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NSWC INDIAN HEAD
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# PRELIMINARY ASSESSMENT REPORT

NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

IDENTIFICATION: MD4170024109

NEESA 13-021A
JANUARY 1992

**NAVAL ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY**

**Port Hueneme, California 93043-5014**

# PRELIMINARY ASSESSMENT REPORT

## NAVAL ORDNANCE STATION
## INDIAN HEAD, MARYLAND

**IDENTIFICATION: MD4170024109**

**NEESA 13-021A**
**JANUARY 1992**

ADDENDUM TO THE
INITIAL ASSESSMENT STUDY

# PRELIMINARY ASSESSMENT REPORT

| | |
|---|---|
| Activity Name: | Naval Ordnance Station<br>Indian Head, Maryland |
| Address: | Naval Ordnance Station<br>Indian Head, Maryland<br>20646-5000 |
| UIC: | N00174 |
| EPA Region: | 3 |
| EPA Identification: | MD4170024109 |
| Latitude: | 38° 35′ 40" N |
| Longitude: | 077° 10′ 45" W |


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Prepared by:
Naval Energy and Environmental Support Activity
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NEESA 13-021A
January 1991

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| MD | 4170024109 |

**II. HAZARDOUS CONDITIONS AND INCIDENTS**

01 [X] A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

The unused shallow aquifer may be affected by sites 41, 42, 43, 44, 45, 47, 48, and 50. See section 3 of PA report.

01 [X] B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

Mercury that may have been disposed in the storm sewers may have discharged to the Mattawoman Creek. Silver may be in the sediments as well. The shallow aquifer of the NOS Indian Head peninsula is hydraulically connected to the Mattawoman and Potomac River

01 [X] C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: _____) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

Asbestos and mercury vapors may potentially contaminate air within Bldg 102. Mercury vapors may also affect air in Bldg. 101. See sites 54 and 55 in section 3 of the PA report.

01 [X] D. FIRE EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: _____) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

None.

01 [X] E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: _____) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

None. Building 102 is no longer in use and Bldg. 101 has limited access to location where mercury was found.

01 [X] F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: _____) — [X] POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: unknown (acres) — 04 NARRATIVE DESCRIPTION

Sink drain from Bldg 103 discharged to soil beneath building. Soil near cracked sewer lines servicing lab facilities may be contaminated. Also possible soil contamination at sites 41, 42, 43, 44, 45, 46, 47, and 48.

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

None.

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

None.

01 ☐ I. POPULATION EXPOSURE INJURY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

None.

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## PRELIMINARY ASSESSMENT
### PART 1 - SITE INFORMATION AND ASSESSMENT

**I. IDENTIFICATION**

| 01 STATE | 02 SITE NUMBER |
|---|---|
| MD | 4170024109 |

**II. SITE NAME AND LOCATION**

| 01 SITE NAME (Legal, common, or descriptive name of site) | 02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER | | | | |
|---|---|---|---|---|---|
| Naval Ordnance Station, Indian Head | | | | | |
| 03 CITY | 04 STATE | 05 ZIP CODE | 06 COUNTY | 07 COUNTY CODE | 08 CONG DIST |
| Indian Head | MD | 20646 | Charles | 017 | 05 |
| 09 COORDINATES LATITUDE | LONGITUDE | | | | |
| 38 35' 40"N | 077 10' 45".W | | | | |

10 DIRECTIONS TO SITE (Starting from nearest public road)

NOS Indian Head is located at the southern most point of Route 210, south and west of the city of Indian Head.

**III. RESPONSIBLE PARTIES**

| 01 OWNER (If known) | 02 STREET (Business, mailing, residential) | | | |
|---|---|---|---|---|
| Commanding Officer | Naval Ordnance Station | | | |
| 03 CITY | 04 STATE | 05 ZIP CODE | 06 TELEPHONE NUMBER | |
| Indian Head | MD | 20646 | (301) 283-7746 | |
| 07 OPERATOR (If known and different from owner) | 08 STREET (Business, mailing, residential) | | | |
| | | | | |
| 09 CITY | 10 STATE | 11 ZIP CODE | 12 TELEPHONE NUMBER | |
| | | | ( ) | |

13 TYPE OF OWNERSHIP (Check one)

☐ A. PRIVATE ☒ B. FEDERAL: Navy (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL

☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ C. NONE

**IV. CHARACTERIZATION OF POTENTIAL HAZARD**

01 ON SITE INSPECTION

☒ YES DATE 05 / 22 / 89 (MONTH DAY YEAR)

☐ NO

BY (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR

☐ E. LOCAL HEALTH OFFICIAL ☒ F. OTHER: Naval Energy and Environmental Support Activity (Specify)

CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)

☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION

1890 (BEGINNING YEAR) | Present (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

This Preliminary Assessment report describes thirteen potentially contaminated sites. The major contaminants of concern are mercury, asbestos, polychlorinated biphenyls, silver, toluene, and cadmium.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Contaminants have potential to leach into groundwater.

Building 102 was closed due to visible presence of mercury and asbestos

**V. PRIORITY ASSESSMENT**

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)

☐ A. HIGH (Inspection required promptly) ☒ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

**VI. INFORMATION AVAILABLE FROM**

| 01 CONTACT | 02 OF (Agency/Organization) | | | 03 TELEPHONE NUMBER |
|---|---|---|---|---|
| Shawn Jorgensen | NOS Indian Head | | | (301) 743-6745 |
| 04 PERSON RESPONSIBLE FOR ASSESSMENT | 05 AGENCY | 06 ORGANIZATION | 07 TELEPHONE NUMBER | 08 DATE |
| Sherry Van Duyn | Navy | NEESA | (805) 982-2634 | 06 / 28 / 91 (MONTH DAY YEAR) |

EPA FORM 2070-12 (7-81)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## PRELIMINARY ASSESSMENT
## PART 2 - WASTE INFORMATION

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| MD | 4170024109 |

## II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

**01 PHYSICAL STATES** (Check all that apply)

- [X] A. SOLID
- [ ] B. POWDER, FINES
- [ ] C. SLUDGE
- [ ] D. OTHER _____ (Specify)
- [ ] E. SLURRY
- [ ] F. LIQUID
- [ ] G. GAS

**02 WASTE QUANTITY AT SITE** (Measures of waste quantities must be independent)

TONS _____
CUBIC YARDS unknown
NO. OF DRUMS _____

**03 WASTE CHARACTERISTICS** (Check all that apply)

- [X] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [X] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [ ] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

## III. WASTE TYPE

| CATEGORY | SUBSTANCE NAME | 01 GROSS AMOUNT | 02 UNIT OF MEASURE | 03 COMMENTS |
|---|---|---|---|---|
| SLU | SLUDGE | | | |
| OLW | OILY WASTE | | | |
| SOL | SOLVENTS | | | |
| PSD | PESTICIDES | | | |
| OCC | OTHER ORGANIC CHEMICALS | | | |
| IOC | INORGANIC CHEMICALS | unknown | | asbestos within Building 102 |
| ACD | ACIDS | | | |
| BAS | BASES | | | |
| MES | HEAVY METALS | 46,200 | pounds | estimated mercury to sewers |

## IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

| 01 CATEGORY | 02 SUBSTANCE NAME | 03 CAS NUMBER | 04 STORAGE/DISPOSAL METHOD | 05 CONCENTRATION | 06 MEASURE OF CONCENTRATION |
|---|---|---|---|---|---|
| MES | Mercury | 7439-97-6 | Spills | unknown | |
| IOC | Asbestos | 1332-21-4 | Present in building | unknown | |
| OCC | Polychlorinated Biphenyls | 1336-36-3 | PCB oil leaked to ground | unknown | |
| MES | Silver | 7440-22-4 | Present in Creek Sediment | unknown | |
| MES | Cadmium | 7440-43-9 | On ground | unknown | |
| SOL | Toluene | 108-88-3 | Spills | unknown | |
| | | | | | |
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| | | | | | |
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| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

## V. FEEDSTOCKS (See Appendix for CAS Numbers)

| CATEGORY | 01 FEEDSTOCK NAME | 02 CAS NUMBER | CATEGORY | 01 FEEDSTOCK NAME | 02 CAS NUMBER |
|---|---|---|---|---|---|
| FDS | | | FDS | | |
| FDS | | | FDS | | |
| FDS | | | FDS | | |
| FDS | | | FDS | | |

## VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Initial Assessment Study NOS Indian Head, Maryland. NEESA 13-021.
Personnel interviews, site visit.

EPA

**POTENTIAL HAZARDOUS WASTE SITE**
**PRELIMINARY ASSESSMENT**
**PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS**

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| MD | 4170024109 |

**II. HAZARDOUS CONDITIONS AND INCIDENTS** *(Continued)*

01 [X] J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) [X] POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Flora in vicinity of Bldg. 103 drain line may be affected, as well as at Site 44, Soak Out Area (solvent unknown), and sites 45 and 48 (solvent containers of unknown origin)

01 [X] K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) [X] POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION *(Include name(s) of species)*
Fauna utilizing Mattawoman Creek may potentially be affected by mercury in the storm sewers, silver in the sediments, and solvents which may migrate via ground water to the Mattawoman Creek.

01 [X] L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) [X] POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Fish in the Mattawoman Creek are consumed by recreational fishermen

01 [X] M. UNSTABLE CONTAINMENT OF WASTES *(Spills/runoff/standing liquids/leaking drums)* — 02 ☐ OBSERVED (DATE: _____) [X] POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION
Mercury and asbestos at sites 50,54, and 55 are contained within the bldgs. The potential silver in the sediments, PCBs in scrapyard and areas of alleged solvent disposal are uncontained potential sites.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
torm sewer discharge from the lab area and Organic Plant discharge to the Mattawoman Creek.

01 [X] O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 [X] OBSERVED (DATE: 1969&1989) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Visible mercury was identified in storm and sanitary sewer manholes in lab area.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
None.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS
None.

**III. TOTAL POPULATION POTENTIALLY AFFECTED:** _____

**IV. COMMENTS**

**V. SOURCES OF INFORMATION** *(Cite specific references, e.g., state files, sample analysis reports)*
Initial Assessment Study, NOS Indian Head, Maryland, NEESA 13-021.
Personnel interviews; and site visit

## EXECUTIVE SUMMARY

This Preliminary Assessment report is an addendum to the Initial Assessment Study (IAS) of Naval Ordnance Station Indian Head, Maryland (NEESA 13-021, May 1983). The Preliminary Assessment is part of the Navy Installation Restoration program, designed to identify contamination of Navy properties resulting from past operations and institute corrective measures as needed. Thirteen sites identified subsequent to the IAS are recommended for further action under the Navy Installation Restoration program as discussed in section 3 of this report. The suspected hazardous contaminants include: elemental silver in creek sediments, polychlorinated biphenyls in soil, toluene in soil, cadmium in sandblast grit surface disposal area, uncontained mercury and asbestos in laboratory buildings. Three of the sites may be contaminated with solvents which could not be identified by a record search, and one site is a reported landfill which may have received hazardous waste.

CONTENTS

1. INTRODUCTION ..... 9
1.1 Authority and Scope ..... 9

2. GENERAL FINDINGS .....10
2.1 Potential for Contaminant Migration .....10
2.2 Potential Contaminant Receptors .....13

3. SITE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS .....13
3.1 Organic Plant.....13
3.1.1 Site 39, Silver Release to Sediments .....13
3.1.2 Site 40, Palladium Catalyst in Sediments .....16
3.2 Public Works .....17
3.2.1 Site 41, Scrap Yard .....17
3.2.2 Site 42, Olson Road Landfill .....17
3.3 Cast Plant .....20
3.3.1 Site 43, Toluene Disposal .....20
3.4 Pilot Plant .....22
3.4.1 Site 44, Soak Out Area .....22
3.4.2 Site 45, Abandoned Drums .....24
3.4.3 Site 46, Cadmium Sandblast Grit .....24
3.4.4 Site 47, Mercuric Nitrate Disposal Area .....25
3.5 Nitration Area .....27
3.5.1 Site 48, NG Plant Disposal Area .....27
3.6 Laboratory Area .....27
3.6.1 Site 49, Chemical Disposal Pit .....27
3.6.2 Mercury Contamination of Laboratory Area .....31
3.6.2.1 Site 50, Building 103 Crawl Space .....32
3.6.2.2 Site 51, Building 101 Dry Well;
and Site 52, Building 102 Dry Well.....35
3.6.2.3 Site 53, Mercury Contamination of the Sewage System 35
3.6.2.4 Site 54, Building 101 .....37
3.6.2.5 Site 55, Building 102 .....38
3.6.2.6 Building 556 .....41

4.0 REFERENCES .....42

APPENDIX

# 1. INTRODUCTION

Prior to the enactment of the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Navy Installation Restoration program was known as the Navy Assessment and Control of Installation Pollutants (NACIP) program. The first step in the NACIP program investigation was called an Initial Assessment Study (IAS) which contained the elements of a Preliminary Assessment. The IAS for Naval Ordnance Station (NOS) Indian Head, NEESA 13-021, was completed in May 1983 (NEESA, 1983).

On May 9, 1989, the Naval Sea Systems Command requested that NEESA conduct a Preliminary Assessment of Building 102 and the immediate surrounding area at NOS Indian Head, Maryland. January 17, 1990, the Chesapeake Division, Naval Facilities Engineering Command (CHESDIV) requested a supplemental Preliminary Assessment to consolidate PA information collected during the summer of 1989, and to collect the necessary information to satisfy the Superfund Amendments and Reauthorization Act (SARA) requirements.

Because the IAS includes the information about NOS Indian Head operations, this PA report contains only the site specific information for the potentially hazardous waste sites identified during the PA on-site survey. The history and mission of NOS Indian Head, along with information on the physical and biological features, and a description of station operations are given in the IAS (NEESA 13-021, May 1983).

The PA on-site survey for NOS Indian Head was conducted in four segments: from 17 through 25 May 1989, 25 Jun to 3 Jul 1990, 1 to 12 Oct 1990, and 3 through 14 Dec 1990. General findings concerning migration pathways and potential receptors are included in section 2. Section 3 gives specific information, conclusions and recommendations for sites identified subsequent to the IAS.

**1.1 Authority and Scope.** Section 211 of the Superfund Amendments and Reauthorization Act of 1986 (SARA 211) provides continued authority for the Department of Defense Environmental Restoration Program (DERP) and the Defense Environmental Restoration Account (DERA). The Navy Installation Restoration (IR) program is authorized by Chief of Naval Operations instruction (OPNAVINST) 5090.1 of Aug 1990. The Naval Facilities Engineering Command (NAVFACENGCOM) manages the Navy program. NAVFACENGCOM tasked the Naval Energy and Environmental Support Activity (NEESA) to conduct a Preliminary Assessment (PA) for each Navy and Marine Corps facility listed on the Federal Agency Hazardous Waste Compliance Docket (Docket) as required by SARA 120, or upon request by the engineering field divisions.

PAs are conducted in accordance with the Preliminary Assessment Guidance for Fiscal Year 1988, OSWER DIRECTIVE 9345.0-01, U.S. Environmental Protection Agency, January 1988; and recommendations are consistent with the National Contingency Plan.

The PA begins with investigation and review of available records at NEESA and the cognizant NAVFACENGCOM Engineering Field Division. After the record search, the PA team visits the activity to complete documentation of past and present operations and disposal practices. With the assistance of the activity point of contact, the team tours the activity and interviews long term employees. If a potential threat to human health or the environment is suspected, further action is recommended.

## 2. GENERAL FINDINGS

This section summarizes the Preliminary Assessment findings on potential contaminant migration pathways and the potential contaminant receptors at NOS Indian Head shown in Figure 1.

**2.1 Potential for Contaminant Migration.** Contaminants at NOS Indian Head may migrate in surface water, ground water, and air. Of the three, erosion and sediment transport in surface water run-off have the greatest potential to transport contaminants off base.

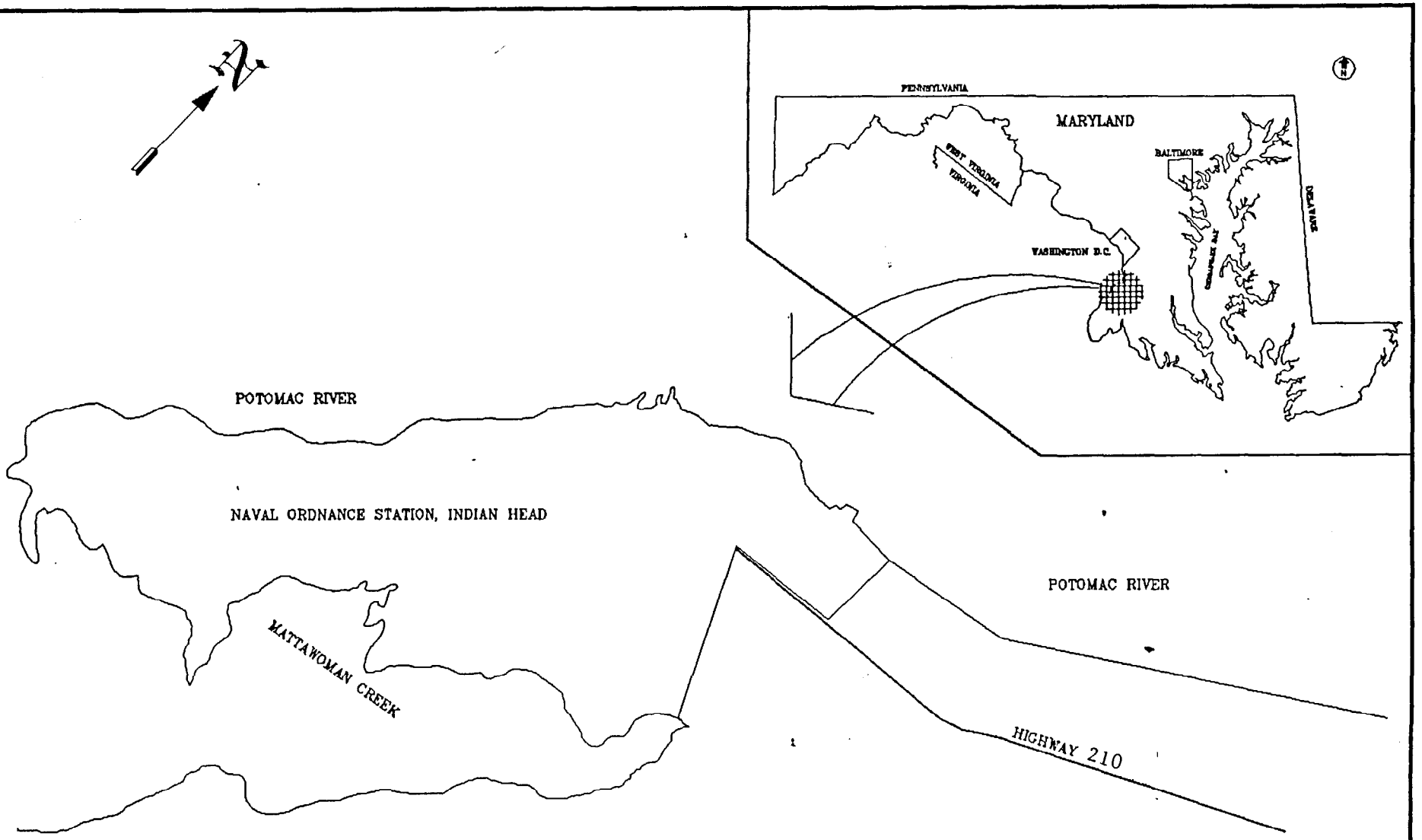
2.1.1 Surface Water. There are three principle waterways located in the immediate vicinity of NOS Indian Head: Potomac River, Mattawoman Creek, and Chicamuxen Creek. A number of natural drainage channels on station receive rapid flow during intense summer storms, but usually flow intermittently with discharge from storm and industrial sewers. These natural drainage channels tend to flow toward the Mattawomen Creek as shown by the drainage divide line in Figure 2.

2.1.2 Ground Water. The primary route of contaminant migration would be through the shallow water bearing zones present in the surficial deposits. Any potential contaminants entering the shallow water-bearing zones would be expected to migrate laterally towards the Mattawoman Creek, the lowest hydraulic point in the area.

Potable ground water supplies at NOS Indian Head are confined to deep aquifers which are separated from the land surface by extensive deposits of low permeability, fine grained materials such as clays and silty clays. Although the upper portions of the surficial deposits do contain water, this water is not used as a source of supply at NOS Indian Head (NEESA, 1983).

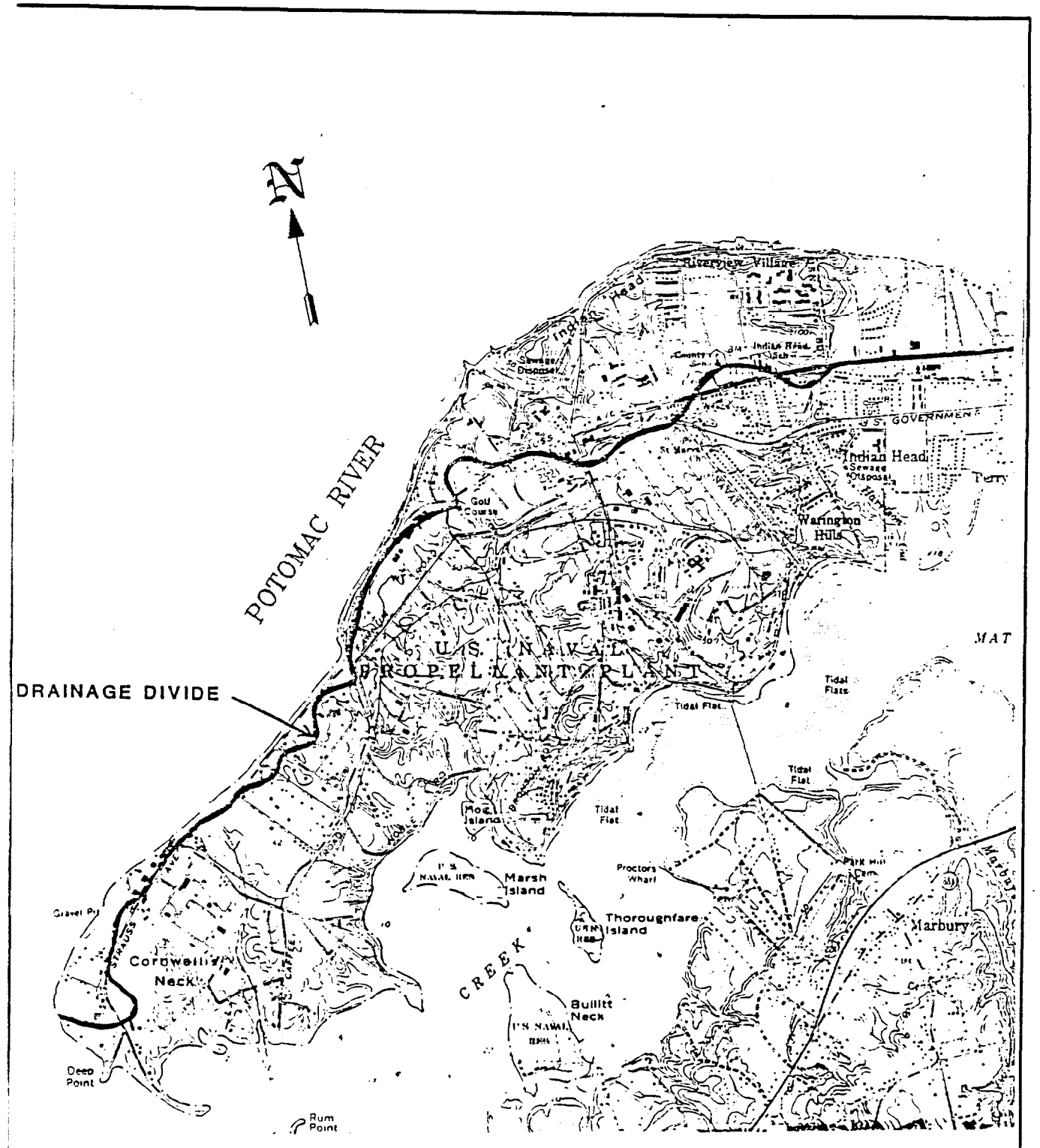
2.1.3 Air. Mercury vapors have been detected in the breathing zone within the basement of Building 101 near the location where mercury droplets wre discovered (see discussion section 3.6.2.4 Site 54, Building 101). The mercury vapor were not detected in the upper level offices thus a release of mercury vapors from Building 101 is expected to be inconsequential.

There is a potential for the release of mercury vapors and friable asbestos fibers at Site 55, Building 102. Building 102 is locked and no longer in use, however, several of the windows in the building are open or broken, creating the potential for release of airborne asbestos fibers and mercury vapors.




PRELIMINARY ASSESSMENT
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 1
LOCATION OF NAVAL ORDNANCE STATION




PRELIMINARY ASSESSMENT
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 2
DRAINAGE DIVIDE ON THE
MAIN PENINSULA
(REF. NEESA, 1983)

There are three occupied buildings (Buildings 101, 556, and 103) within 100 feet of Buildng 102.

## 2.2 Potential Contaminant Receptors.

2.2.1 Surface Water Receptors. Users of the surface water at NOS Indian Head include several species of vegetation and indigenous animals. The only species identified at NOS Indian Head that is designated as endangered or threatened by Federal or state authorities is the Rainbow Snake (*Farancia erytrogramma erytrogramma*). According to the Maryland Department of Natural Resources, one male and two female Rainbow Snakes were collected at NOS Indian Head in July 1937 during road Building operations on Stump Neck. The Federally-listed, endangered Southern Bald Eagle (*Haliaeetus leucocephalus*) is indigenous to Charles County and may be an infrequent visitor to NOS. In addition, hte Potomac River is potential habitiat for the Shortnose Sturgeon (*Acepenser brevirostris*) and a number of sea turtles, all of which are Federally-listed. No endangered or threatened plant species have actually been identified at NOS; however, the lotus (*Nelumbo lutea*) is found at its only Maryland location approximately 1.5 miles upstream at Mattawoman Creek (NEESA, 1983).

Surface water run-off from the process areas tends to flow toward the Mattawoman Creek as indicated by the drainage divide in Figure 2. Waters of the Mattawoman Creek are used for both recreational and commercial fishing and for recreational boating.

2.2.2 Ground Water Receptors. Shallow ground water from NOS Indian Head is expected to flow laterally under topographic influence and discharge to the Mattawoman Creek. Fish from the waters of the Mattawoman Creek are consumed by recreational fishermen and are also used as a primary food source by waterfowl.

2.2.3 Air Exposure Route Receptors. Building 102 has been abandoned since February 1989. The building is locked and access is restricted; however, several of the windows in the building are open or broken, creating the potential for exposure to airborne asbestos fibers and mercury vapors. Building 101 is still in use. Mercury vapors were detected in the breathing zone of rooms in the basement and building occupants may have been exposed. The permissible exposure limit (PEL) is 0.05 milligrams per cubic meter for mercury vapors (29 CFR 1910.1000).

# 3. SITE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

## 3.1 Organic Plant

3.1.1 Site 39, Silver Release to Sediments.

Findings. It is suspected that the production of Bis-2,2-Dinitropropyl Acetal/Formal (Acetal/Formal) has introduced elemental silver to the sediments of the Mattawoman

Creek about 175 feet southeast of Building 497. Discharge piping from Building 497 leads southeast, directly toward the Mattawoman Creek. The potential silver contamination is expected to be located as indicated in Figure 3.

Silver nitrate is used as a catalyst for the formation of Acetal/Formal, a plastisizer (propellant binder) used in Polaris rocket motors. Acetal/Formal was produced at NOS Indian Head from 1961 to 1965 in the area known as the Organic Chemical Plant. Building 497 was the main production facility, supported by the nearby facilities shown in Figure 3.

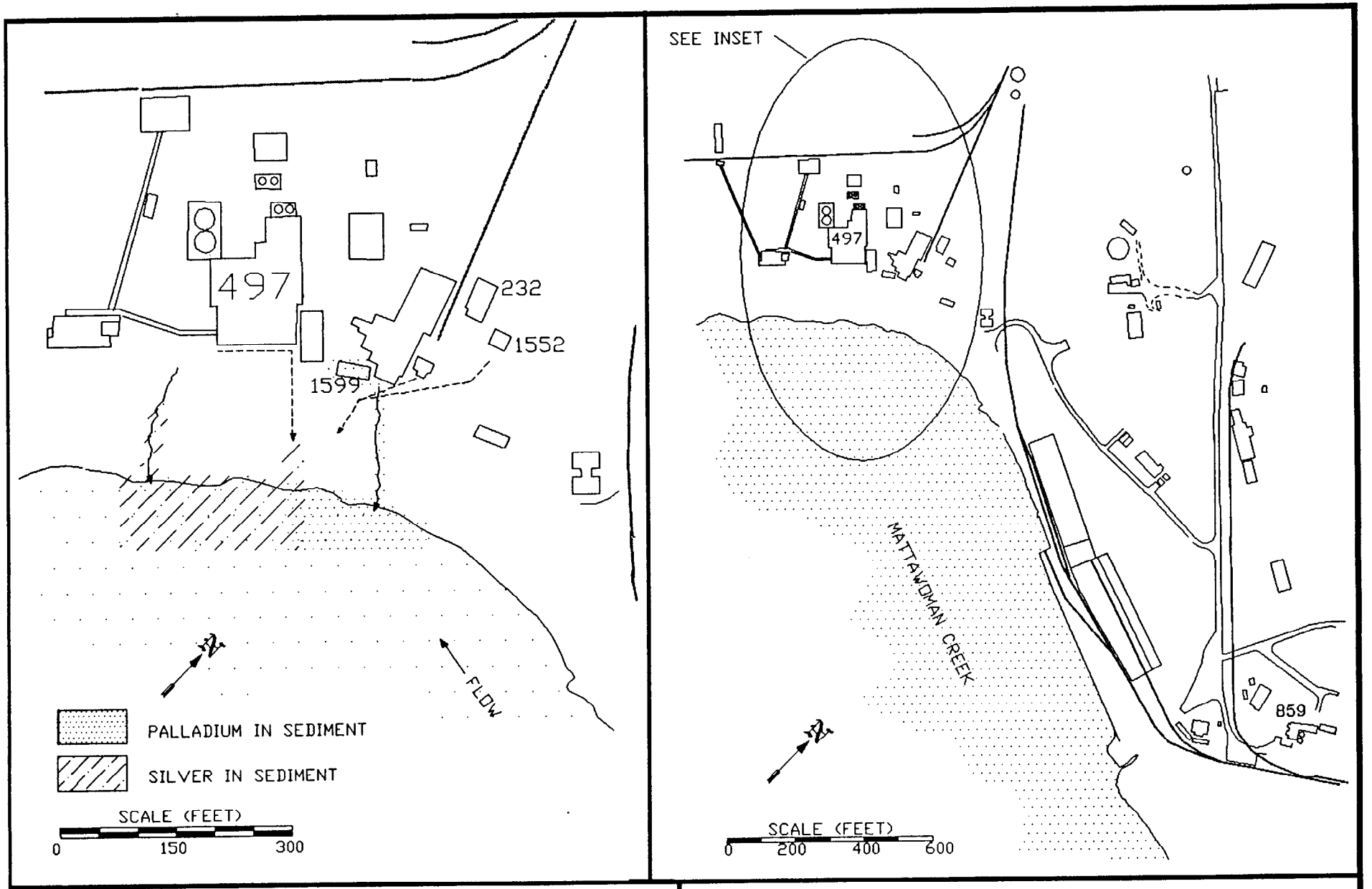
In the manufacturing process the silver nitrate catalyst reacts to form elemental silver. The silver is then recovered from the reaction vessel and returned to the supplier from which it was purchased to undergo a nitration reaction, converting the silver back to silver nitrate. However, interviews with Navy personnel revealed an incident where a valve was mistakenly left open and the contents of the 500 gallon batch reactor in Building 497, including the silver nitrate catalyst, were released to the Mattawoman Creek. Additional reports suggest that other similar releases may have occurred at various times during the production period. Navy personnel indicated that at times during the years of production, Acetal/Formal and elemental silver were visible in the water and creek sediments. Other hazardous substances involved in production include: dinitropropanol (DNPOH), ethylene dichloride, methyl chloride; and formaldehyde.

A Potomac River sediment study conducted by the Chesapeake Laboratory of the Environmental Protection Agency in 1970 revealed that unusually high concentrations of elemental silver existed in the sediment near NOS Indian Head. Silver appeared at a concentration of 1207 ppm, compared with other measured levels of approximately 2 to 4 ppm up and down stream (Hauser and Fauth, 1972). A map showing the sediment sample locations is given the the appendix.

Conclusions. The amount of silver discharged to the Mattawoman Creek is unknown, but because several Navy personnel spoke of visible silver in the creek, the amount discharged is suspected to be a detectable and perhaps a recoverable amount.

Discharge piping from Building 497 leads southeast, directly toward the Mattawoman Creek. The contaminated area is therefore expected to be located as indicated in Figure 3.

Recommendations. A Site Inspection is recommended under the Navy Installation Restoration Program. A sampling grid size should be determined based on an estimated target size. In this way, randomly placed samples will result in a confident measurement to confirm or deny contamination of the Mattawomen Creek sediments near the outfall of Building 497. The sediment samples should be analyzed for silver content.




PRELIMINARY ASSESSMENT
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 3
SITES 39 – SILVER, AND 40 – PALLADIUM
RELEASES TO CREEK SEDIMENT

### 3.1.2 Site 40, Palladium Catalyst in Sediments.

Findings. Interviews with facility personnel indicate that production of Unsymmetrical- Dimethylhydrazine (UDMH) resulted in the release of a palladium catalyst to the Mattawoman Creek. UDMH is a liquid which is most commonly used as a rocket fuel (or in rocket fuel formulations). This fuel was produced at NOS Indian Head from 1974 to 1975 to supplement the U.S. Air Force supply.

Production of UDMH involves hydrogenation of Dimethylnitrosamine (DMNA) using a palladium catalyst. This process was conducted utilizing Buildings 232, 1552, and 1599 shown in Figure 3. It was reported that $2 million of the catalyst, 5% palladium on carbon black, was purchased for this operation and that 40% of this was lost. This lost material cannot be accounted for.

There were reportedly a few start-up spills associated with UDMH production, but the substances released and the quantities involved are unknown. In 1975, a 2000-gallon hydrogenation reactor tank in Building 1599 was reported to have released nearly this full amount to the surrounding area and Mattawoman Creek due to a faulty valve. The palladium catalyst on carbon created a large black plume in the creek; the amount of palladium catalyst involved is unknown.

Production ceased in 1975 due to process failures - corrosion of equipment being the most troublesome. A private corporation was contracted to continue production off-base. Shortly thereafter, DMNA was pronounced a suspected carcinogen, and operations were halted. Having no other mechanism for disposal, the contractor began transporting DMNA to NOS Indian Head for incineration in the mid 1970's.

Conclusions. Due to the corrosive nature of UDMH and the numerous resultant equipment failures, it is likely that the palladium lost during operations was released to the area down gradient of the hydrogenation buildings. Furthermore, it is suspected that the palladium was not released in a single incident, but rather that the releases occurred in several incidents.

Estimating the loss as 40% of $2 million worth of 5% palladium on carbon black and assuming $100 per 100 grams of catalyst, (Note: the catalyst cost is a conservative estimate based on a cursory review of 1990 prices of palladium on carbon black. When purchased in 500 gram quantities the 1990 cost is about $135 per 100 grams), the pounds of palladium lost is calculated as follows:

(.4)($2000000)(100grams cat./$100)(2.2 lb/1000grams cat.)

x (0.05 lb pallad./ lb catalyst)

= 88 lb palladium

All drainage pipes and ditches from the hydrogenation area lead southeast, directly toward the Mattawoman Creek about 150 feet away (see Figure 3). Any discharge from process buildings would likely migrate to this area.

Recommendations.
A Site Inspection is not recommended under the Navy Installation Restoration program as palladium is not regulated as a hazardous substance according to the Federal Register, 40 CFR Parts 116, 117, and 302, "List of Hazardous Substances and Reportable Quantities", August 14, 1989; and 40 CFR Parts 264, 265, 270, and 271, "Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule", July 27, 1990.

## 3.2 PUBLIC WORKS

### 3.2.1 Site 41, Scrap Yard.

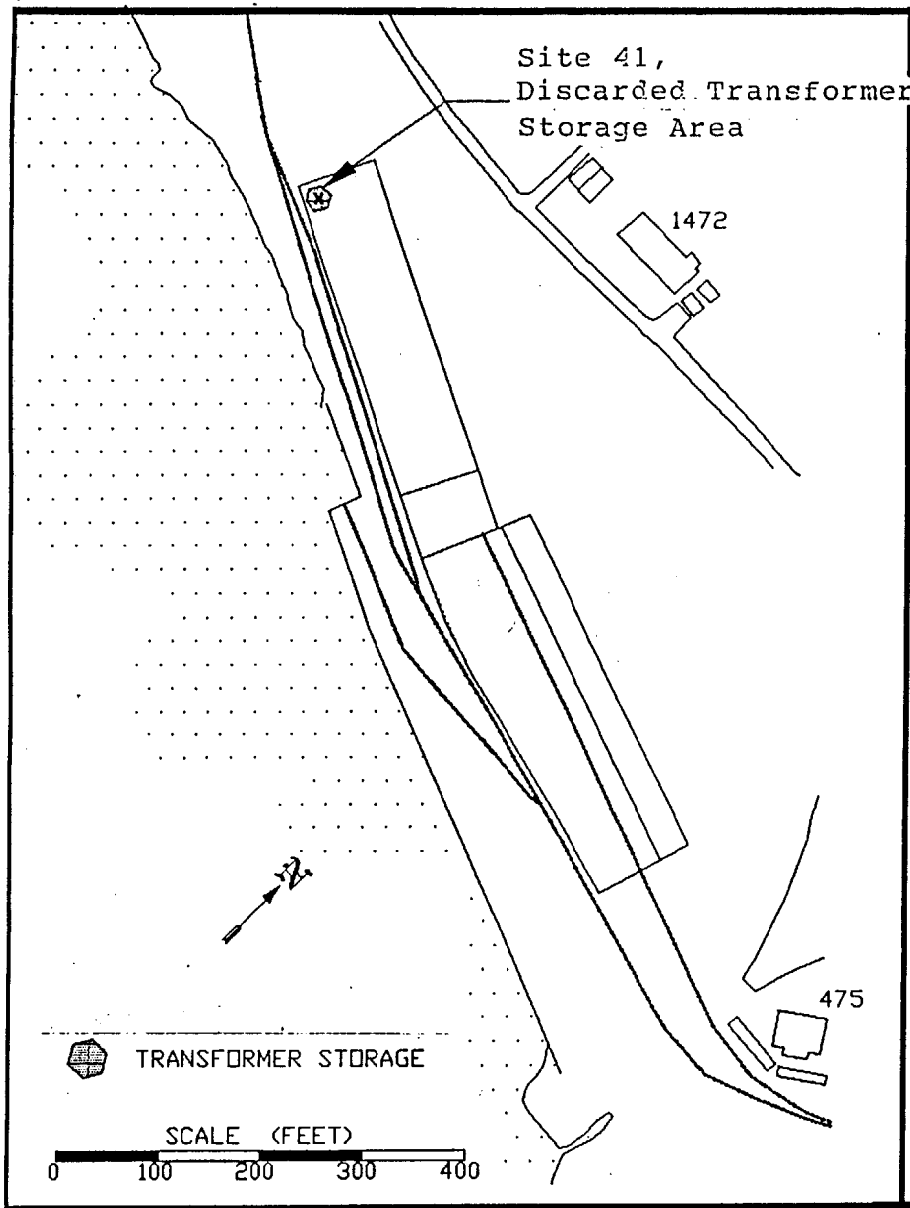
Findings. From the 1960s until 1988, discarded electrical transformers were held at the Scrap Yard prior to disposal via the Defense Marketing Reutilization Office (DRMO). Transformers in poor condition were stored at the northwest end of the Scrap Yard in the corner nearest the creek as shown in Figure 4. The NOS Indian Head "Waste Analysis Plan" of October 1981 reported 27 discarded transformers awaiting disposal, of these, nine contained PCBs, and eight were PCB-contaminated (NEESA, 1983). Presently, there are approximately 20 non-PCB transformers stored in the same area.

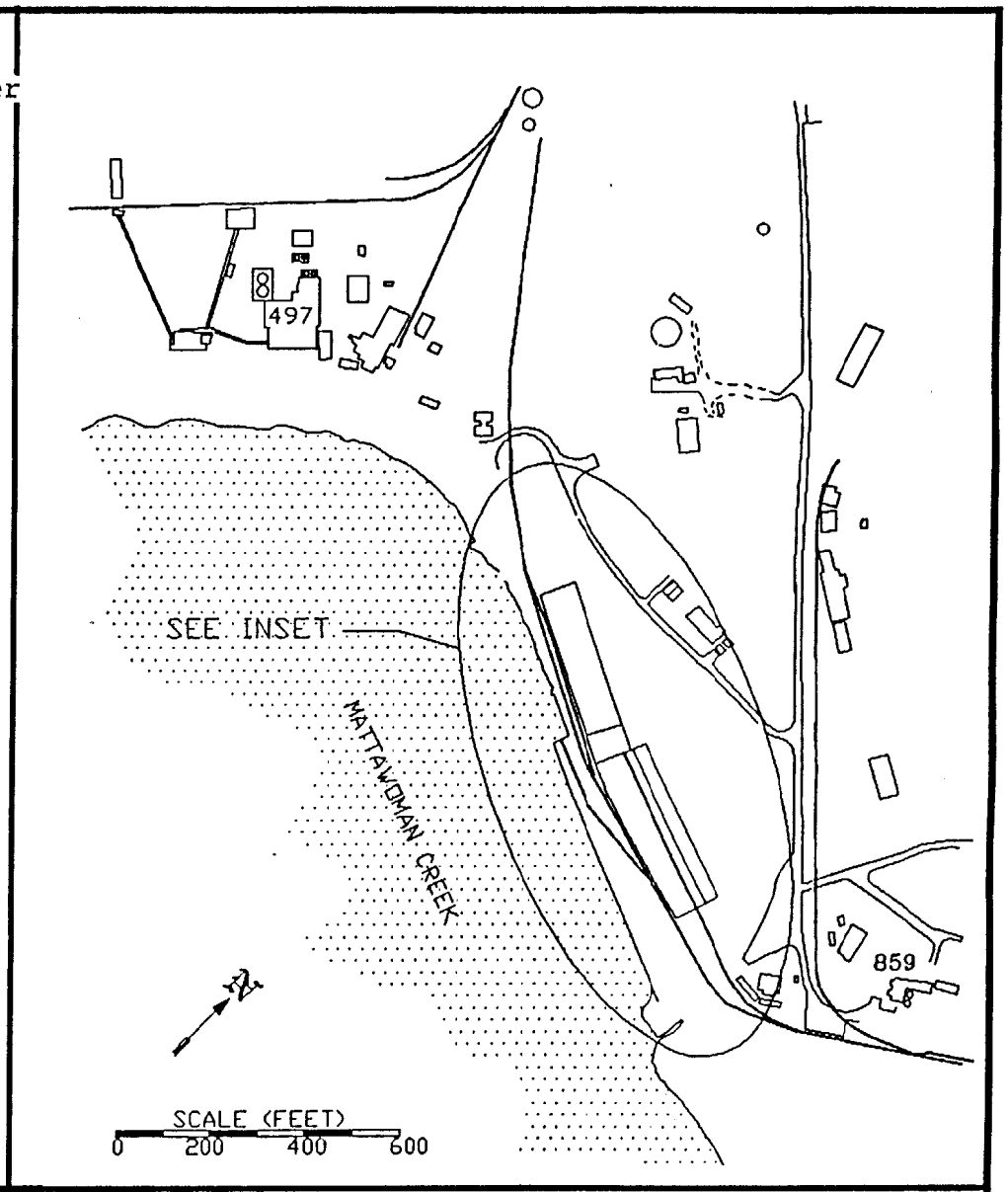
Conclusions. Because those transformers taken to the Scrap Yard were known to leak and scheduled for disposal, it is suspected that PCB containing dielectric fluid was released to the surface soils of the Scrap Yard.

Recommendations. A Site Inspection is recommended under the Navy Installation Restoration program. Soil sampling for PCBs is recommended in the visibly stained areas. Random sampling of a grid which is based on an estimated target size is recommended for the entire suspected area. Enough randomly placed samples will then yield a confident measurement to confirm of deny contamination.

### 3.2.2 Site 42, Olson Road Landfill.

Findings. For about five years, until 1987, the area near Olson Road shown in Figure 5 was used for disposal of a variety of solid waste from all over the station. Whether the landfill ever received hazardous waste was neither confirmed nor denied by activity records and personnel interviews. Currently, the only visible solid waste in the area is branches, pallets, and a few scattered, unlabeled cans and drums. The rest of the area appears to have been filled in by earth moving equipment. The

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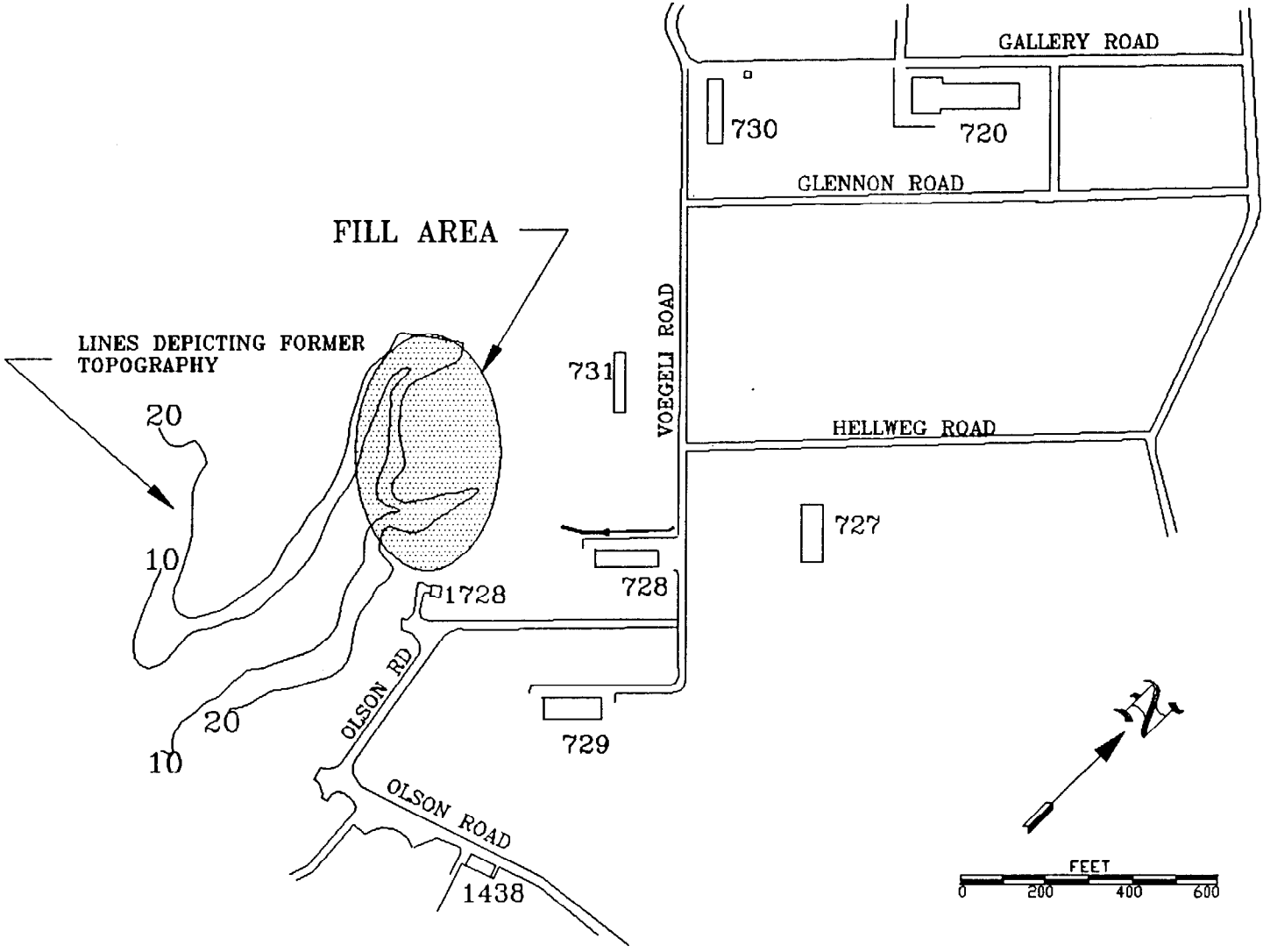
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 4
SITE 41 – SCRAPYARD

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NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 5
SITE 42 – OLSON ROAD LANDFILL

topographical map (NAVFAC dwg. no. 93612, NOS Indian Head, Area 11, Topography) of the area which now appears filled in shows gradients that are no longer visible at the land surface.

Conclusions. Based on NOS personnel reports and appearance of the area, this area was not designated as a landfill but has been used as such. The current elevation in the area is estimated to be about 20 feet higher than the elevation shown on the NAVFAC Area 11 Topography map.

Recommendations. A Site Inspection is recommended under the Navy Installation Restoration program. Soil borings near the perimeter of the site are recommended to determine the soil characteristics and potential for migration of leachable contaminants. Testing may also be conducted for evidence of typical landfill degradation such as natural gas, carbon monoxide/carbon dioxide/oxygen ratios. Depending on the depth to ground water, monitoring wells may be warranted with care taken not to disturb the landfill but rather intercept a down gradient plume.

## 3.3 CAST PLANT

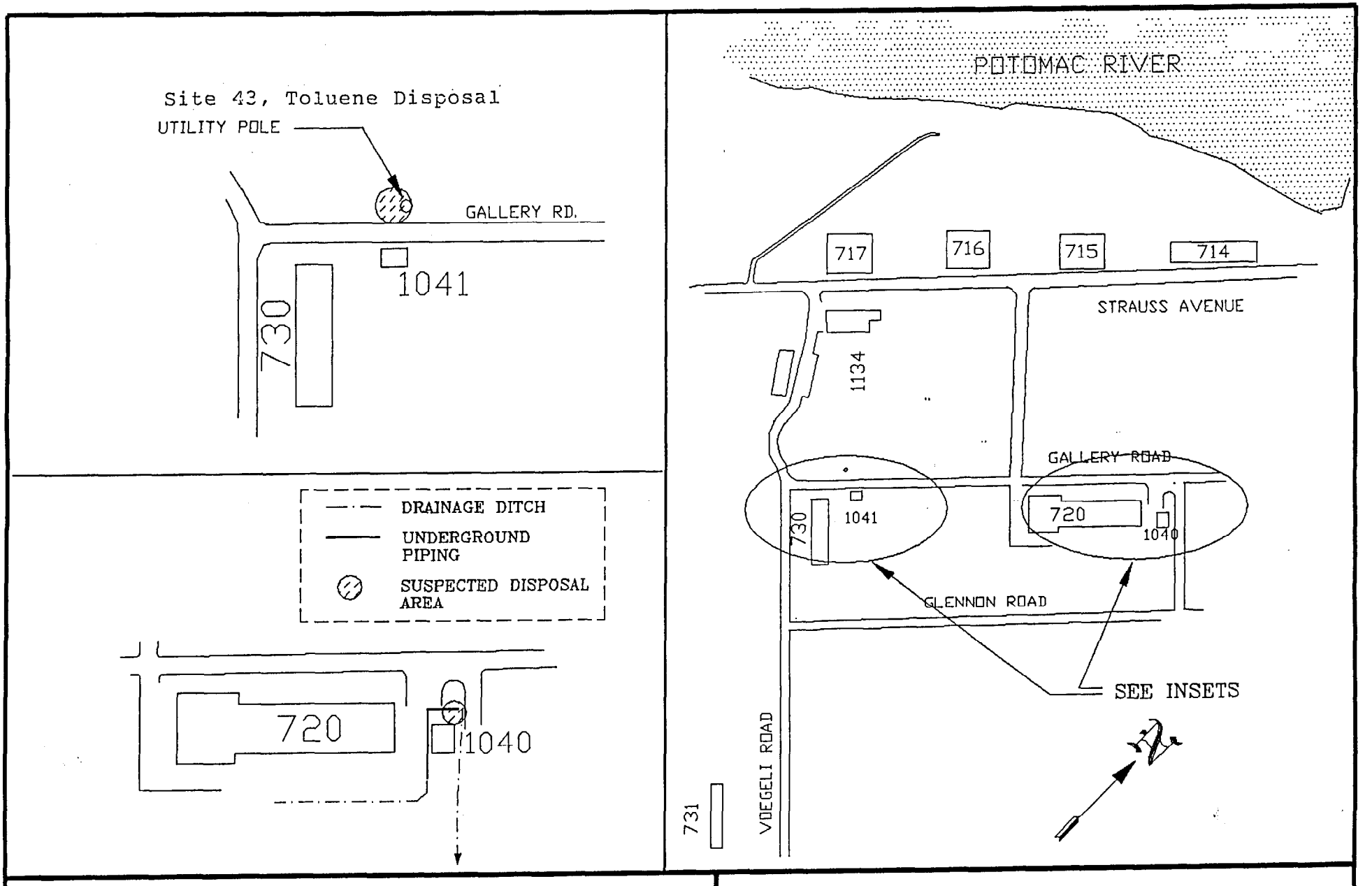
### 3.3.1 Site 43, Toluene Disposal.

Findings. Solvents are commonly used by Navy personnel working at the Cast Plant to remove propellant and oily residues from various metal parts. Composite-type propellants are easily removed using toluene. Similarly, nitroglycerine-based propellants are removed using acetone. It is believed that these solvents may have been released near parts cleaning Buildings 1040 and 1041, located in the Cast Plant area (see Figure 6).

Building 1041 was used to clean parts contaminated with composite propellants and plastic bonded explosives (PBX). Production of standard arm boosters and sustainers, and jet assist takeoff units (JATOs) in Buildings 743, 728, 730, and 729 created a need for such an operation. Both acetone and toluene were used in Building 1041. Cleaning took place two or three times per week from the late 1950's through November of 1989.

Similarly, Building 1040 was used as a parts cleaning house from about 1960 until 1989. Unlike Building 1041, however, only acetone was used here, since cleaning was primarily of Terrier parts.

After the parts were cleaned, the spent solvent was combined or "slummed" with sawdust and placed in 55 gallon drums to be taken to the Cast Plant burn point (SWMU 19) for disposal. It was reported, however, that at Building 1041, spent solvent would often be carried across the street and poured on the ground at the base of the utility pole located there. At Building 1040, acetone was reportedly disposed of in the drainage ditch just outside the door (see Figure 6).

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NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 6
SITE 43 – TOLUENE DISPOSAL

Conclusions. Because the surface disposal was not the excepted standard practice and occurred only with few personnel present, it is difficult to quantify the amounts of solvent released. One report estimated that 15 to 20 gallons per week were disposed at the base of the utility pole for more than two years - mostly toluene and some acetone. Similarly, in Building 1040 acetone was sometimes poured outside. Both cleaning operations existed for more than 30 years, this could amount to as much as 23,000 to 30,000 gallons of solvent improperly disposed.

Recommendations. A Site Inspection is recommended under the Navy Installation Restoration program. Soil and/or soil gas sampling and analysis for toluene is recommended for the area near the utility pole across the road from Building 1041. Ground water sampling may also be warranted.

Because acetone would readily volatilize under ambient conditions rather than migrate through the soil to ground water, sampling for acetone near Building 1040 is not recommended.

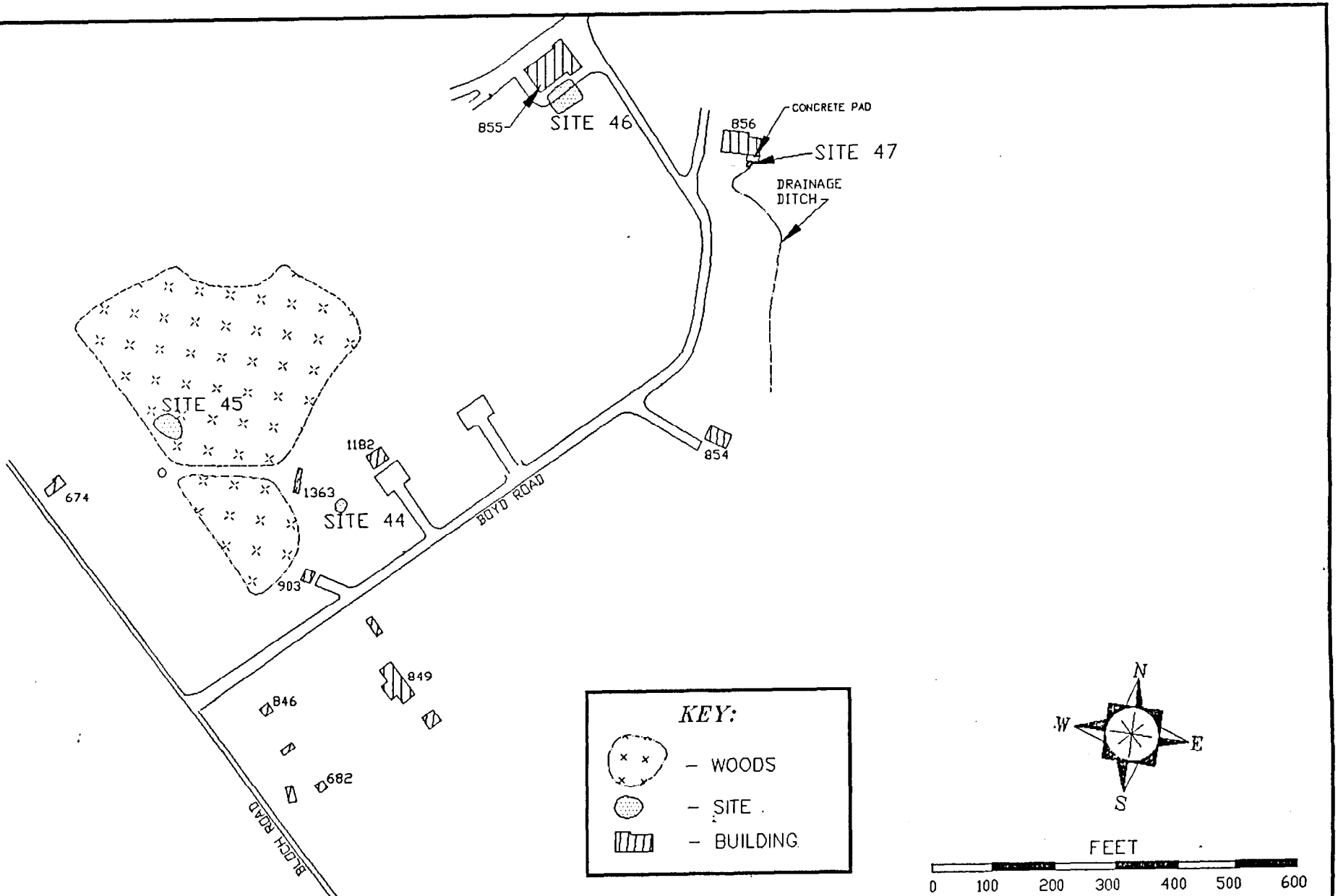
## 3.4 PILOT PLANT

### 3.4.1 Site 44, Soak Out Area.

Findings. In the late 1960's to early 1970's, a soak out tank was used to remove propellant from rocket motor catapult tubes. The tank consisted of two 55 gallon drums welded together one on top of the other, located about 75 feet east of Building 1363 and 40 feet south of Building 907 as shown in Figure 7. The drums were filled with a nonflammable solvent believed to be pennchem 9018, a polysulfide solvent containing mercaptan. The propellant contaminated tubes were dipped from a large A-frame structure into the solvent to be soaked for 2 to 3 days. A smaller catch tank was placed at the bottom of the larger tank to collect pieces of propellant that would fall out of the tubes during cleaning. The soak out drums sat directly on the ground where an unknown amount of solvent was spilled during the cleaning operations as the tubes were lifted out of the solvent. No vegetation was present in an area about 20 feet in diameter around the tank for the 3 to 4 years the cleaning operation occurred. Presently the vegetation does not appear to be stressed.

The solvent was changed about once a month; and because the spent solvent was nonflammable it could not be incinerated. Some reports indicated that the solvent drums (less than ten 55 gallon) were taken in the woods for storage until a disposal method was found. These drums could not be located but were supposedly close to Building 1182 and in the woods. Other reports included drums placed in the woods with the tops removed, which allowed the contents to evaporate.

Conclusions. The nonflammable solvent is believed to be pennchem 9018, a polysulfide solvent containing mercaptan. It may have contained toluene, acetone and/or methylene chloride since these

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NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 7
PILOT PLANT

SITE 44 - SOAKOUT AREA
SITE 45 - ABANDONED DRUMS
SITE 46 - CADMIUM SANDBLAST GRIT
SITE 47 - MERCURIC NITRATE DISPOSAL

are common constituents in solvents used to clean propellant rocket motors. An effort was made to find an accurate account of the solvent constituents but the producing company, Pennwalt, has been sold to several companies and no records were found.

Recommendations. Soil samples are recommended in the soak out area. If the solvent penetrated the surficial deposits to the water-bearing zones, sampling should also be performed to the northwest and southeast of the soak out area. This is because the soak out area lies very near the NE-SW trending drainage divide. Note: an estimated range of permeabilities in the area is $10^{-7}$ to $10^{-1}$ cm/s which results from interbedded fine and course-grained sediments. These are underlain by extensive layers of fine grained clays and silty clays. The water-bearing zone is expected to be less than 5 feet (NEESA, 1983).

### 3.4.2 Site 45, Abandoned Drums.

Findings. Twenty-three corroded drums were found in the woods about 250 feet west of Building 1363 (see Figure 7). Two of the 23 are overpack drums with plastic liners. No labels were visible. There are reports that the drums have been there for 15 to 20 years. These drums may have contained the solvent from the Soak Out Area but positive identification could not be made. Presently, vegetation in the area does not appear to be stressed.

To more precisely locate the drums, follow the path west from Building 1363 toward Building 674. At about 250 feet near the edge of the woods there is a storm drain. North of the storm drain about 70 feet, the drums are just inside the woods.

Conclusions. Although the content of the drums is unknown, it is suspected that they once contained a hazardous waste. In the past it was not an unusual practice to put drums of difficult to dispose waste in the woods until a solution was found.

Recommendations. This site is recommended for a Site Inspection under the Navy Installation Restoration program. Soil sampling is recommended both to the northwest and southeast of the area due to its proximity to the drainage divide.

### 3.4.3 Site 46, Cadmium Sandblast Grit

Findings. Since the mid 1960's, rocket motor catapult tubes have been sand blasted at Building 855. Sand blasting grit, containing cadmium, was sometimes disposed in the gravel area behind the building or in the nearby ditch. See Figure 7. From the mid 1970's until the early 1980's, however, the grit was normally placed in ash cans and disposed at Bronson Road Landfill (SWMU 16). DRMO has been in charge of disposing of the drummed grit since the early 1980's.

There are two sand blasting units at Building 855. Catapult tubes with cadmium plating are sand blasted in the larger of the two blasters and, since the mid 1970's, CCU22As are treated in the smaller blaster. Facility personnel estimated that 30 gallons of sand blasting grit were generated every 3 months as the result of blasting 75 cadmium plated catapult tubes per week. The sand blasting took place one day per week, one shift per day, for 20 to 25 weeks per year.

Currently the grit is drummed, analyzed and sent to DRMO for disposal. In February of 1990, grit analysis measured 10.6 mg/l extractable cadmium in the grit from the small blaster (determined by Extractable Pollutant Toxicity method); and in June of 1990, 69.4 mg/l cadmium were extracted from the grit of the larger blaster (also by EPTox method).

Conclusions. Based on the 1990 analyses of the sand blasting grit used in the resurfacing of catapult tubes, it is believed that the grit disposed in various locations around Building 855 contained cadmium. Estimates as to the amount, frequency and time period over which the grit was disposed near the building could not be confirmed.

Recommendations. A Site Inspection is recommended under the Navy Installation Restoration program. Soil sampling and analysis for cadmium is recommended in the gravel area behind Building 855 and in the nearby ditch.

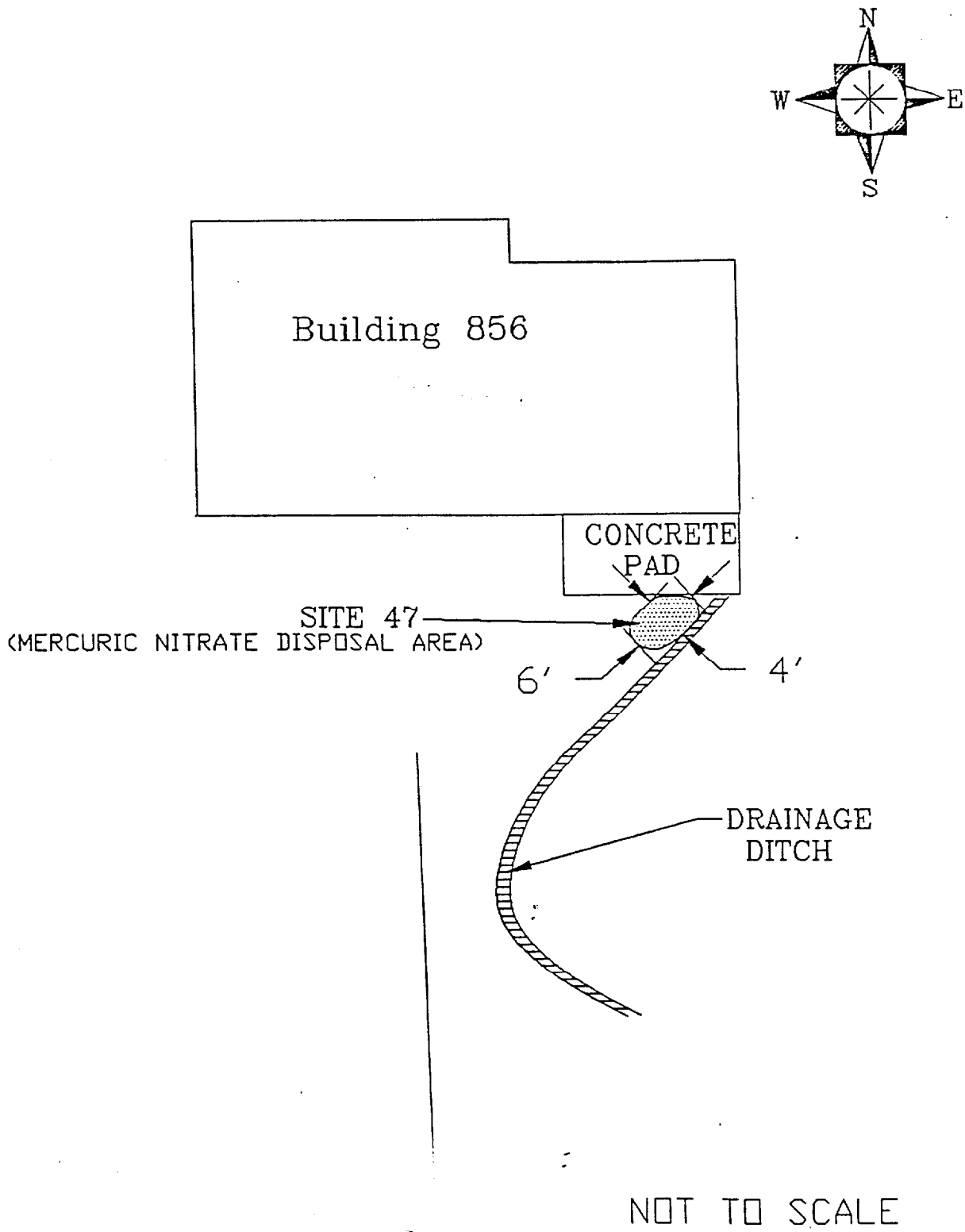
### 3.4.4 Site 47, Mercuric Nitrate Disposal Area.

Findings. Mercuric nitrate ($Hg(NO_3)_2$) is a catalyst in the reaction of hydrazine with nitroform, forming hydrazinium nitroformate, an oxidizer for propellants in the Polaris missile. According to facility personnel, mercuric nitrate was disposed in an area of approximately twenty-four square feet on the west bank of the drainage ditch and just south of the concrete pad behind Building 856 from the year 1957 through 1965. See Figures 7 and 8.

During propellant production, there were three eight-hour shifts per day. One ounce of mercuric nitrate dissolved in 98% nitric acid was poured from 55 gallon drums onto a 6 x 4 foot bed of limestone chips per shift. These shifts ran seven days a week for about half the year for eight years. Assuming there was enough limestone present to neutralize most of the nitric acid, the mercuric nitrate would precipitate as the salt, $Hg(NO_3)_2 \cdot HgO$, through the reaction:

$$2Hg(NO_3)_2 + H_2O \rightarrow Hg(NO_3)_2 \cdot HgO + 2HNO_3$$

Three shifts per day for half a year over an eight year period (i.e. four years), seven days a week, amounts to an estimated 274 pounds of $Hg(NO_3)_2$ poured onto the bed of limestone chips (this is equivalent to 169 pounds of elemental mercury).

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NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 8
SITE 47 – MERCURIC NITRATE DISPOSAL AREA

Conclusions. Depending on the soil characteristics of this area, migration of the mercuric nitrate and/or its salt precipitate, described above, may have been limited to surface soils. Depending on the solubility of this precipitate and the permeability of the soil, the mercury may have migrated into the shallow ground water and away from the site into the Mattawoman Creek.

Recommendations. This site is recommended for a Site Inspection under the Navy Installation Restoration Program. Soil samples should be collected at various depths in the 6 x 6 foot area bounded by the drainage ditch and the south edge of the concrete pad shown in Figure 8.

## 3.5 NITRATION AREA

### 3.5.1 Site 48, NG Plant Disposal Area.

Findings. This site of unknown origin consists of various types of solid waste such as solvent containers, bottles, metal scrap and refuse. The disposal area, located in the woods behind Building 766 (see Figure 9), was discovered by CHESDIV personnel during a station visit. It is unknown whether any of the containers have remained intact with hazardous contents or if the containers are empty.

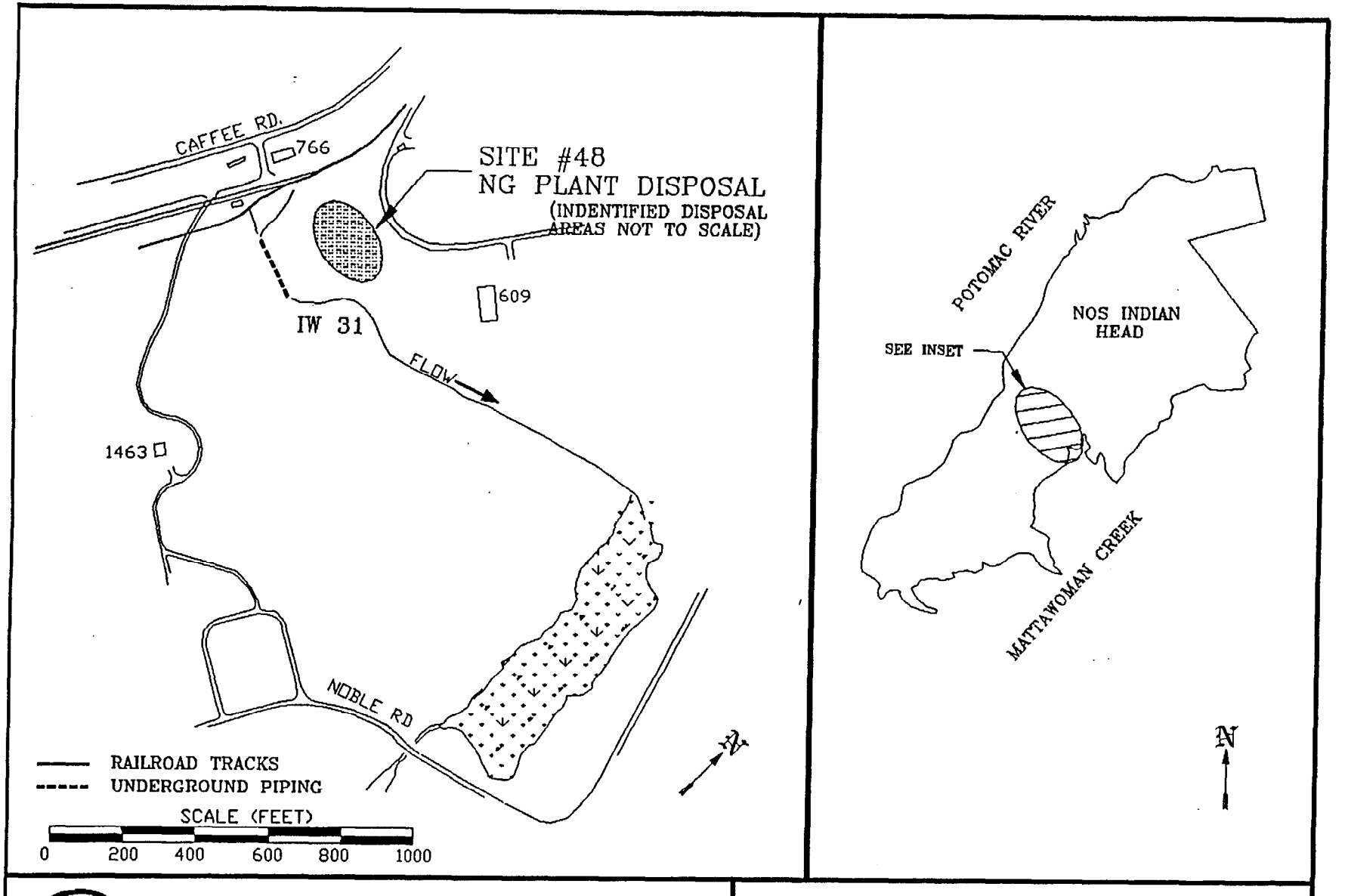
Conclusions. Since solvents used in the nitration area are likely hazardous substances, this site should be considered hazardous unless further information is obtained to indicate otherwise.

Recommendations. A Site Inspection is recommended under the Navy Installation Restoration program. It is recommended that the containers and refuse be disposed properly and the soil be sampled in a statistically random manner for volatile and semi-volatile organic compounds by soil cores at depths greater than 6 inches.

## 3.6 LABORATORY AREA

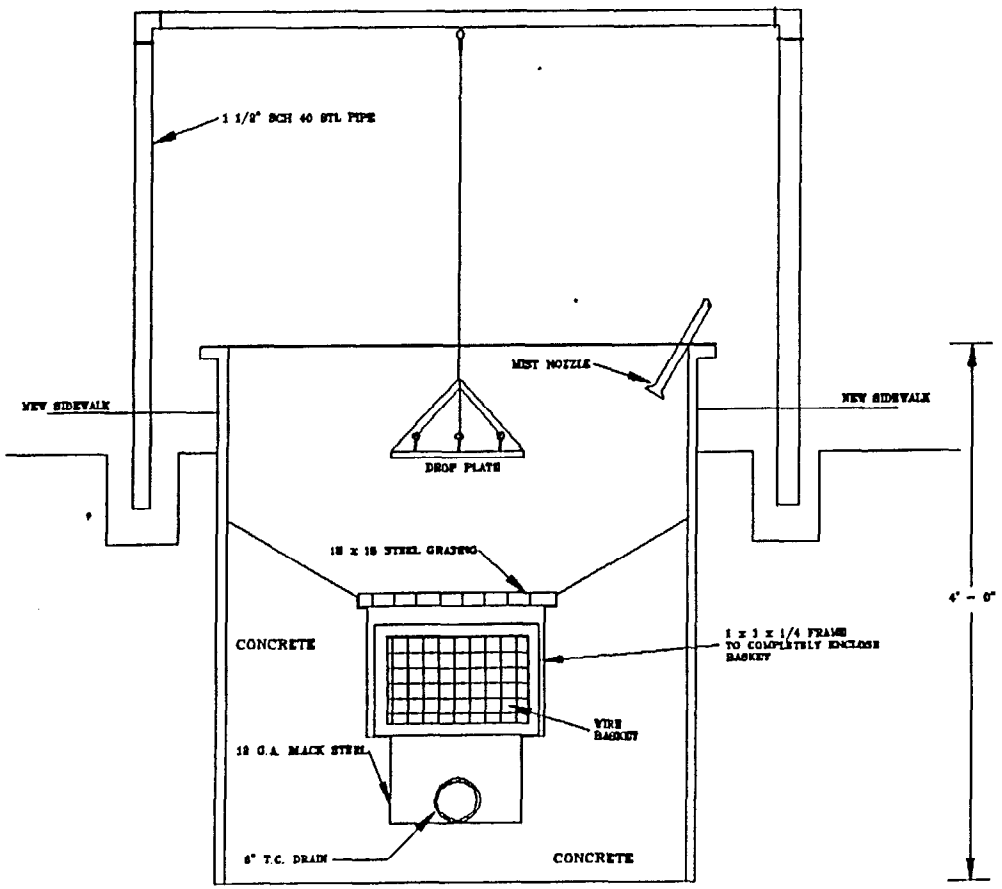
### 3.6.1 Site 49, Chemical Disposal Pit.

Findings. During the records search, a drawing (Bureau of Yards and Docks, Dwg. No. 15,699, 1964) was obtained showing the location of a chemical disposal pit northeast of Building 444 connecting to sanitary sewer manhole 472 as shown in Figure 10. However, visual inspection revealed the drain line from the pit connected to storm sewer manhole 473, as shown in Figure 11, rather than sanitary sewer manhole 472. The pit is a concrete structure approximately three feet deep as shown in Figure 10. To operate, bottles containing waste are placed on the steel grate; the drop plate falls, crushing the bottle. A wire basket suspended below the steel grate catches the broken glass and the

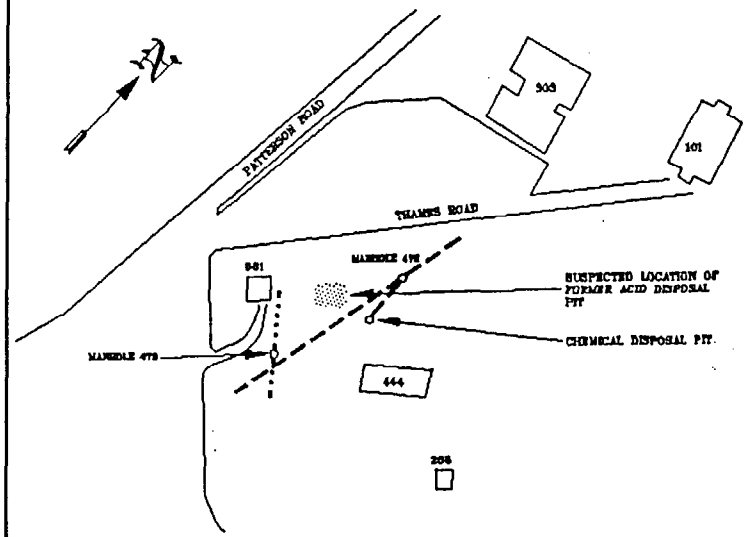



PRELIMINARY ASSESSMENT
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 9
SITE 48
NG PLANT DISPOSAL AREA




SIDE VIEW




EXPLANATION:

| | |
|---|---|
| ..... | STORM SEWER |
| — — — — — | SANITARY SEWER |
| ▭ | BUILDING OR STRUCTURE |

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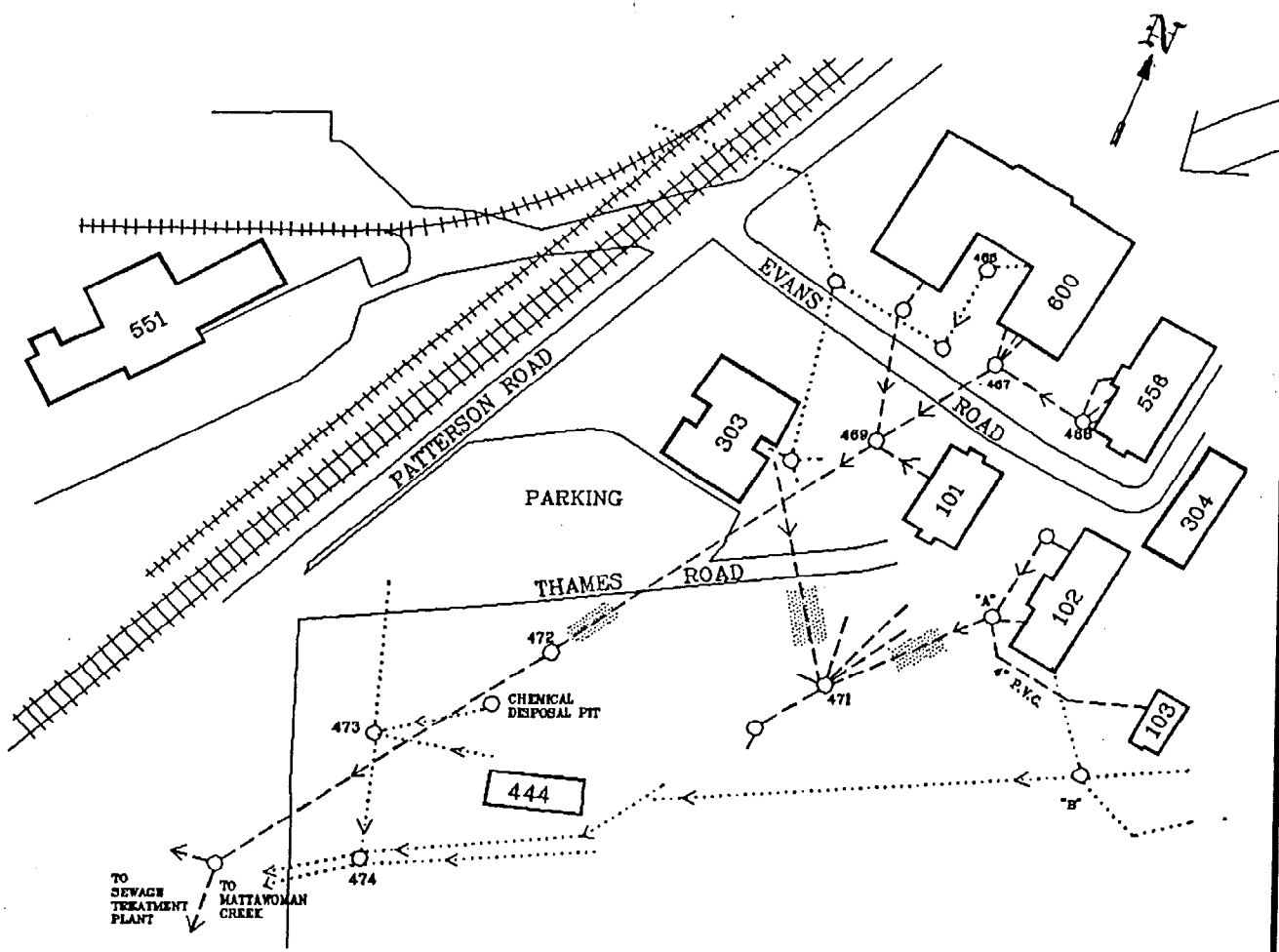
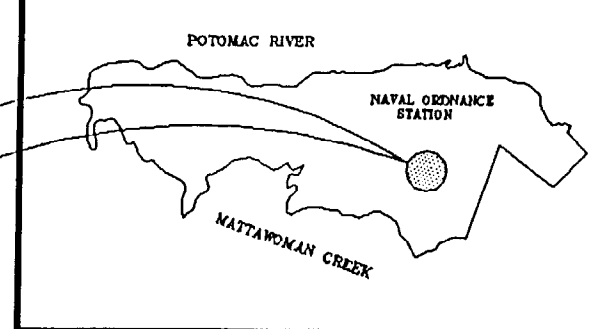
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

Figure 10
Chemical Disposal Pit




(FROM YARDS AND DOCKS DWG. NO. 870,579)




EXPLANATION:

- BUILDING OR STRUCTURE
- STORM SEWER
- SANITARY SEWER
- RAILROAD
- PAVED ROAD
- MANHOLE
- AREA FOR LOCATION OF EXPLORATORY TRENCHES

PRELIMINARY ASSESSMENT
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 11
LOCATION OF LABORATORIES

contents of the bottle are allowed to soak into the bottom of the pit. Reportedly this pit received limited use until the early 1970's. See Figure 10 for a detail of the chemical disposal pit.

The Chemical Disposal Pit is not to be confused with the older Waste Acid Disposal Pit, SWMU 14 (also NEESA 13-021, 1983, p. 6-40, NACIP Site 14). The Waste Acid Disposal Pit was approximately fifteen to twenty feet deep with rocks placed on the bottom. One retired employee remembered a pipe coming a few inches out of the ground where the acid was poured. Unknown quantities of outdated and contaminated solvents, acids, and various other chemicals from the laboratories were also reported to have been discarded in the older pit. The waste acid, a product of the nitrometer tests, was likely contaminated with mercury as well. The pit was reported to have been filled in with concrete in 1975.

The location of the waste acid pit was reported to be fifty feet northeast of Building 881, and seventy five feet northwest of Building 444. During the site survey, NEESA team members observed a depression about 8 feet in diameter, 10 feet east of Thames Road and 25 feet south of Building 106A - the underground magazine. In the middle of the depression was a small pile of concrete rubble approximately 1 foot in diameter which is believed to be the location of the former Waste Acid Disposal Pit. This site was addressed as part of the RCRA Facilities Investigation at NOS Indian Head.

Conclusions. Based on interviews with NOS personnel it was determined that the chemical disposal pit received very little if any use. The pit appears to be structurally sound, and there are no visible signs of use such as chemical stains or broken glass. No hazardous substance releases to the environment are known or suspected to have occurred at this site.

Recommendations. No further action is recommended under the Navy Installation Restoration program.

### 3.6.2 **Mercury Contamination of Laboratory Area.**

In the latter part of the 1980s mercury contamination of laboratory area buildings was discovered. Elevated mercury levels in the sanitary sewage sludge at NOS Indian Head have been traced back to the laboratory area as well. This has raised questions as to the use and handling of mercury, and where one might expect to find mercury contamination.

Mercury Use in Laboratory Area.
Buildings 101, 102, 103, 556, and 600 were constructed in the early and mid 1900s for use as laboratory facilities. At various periods throughout the 80 years of laboratory operation, each of the buildings utilized equipment containing mercury including nitrometers, pycnometers, talianis, vacuum stability testing equipment, and thermometers. Presently, Buildings 101 and 600 use equipment containing mercury.

The nitrometers, used in Buildings 101, 102, and 556, contained about 53 pounds of mercury. A nitrometer was used to determine percent nitrogen in nitrate esters. During the testing, propellant and sulfuric acid were added to a vessel containing approximately fifteen pounds of mercury. The gases were then drawn off to be tested for nitrogen content. Reportedly, the nitrometer bulbs containing mercury would sometimes explode under pressure during sensitivity tests.

After the nitrometer testing, the spent mercury was poured into "slop jars" and taken to the sink where tap water was run into the jar to remove the sulfuric acid from the mercury. During the process of transferring spent mercury from the nitrometer to the slop jars, numerous small spills were common. Jars often broke or mercury was washed out of the jars and down the drains where it would deposit in the plumbing.

Mercury was not handled as a hazardous waste until the 1970s, and no records are in existence to confirm any major spill incidents in the past. The use of nitrometers and slop jar handling appears to have lead to the laboratory area mercury contamination problems.

3.6.2.1 Site 50, Building 103 Crawl Space.

Findings. Building 103, constructed in 1902, is a single story, 512 square foot structure. It is used as part of the laboratory facilities at the Naval Ordnance Station. Laboratory equipment containing mercury was reportedly used at different times throughout the history of Building 103. The equipment included nitrometers, pycnometers, talianis, and thermometers.

In 1985, NOS public works department contracted for the replacement of the two sinks in Building 103. After replacing the two sinks, the contractor reported to public works that the sinks connected to a single drain line that discharged to the soil beneath the building, and there was no existing connection to a storm or sanitary sewage system. Prior to this it was believed that the sink discharge line connected to a sewer from Building 102 before connecting to the "B" manhole as shown in Figure 11. This configuration is described in the 1981 Point Source Pollution Abatement Study by NOS Indian Head (NOS Indian Head, 1981). After the discovery of the discharge to the soil, a four inch diameter polyvinylchloride (PVC) pipe was installed from the sink drainage line to manhole "A", west of Building 102 as shown in Figure 11.

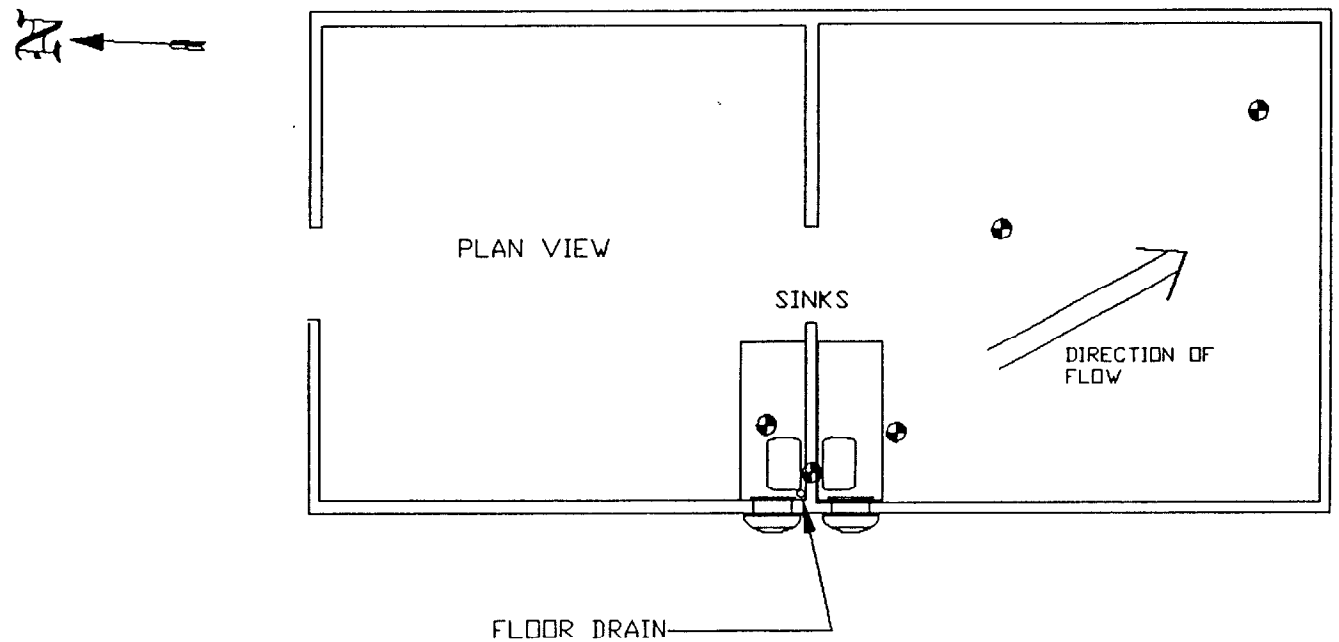
Reportedly, mercury handling procedures similar to those described above were carried out in Building 103 as well. Spent mercury was transferred from nitrometers to slop jars and then cleaned over the sink with numerous small spills. An unknown amount of mercury and small quantities of chemicals were likely disposed down the sinks during the eighty three years of discharge to the soil under the building.

The floor of Building 103 is elevated approximately three feet above the existing grade which slopes to the south. Visual inspection of the crawl space beneath the building revealed possible asbestos thermal system insulation (TSI) covering the pipes. The insulation appeared to be in good condition.

Conclusions. A Site Inspection is recommended under the Navy Installation Restoration program due to the possible mercury and unknown chemical contamination of the soil beneath Building 103.

Recommendations. To verify the presence and types of contaminants at Building 103, the following sample program is recommended. The recommended sampling locations are shown in Figure 12.

| | |
|---|---|
| Type of samples: | soil |
| Number of borings: | 5 |
| Number of samples: | 10 |
| Sampling frequency: | once |
| Testing parameters: | EPA methods 8020, aromatic volatile organics; 8240, volatile organics; 8010, halogenated volatile organic purgables; 8015, non-halogenated volatile organics; and 8270, semi-volatile organics. Soil samples should be analyzed for priority pollutant metals as well. Analyses should be performed by a laboratory approved under the Navy Laboratory QA/QC Program. |
| Remarks: | Soil samples should be collected at the 0 to 6 and 12 to 18 inch level. Samples collected at the 0 to 6 inch level should not be analyzed for volatile and semi-volatile organic compounds, as these compounds volatilized from the near surface soils over time. Care should be taken not to disturb or damage the TSI on the steam lines underneath the building during the sampling. Two background soil samples should be collected for QA/QC purposes. |




PROPOSED SOIL BORING LOCATION

NO SCALE

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INDIAN HEAD, MARYLAND

FIGURE 12
Site 50, Building 103
Crawl Space

3.6.2.2 Site 51, Building 101 Dry Well; and Site 52, Building 102 Dry Well.

Findings. NOS Indian Head personnel interviewed with regard to the laboratory area spoke of a flash tank room and a dry well near Building 102 as shown in Figure 13. There was some speculation as to whether the flash tank was used to vaporize off volatile components of a laboratory waste stream and whether the dry well had received the remaining liquid phase of the waste.

Inspection of Department of the Navy, Bureau of Yards and Docks drawings 1028836, 1028837, and 1028839 of 1964 revealed dry wells at both Buildings 101 and 102. The flash tank detail, dry well detail and the utilities site plan show a 1 inch steam condensate line leading to the dry wells. There are no wastewater lines leading to the dry wells. Furthermore, the crushed stone of the dry wells was two feet below grade, making the them difficult to locate and access. It is therefore unlikely that any surface disposal took place at the well locations.

The flash tank/steam condensate system no longer exists.

Conclusions. Based on the Bureau of Yards and Docks drawings, showing only a steam condensate line leading to the dry wells, and a lack of evidence to indicate use for laboratory waste, no hazardous waste is suspected in the dry wells.

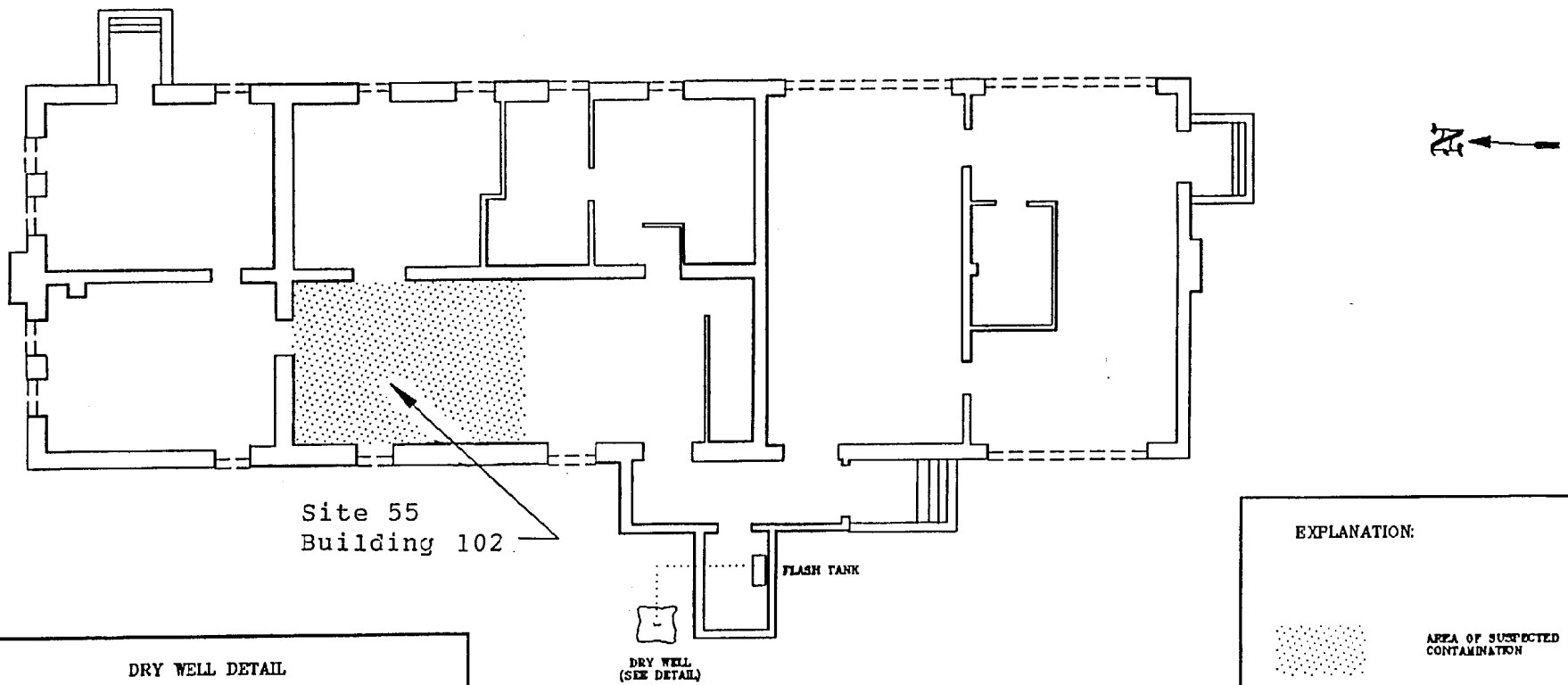
Recommendations. No further work is recommended under the Navy Installation Restoration program.

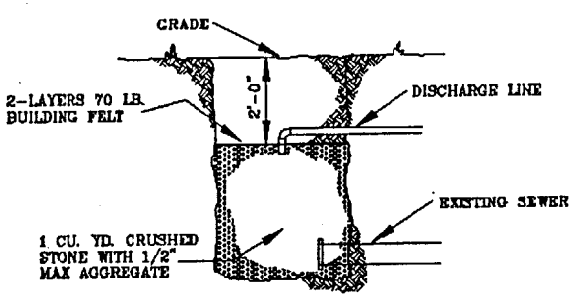
3.6.2.3 Site 53, Mercury Contamination of the Sewage System.

Mercury Discovered in Manholes. In 1969, approximately ten pounds of mercury were recovered from storm sewer manhole "B" shown in Figure 11. In early 1989, approximately one pound of mercury was recovered from sanitary storm sewer manhole "A" shown in Figure 11. Both of these manholes have drain line connections to Building 102.

Reportedly, about ten percent of the mercury sent to Building 102 was returned to the Building 444 mercury storage vault for reclamation. Laboratory workers from Building 102 reported that approximately a liter of mercury was lost per month. Over the 77 year period that the Building 102 laboratory operated without mercury traps on the sinks (1909 - 1986), it is possible that 28,000 pounds of mercury were discharged to the drain lines. Additional large quantities of mercury may have been disposed down the drain lines from similar mercury handling and disposal procedures practiced at the other laboratories. It is probable that the mercury in the manholes was a result of the past handling of mercury in Building 102.

After mercury was discovered in manhole "A" in early 1989, other manholes in the vicinity and down line of the laboratory




EXPLANATION:

- AREA OF SUSPECTED MERCURY CONTAMINATION
- WINDOW
- DISCHARGE LINE
- BUILDING WALL

(FROM BUREAU OF YARDS AND DOCKS DWG. NO. 1028839)

PRELIMINARY ASSESSMENT
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND

FIGURE 13
BUILDING 102
BASEMENT FLOOR PLAN

buildings were inspected for mercury. No visible mercury contamination was discovered. The mercury in manhole "A" may have been dislodged from the pipes during a sewer line video survey conducted in 1988. Since that time, the manholes in the vicinity and down line of the laboratory facilities have been regularly inspected for signs of visible mercury. The sewer lines in manhole "A" were blocked off with sandbags, and mercury traps were installed on the lines.

Sewer Line Video Survey. In late 1988, a video survey was performed at NOS Indian Head to determine the condition of the gravity sewer lines. The sewer lines were found to be in poor condition in the vicinity of the laboratory facilities and in need of repair or replacement in some instances. The vitrified clay and terra-cotta pipes were broken, cracked, sagging, separated and in some cases collapsed. Any mercury would tend to settle in the low, cracked, or damaged spots in the sewer lines and contaminate the surrounding soil.

During the same time period as the video survey, mercury levels in the NOS sanitary sewage sludge had reached 150 parts per million (ppm). The maximum allowable amount of mercury in class I sanitary sewage sludge is 10 ppm (Memorandum, NAVORDSTA Indian Head, Code 0411C, INVESTIGATION OF MERCURY HAZARD IN BUILDING 102, 28 Jan 1988).

Conclusions. Considering the elevated levels of mercury in the NOS sewage sludge; the sewer line video survey; discussions with past and present employees of the laboratory area concerning past handling practices of mercury, acid and various solvents; and the number of years the laboratory facilities have operated, hazardous chemical contamination of the storm and sanitary sewer pipes and surrounding soil is suspected.

Recommendations. A Site Inspection is recommended under the Navy Installation Restoration program. Exploratory trenches are recommended at the shallowest locations possible along the sewer pipes in the areas indicated on Figure 11. The trenches should be at least fifteen feet in length and deep enough to expose the sewer pipe. Soil samples should be taken at all sewer pipe joints, major cracks, and damaged areas. The samples should be analyzed for total mercury by a Navy approved laboratory using the appropriate SW-846 method. At least two background samples should be obtained for QA/QC purposes.

3.6.2.4 Site 54, Building 101.

Findings. Building 101 is located in the restricted area of the base near Patterson and Evans road as shown in Figure 11. Building 101 housed mercury containing laboratory equipment, such as nitrometers and talianis, with mercury handling practices reportedly similar to those described above.

In January 1990, several droplets of mercury were discovered resting on the insulation of a steam pipe located in the

southeast corner room of the basement in Building 101. When NOS Safety Office personnel began removing the drop ceiling tiles, mercury vapors were detected in the breathing zone, but there were no visible signs of mercury on the ceiling tile tracks.

A 1918 blueprint (No. 12069) shows four nitrometers in the room above where the mercury droplets were discovered. Reportedly, the nitrometer bulbs containing mercury would sometimes explode under pressure during sensitivity tests. The sink where mercury slop jars were used was located on the east wall. An NOS employee reported that in the mid 80's, while occupying the basement office where the mercury droplets were discovered, an organic solvent odor was detectable when solvents were flushed down the drain, indicating a leaky pipe.

Conclusions. The discovered mercury may be the result of leaking drain pipes or perhaps mercury spatters from nitrometer testing which seeped into the floor. Possibly the mercury gathered in the ceiling tracks and was able to flow under the force of gravity to the lowest point of the ceiling until enough had accumulated to begin dripping.

Recommendations. The area of Building 101 where the mercury was discovered should remain closed off, and signs warning of a possible mercury hazard should be posted. Consult an Industrial Hygenist to conduct air monitoring and a personal dosemetry sampling program to insure NOS employees are not exposed to harmful levels of mercury vapors. Contamination from asbestos as well as mercury must be considered when taking steps to characterize and remediate the hazards of Building 101.

3.6.2.5 Site 55, Building 102.

Findings. Building 102, constructed in 1909, was used as a laboratory for testing nitrocellulose by the nitrometer method. It is located in the restricted area of the base near Patterson and Evans road as shown in Figure 11. Other mercury containing equipment including pycnometers, talianis, vacuum stability testing equipment, and thermometers, were used to determine the densities and sensitivity of propellants throughout the eighty years of laboratory operations in Building 102.

On 6 October 1987, metallic mercury was discovered dripping from the ceiling onto the sink table top of the coffee mess, located in the northern end of the basement of Building 102, shown in Figure 13. Ceiling tiles were removed in search of the mercury source, revealing the original tongue and groove wood flooring. This flooring was placed on diagonally laid wood subflooring with a layer of asbestos sheeting as a fire retardant. The asbestos sheeting prohibited the planned removal of the mercury contaminated wood floor. Plastic sheeting was placed under the ceiling to encapsulate the leaking mercury. An estimated two ounces of mercury leaked onto the plastic sheeting from the wooden floor, necessitating the closure of the northern end of the building to protect the health of employees. Building 102

was abandoned in February 1989 and the water supply to the building was terminated to help alleviate high mercury levels in the sanitary sewage sludge.

Interviews with past NOS employees as to the historical operations of Building 102 revealed that the wooden floor was not sealed with an impervious surface until the early 1960s. A nitrometer was once located on the first floor directly above where mercury was discovered leaking out of the ceiling into the basement (Bureau of Yards and Docks Dwg. No. 65005, 1916). Though most spills were thought to be of no consequence, a major spill did occur upstairs in Building 102 in the early 1960s before the present concrete impervious floor was installed.

Building 102 was renovated in 1963 and the nitrometer operation was moved to the south room on the first floor. The wooden floor was sealed with a two inch layer of concrete, and the area of the basement beneath the original location of the nitrometer was converted to office space. In the mid 1970s the nitrometer was moved to the southern room in the basement of Building 102. The floor drains in the basement were plugged in the early 1980s to prevent the release of mercury in case of a spill. Presently, the nitrometer remains in the basement and contains mercury.

In 1986 mercury traps were installed in the sinks of Building 102 where mercury was handled. When the U-joints were removed to install the traps, the plumber reported "about a teaspoon" of mercury was present in each. After the building was closed the sinks were salvaged for use in other buildings. When removing the sinks, mercury was encountered in the piping and U-joints.

Visual inspection and the record search for Building 102 revealed that friable and nonfriable asbestos containing materials (ACM) are present throughout the structure. Possible sources include thermal system insulation (TSI) on the steam and hot water lines, asbestos mud on the steam and hot water pipe elbows, transite wall board, ceiling tiles, asphalt-asbestos floor tiles, floor glue, batt insulation in the ceiling and walls, flooring felts, and heating, ventilation, and air conditioning (HVAC) system insulation. The suspected ACMs observed during the site visit were deteriorated and friable, creating a possible fiber release hazard.

Conclusions. Occupants and workers in Naval buildings containing asbestos materials are protected by the Occupational Safety and Health Administration, 29 CFR 1910.1001 and OPNAV 5100.23B. Though the contamination of a building is not covered under the Navy Installation Restoration program, Building 102 is recommended for further action due to the presence of friable asbestos containing insulation materials, and mercury contamination of the wooden floors and piping. Plans to demolish Building 102 should be carried out in conjunction with any sewer line removal/repair to avoid duplicating efforts.

Recommendations. Recommendations for the characterization and eventual remediation of the contamination in Building 102 are

given in consideration of possible dual contamination of both asbestos and mercury. Since there are stricter regulations governing the removal of asbestos, these regulations will have to be followed with slight modifications to include the hazards associated with metallic mercury and mercury vapors. The specific recommendations include the following:

1) Seal all openings from the building to the outside environment, restrict access, and post signs warning of asbestos and mercury hazards.

2) Sample ambient air levels for both mercury and asbestos within Building 102. Mercury vapor levels may be sampled with a Jerome 411 Mercury Vapor Analyzer. For asbestos, at least five air samples must be obtained with a high volume pump, simultaneously and aggressively, within the building. Five air samples must be obtained simultaneously, outside the abatement area at the same time the five samples are obtained within the abatement area. Two field blanks and one lab blank must be analyzed for quality assurance/quality control (QA/QC) purposes. The samples may be analyzed by either polarized light microscopy or transmission electron microscopy. The specific advantages and disadvantages associated with each method should be investigated before deciding on the specific method. Regardless, all air samples must be analyzed by the same method.

3) Randomly sample suspected mercury contaminated and "homogeneous" asbestos containing materials to verify that the material is asbestos and to determine the extent of the contamination. A homogeneous area contains asbestos material that is uniform in texture and color and appears identical in every other respect. The number of samples to be collected depends on the size of area to be sampled (EPA, 1985).

| Size of area | Number of asbestos samples to be collected |
|---|---|
| Less than 1000 square feet | 3 |
| Between 1000 & 5000 square feet | 5 |
| Greater than 5000 square feet | 7 |

The number of samples and sample location for TSI will depend on the local circumstances of the insulation. At least three samples must be taken in each sample area. For long pipe runs or risers, more samples should be taken. All sampling must be done in accordance with appropriate OSHA and OPNAV regulations including NIOSH approved full face air purifying respirators with approved cartridges for asbestos. If air monitoring reveals the mercury levels in the air to be above the permissible exposure limit/threshold limit value (PEL/TLV) of 0.050 milligrams per cubic meter, air respiratory protection must be used. There are no approved respirator cartridges for both asbestos and mercury hazards.

4) Enclose Building 102 and wet remove all asbestos

insulation and wastewater lines known or suspected to have received mercury waste. During the asbestos abatement, remove the tongue and groove mercury contaminated wooden floor. This removal must be conducted using supplied air respiratory protection due to the hazards of both mercury and asbestos.

3.6.2.6 Building 556. Building 556, located north of Buildings 101 and 102 in the laboratory area, once housed mercury containing laboratory equipment for surveillance testing of propellants. Reportedly, mercury was "oozing from the walls" at the time Building 556 functioned as part of the laboratory facilities, implying poor house-keeping practices on the part of laboratory personnel. Building 556 has since been converted to office space.

During the PA site visit, the crawl spaces in the basement of Building 556 were inspected in order to view the floor from below. There were no visible signs of mercury. Following the PA site visit in June 1990, NOS Safety Office personnel obtained readings of 0.001 milligram per cubic meter in the crawl space and a reading of 0.051 milligrams per cubic meter under the stairs. Yet there were no visible signs of mercury. The readings were repeated later that day and no mercury vapors were detected.

Recommendations. Consult an Industrial Hygenist to conduct air monitoring and a personal dosemetry sampling program to insure NOS employees are not exposed to harmful levels of mercury vapors. Anyone working in the crawl space should be alerted to the possibility of mercury vapor exposure. Building 556 is not recommended for the Installation Restoration program.

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# APPENDIX

Table IX

SUMMARY OF TOXIC METALS CONTENT OF SEDIMENTS AT NAVAL ORDNANCE STATION[1]

| Mud sample[2] | Date sampled | Concentration (dried sample) (ppm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Pb | Zn | Mn | Cr | Cu | Co | Cd | Ni | Ag |
| **Mattawoman Creek** | | | | | | | | | | |
| A | 3/16/70 | 258 | 373 | 30 | 22 | 16 | ⊕ | 6.5 | -[3] | ⊕ |
| B | 3/16/70 | 1776 | 162 | 33 | 22 | 20 | 22 | ⊕ | -[3] | 31 |
| A | 4/16/70 | 431 | 197 | 65 | 36 | 72 | 29 | 2 | -[3] | 2 |
| A-1 | 4/16/70 | 222 | 270 | 28 | 18 | 78 | 14 | 5 | -[3] | ⊕ |
| A-2 | 4/16/70 | ⊕ | 49 | 20 | 14 | 14 | 14 | 4 | -[3] | ⊕ |
| B | 4/16/70 | 582 | 63 | 16 | 8 | 15 | 5 | 1 | -[3] | 1 |
| B-1 | 4/16/70 | 600 | 91 | 75 | 9 | 120 | 11 | 1 | -[3] | ⊕ |
| B-2 | 4/16/70 | 120 | 16 | 48 | 8 | ⊕ | 8 | ⊕ | -[3] | ⊕ |
| C | 4/16/70 | 18 | 36 | 73 | 7 | ⊕ | 36 | 2 | -[3] | 1 |
| C-1 | 4/16/70 | 1498 | 115 | 66 | 13 | 595 | 8 | 1 | -[3] | ⊕ |
| C-2 | 4/16/70 | 10 | 11 | 44 | 4 | ⊕ | 5 | 2 | -[3] | ⊕ |
| Station 10-B-0 | 5/19/70 | 19 | 75 | 81 | 21 | 16 | 28 | 0.7 | -[3] | ⊕ |
| Station 10-B-0 | 6/10/70 | 55 | 254 | 604 | 37 | 37 | 16 | 0.8 | -[3] | 10 |
| Station 10-B-0 | 7/8/70 | 56 | 199 | 642 | 24 | 66 | 14 | 1.4 | -[3] | 11 |
| 27 | 12/8-9/70 | ⊕ | 335 | 104 | ⊕ | 2 | 4 | ⊕ | 1 | ⊕ |
| 28 | 12/8-9/70 | 203 | 40 | 127 | 6 | 34 | 7 | ⊕ | 3 | 1 |
| 29 | 12/8-9/70 | 737 | 1535 | 472 | 47 | 242 | 12 | 10 | 36 | 18 |
| 30 | 12/8-9/70 | 14 | 163 | 113 | 14 | 56 | 8 | ⊕ | 10 | 3 |
| 31 | 12/8-9/70 | 139 | 1006 | 435 | 15 | 41 | 18 | ⊕ | 36 | 5 |
| 32 | 12/8-9/70 | ⊕ | 35 | 58 | 2 | 7 | 6 | ⊕ | 3 | 1207 |
| 33 | 12/8-9/70 | ⊕ | 55 | 51 | ⊕ | 2 | 2 | ⊕ | 1 | 1 |
| **Potomac River** | | | | | | | | | | |
| Station 10 | 5/19/70 | 50 | 295 | 101 | 43 | 44 | 47 | 1.2 | -[3] | 1 |
| Station 11 | 5/19/70 | 50 | 277 | 100 | 35 | 42 | 47 | 1.1 | -[3] | ⊕ |
| Station 10 | 6/10/70 | 60 | 333 | 1687 | 50 | 52 | 24 | 0.6 | 44 | 4 |
| Station 11 | 6/10/70 | 64 | 328 | 1740 | 44 | 52 | 22 | 0.8 | -[3] | 3 |
| Station 10 | 7/8/70 | 14 | 75 | 425 | 18 | 16 | 6 | ⊕ | 18 | 1 |
| Station 10 | 8/18-20/70 | 36 | 239 | 1580 | 26 | 46 | 14 | ⊕ | 18 | 3 |
| Station 11 | 8/18-20/70 | 36 | 258 | 1710 | 26 | 48 | 18 | ⊕ | 24 | 3 |
| Station 11 | 12/8-9/70 | 60 | 604 | 658 | 62 | 31 | 21 | 0.01 | 19 | 38 |
| Station 11 | 12/8-9/70 | 5 | 209 | 1398 | 21 | 14 | 18 | ⊕ | 15 | 2 |

[1] ⊕ = concentration below detection limit (usually less than 0.05 ppm).
[2] Locations shown on Figures 1, 21, and 22.
[3] Not determined.

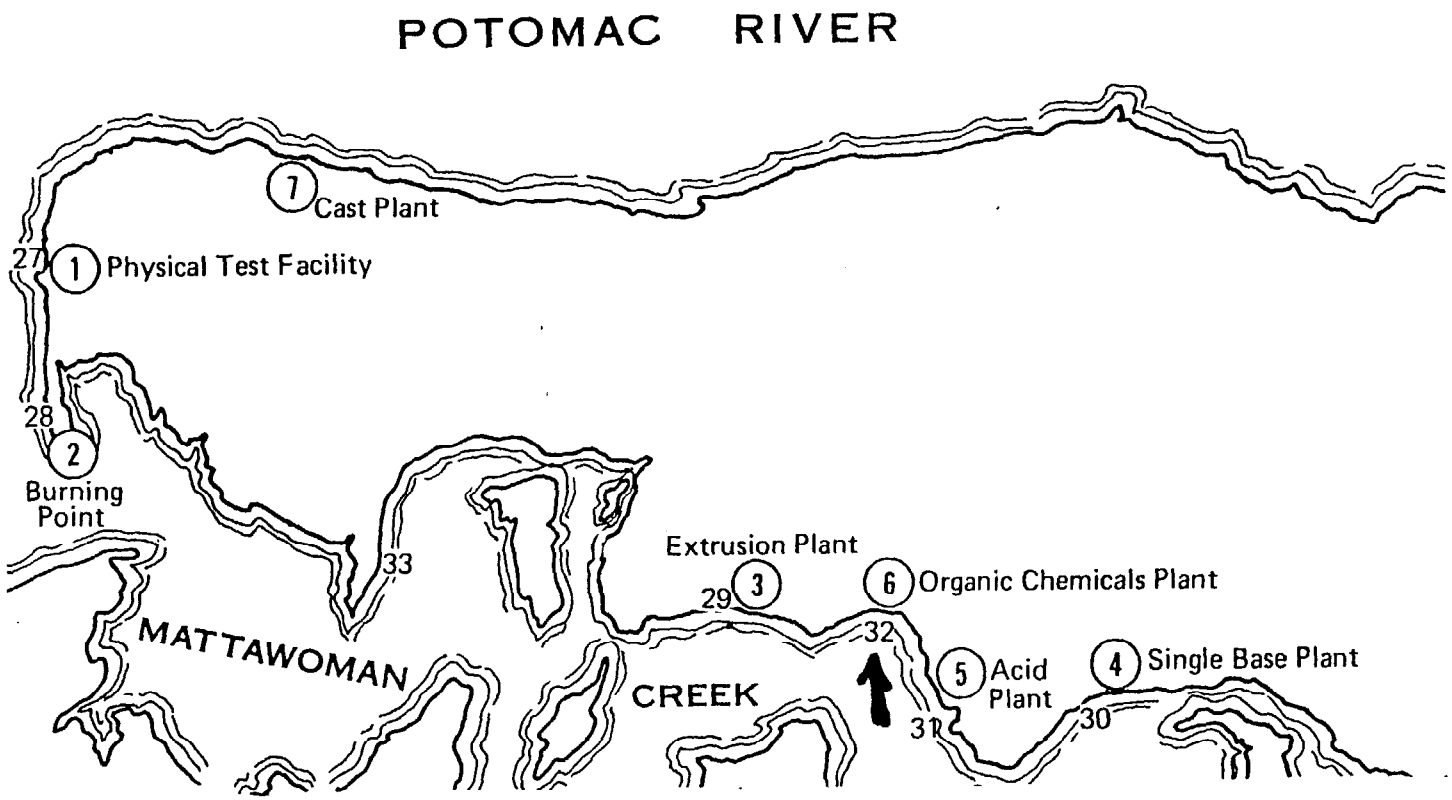


FIGURE 22. SEDIMENT SAMPLING LOCATIONS AT NAVAL ORDNANCE STATION, INDIAN HEAD, MD.