ANL/ESD/TM-101

Contamination Source Review for Building E5978, Edgewood Area, Aberdeen Proving Ground, Maryland

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Contamination Source Review for Building E5978, Edgewood Area, Aberdeen Proving Ground, Maryland

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by

G. Mosqueda, J. Dougherty, A.K. Draugelis,
J. Rueda, and R.E. Zimmerman

Summary

This report was prepared by Argonne National Laboratory (ANL) to document the results of a contamination source review of Building E5978 at the Aberdeen Proving Ground (APG) in Maryland. The report may be used to assist the U.S. Army in planning for the future use or disposition of this building. The review included a historical records search, physical inspection, photographic documentation, geophysical investigation, and collection of air samples. The field investigations were performed by ANL during 1994 and 1995.

Building E5978 (APG designation) is located on Hog Point Road near the Gunpowder River in the Edgewood Area of APG. The building, constructed in 1953 for use as a storage facility, was placed on inactive status in 1976 and has been unoccupied since that time.

The physical inspection and photographic documentation of Building E5978 were completed in November 1994. At the time of the inspection, most of the building had collapsed; the north, south, and east walls are only partially standing. The single-story, one-room square structure, measuring 16 ft 6 in. by 16 ft 6 in., is constructed of wood with a gable roof. The exterior walls are wooden framing and horizontal planking covered with painted tar paper. The gable roof is covered with asphalt shingles. The building has a wood floor supported by wooden framing; no foundation was apparent at the time of ANL's inspection. The interior walls and ceiling are constructed of painted plywood sheeting, but these walls and most of the ceiling had collapsed before the ANL inspection. There is no evidence of plumbing, heating, or electrical connections or floor drains inside the building.

In April and May 1992, ANL staff conducted geophysical surveys in the immediate vicinity of Building E5978 by using several nonintrusive methods. Survey results suggest the presence of some underground objects in the vicinity of the building, but they do not provide conclusive evidence of the source of the geophysical anomalies observed.

Air quality samples were collected upwind, downwind, and inside Building E5978 in November 1994. Analytical results showed no distinguishable difference in the hydrocarbon and chlorinated solvent levels between the two background samples and the sample collected inside Building E5978. These results indicate that Building E5978 is not a source of volatile organic compound contamination.

No information was available regarding underground storage tanks associated with Building E5978.

On the basis of information collected and reviewed for Building E5978, it is the authors' judgment that no significant air contamination is associated with this building. The geophysical surveys indicate some anomalies in the vicinity of the building that warrant further investigation and evaluation.

1 Introduction

The U.S. Army Aberdeen Proving Ground (APG) commissioned Argonne National Laboratory (ANL) to conduct a contamination source review to identify and define areas of toxic or hazardous contaminants and to assess the physical condition and accessibility of APG buildings. The information obtained from this review may be used to assist the U.S. Army in planning for the future use or disposition of the buildings. The contamination source review consisted of the following tasks: historical records search, physical inspection, photographic documentation, geophysical investigation, and collection of air samples. This report provides the results of the contamination source review for Building E5978.

Located on Chesapeake Bay in Harford and Baltimore counties, Maryland, APG occupies approximately 30,000 acres. The facility is divided into the Aberdeen and Edgewood areas (Figure 1). The primary mission at APG has been the testing and evaluation of U.S. Army warfare materials. Since its beginning in 1917, the Edgewood Area of APG has been the principal location for chemical warfare agent research, development, and testing in the United States. APG was also used for producing chemical warfare agents during both world wars, and it has been a center for the storage of chemical warfare material (Nemeth 1989).

Many of the APG facilities constructed between 1917 and the 1960s are no longer used because of obsolescence and their poor state of repair. Because many of these buildings were used for research, development, testing, and/or pilot-scale production of chemical warfare agents and other military substances (such as incendiary materials or munitions containing these materials), the potential exists for portions of the buildings to be contaminated with these substances, their degradation products, and other laboratory or industrial chemicals. These buildings, and associated structures or appurtenances (e.g., underground or aboveground storage tanks, pipes, sumps), may contribute to environmental concerns at APG.

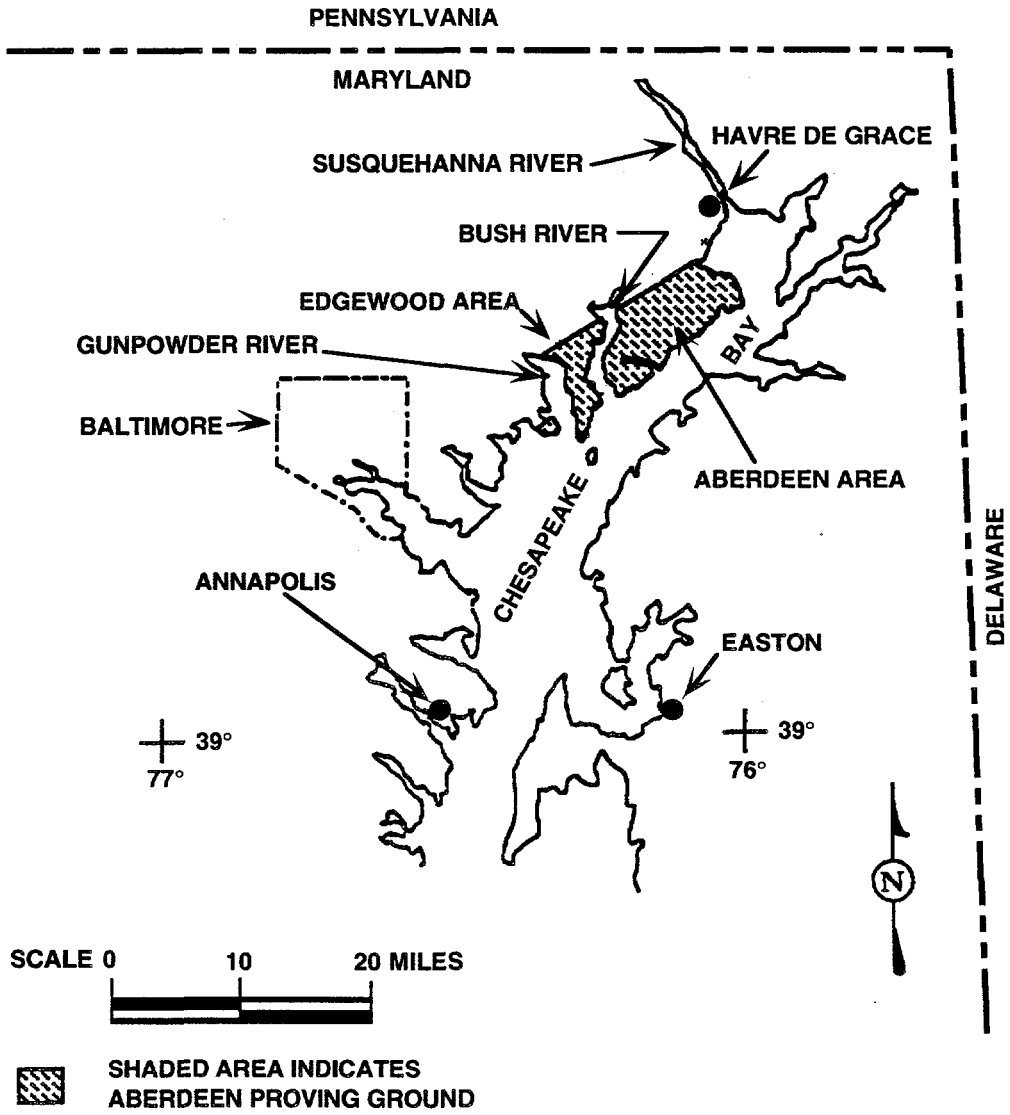


FIGURE 1 Map of Aberdeen Proving Ground Location

2 Methodology

Before the detailed building inspection, ANL personnel made a preliminary site visit to locate the building and obtain building records from APG, identify potential issues to be addressed in the health and safety plan, resolve any access restriction issues, and identify required support services.

Photographs were taken of the building's exterior and interior surfaces during the building inspection in November 1994. The photographs followed a set sequence whenever possible. The exterior was photographed starting on the north side and continuing clockwise around the building; walls were photographed starting in the north or northwest corner of each room and continuing clockwise until reaching the starting point. The ceiling and floor of each room were also photographed.

The area around Building E5978 was examined in April and May 1992 using several nonintrusive survey methods, including total field magnetics, electrical conductivity, and ground-penetrating radar (GPR).

ANL staff collected air quality samples upwind, downwind, and inside of Building E5978 during November 1994. Organic compounds from 24-liter samples trapped in a sorbent polymer cartridge were thermally desorbed and analyzed by using a gas chromatograph equipped with a mass spectrometer. Compound identification was based on mass spectral interpretation and a computer search of the 140,000 compounds in the Wiley spectral library.

Detailed descriptions of the methodologies used for the air quality monitoring are provided in the appendix to this report.

3 Historical Record Search

Building E5978 (APG designation) is located on Hog Point Road, near the Gunpowder River in the Edgewood Area of APG. A historical records search indicates that this building was constructed during 1953 and used from 1953 through 1976 as a storage facility (Nemeth 1989). Building E5978 eventually became associated with training and testing exercises conducted at APG (EAI Corporation 1989). The building was placed on inactive status in 1976 (EAI Corporation 1989).

At the time of the ANL investigation, Building E5978 had collapsed. The north, south, and east walls remained only partially standing; the west wall had been completely destroyed. The roof had collapsed inward onto the building as a result of severe deterioration of the wood framing.

4 Building Description

This section presents a physical description of Building E5978 and the surrounding area as they appeared at the time of ANL's 1994 inspection. This physical description includes an account of the condition of the exterior walls, roof, ceiling, and floor of the building. There was no evidence of plumbing, heating, or electrical connections or floor drains inside the building during the ANL inspection.

4.1 Site Description

4.1.1 Location

Building E5978 is located on Hogs Point Road in the Westwood section of APG's Edgewood Area. Major geographic features in the general vicinity of Building E5978 include Hog Point, Reardon Inlet (a small stream), and the Gunpowder River (Figure 2).

4.1.2 Proximity to Other Buildings

Building E5978 is located approximately 50 ft to the east of Building E5974. Both of these building are in the isolated Westwood section of APG.

4.1.3 Building Structure

Building E5978 is a single-room, single-story, square structure. The building is constructed with a simple gable roof covered with asphalt shingles. The exterior walls of the building consist of vertical wood framing and horizontal planking covered with painted tar paper. The interior walls are finished with plywood sheeting. The floor of Building E5978 is wood planking over wood framing that seems to be supported by concrete blocks or pier stones; no evidence of a foundation was observed. Building E5978 has mostly collapsed as a result of severe deterioration of the wooden structure. Figure 3 shows the floor plan of the building, developed from the ANL survey and historical documentation (EAI Corporation 1989). Figure 4 provides photographs of the building exterior.

4.1.4 Exterior Dimensions

The exterior dimensions for Building E5978 are 16 ft 6 in. by 16 ft 6 in. (Figure 3). The exterior walls are 8 ft high, with a roof gable extending another 4 ft on the north and south sides.

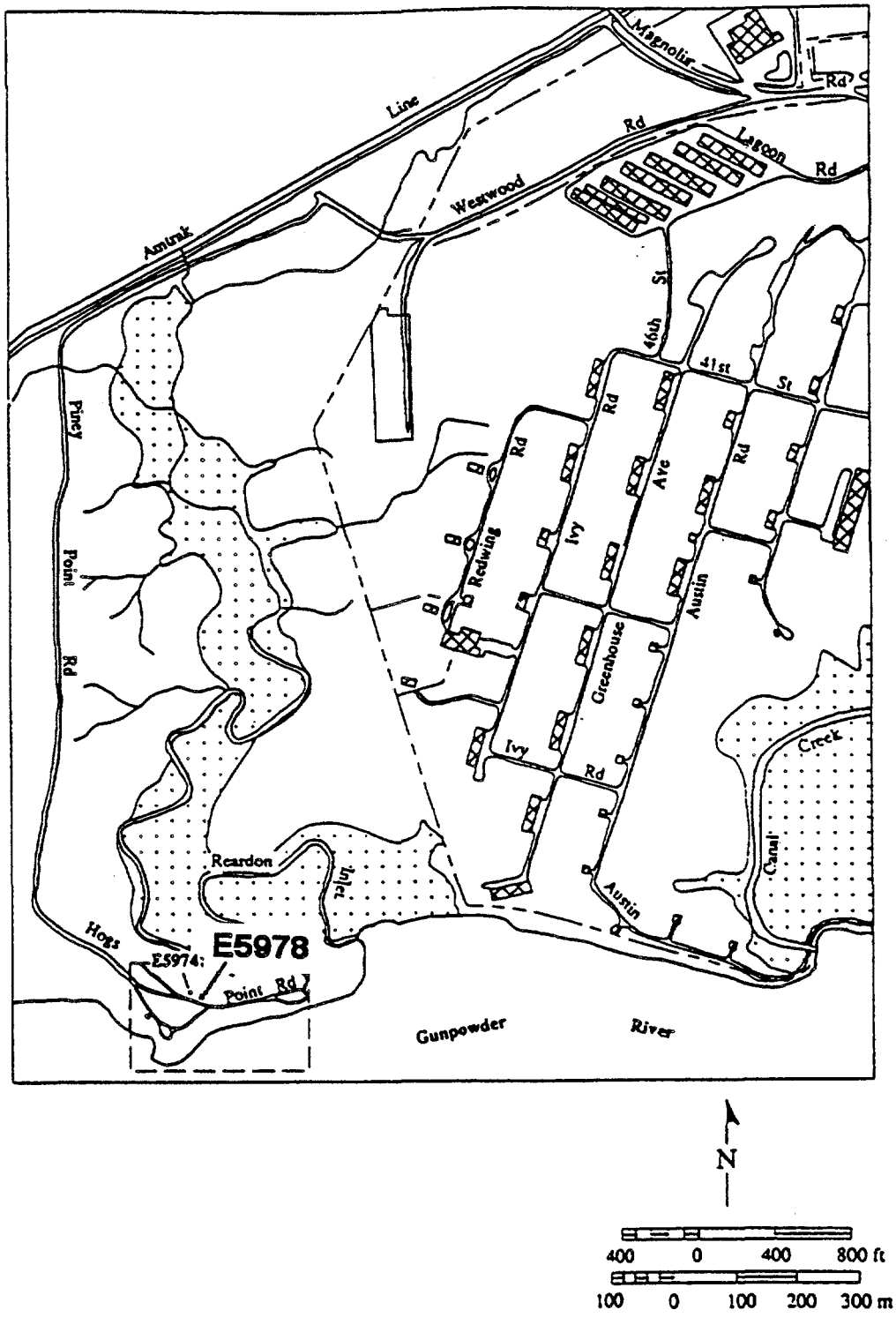


FIGURE 2 Map of Building E5978 Location

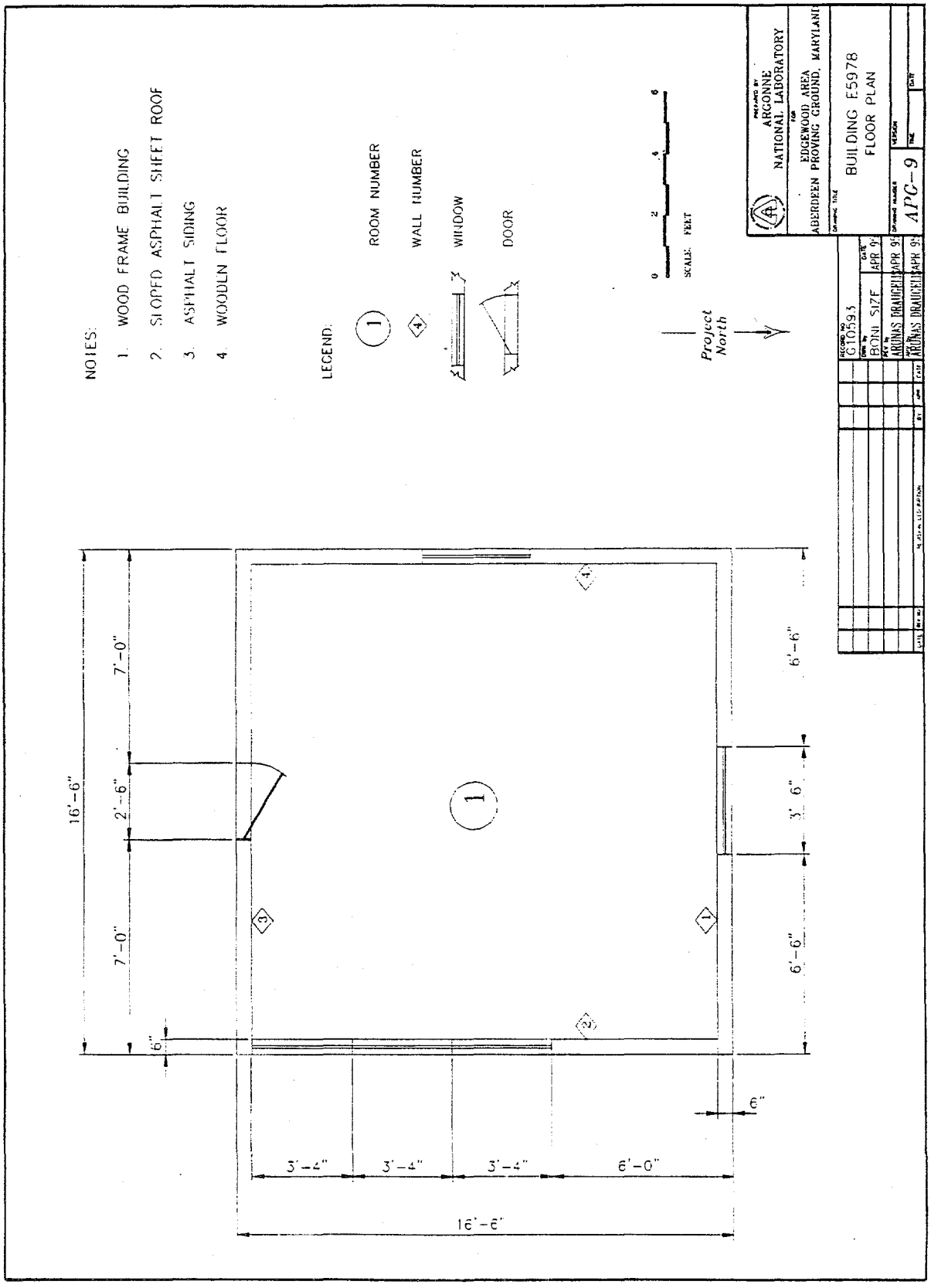
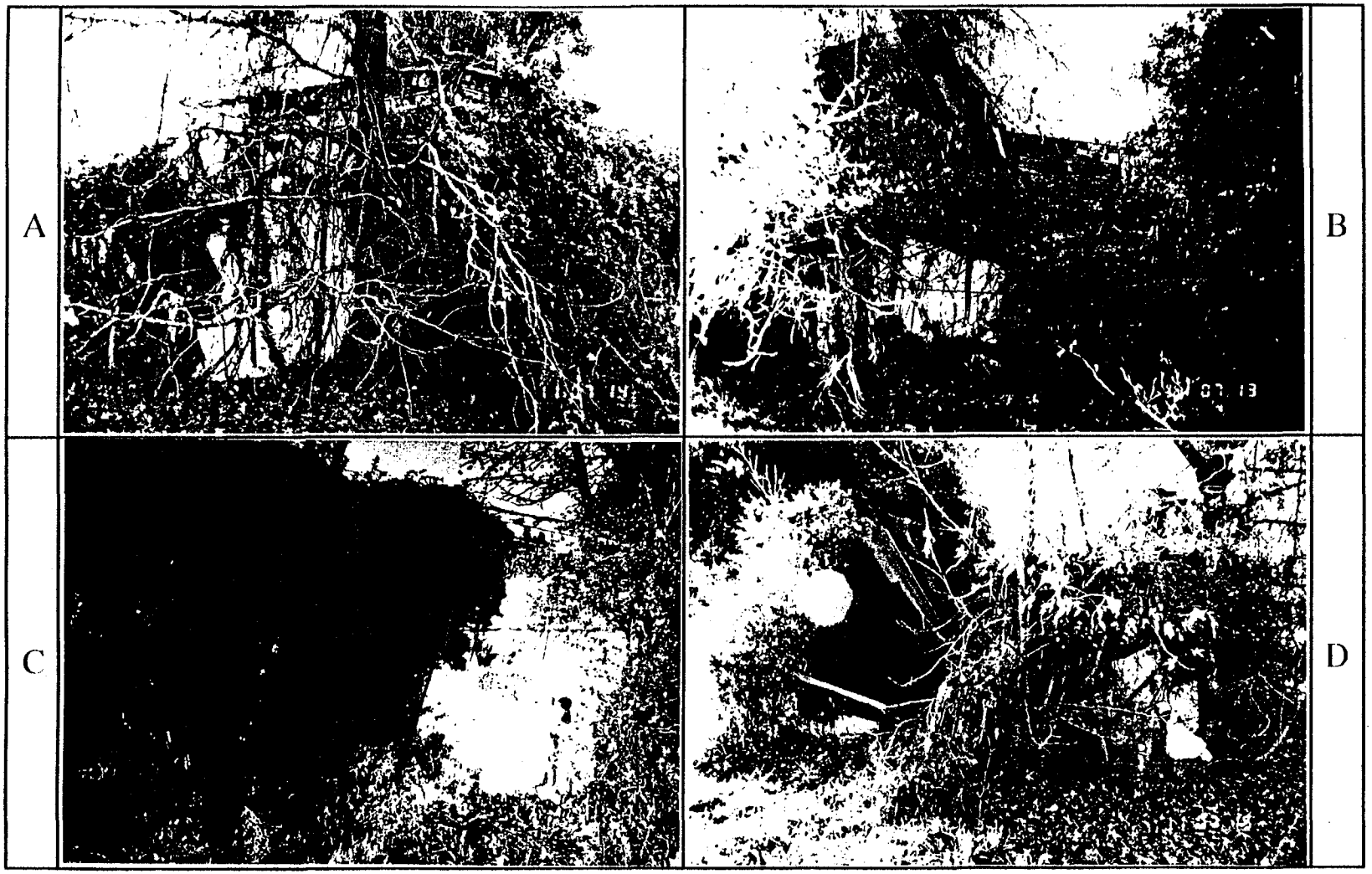


FIGURE 3 Building E5978 Floor Plan



A	North Elevation
C	South Elevation

West Elevation	B
East Elevation	D

FIGURE 4 Photographs of Building E5978 Exterior

4.1.5 Topography

Building E5978 is located in an area of APG known as Hog Point. Hog Point is approximately 1/4 mile wide and extends about 1/2 mile from east to west. It is bordered to the south by the Gunpowder River and to the north by a low swampy area known as Reardon Inlet. The point itself is relatively flat and very heavily wooded. Building E5978 is approximately 100 ft from Chesapeake Bay.

4.1.6 Vegetation in the Immediate Vicinity

The area directly surrounding Building E5978 is very densely vegetated. Many small trees are growing within 2 ft of the building and a network of vines has entirely covered the structure.

4.1.7 External Aboveground Structures or Equipment

A concrete slab located several feet to the south of Building E5978 appears to be the foundation for an oil tank that might have provided fuel for the building's heating system. A chimney was formerly located on the roof of the structure (EAI Corporation 1989). A fuel tank was discovered during the investigation of Building E5974, a building almost identical to Building E5978. No fuel delivery lines were found connecting Building E5978 with a fuel source.

4.1.8 Connections with Adjacent Buildings

None.

4.1.9 Underground Structures

None.

4.1.10 Surface Drainage System

None.

4.1.11 Utility Access Points

None.

4.1.12 Exterior Piping

None.

4.1.13 Nearby Roads and Sidewalks

Hog Point Road is located to the south of Building E5978.

4.2 North Exterior Elevation

4.2.1 Dimensions

The north side is the gable end of Building E5978. The north exterior elevation is 16 ft 6 in. long with a total height of 12 ft from the ground to the peak of the roof; the wall is 8 ft high and the gable extends upward another 4 ft (Figures 3 and 4).

4.2.2 Construction Materials

The north exterior wall consists of vertical wood framing and horizontal planking covered with tar paper siding.

4.2.3 Doors and Windows

A window opening, measuring 42 in. by 42 in., is located in the center of the north wall. The window and frame are no longer present, but the opening is protected with steel security bars.

4.2.4 Piping

None.

4.2.5 Utility Connections

None.

4.2.6 External Equipment or Structures

None.

4.2.7 Vegetation

The vegetation north of Building E5978 is very dense. Small trees are growing near the building and a network of vines has almost entirely covered the structure.

4.2.8 Overall Condition

Because of a lack of maintenance, Building E5978 shows signs of severe deterioration and weathering. As a result, most of the building has collapsed, but the north wall remains standing.

4.3 East Exterior Elevation

4.3.1 Dimensions

The east exterior wall of Building E5978 measures 16 ft 6 in. long by 8 ft high (Figures 3 and 4).

4.3.2 Construction Materials

The east exterior wall consists of vertical wood framing and horizontal planking covered with tar paper siding.

4.3.3 Doors and Windows

Three windows, each measuring 40 in. wide by 42 in. high, are located along the south portion of the east wall.

4.3.4 Piping

None.

4.3.5 Utility Connections

None.

4.3.6 External Equipment or Structures

None.

4.3.7 Vegetation

The vegetation east of Building E5978 is very dense. Small trees are growing near the building and a network of vines has almost entirely covered the structure.

4.3.8 Overall Condition

Because of a lack of maintenance, the east exterior elevation shows signs of severe deterioration and weathering. Most of the east wall remains standing, but is critically damaged.

4.4 South Exterior Elevation

4.4.1 Dimensions

The south exterior elevation of Building E5978 is the gable end of the structure. The south wall measures 16 ft 6 in. long. The total height is 12 ft from the ground to the peak of the roof; the wall is 8 ft high and the gable extends upward another 4 ft (Figures 3 and 4).

4.4.2 Construction Materials

The south exterior wall consists of vertical wood framing and horizontal planking covered with tar paper siding.

4.4.3 Doors and Windows

A doorway measuring 30 in. wide by 82 in. high is located in the center of the south wall. A wooden door is still in place.

4.4.4 Piping

None.

4.4.5 Utility Connections

None.

4.4.6 External Equipment or Structures

None.

4.4.7 Vegetation

The vegetation south of Building E5978 is very dense. Small trees are growing near the building and a network of vines has almost entirely covered the structure.

4.4.8 Overall Condition

Because of a lack of maintenance, the south exterior elevation shows signs of severe deterioration and weathering. The entire wall has fallen toward the interior of the building.

4.5 West Exterior Elevation

4.5.1 Dimensions

The west exterior wall of Building E5978 measures 16 ft 6 in. long by 8 ft high (Figures 3 and 4).

4.5.2 Construction Materials

The west exterior wall consists of vertical wood framing and horizontal planking covered with tar paper siding.

4.5.3 Doors and Windows

A window opening, measuring 42 in. by 42 in., is located in the center of the west wall.

4.5.4 Piping

None.

4.5.5 Utility Connections

None.

4.5.6 External Equipment or Structures

None.

4.5.7 Vegetation

The vegetation west of Building E5978 is very dense. Small trees are growing near the building and a network of vines has almost entirely covered the structure.

4.5.8 Overall Condition

Because of a lack of maintenance, the west exterior wall shows signs of severe deterioration and weathering. As a result, the wall has completely collapsed.

4.6 Roof

4.6.1 Type and Dimensions

Building E5978 has a 6/12 gable roof measuring 16 ft by 16 ft.

4.6.2 Height

The height of the roof is 8 ft at the eaves and 12 ft at the peak.

4.6.3 Surface Materials

The roof of Building E5978 is covered with asphalt shingles.

4.6.4 Support System

The structural members used to frame the roof are wood rafters.

4.6.5 Condition

The roof of Building E5978 has collapsed because of severe deterioration of the wooden roof supports. Portions of the roof slant down from the north and south walls to the floor.

4.6.6 Equipment Located on Roof

None.

4.6.7 Chimneys, Roof Vents, or Vent Stacks

An opening in the roof was used for a metal chimney stack. This type of chimney was commonly used as an exhaust vent for a combustion-type heater.

4.6.8 Piping

None.

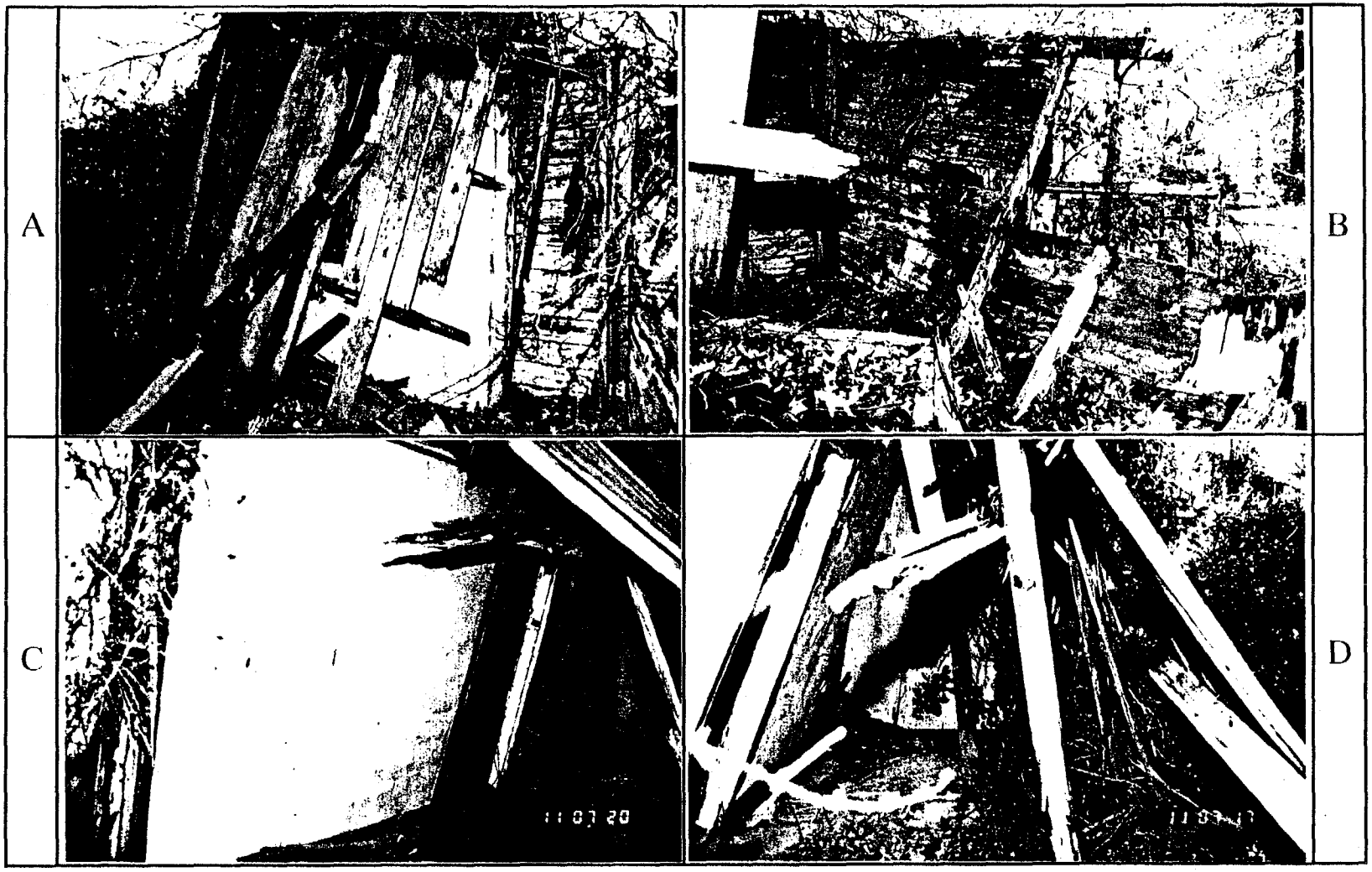
4.7 Interior Floor Plan

4.7.1 Room Numbers and Dimensions

Building E5978 is a single-story, one-room building with interior dimensions of 16 ft by 16 ft (Figure 3).

4.7.2 Walls

The interior walls are common with the exterior walls and consist of finished plywood sheeting that extends from the floor to the roof line of the building (Figure 5).



A	Wall 1
C	Wall 3

Wall 2	B
Wall 4	D

FIGURE 5 Photographs of Building E5978 Interior — Walls

4.7.3 Floor

The floor of Building E5978 is made of wood planking installed over a wood frame (Figure 6).

4.7.4 Floor Penetrations

None.

4.7.5 Interior Partitions

None.

4.7.6 Equipment or Supplies

None.

4.8 Room 1

4.8.1 Walls

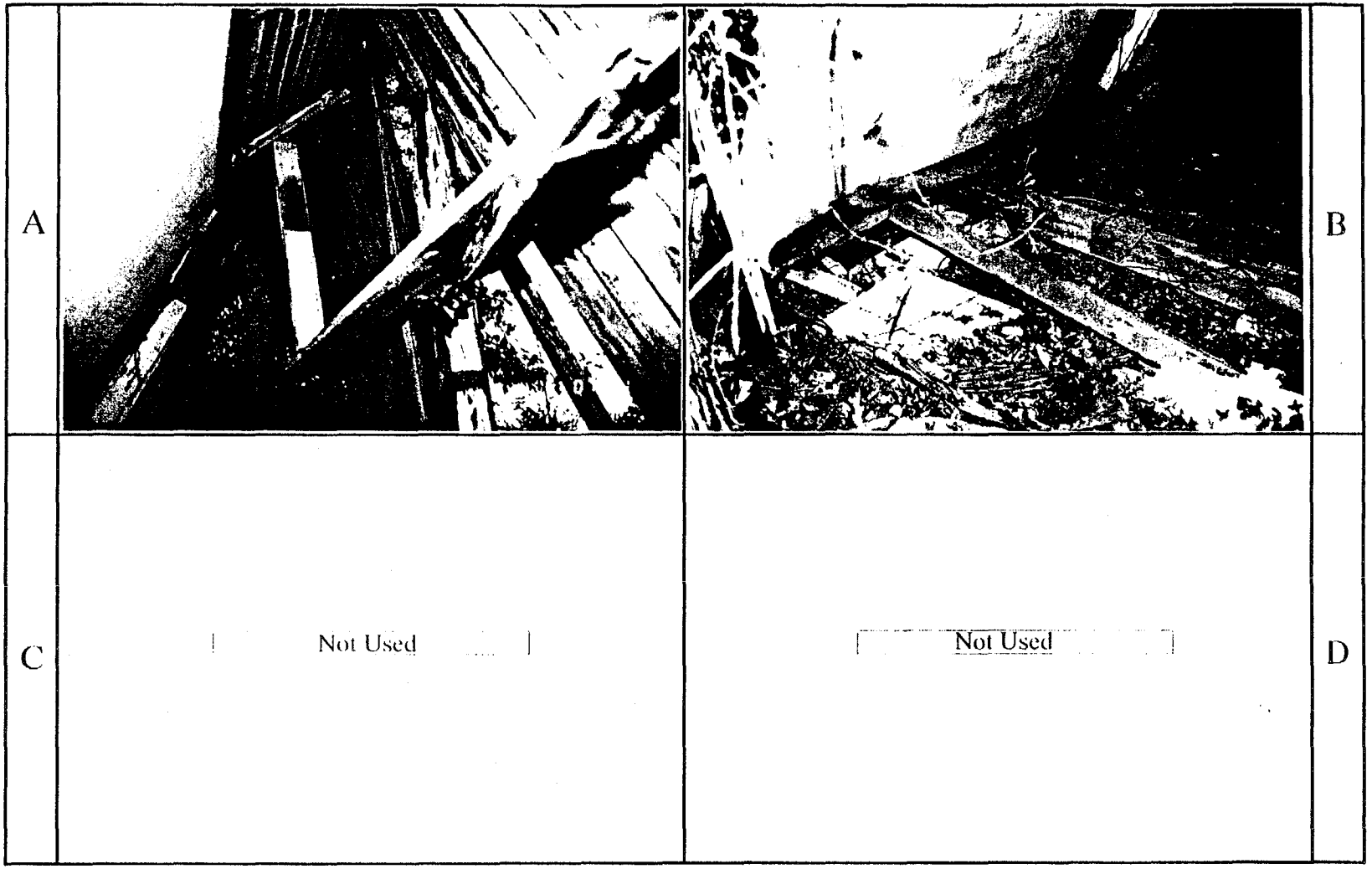
The walls of room 1 are made of finished plywood sheeting.

4.8.2 Finish Materials

The walls are painted white.

4.8.3 Piping

None.



A	Ceiling
C	Not Used

Floor	B
Not Used	D

FIGUR E 6 Photographs of Building E5978 Interior — Ceiling and Floor

4.8.4 Equipment

None.

4.8.5 Doors and Windows

A wooden door measuring 30 in. wide by 82 in. high is located in the center of the south wall. A window opening measuring 42 in. by 42 in. is located in the center of the north wall; another with the same dimensions is located in the center of the west wall. Three windows, each measuring 40 in wide by 42 in high, are along the east wall.

4.8.6 Ceiling and Floor

The ceiling of room 1 has collapsed (Figure 6). Wooden rafters remain hanging from the walls down to the floor. The building has a wood plank floor supported by a wooden-frame. The floor is in poor condition; no foundation was apparent at the time of ANL's inspection (Figure 6B).

5 Geophysical Investigation

ANL personnel conducted a geophysical survey of the area surrounding Building E5978 in April and May 1992 (McGinnis et al. 1992). Noninvasive geophysical survey methods, including magnetics, electrical resistivity, and GPR were conducted around the building.

The following specific conclusions were drawn from the geophysical surveys of Building E5978 (McGinnis et al. 1992):

- Magnetic anomalies between Buildings E5974 and E5978 and along Hog Point Road are believed to be associated with construction fill and road-grade material.

- Three magnetic anomalies in the high-resistivity northwest quadrant of the survey area are caused by unidentified sources.

- High resistivities in the west/northwest quadrant are believed to be caused by natural sources; however, an electrical depth-sounding station centered in this zone indicates a layer rising to 3,055 ohm-meter. A value this high in a wetland environment is not completely understood, but the GPR data indicate that this reflector may be a sand lense. Core samples taken from the northwest quadrant would satisfy questions about the source of this unusual feature.

- No magnetic, electrical, or GPR anomalies immediately surrounding the building suggest the presence of buried pipes, drains, or tanks.

6 Air Quality Monitoring

ANL staff collected air quality samples upwind, downwind, and inside of Building E5978 during November 1994. Analytical results showed no distinguishable differences in the levels of hydrocarbons and chlorinated solvents between the two background samples and the sample taken inside Building E5978. These results indicate that Building E5978 is not a source of volatile organic compound contamination. The air quality monitoring report is provided in the appendix.

7 Underground Storage Tanks

No information on underground storage tanks associated with Building E5978 is available.

8 Conclusions

On the basis of the information collected and reviewed by ANL for Building E5978, it is the authors' judgment that no significant air contamination is associated with this building. The geophysical surveys indicate some anomalies in the area of Building E5978 that warrant further investigation and evaluation.

9 References

EAI Corporation, 1989, *Historical Records Search and Site Survey of Edgewood Area Buildings — Final Report*, prepared for U.S. Army Chemical Research, Development, and Engineering Center, Aberdeen Proving Ground, Maryland, under contract no. DAAIS-87-D0021.

McGinnis, M.G., L.D. McGinnis, S.F. Miller, and M.D. Thompson, 1992, *Interim Progress Report — Geophysics: Decommissioning of Buildings E5974 and E5978, Aberdeen Proving Ground,* ANL/ESD/TM-47, Argonne National Laboratory, Argonne, Ill.

Nemeth, G.,1989, *RCRA Facility Assessment Report, Edgewood Area, Aberdeen Proving Ground, Maryland*, unnumbered report prepared for Aberdeen Proving Ground, Maryland.

Appendix:

Air Quality Monitoring Report

ARGONNE NATIONAL LABORATORY

INTRA-LABORATORY MEMO

March 27, 1995

TO: Eric Zimmerman

FROM: John Schneider JFS

SUBJECT: **Building E5978 Air Monitoring for Volatile Organic Compounds Results**

Building E5978 at the Aberdeen Proving Ground (APG) was constructed in 1960 for use as a field office during training and testing. The building was placed on an inactive status in 1976.

Air samples were collected and analyzed on-site at APG by ANL during the week of November 14, 1994. Samples were collected by drawing ambient air through a Tenax TA sorbent polymer sampling cartridge (4 mm I.D. x 11.5 cm) traps at the rate of 200mL for 120 minutes, yielding a 24 L sample volume. The cartridges were analyzed by thermally desorbing the trapped organic compounds with a Dynatherm model 900 ACEM thermal desorption unit on to a Hewlett-Packard 5890 series II gas chromatograph (GC) equipped with a Hewlett-Packard 5972 mass spectrometer (MS) and flame photometric detector (FPD). The FPD is specific for sulfur or phosphorous containing compounds.

The MS was used for detecting and identifying organic compounds desorbed from the Tenax traps. Spectra were obtained by scanning from 45 to 400 atomic mass units at a rate of two scans every second. Identifications were based on mass spectral interpretation and computer searching of the 140,000 compound Wiley spectral library. A standard mixture of volatile organics containing toluene at 200 ng/uL and other aromatic hydrocarbons, was run daily to assure that the instrument was operating properly. All quantitations are estimates, using the assumption that analyte response factors should be similar to toluene in the standard mixture of volatile organics.

The FPD was used to "screen" for organic compounds containing sulfur or phosphorous atoms. This information was needed because of the history of the APG in the production and storage of CWA (CWA and CWA degradation products contain sulfur and/or phosphorous). This information was also useful in identifying unknown organic compounds.

The majority of the volatile organic compounds found during the ANL air monitoring are commonly found in any building (hydrocarbons and chlorinated solvents). The following compounds were the major components found in the air samples:

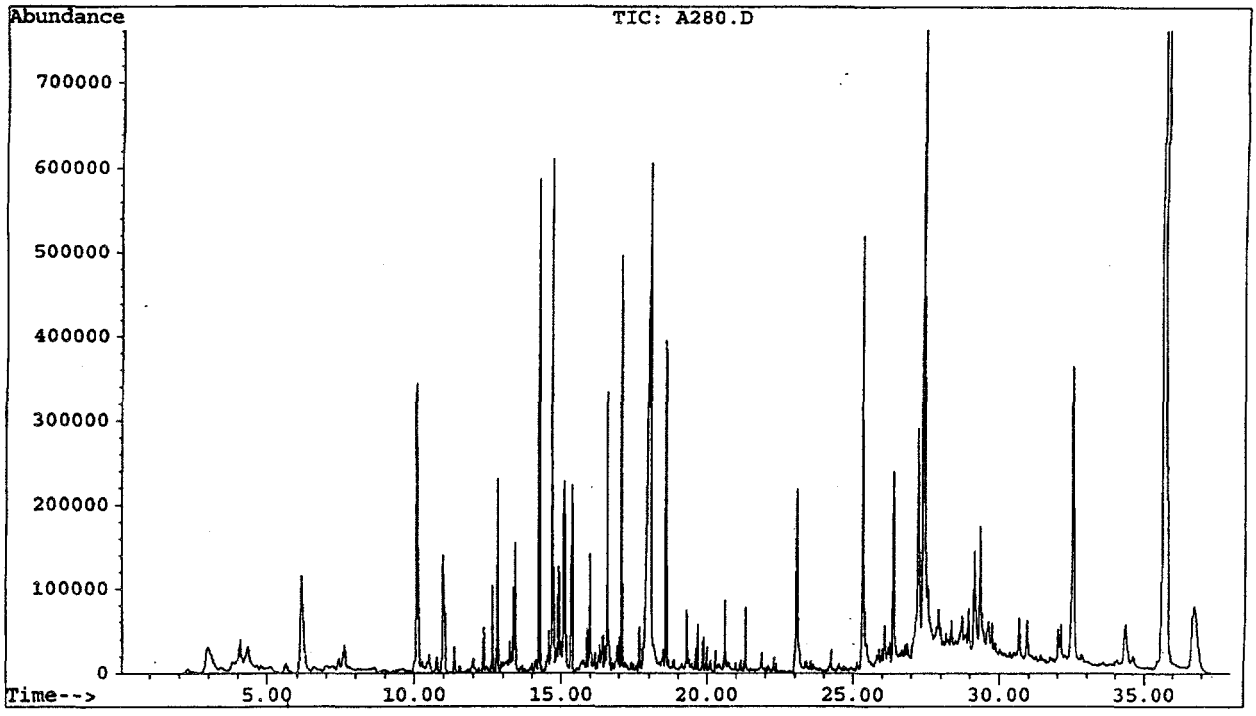
Compound	E5978	Upwind
Benzene	0.13 ng/L	0.09 ng/L
Toluene	0.20 ng/L	0.13 ng/L
Hexanal	0.11 ng/L	0.09 ng/L
Ethyl Benzene	0.04 ng/L	0.03 ng/L
Xylene	0.09 ng/L	0.06 ng/L
Alpha Pinene	0.22 ng/L	0.20 ng/L
Benzaldehyde	0.26 ng/L	0.26 ng/L
Phenol	0.06 ng/L	0.07 ng/L
Beta Pinene	0.16 ng/L	0.12 ng/L
Methyl Phenyl Ketone	0.11 ng/L	0.14 ng/L

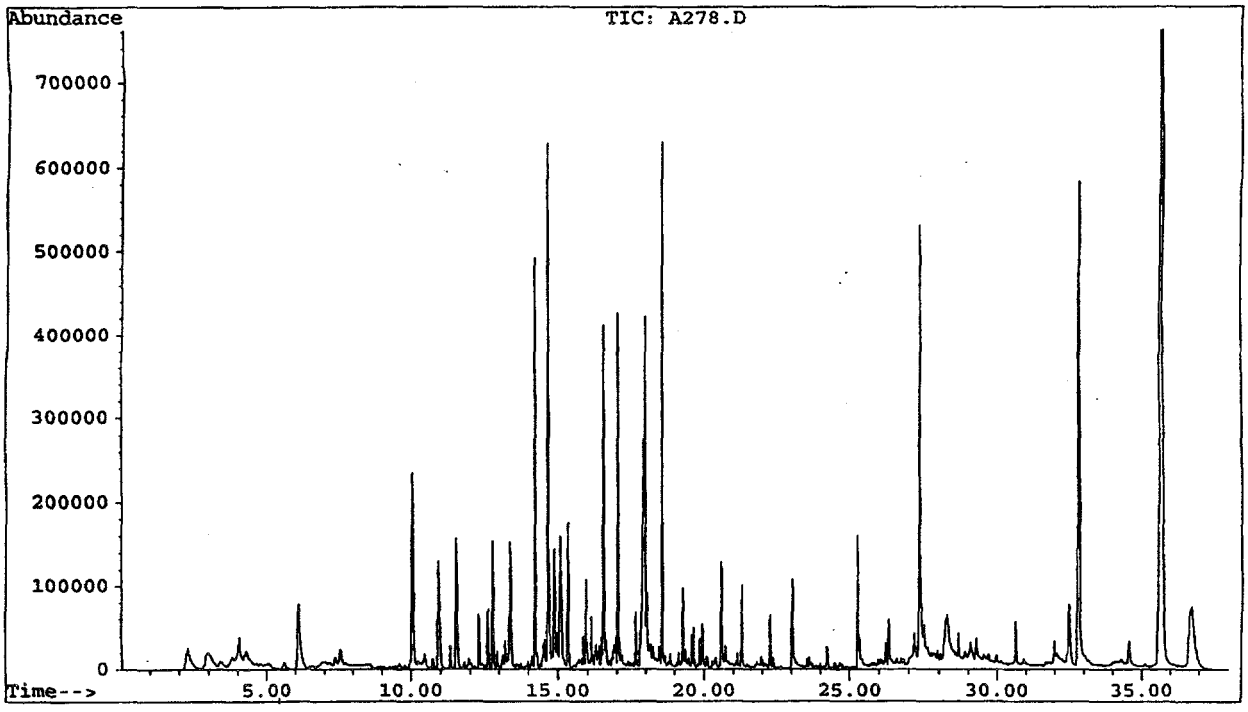
All compounds were also present at similar levels in an upwind air sample. Figure 1 is a total ion chromatogram (TIC) of the air sample taken in E5978. Figure 2 is a TIC of the upwind air sample. Table 1 is the air sampling data sheet.

The analysis indicates that Building E5978 is not a source of volatile organic compound contamination.

JFS:lls

File : C:\HPCHEM\2\DATA\A280.D
Operator : lar
Acquired : 20 Nov 94 9:56 am using AcqMethod PILOT
Instrument : 5972 - In
Sample Name: 280(47) E5978 main rm 3:25-5:25 200mL/min
Misc Info : start, 350mL/min end, facing ceiling
Vial Number: 1




Abundance
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700000
600000
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400000
300000
200000
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Time-->
5.00
10.00
15.00
20.00
25.00
30.00
35.00

Air Sampling Data Sheet

Date: 11/19/01 | Site: Aberdeen Proving Grounds | Researchers: [illegible]

Sample			Sampling Specifications							Location				Ambient Conditions		
			Sampling Time		Flow Rate		Pump							Temp-		
Number	Building	Room	Start	End	Initial	Final	Setting	Pump ID #	Manifold	Height	Distance #1	Distance #2	Facing	erature	Pressure	Humidity
(39) 278	E5178	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	P. 1.50	5	5A	16"	18.2' From S. E. Corner	[illegible]	[illegible]	[illegible]	[illegible]	34%
(33) 279	E5179	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	P. 1.50	[illegible]	5B	16"	36' From N. E. Corner	[illegible]	[illegible]	[illegible]	[illegible]	34%
(47) 280	E5180	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	P. 1.50	4	4A	16"	7' From E. Wall	2' From [illegible]	Ceiling	[illegible]	[illegible]	[illegible]
(48) 281	E5181	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	P. 1.50	4	4B	16"	9' From S Wall	42' From E [illegible]	Ceiling	63°F	[illegible]	33%
(53) 282	E5274	Upstairs [illegible]	3:43 p.m.	[illegible]	[illegible]	[illegible]	P. 1.50	2	6A	20"	12' From S. E. Corner	[illegible]	[illegible]	[illegible]	[illegible]	33%
(51) 283	E5274	[illegible]	3:45 p.m.	5:51 p.m.	200	100	P 1.50	3	6B	20"	6' From N. E. Corner	[illegible]	[illegible]	63°F	[illegible]	33%
(49) 284	E5174	[illegible]	5:37 p.m.	5:51 p.m.	[illegible]	200	P 1.50	2	7A	16"	7' From E. Wall	6' From [illegible]	Ceiling	63°F	[illegible]	33%
(48) 285	E5274	[illegible]	3:47 p.m.	5:51 p.m.	200	200	P.150	2	7B	16"	9' From E. Wall	6' From [illegible]	Ceiling	63°F	[illegible]	33%