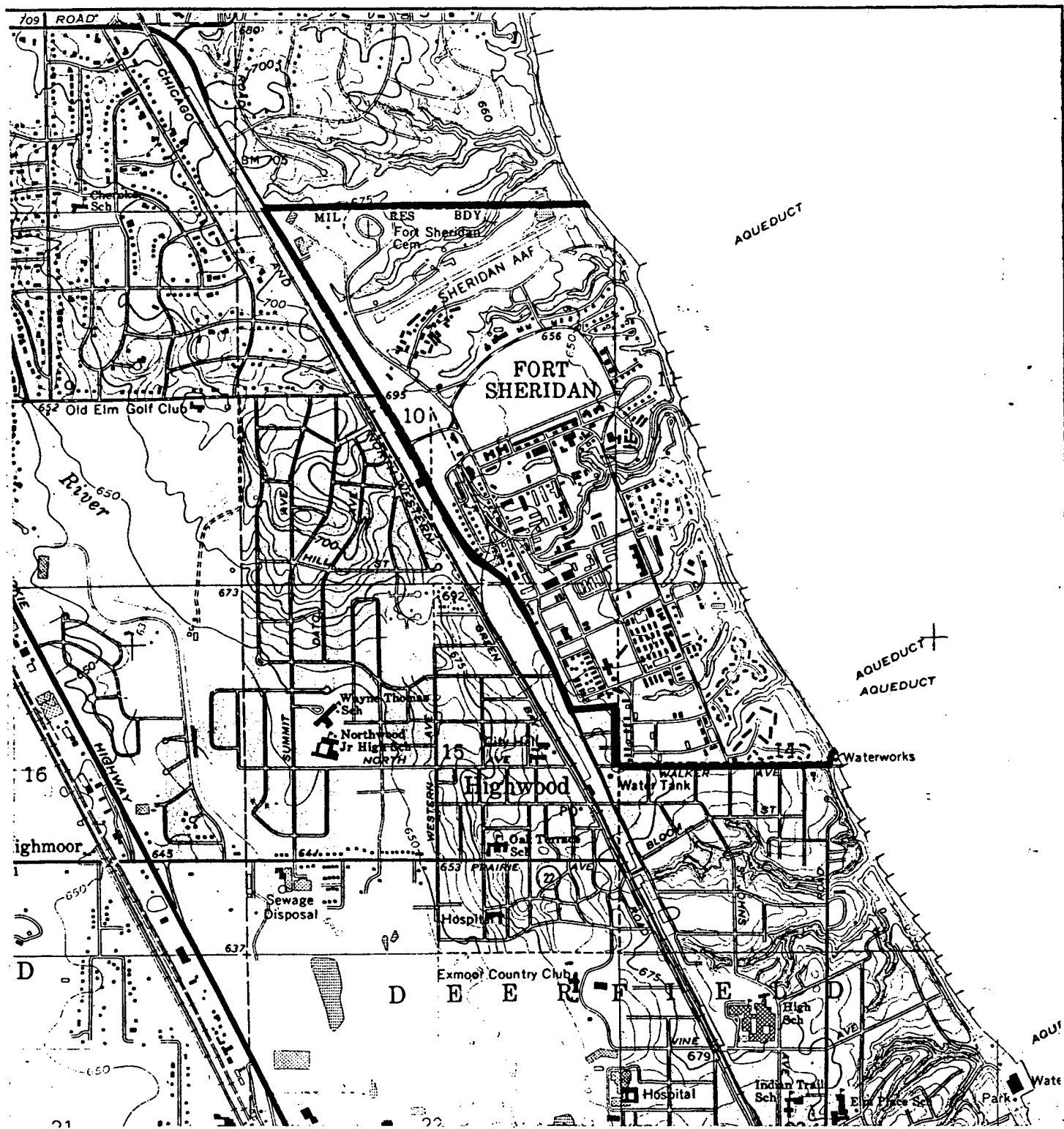
Preliminary assessments of Fort Sheridan, conducted in 1982 and 1989, identified several areas on the installation affected by previous landfilling activities; storage and handling of petroleum, oils, and lubricants (POL), as well as other motor pool wastes; polychlorinated biphenyl (PCB)-containing electrical equipment; and storage and handling of pesticides (Gross et al., 1982; and Argonne National Laboratory, 1989). The nature

and duration of these activities at Fort Sheridan justify conducting a Remedial Investigation/Feasibility Study (RI/FS) to verify and quantify the nature and extent of associated constituents, perform human health and environmental risk assessments, and evaluate remedial action alternatives leading to individual study area response actions, if necessary. The location of Fort Sheridan is shown in Figure 1-1.

At Fort Sheridan, the RI objectives are to acquire the data necessary to define the distribution, types, and concentrations of site-related constituents; assess potential current and/or future risks to human health and the environment from exposure to these constituents; and support the evaluation of remedial alternatives in the FS. The RI data will be sufficient to support the Baseline Risk Assessment (BRA) and in those instances where further action is required will provide sufficient information for the FS, Proposed Plan, and Record of Decision .

The RI/FS program is being conducted in accordance with the USEPA RI/FS Draft Guidance Manual, which addresses the SARA amendments to CERCLA and state guidelines (USEPA, 1988). As such, the RI/FS program is implemented in accordance with protocols, procedures, and work scopes identified in the following plans: (1) the site specific sampling and analysis plans, of which this Sampling and Analysis Plan for Background Sampling (BSAP) is an example; (2) the Overall Quality Assurance Project Plan (OQAPP) (ESE, 1995); and (3) the Health and Safety Plan (HASP)(ESE, 1993 as revised). These plans correspond directly to the Field Sampling Plan, the QAPP, and the HASP called for in USEPA guidance.

Fort Sheridan has been divided into two Operable Units (OUs) to facilitate the implementation of the RI/FS program and expedite the reuse of surplus Army property under the BRAC program. The first OU, designated the Surplus OU, consists of the property still owned by the U.S. Army and planned for disposal and reuse. This area is in the north end of the former Fort Sheridan and is primarily comprised of the golf course and historic district. The second OU is designated the Department of Defense OU (DOD OU), since this area will remain the property of the U.S. Navy and Army Reserve. It includes most of the area to the south of Bartlett Ravine and the Army Reserve property and cemetery in the northwest corner of Fort Sheridan.



ILLINOIS

QUADRANGLE LOCATION

Project #490-2087
Adapted From USGS Topographic Quadrangle:
Highland Park, Illinois, 1980.

ES&I Environmental Science & Engineering, Inc.

0 2000 feet

N

Figure 1-1
Site Location
Background Sampling & Analysis Plan

Fort Sheridan
Fort Sheridan, Illinois

1.2 Project Purpose

The existing background database is insufficient to permit a determination of background concentrations at acceptable statistical confidence levels. This BSAP is designed to address this issue through the collection of additional background soil and groundwater samples at the installation to support the statistical analysis and the BRA. During a site visit conducted by the BRAC Cleanup Team (BCT) on July 19, 1994 four locations for the collection of these samples were identified. The rationale, approach, and schedule for conducting the additional field activities required to address these issues are discussed in detail when they differ from or are not included in the OQAPP.

As has been indicated, some background data have been collected during previous phases of work at Fort Sheridan. These data are currently being validated independently of the Army's laboratory in accordance with the OQAPP. It is anticipated that the data collected under this BSAP will be combined with the validated portion of the previously collected data to constitute the complete background database at Fort Sheridan. However, the scope of work defined under this BSAP is expected to provide adequate data to permit the objectives of the background sampling to be achieved even if none of the previously collected data pass the independent data validation program.

1.3 Report Format

The Background SAP is presented in the following five sections, and when combined with the OQAPP is equivalent to a Field Sampling Plan as described in U.S.EPA guidelines:

- Section 1.0 - Project Description
- Section 2.0 - Site Management
- Section 3.0 - Remedial Investigation Data Collection
- Section 4.0 - Chemical Analysis Program
- Section 5.0 - Site Specific Exploration

For the most part, information that must be included in Sections 1.0, 2.0, 3.0, and 4.0 is already discussed in the OQAPP. Rather than reiterate such information here, it is incorporated by reference to specific OQAPP subsections. Site specific explorations for

collecting background data are not described in the OQAPP and hence are presented in detail in Section 5.0 of this BSAP.

Section 1.0 presents the project overview and describes the purpose of this BSAP. Section 2.0, Site Management summarizes the support activities necessary for data collection and includes mobilization, site access considerations, instrumentation, documentation, field instrumentation, decontamination, and control and disposal of contaminated materials. Section 3.0, Remedial Investigation Data Collection, is a description of the various field procedures to be used such as; well installation and sampling; soil sampling; handling of investigation derived waste (IDW), field quality control, ...etc.. Section 4.0, The Chemical Analysis Program, describes the analytical methods, data management, and analytical quality control procedures. Finally, Section 5.0, Site Specific Explorations, describes the field program for the collection of background samples at Fort Sheridan including sample locations and the chemical analyses to be conducted.

Additional background information is provided in Section 1.0 of the OQAPP and its attendant subsections. The reader is referred to that document for discussions of the following:

- Population and Surrounding Land Use - Subsection 1.2.2
- Physical Setting - Subsection 1.2.3
- Climate -Subsection 1.2.3
- Physiography -Subsection 1.2.3
- Geological Units - Subsection 1.2.3
- Soils - Subsection 1.2.3
- Biota - Subsection 1.2.3

2.0 SITE MANAGEMENT

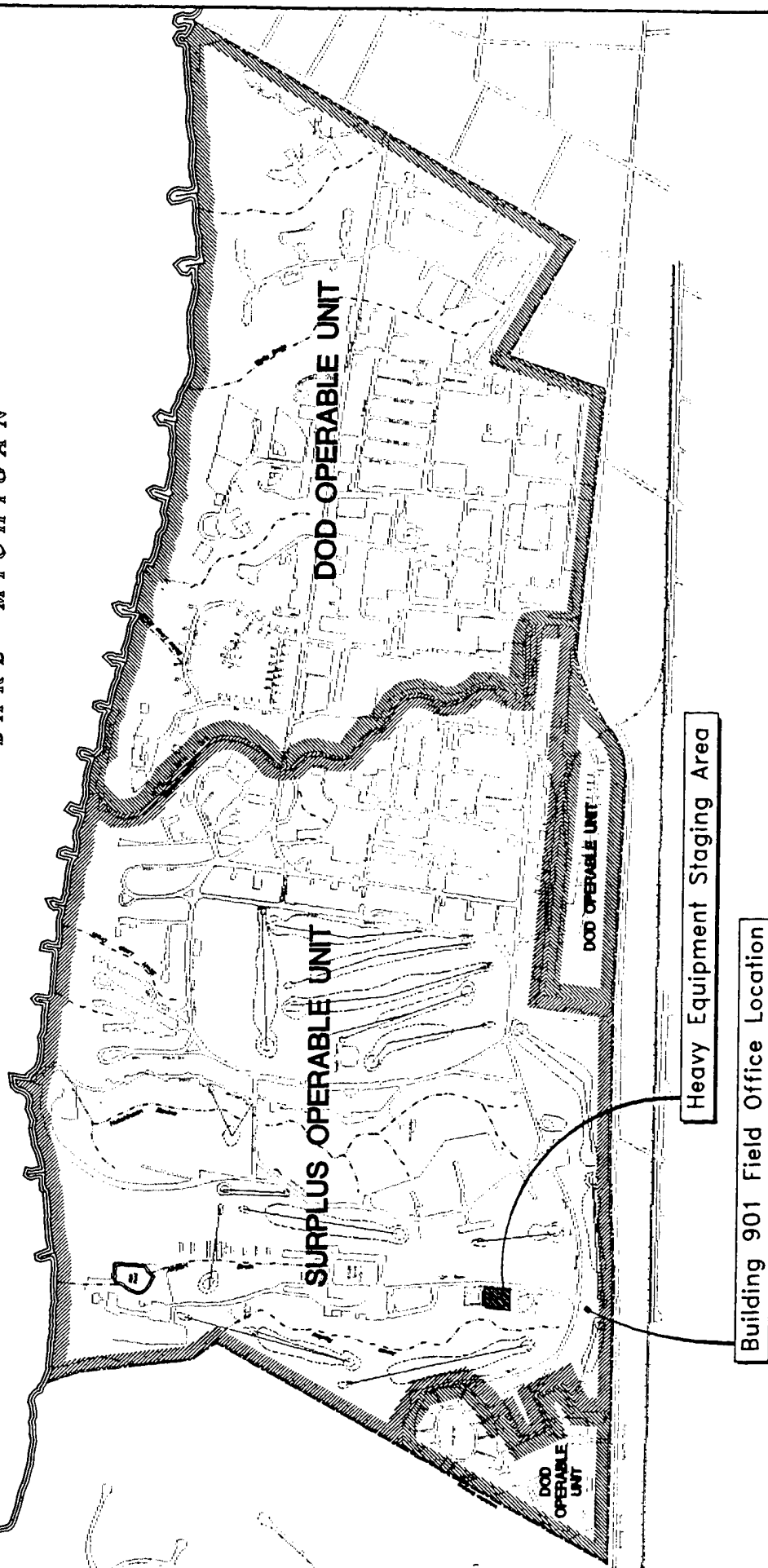
Site management activities support the data collection activities and include mobilization, site access and control, documentation, field instrumentation, decontamination, and control and disposal of investigation-derived waste (IDW). The following subsections present the salient points summarized from their counterparts in the OQAPP. The reader is referred to Section 2.0 of the OQAPP for a discussion of the project management structure. Unless otherwise discussed and specified, the work conducted under this BSAP will be performed in strict accordance with the protocols and procedures included in the OQAPP and the Fort Sheridan Health and Safety Plan, as revised.

2.1 Mobilization

The following activities will be performed at Fort Sheridan as part of mobilization:

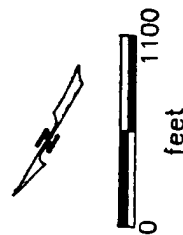
- Command post setup, including field and sample management office, communications (i.e., two-way radios), portable toilets, and utility hookups and water treatment system setup, as needed. The location of the field and sample management office is shown in Figure 2-1.
- Staking and utility clearance (i.e., excavation permits) of each exploration location.
- Field team orientation.
- Field team health and safety meeting.
- Check in, and hold field schedule discussions, with the Fort Sheridan BRAC Environmental Coordinator (BEC). Coordinate work with the Navy Public Works and Security Offices, and Lake County Forest Preserve, if requested to do so by the BEC.

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Adapted from Official Post Map, Directorate of Engineering and Housing, Fort Sheridan, Illinois, January 6, 1989

Figure 2-1
Field Office and Heavy Equipment
Staging Area Locations
 Background Sampling and Analysis Plan
 Fort Sheridan
 Fort Sheridan, Illinois



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2.2 Site Access and Control

Fort Sheridan is an open installation and access to most sites is unrestricted. Written access permission for any restricted areas will be obtained from, or through, the BEC prior to conducting any field work in these areas.

Field equipment left onsite overnight will be locked, if possible, in a trailer or vehicle. When heavy well drilling or soil boring equipment is in use, the work site will be cordoned off with brightly colored construction tape. A sign will also be visible stating "Keep Out, Environmental Investigation Construction Area. Direct Inquires to Ft. Sheridan BRAC Office (708) 926-7201."

2.3 Documentation

The reader is referred to Subsection 4.1.2 of the OQAPP for discussions of record keeping requirements and procedures that will be followed. Documentation, records, and plans (described in the referenced subsection) of those activities performed at Fort Sheridan will be kept on-site during field operations. Particular items that will be kept onsite include the HASP, the OQAPP, and certifications that contractor employees have current Occupational Safety and Health Administration (OSHA) training in Hazardous Waste Operations according to 29 CFR 1910.120.

2.4 Field Instrumentation

The reader is referred to Subsection 6.1 of the OQAPP for details on field instrumentation and calibration requirements. A list of equipment anticipated to be used during the implementation of this BSAP is included as Appendix A.

2.5 Decontamination

Decontamination procedures will conform to the requirements discussed in Subsection 4.12 of the OQAPP.

2.6 Control and Disposal of IDW

Soil cuttings from background areas are presumed to be unaffected by installation mission activities. However, this plan calls for soils from background areas to be continuously screened with a photoionization detector (PID) or an organic vapor monitor (OVM) during sample collection. The screening procedure is described in Section 5.0 of this BSAP. Soils from locations with PID/OVM readings above background will be containerized and handled according to protocol presented in the Subsection 4.15 of the OQAPP. Cuttings from unaffected soil borings will be mixed with pelletized bentonite and placed back in the boring. Cuttings from unaffected borings in which wells are constructed will be spread on the ground.

IDW water from monitoring well purge and development activities at background areas is presumed to be unaffected by mission activities. Consequently, this water will be discharged to the ground near the monitoring well unless analysis of groundwater monitoring samples show that the groundwater has been affected, in which case it will be composited and containerized in a large holding tank and handled according to protocol presented in Subsection 4.15 of the OQAPP. Groundwater from monitoring wells installed in borings with PID/OVM readings above background will be containerized and handled according to protocol presented in Subsection 4.15 of the OQAPP.

All IDW water from decontamination activities will be containerized and a single composite sample will be analyzed for the parameters required by the local publicly owned treatment works prior to discharge to their system.

Containers of soil and/or water will be stored in Building 86 or another location approved by the BCT until their appropriate disposal. Building 86 is currently used to store small quantities of hazardous waste at Fort Sheridan. The storage area will, at a minimum, meet the technical requirements of 40 CFR 264 Subpart I and analogous state regulations. These requirements are presented in Appendix B.

3.0 REMEDIAL INVESTIGATION DATA COLLECTION

This section includes descriptions of information gathering methods required to meet the site-specific data quality objectives (s). Since this information has already been adequately presented in the OQAPP, the reader is referred to Sections 3.0 (specifically Tables 3-2 through 3-16) and 4.0 of that document for pertinent discussions of DQOs and investigatory techniques, respectively. Sections 5.0, 6.1, and 11.1 of the OQAPP discuss sample custody procedures, field instrumentation calibration, and field instruments, respectively. Section 5.0 of this document describes the site-specific field investigation programs that will be implemented at the various background areas at Fort Sheridan.

Background data, in general, are necessary to permit an evaluation of the significance of constituent concentrations detected during the RI and to support the BRA in determining background potential risks and hazard indices and to evaluate potential risks associated with Fort Sheridan study areas. Specifically, additional background data are required for Fort Sheridan to develop a statistically defensible background database with a 95% upper confidence limit.

The characteristic of completeness of collected data, as defined in Subsection 3.4 of the OQAPP, is a measure of the amount of valid data obtained compared to the total data obtained. Although the expected minimum level of completeness to be achieved for each analyte for the field sampling effort and laboratory analyses for the Fort Sheridan project as a whole is 90 percent, due to the critical nature of the background data, the level of completeness prescribed for the work described in this BSAP is 100 percent.

4.0 CHEMICAL ANALYSIS PROGRAM

The chemical analysis program and analytical methods presented in Sections 6.0, 7.0, 8.0 and 9.0 of the OQAPP and their attendant subsections will be strictly adhered to during the implementation of the work described in Section 5.0 of this document. The reader is referred to these sections of the OQAPP for detailed discussions of field instrument calibration procedures (Subsection 6.1), laboratory instrumentation (Subsection 6.2), analytical methodologies (Section 7.0), and data reduction and validation procedures (Subsections 8.1 and 8.2).

Sample holding times, container requirements, and preservation techniques are described in detail in Subsection 4.13 of the OQAPP. Specific chemical analyses and QC sample requirements to be used for the background sampling are included in Section 5.0 of this BSAP.

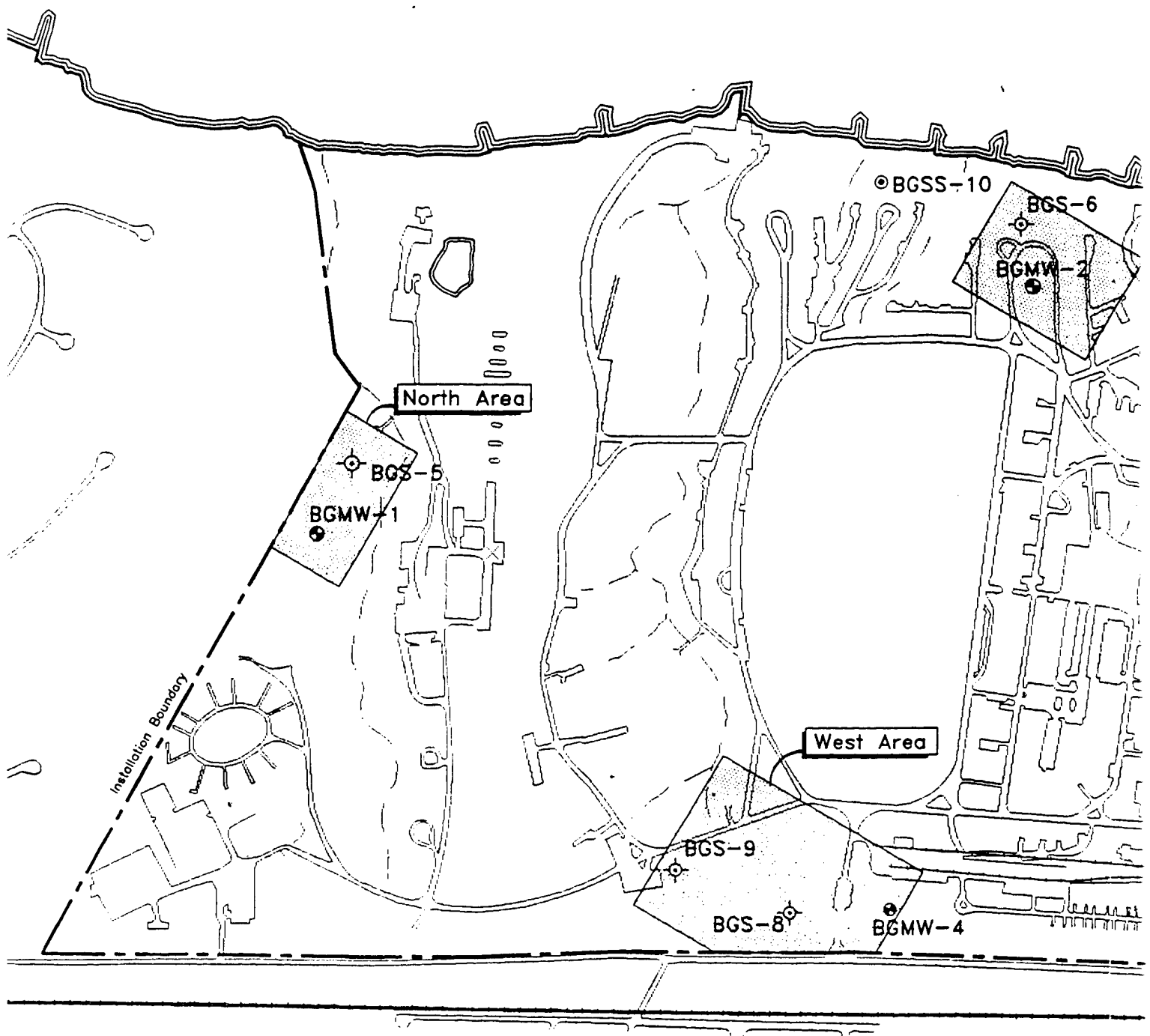
5.0 SITE SPECIFIC EXPLORATIONS

This section presents individual background study area descriptions and proposed sampling and analytical programs. The technical objective of the background sampling program presented herein is to ensure that adequate background data are collected to permit an evaluation of the significance of constituent concentrations detected during the RI and to support the BRA in determining background potential risks and hazard indices and to evaluate potential risks associated with Fort Sheridan study areas.

Background sampling was performed during previous on-site activities; however, the number of background samples collected is insufficient to establish background levels of constituents at Fort Sheridan with a 95% upper confidence limit. To enable this degree of statistical confidence to be established and to support the BRA, additional soil and groundwater quality data from unaffected areas of the installation will be collected. These data will then be combined with previously collected validated data to establish a benchmark with which to compare analytical data from known or potentially affected areas.

Areas for the collection of background samples were selected by the BCT during a site visit on July 19, 1994. These areas, indicated on Figure 5-1, were selected because they are believed to be unaffected by activities at Fort Sheridan based on a review of available site records and aerial photographs.

At each location soil borings will be continuously logged and samples will be screened with a PID or OVM as drilling advances to qualitatively assess the suitability of the area for background sampling. The screening procedure will consist of placing two to four ounces of soil in a canning jar. The jar opening will then immediately be covered with aluminum foil. The contents of the jar will be allowed to equilibrate for approximately 15 minutes at which time the probe of the PID or OVM will be inserted into the jar through the foil. The sustained PID or OVM reading will be noted in the drilling log. A sustained reading is defined as the reading observed approximately five to ten seconds after insertion of the meter probe into the jar. However, some discretion will be allowed the site geologist based on site conditions (i.e. soil moisture, atmospheric conditions).



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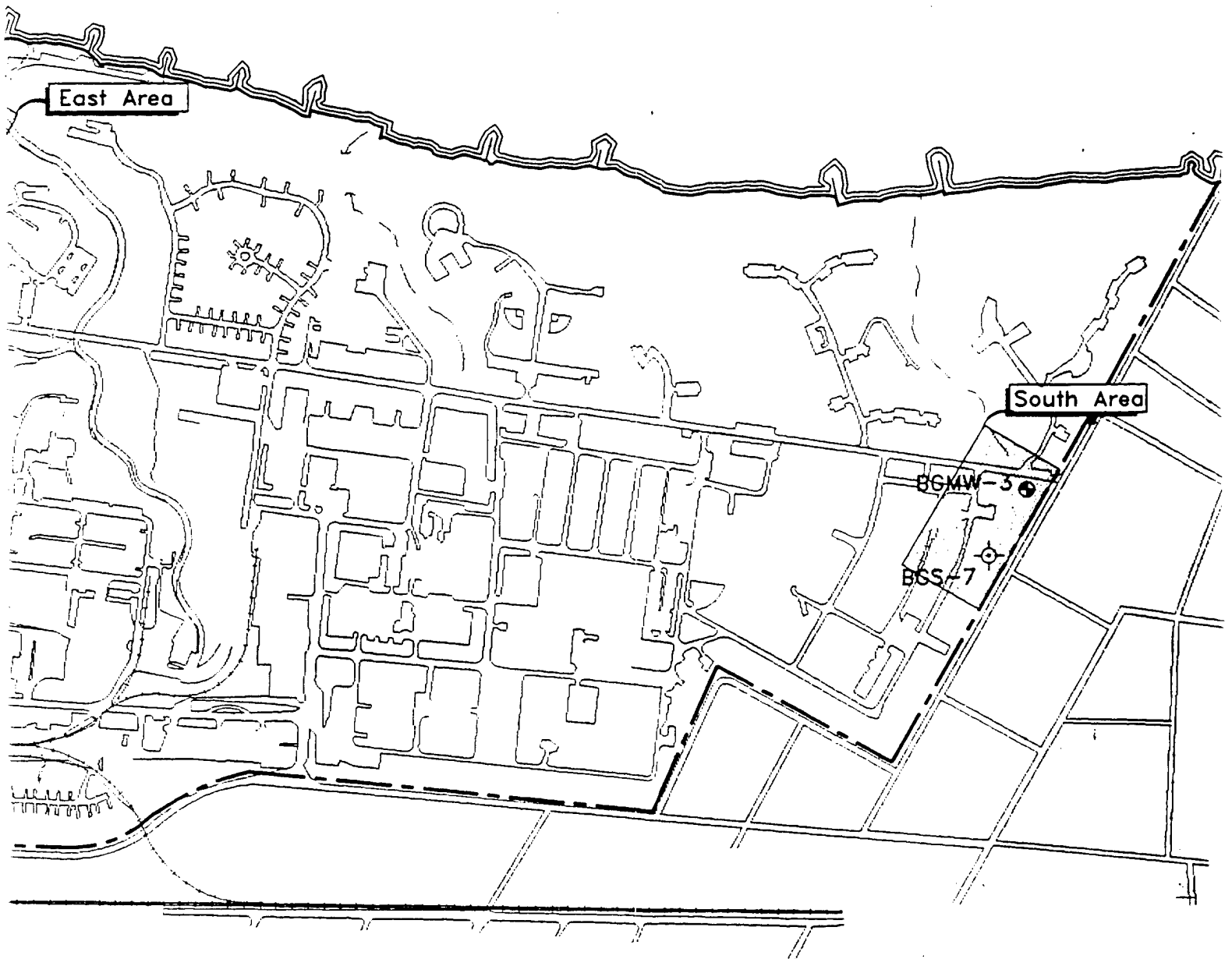
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- ⊕ Proposed Background Soil Sample Location
- Proposed Background Soil Sample/Monitoring Well Location
- ⊙ Proposed Background Surface Soil Sample Location

Adapted from Official Post Map, Directorate of Engineering and Housing, Fort Sheridan, Illinois, January 6, 1989.

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2

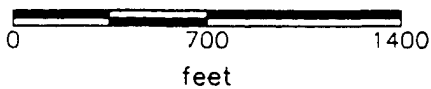
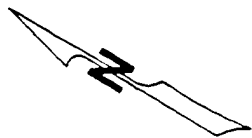


Figure 5-1
Background Sampling Areas
Background Sampling and
Analysis Plan
Fort Sheridan
Fort Sheridan, Illinois

A sustained reading above background in any of the screened samples will be cause to abandon the boring. A portion of any field-screened sample collected from a subsequently abandoned borehole will be analyzed for the same analyte list as other background samples. A maximum of two borings will be abandoned at any area. The third boring will be completed and sampled regardless of the field screening results and a replacement, background location will be selected by the BCT. Sampling will be conducted at the replacement location in manner identical to that described in this BSAP. The final disposition of the data from this third boring will be determined based on the laboratory analytical results from the samples collected.

The background PID/OVM reading will be defined as the highest reading displayed by the screening device when it is exposed to the ambient air of the sampling location. This reading will be determined for each location before drilling begins and collected upwind of the sampling location. These data regarding the presence of VOCs will be used to qualitatively evaluate whether the soils at each location have been affected by mission activities.

The areas discussed below have been selected by the BCT for assessment under this BSAP. Ten locations for the collection of background samples have been identified. These locations have been grouped into five groups, based primarily on physical proximity, as follows:

- Background Area - North
- Background Area - East
- Background Area - South
- Background Area - West
- Lake Michigan Bluff Area

It is anticipated that the work described in the following paragraphs will be completed according to the schedule presented here.

Receive regulatory concurrence on OQAPP

Apr 95

Receive regulatory concurrence on remaining plans (i.e. Site-Specific Sampling and Analysis Plans for the Surplus OU)	June 95
Mobilize for background field effort	July 95
Initiate background field work	July 95

5.1 Background Area North

5.1.1 Site Description

Background Area North is located between Janes Ravine and the northern boundary of the installation. The planned sampling locations for Background Area North are shown on Figure 5-2. A portion of this area is currently utilized as a golf course; however there is no evidence that the area has been affected by any installation mission activities. The remainder of the area is open grass punctuated by trees. The installation cemetery is located just to the west of the area and the abandoned runway is to the south across Janes Ravine.

5.1.2 Sampling Program

The following paragraphs outline the investigation proposed to meet the technical objectives discussed in Section 5.0.

Soil Sampling

Soil samples will be collected at the two locations indicated on Figure 5-2. Three sets of soil samples will be retained for analysis from each boring. The samples will be collected from the surface and at distinct geologic strata encountered during drilling. In the event repetitive intercalated strata are encountered, efforts will be made to collect a sample of each major soil type (e.g. clay, silt, sand) for analysis. However, each stratum will not be sampled. This protocol will meet the BSAP objective of collecting data regarding background constituent concentrations in the soil(s) underlying Fort Sheridan.

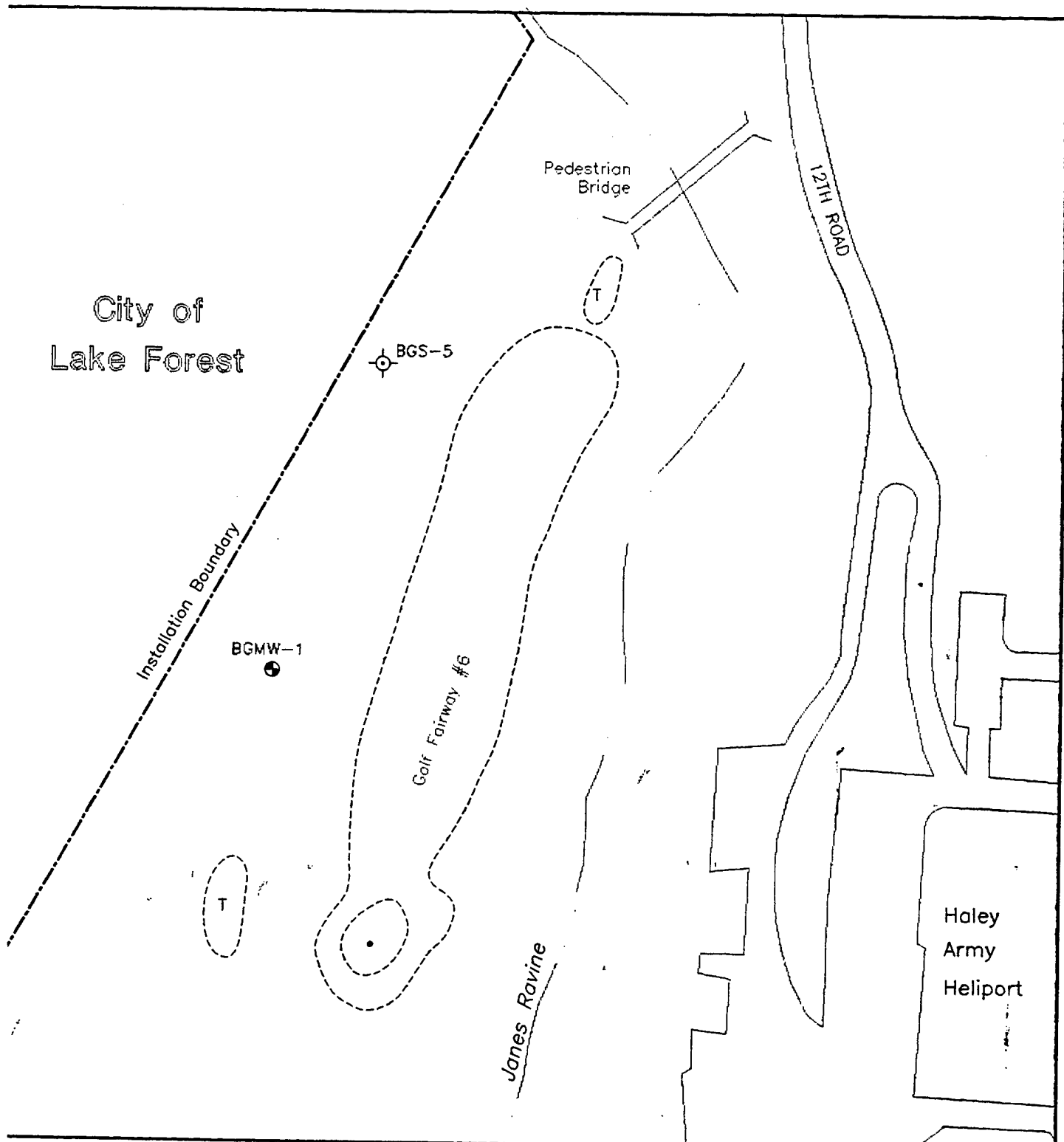
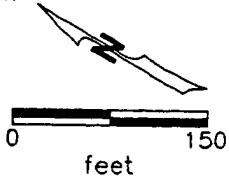


Figure 5-2
Background Area North
Sampling Locations
 Background Sampling and
 Analysis Plan
 Fort Sheridan
 Fort Sheridan, Illinois

- ⊕ Proposed Background Soil Sample Location
- Proposed Background Soil Sample/Monitoring Well Location

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Determination of what constitutes a distinct zone will be made by the site geologist based on the Unified Soil Classification System (USCS) description of the sample and field index tests (e.g. field penetrometer, plasticity). In the absence of variable geologic strata, samples will be obtained from the following intervals in order to provide general coverage along the length of the borehole: 0 to 0.5 feet, 6 to 8 feet, and 12 to 14 feet below ground surface (ft-bgs).

The soil borings will be advanced to saturation and samples will be collected from unsaturated soils. If the water table is encountered at less than 12 ft-bgs the three sample intervals will be adjusted accordingly. If the unsaturated zone is less than 6 feet thick only two soil samples will be collected from that location. In any case, a surface sample will be collected at each location. Borings in which monitoring wells are to be installed will be drilled and logged to 10 feet below saturation. The wells will be constructed to straddle the water table.

The samples will be collected with a drill rig using hollow-stem augers and an appropriate soil sampling device as described in Subsection 4.4 of the OQAPP. Collection techniques and materials will conform to those presented in Subsection 4.4 of the OQAPP. Access to these locations will be via Airport Road and the bridge across Janes Ravine. Ground disturbance from well installation and soil boring activities will be repaired.

Groundwater Sampling

A four-inch diameter monitoring well will be installed in one of the soil borings drilled at Background Area North as indicated in Figure 5-2. The well will be installed according to procedures presented in Subsection 4.5 of the OQAPP. Groundwater samples will be collected from this well for analysis on two occasions. The sampling episodes will coincide with two comprehensive rounds of groundwater sampling; the first to be conducted during the Surplus Operable Unit RI field work and the second as part of the Department of Defense Operable Unit RI field work. The samples will be collected according to procedures presented in Subsection 4.5 of the OQAPP.

Sample Analyses

Samples will be analyzed according to the program presented in Table 5-1 of this document and by the methods specified in Section 7.0 of the OQAPP. The Quality Assurance/ Quality Control (QA/QC) Program for the background sampling is outlined in Table 5-2.

5.2 Background Area East

5.2.1 Site Description

Background Area East is located just south of Scott Loop Drain on the bluff over-looking Lake Michigan. The area is developed as residential housing for officers; however, the homes are vacant and there is no evidence that the area has been adversely affected by Fort Sheridan mission activities. Proposed sampling locations for Background Area East are shown on Figure 5-3.

The previously collected data indicate that the groundwater flow direction under Fort Sheridan is eastward toward Lake Michigan. This means that Background Area East is situated on the down-hydraulic gradient side of the installation; however, it is not directly downgradient of any sites identified as affected by mission activities. This area is valuable in assessing the background groundwater quality as it may provide information on the natural evolution of the groundwater as it flows beneath Fort Sheridan.

5.2.2 Sampling Program

The sampling and analytical programs for Background Area East designed to meet the technical objectives discussed in Section 5.0 is the same as that described for Background Area North in Section 5.1.2 of this document. The sampling and analysis of the surface sample indicated in Figure 5.3 is described in Section 5.5. Access to Background Area East will be via Logan Loop.

TABLE 5-1
Summary of Sampling and Analysis Program
Sampling and Analysis Plan for Background Sampling
Fort Sheridan, Illinois

SAMPLE LOCATION	SAMPLE POINT	SAMPLED MEDIA	ANALYTICAL PARAMETERS*												
			TCL Metals (Total)	TCL Metals (Fltrd)	VOCs	SVOCs & TRPH	Pesticide/PCBs/Herbicide	Explosives	TCLP	Cyanide	LDPsoil or SLP water				
Background	BGS/MW-1X	Soil/Groundwater	y	y	y	y	y	y	y	y	y	y	y	y	y
Area North	BGS-5X	Soil	y	-	y	y	y	y	y	y	y	y	y	y	-
Background	BGS/MW-2X	Soil/Groundwater	y	y	y	y	y	y	y	y	y	y	y	y	y
Area East	BGS-6X	Soil	y	-	y	y	y	y	y	y	y	y	y	y	-
Background	BGS/MW-3X	Soil/Groundwater	y	y	y	y	y	y	y	y	y	y	y	y	y
Area South	BGS-7X	Soil	y	-	y	y	y	y	y	y	y	y	y	y	-
Background	BGS/MW-4X	Soil/Groundwater	y	y	y	y	y	y	y	y	y	y	y	y	y
Area West	BGS-8X	Soil	y	-	y	y	y	y	y	y	y	y	y	y	-
	BGS-9X	Soil	y	-	y	y	y	y	y	y	y	y	y	y	-
Bluff Surface Sample	BGSS-10	Soil	y	-	y	y	y	y	y	y	y	y	y	y	-
Background and Surface Water	BGSD/SW-1	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	y	-
	BGSD/SW-2	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	y	-
Samples	BGSD/SW-3	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	y	-
	BGSD/SW-4	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	y	-
	BGSD/SW-5	Sediment/Surface Water	y	y	y	y	y	y	y	y	y	y	y	y	-
Waste Char.	COMPOSITE	Water	***	***	***	***	***	***	***	***	***	***	***	***	***

* TCL = Target Compound List, VOC = Volatile Organic Compound, SVOC = Semi-VOC, PCB = Polychlorinated Biphenyl, TRPH = Total Recoverable Petroleum Hydrocarbons, LDP = Landfill Design Parameters, SLP = Standard Landfill Parameters & TCLP = Toxicity Characteristic Leaching Procedure. LDFs include wet & dry bulk density, specific capacity, pH, Total Organic Carbon (TOC), & cation exchange capacity. SLPs include fluoride, nitrate, hardness, sulfate, chloride, TOC, chemical oxygen demand, boron, alkalinity, and Total Dissolved Solids.
 ** TCLP for Pb will be run on the soil samples from one boring at each of the four background areas (N, E, S, W).
 *** A minimum of one characterization sample will be collected from every 10 containers or fraction thereof. The sample(s) will be tested for the list of analytes required by the POTW before discharge.

TABLE 5-2
 QA/QC Program and Sampling Rationale
 Sampling and Analysis Plan for Background Sampling
 Fort Sheridan, Illinois

SAMPLED MEDIA	Estimated Number of Field Samples	Analytical Parameters for Field Samples*	Estimated Number of QA/QC Samples				Rationale and Comments
			Duplicates**	Field/Equipment Blanks***	Trip Blanks	M.S. & M.S. Dups****	
Soil	28	TCL Metals, VOCs, SVOCs, Herbicides, Pesticides/PCBs, TRPH, TCLP Pb, LDP	3	3	*****	3	Supplement to existing background data, establish statistically defensible background levels, input to Baseline Risk Assessment.
Ground Water	8	TCL Metals Total & Filtered, VOCs, SVOCs, Herbicides, Pesticides/PCBs, Cyanide, TRPH, SLP	1	1	*****	1	Supplement to Existing Background Data, establish statistically defensible background levels, input to Baseline Risk Assessment.
Sediment	5	TCL Metals, VOCs, SVOCs, Herbicides, Pesticides/PCBs, TRPH, TCLP Pb	1	1	*****	1	Establish statistically defensible background levels for sediment, input to Baseline Risk Assessment.
Surface Water	5	TCL Metals Total & Filtered, VOCs, SVOCs, Herbicides, Pesticides/PCBs, Cyanide, TRPH, SLP	1	1	*****	1	Establish statistically defensible background levels for surface water, input to Baseline Risk Assessment.
Waste Water	*****	*****	*****	*****	*****	***	Predisposal characterization of water generated during deconting.

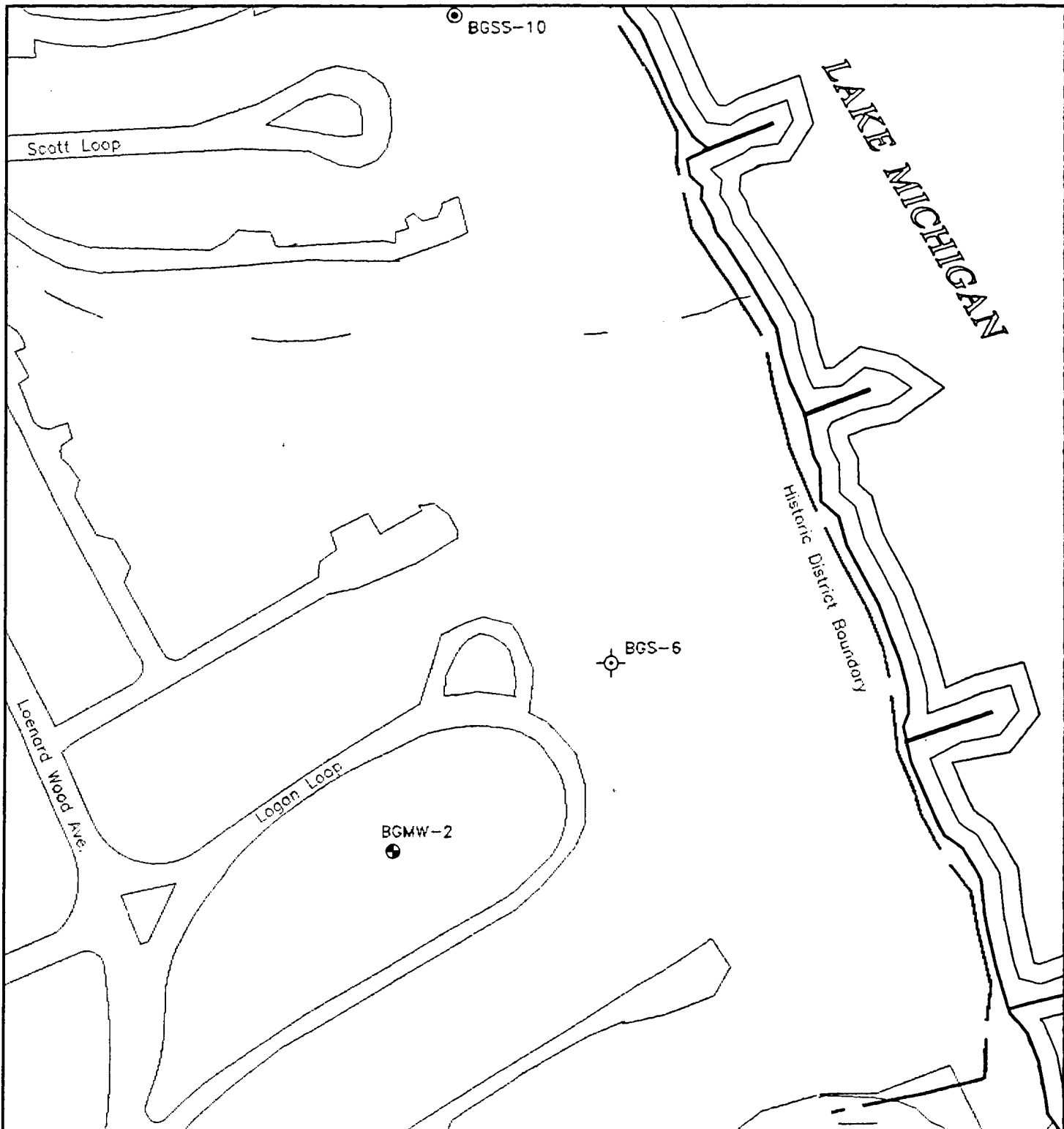
* TCL = Target Compound List, VOC = Volatile Organic Compound, SVOC = Semi-VOC, PCB = Polychlorinated Biphenyl, TRPH = Total Recoverable Petroleum Hydrocarbons, LDP = Landfill Design Parameters, SLP = Standard Landfill Parameters & TCLP = Toxicity Characteristic Leaching Procedures. LDPs include wet & dry bulk density, specific capacity, pH, Total Organic Carbon (TOC), & cation exchange capacity. SLPs include fluoride, nitrate, hardness, sulfate, chloride, TOC, chemical oxygen demand, boron, alkalinity, and Total Dissolved Solids.




** Number of duplicate samples figured as 10% of total number of samples for each media and analyte list.

*** Number of field/equipment blank samples and matrix spike and matrix spike duplicates figured as 10% of total number of samples for each media and analyte list.

**** Number of trip blank samples depends on sampling order and timing. A minimum of one trip blank per cooler will be analyzed.

***** Number of Waste Water samples analyzed will depend on number of containers of waste water. A minimum of one sample per 10 containers or fraction thereof will be analyzed for the analyte list required by the Publicly Owned Treatment Works (POTW).



-  Proposed Background Soil Sample Location
-  Proposed Background Soil Sample/
Monitoring Well Location
-  Proposed Background Surface
Soil Sample Location



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Figure 5-3 Background Area East and Lake Michigan Bluff Area Sampling Locations

Background Sampling and
Analysis Plan

Fort Sheridan
Fort Sheridan, Illinois

5.3 Background Area South

5.3.1 Site Description

Background Area South is located near the head of Schenck Ravine along the southern boundary of the installation. The general area is lightly developed with residential housing units for base personnel which are now largely vacant. The specific sampling locations for Background Area South are several hundred feet south of Landfill Nos. 6 and 7 in a grassy area bounded by woods as shown on Figure 5-4. There is no indication that mission activities have affected the area.

5.3.2 Sampling Program

The sampling and analytical programs for Background Area South designed to meet the technical objectives discussed in Section 5.0 is the same as that described for Background Area North in Section 5.1.2 of this document. Access to Background Area South will be via Patten Road and 11th Street.

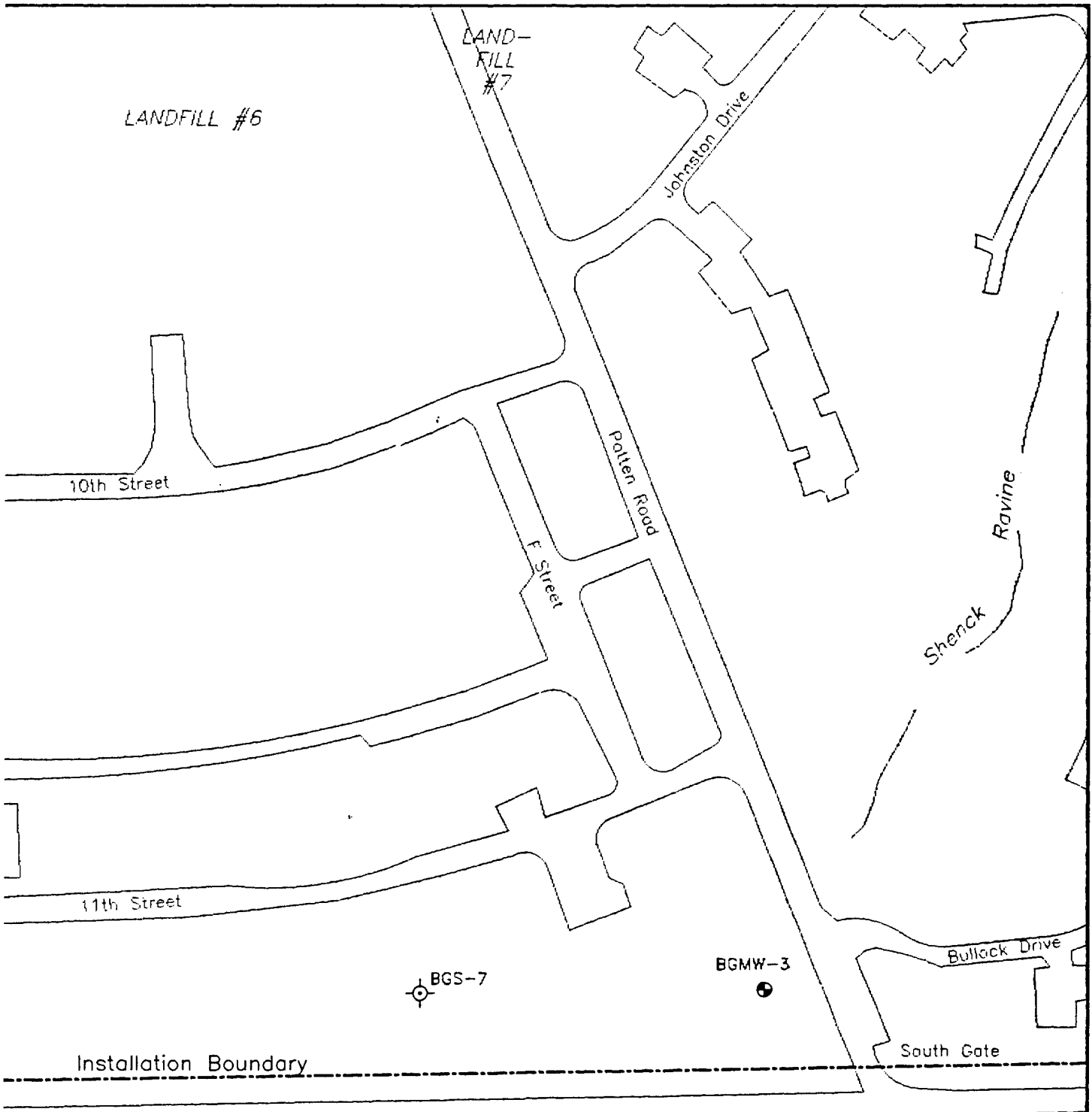
5.4 Background Area West

5.4.1 Site Description

Background Area West straddles the main entrance to Fort Sheridan and part of the golf course along the western boundary of the installation. The northernmost sample location is near the golf course club house. Background Area West consists of open grass dotted by trees. There is no indication that the area has been affected by mission activities. Sampling locations were chosen to provide general coverage of the area and to minimize the likelihood of encountering residuals from the golf course activities. The proposed sampling locations for Background Area West are shown on Figure 5-5.

5.4.2 Sampling Program

The sampling and analytical programs for Background Area West designed to meet the technical objectives discussed in Section 5.0 is the same as that described for Background Area North in Section 5.1.2 of this document with the exception that soil borings will be conducted at three locations. A monitoring well will be installed in one of the soil borings. Access to Background Area West will be via either George Bell Road or Leonard Wood Avenue.



Proposed Background Soil Sample Location
 Proposed Background Soil Sample/
Monitoring Well Location

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Figure 5-4
Background Area South
Sampling Locations
 Background Sampling and
 Analysis Plan
 Fort Sheridan
 Fort Sheridan, Illinois

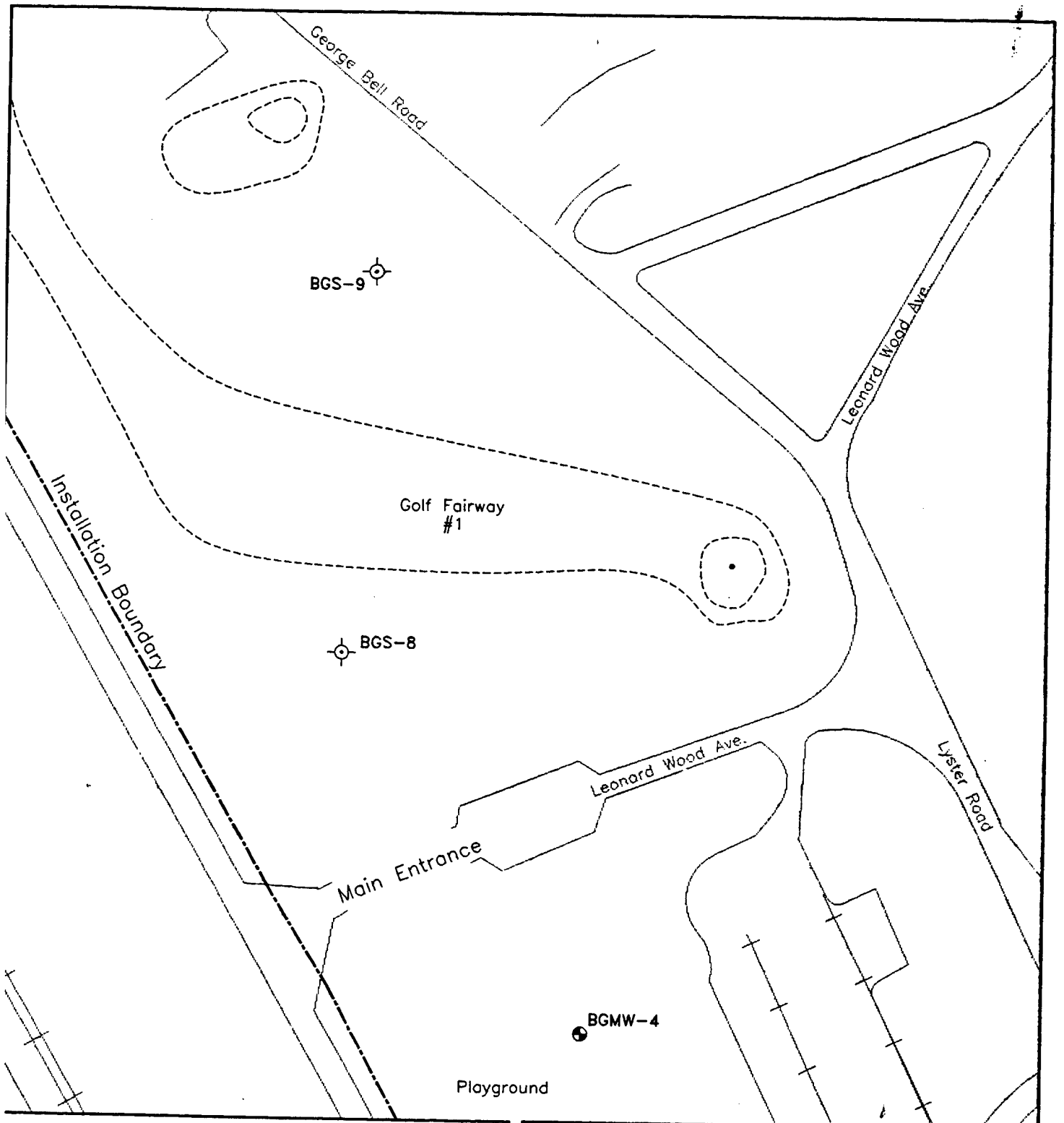


Figure 5-5
Background Area West
Sampling Locations

Background Sampling and
 Analysis Plan
 Fort Sheridan
 Fort Sheridan, Illinois

- ⊕ Proposed Background Soil Sample Location
- ⊙ Proposed Background Soil Sample/
Monitoring Well Location



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5.5 Lake Michigan Bluff Area

5.5.1 Site Description

The Lake Michigan Bluff Area background site is located on the bluff overlooking Lake Michigan between Hutchinson and Bartlett Ravines. The location is shown in Figure 5-3. There is no indication that this area has been affected by mission-related activities.

5.5.2 Sampling Program

The following paragraphs outline the investigation proposed to meet the technical objectives discussed in Section 5.0.

Soil Sampling

A soil sample will be collected at the location indicated on Figure 5-3. The sample will be obtained from 0 to 0.5 ft-bgs with a hand trowel. Collection techniques and materials will conform to those presented in Subsection 4.4 of the OQAPP and incorporated by reference in Section 3.0 of this document.

Sample Analyses

The sample will be analyzed according to the program presented in Table 5-1 of this document and by the methods specified in Section 7.0 of the OQAPP. The QA/QC Program for the background sampling is outlined in Table 5-2.

5.6 Background Surface Water And Sediment Sampling

5.6.1 Sampling Area Description

An evaluation of Phase I RI data has identified the need to collect background sediment and surface water samples from ravine locations to support the BRA. Five locations for the collection of background samples have been selected in ravines to the north of Fort Sheridan. The ravines are within the boundaries of the Lake County Forest Preserve District's McCormick Nature Preserve and are considered to be representative of background conditions. A review of historical aerial photographs provided no evidence that the sampling locations have been affected by Fort Sheridan mission activities (EPIC, 1990 and National Archives Trust Fund Board, 1934). The ravine sampling locations are indicated in Figure 5-6.

5.6.2 Sampling Program

The following paragraphs outline the investigation program proposed to meet the technical objectives discussed in Section 5.0.

Sediment Sampling

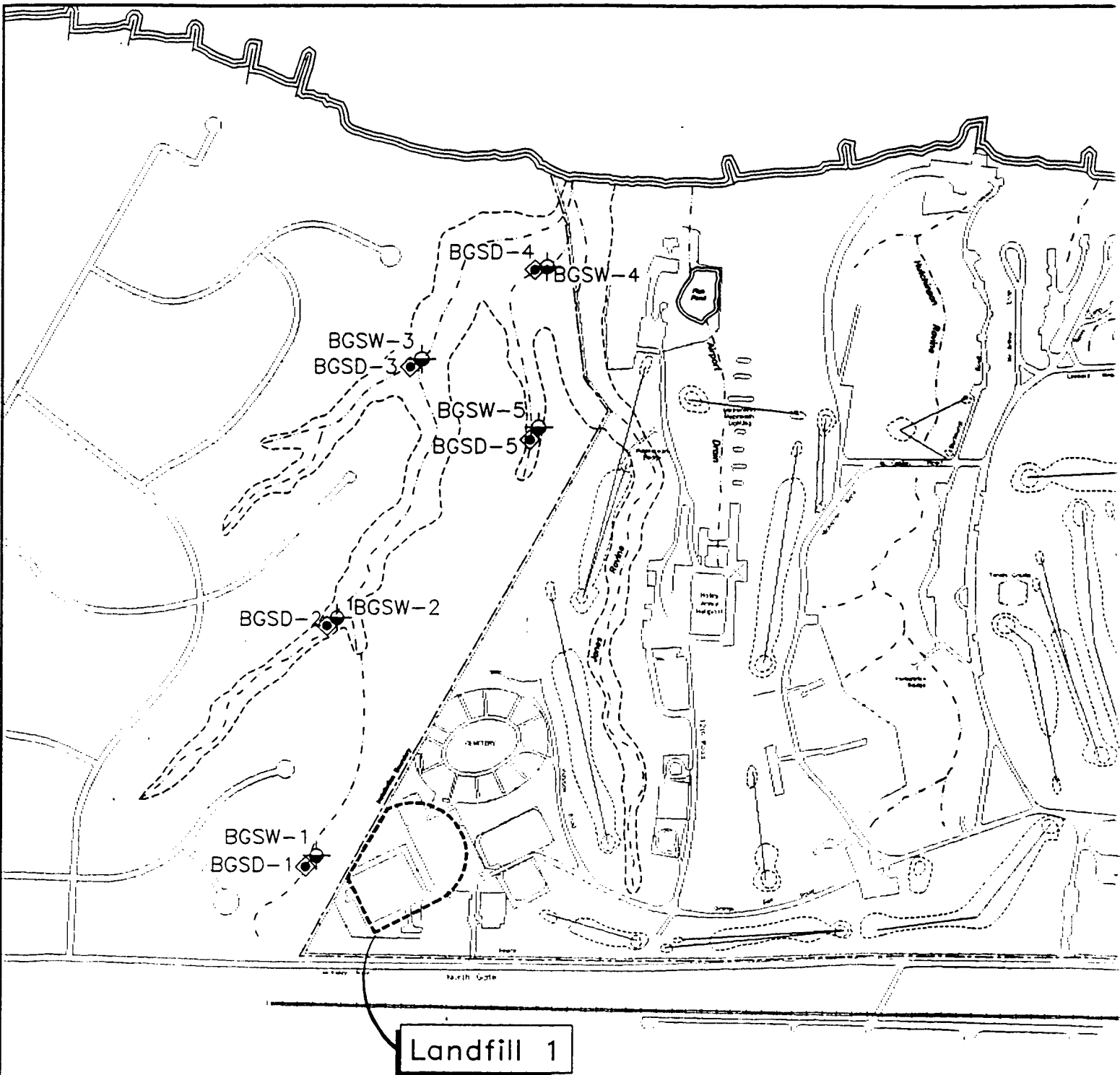
Sediment samples will be collected at the indicated locations. The sampling locations will be accessed from the Lake Michigan beach by following the ravines upstream to the sample point. The sediment samples will be collected according to the protocols and methods specified in Subsection 4.7 of the OQAPP.

Surface Water Sampling

Surface water samples will be collected at the indicated locations. The sampling locations will be accessed from the Lake Michigan beach by following the ravines upstream to the sample point. If surface water is not present at any proposed location, the surface water sample for that location will be relocated, if possible, in discussion with the BCT. The surface water samples will be collected according to the protocols and methods specified in Subsection 4.6 of the OQAPP.

Sample Analyses

Samples will be analyzed according to the program presented in Table 5-1 of this document and by the methods specified in Section 7.0 of the OQAPP. The QA/QC Program for the BSAP sampling is outlined in Table 5-2.



Landfill 1

- ◆ Proposed Background Sediment Sample Location
- ⊕ Proposed Background Surface Water Sample Location

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Installation information adapted from Official Post Map, Directorate of Engineering and Housing, Fort Sheridan, Illinois, Jani Ravines, shoreline and roads north of Installation adapted from USGS 7.5' topographic quadrangle, Highland Park, Ill., 196

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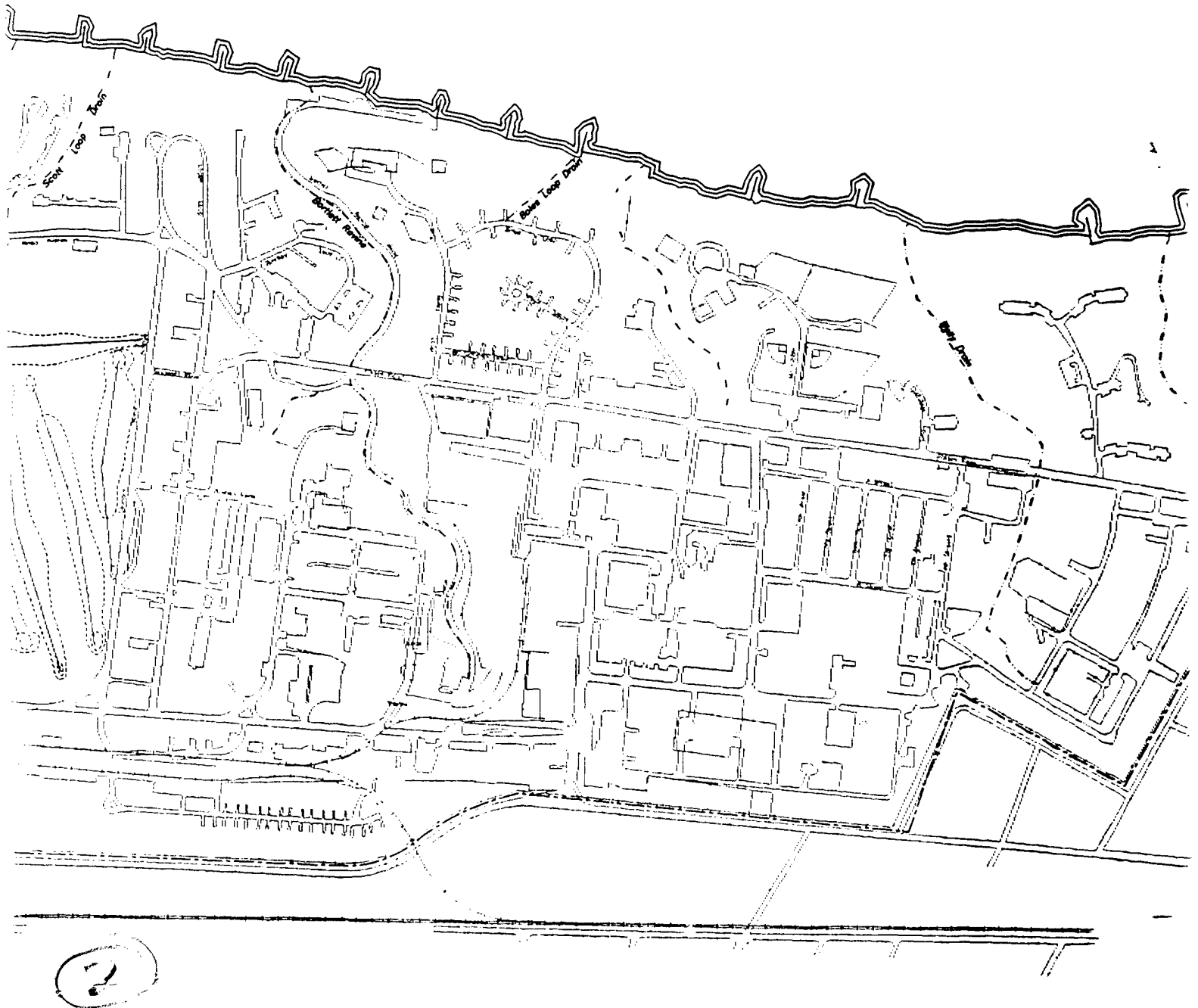


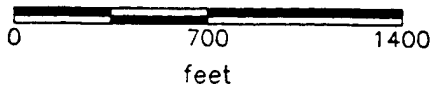
Figure 5-6

Background Surface Water & Sediment Sampling Locations

Background Sampling and Analysis Plan

Fort Sheridan

Fort Sheridan, Illinois



January 6, 1989
1963; photo revised 1972 & 1980.

REFERENCES

- Argonne National Laboratory, 1989. "Enhanced Preliminary Assessment Report: Fort Sheridan, Fort Sheridan, Illinois"; prepared for U.S. Army Toxic and Hazardous Materials Agency; Aberdeen Proving Ground, Maryland.
- Department of the Army Directorate of Engineering and Housing. Certificate of Analysis Conducted by EMS Laboratories, Inc., Darien, Illinois; Reporting Dates: March 28, 1989 and May 31, 1989.
- Environmental Photographic Interpretation Center (EPIC), 1990, "Installation Assessment, Army Base Closure Program, Fort Sheridan;" Environmental Monitoring Systems Laboratory, USEPA, Las Vegas, Nevada.
- Environmental Science & Engineering, Inc., April 1993. "Health and Safety Plan Data Item A009 Fort Sheridan Remedial Investigation/Feasibility Study, Environmental Survey Plans, Contract No. DAAA15-88-D-0006 Task Order 8"; Prepared for U.S. Army Toxic and Hazardous Materials Agency.
- Environmental Science & Engineering, Inc., March, 1995. "Draft Final Overall Quality Assurance Program Plan Remedial Investigation/Feasibility Study Fort Sheridan, Illinois, ESE No. 490-2087-0110"; Prepared for U.S. Army Environmental Center.
- Gross- D., R.L. Muhly- H.K. Woods, R.L. Yon, D.J. Wenz, J.D. Wienand, and N.P. Leibel, 1982. "Preliminary Assessment of Fort Sheridan and Joliet Training Area, Illinois"; prepared for U.S. Army Toxic and Hazardous Materials Agency; Aberdeen Proving Ground, Maryland.
- National Archives Trust Fund Board, July 1934, Photo mosaic of Fort Sheridan, Illinois, 15th Observation Squadron and 21st Photography Section.
- U.S. EPA, 1988. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA - Interim Final"; U.S. EPA/540/G-89/004; October 1988.

Appendix A

Equipment List

EQUIPMENT LIST

Photoionization Meters

- HNu
- Thermo Environmental 580B

Water Rules

- ET-89 or ET-94 Water Level Indicator
- KIR89 or KIR94 Interface Probe

Soil Sampling Devices

- 3-inch by 24-inch Split-Barrel Sampler
- 2-inch by 24-inch Split-Barrel Sampler
- 3-inch by 18-inch Split-Barrel Sampler
- Laskey Continuous Core Soil Sampler
- California Sampler
- Hand Auger
- Hand Trowel
- Brass Liners
- Shelby Tubes

Health and Safety Equipment

- Industrial Scientific MX241 O₂ Lower Explosive Limit Meter
- Industrial Scientific CMX 271 O₂ LEL and CO meter
- American Optical 7-Star Full-Face Air Purifying Respirator
- Various Cartridges for Respirators
- Tyvek Coveralls
- Gloves of Various Materials Including:
 - Nitrile
 - Neoprene
 - Latex
 - Vinyl
- Boot Covers

Drilling Equipment

- Gus Pech 22R Brat Drill Rig
- Ingersol Hurricane 300 Drill Rig
 - 4.25-inch ID augers
 - 6.25-inch ID augers
 - 8.25-inch ID augers

Groundwater Sampling Equipment

- Hydro Lab 4041 or Hydro Lab Surveyor II Digital Automatic Compensating Multimeter
- Yellow Springs Instruments Salinity Conductivity Temperature Meter
- Keck SP-84 Pump
- Grundfos Rediflow 2 Sampling Pump
- Masterflex Peristaltic Pump
- Keck 4-inch Packer with 125 ft. Teflon Air Line
- Geotech In-Line Groundwater Filtering Kit

YSI Dissolved Oxygen Meter
Beckman pH Meter
Disposable High Density Polyethylene Bailer
Miscellaneous
Motorola HT 600 Portable Hand-Held Radios

Appendix B

Technical Requirements for Hazardous Waste Containment

40CFR Subpart I

264.175 Containment

- (a) Container storage areas must have a containment system that is designed and operated in accordance with paragraph (b) of this section, except as otherwise provided by paragraph (c) of this section.
- (b) A containment system must be designed and operated as follows:
 - (1) A base must underly the containers which is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed;
 - (2) The base must be sloped or the containment system must be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation, unless the containers are elevated or are otherwise protected from contact with accumulated liquids;
 - (3) The containment system must have sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be considered in this determination;
 - (4) Run-on into the containment system must be prevented unless the collection system has sufficient excess capacity in addition to that required in paragraph (b)(3) of this section to contain any run-on which might enter the system; and
 - (5) Spilled or leaked waste and accumulated precipitation must be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system.

[Comment: If the collected material is a hazardous waste under part 261 of this Chapter, it must be managed as a hazardous waste in accordance with all applicable requirements of parts 262 through 266 of this chapter. If the collected material is discharged through a point source to waters of the United States, it is subject to the requirements of section 402 of the Clean Water Act, as amended.]

- (c) Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system defined by paragraph (b) of this section, except as provided by paragraph (d) of this section or provided that:

- (1) The storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or
 - (2) The containers are elevated or are otherwise protected from contact with accumulated liquid.
- (d) Storage areas that store containers holding the wastes listed below that do not contain free liquids must have a containment system defined by paragraph (b) of this section:
- (1) FO20, FO21, FO22, FO23, FO26, and FO27.
 - (2) [Reserved]

[46 FR 55112, Nov. 6, 1981, as amended at 50 FR 2003, Jan. 14, 1985]

Illinois Administrative Code, Title 35

Section 724.117 General

Requirements for Ignitable, Reactive or Incompatible Wastes.

(a) The owner or operator must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions) and radiant heat. While ignitable or reactive waste is being handled, the owner or operator must confine smoking and open flame to specially designated locations. "No Smoking" signs must be conspicuously placed wherever there is a hazard from ignitable or reactive waste.

(h) Where specifically required by this Part, the owner or operator of a facility that treats, stores or disposes ignitable or reactive waste, or mixes incompatible waste and other materials, must take precautions to prevent reactions which:

- (1) Generate extreme heat or pressure, fire or explosions, or violent reactions;
- (2) Produce uncontrolled toxic mists, fumes, dusts or gases in sufficient quantities to threaten human health or the environment;
- (3) Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;
- (4) Damage the structural integrity of the device or facility;
- (5) Through other like means threaten human health or the environment.

(c) When required to comply with paragraphs (a) or (b), the owner or operator must document that compliance. This documentation may be based on references to published scientific or engineering literature, data from trial tests (e.g., bench scale or pilot scale tests), waste analyses (as specified in Section 724.113), or the results of the treatment of similar wastes by similar treatment processes and under similar operating conditions.

Section 724.118 Location Standards.

(a) Seismic considerations.

(1) Portions of new facilities where treatment, storage or disposal of hazardous waste will be conducted must not be located within 61 meters (200 feet) of a fault which has had displacement in Holocene time.

(2) As used in subsection (a)(1):

(A) "Fault" means a fracture along which rocks on one side have been displaced with respect to those on the other side.

(B) "Displacement" means the relative movement of any two sides of a fault measured in any direction.

(C) "Holocene" means the most recent epoch of the Quaternary period, extending from the end of the Pleistocene to the present.

(Board Note: Procedures for demonstrating compliance with this standard in Part B of the permit application are specified in 35 Ill. Adm. Code 703.182. Facilities which are located in political jurisdictions other than those listed in 40 CFR 264. Appendix VI (1988) are assumed to be in compliance with this requirement.

(b) Floodplains.

(1) A facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent washout of any hazardous waste by a 100-year flood, unless the owner or operator can demonstrate to the Agency's satisfaction that:

(A) Procedures are in effect which will cause the waste to be removed safely, before flood waters can reach the facility, to a location where the wastes will not be vulnerable to flood waters; or

(B) For existing surface impoundments, waste piles, land treatment units, landfills and miscellaneous units, no adverse effects on human health or the environment will result if washout occurs, considering:

(i) The volume and physical and chemical characteristics of the waste in the facility;

(ii) The concentration of hazardous constituents that would potentially affect surface waters as a result of washout;

(iii) The impact of such concentrations on the current or potential uses of and water quality standards established for the affected surface waters; and

(iv) The impact of hazardous constituents on the sediments of affected surface waters or the soils of the 100-year floodplain that could result from washout.

(2) As used in subsection (b)(1):

(A) "100-year floodplain" means any land area which is subject to a one percent or greater chance of flooding in any given year from any source.

(B) "Washout" means the movement of hazardous waste from the active portion of the facility as a result of flooding.

(C) "100-year flood" means a flood that has a one percent chance of being equaled or exceeded in any given year.

(Board Note: Requirements pertaining to other Federal laws which affect the location and permitting of facilities are found in 40 CFR 270.3. For details relative to these laws, see EPA's manual for SEA (special environmental area) requirements for hazardous waste facility permits. Though EPA is responsible for complying with these requirements, applicants are advised to consider them in planning the location of a facility to help prevent subsequent project delays. Facilities may be required to obtain from the Illinois Department of Transportation a permit or certification that a facility is floodproofed.)

(c) Salt dome formations, salt bed formations, underground mines and caves. The placement of any non-containerized or bulk liquid hazardous waste in any salt dome formation, salt bed formation, underground cave or mine is prohibited.

Subpart C: Preparedness and Prevention

Section 724.130 Applicability.

The regulations in this Subpart apply to owners and operators of all hazardous waste management facilities, except as Section 724.101 provides otherwise.

Section 724.131 Design and Operation of Facility.

Facilities must be designed constructed, maintained and operated to minimize the possibility of a fire, explosion or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil or surface water which could threaten human health or the environment.