FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

FIT PROJECT

TASK REPORT TO THE ENVIRONMENTAL PROTECTION AGENCY CONTRACT NO. 68-01-6056

ALTHOUGH THE WORK DESCRIBED IN THIS REPORT HAS BEEN FUNDED WHOLLY BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY THROUGH CONTRACT NO. 68-01-6056 TO ECOLOGY AND THE ENVIRONMENT, INC., IT HAS NOT BEEN SUBJECTED TO THE AGENCY'S REQUIRED PEER AND POLICY REVIEW AND, THEREFORE, DOES NOT NECESSARILY REFLECT THE VIEWS OF THE AGENCY AND NO OFFICIAL ENDORSEMENT SHOULD THE VIEWS OF THE AGENCY AND NO OFFICIAL ENDORSEMENT SHOULD BE INFERRED.

A Preliminary Assessment
of

Naval Ordnance Station
Indian Head, MD
TDD No. F3-8112-03
EPA No. MD-64

Preparation Date: May 25, 1982

Presented to: Linda Y. Boornazian, Acting DPO
EPA Region III

Prepared by: Susan Belski
Susan Belski

Joseph G. McGovern, FITL III

ecology and environment, inc.

International Specialists in the Environmental Sciences

Naval Ordnance Station
Indian Head, MD
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Naval Ordnance Station
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SUMMARY AND RECOMMENDATIONS

Summary

The Naval Ordnance Station (NOS) occupies roughly 1,800 acres of the Indian Head Peninsula in Indian Head, Maryland. The station provides material and technical support for the US Navy.

Site activities result in the annual generation of the following types and quantities of hazardous wastes:

- 461 tons of explosives.
- 1,645 tons of acid wastes.
- 4 tons of TCE.
- 5 pounds of lead.

Other wastes generated annually by the NOS are as follows:

- 65 cubic yards of paint sludge.
- 150 cubic yards of sewage sludge.

In addition, the site currently stores 4 tons of PCB's.

The NOS has filed an application for a Designated Hazardous Substance Permit (RCRA Generator and TSD facility). In addition, Charles County has issued a draft permit to the station allowing open burning of explosives. This permit was sanctioned by the State of Maryland Air Quality Programs. The final permit is being published.

Significant and relevant site activities are reported herein in two phases as follows:

Phase 1 - Inactive areas of waste disposal and storage:

The NOS operated a sanitary landfill in an abandoned gravel pit (not excavated to groundwater). The station disposed of 150 cubic yards of sewage sludge annually and a total of 6.5 cubic yards of containerized paint sludge. Analysis of sewage sludge indicated that it did not exhibit the characteristics of EP toxicity; paint sludge was not subjected to RCRA testing. The landfill was active for approximately 5 years. It has been inactive for almost 2 years. The landfill has not been capped and seeded.

A scrap yard was formerly utilized for storage of PCB transformers. Transformers containing > 50 ppm PCBs were removed to building 1440. Several transformers of <50 ppm PCBs remain in the scrap yard.

Phase 2 - Active areas of waste disposal and storage:

Currently the station burns explosive and lead contaminated wastes in three open burning grounds (the pyrotechnics, explosives and decontamination burning grounds). Previously, all hazardous wastes generated by the NOS were either returned to the vendor for recycling or burned in the open burning grounds.

The NOS stores roughly 4 tons of PCBs in building 1440 which reportedly is constructed in accordance with applicable regulations.

Currently the wastes generated at the station are disposed of as follows:

- o explosive and lead contaminated wastes are burned in open burning grounds,
- o TCE and waste acids are returned to the vendor for recycling,
- o sewage sludge is applied as a soil conditioner on wildlife support areas,
- o containerized paint sludge is stored on site.

The Navy Assessment and Control of Installation Pollutants (NACIP) has contracted Fred C. Hart to perform an assessment regarding previous waste handling practices at the site. If the assessment identifies problem areas, these areas will be investigated further by sampling and analysis. Remedial activity may be implemented as a final stage in the NACIP/Fred C. Hart assessment.

The Naval Ordnance Station utilizes groundwater from a network of 8 deep wells to supply roughly 2,000 employees and residents at the station. The nearest supply well to the landfill is located less than 1/4 mile upgradient. Two water supply wells for the Town of Indian Head are located approximately 1 1/2 miles northeast of the landfill.

The landfill is underlain by the permeable Aquia Greensand. Groundwater contamination may be occurring via leakage of containerized paint sludge at the landfill.

The NOS is bordered by the Mattawoman Creek to the east and the Potomac River to the west. All burning grounds border the Mattawoman Creek. Surface water contamination may be occurring via discharge of contaminated groundwater. In addition, the open burning of explosive and lead contaminated wastes may

result in the deposition of lead laden ash in surface waters. Increase in lead concentrations in surface waters represents a threat to the aquatic organisms and the food chain, as lead displays bioaccumulation by aquatic organisms.

Recommendations

FIT Region III concludes that the NOS may be adversely impacting groundwater and surface water, and recommends a low priority Site Investigation/ Sampling at the NOS to include the following:

o Wells in the vicinity of the landfill for organics and inorganics to determine possible presence of groundwater contamination.

o Possible fish study to determine if elevated levels of lead are present in aquatic organisms.

As the Navy has commissioned Fred C. Hart in this effort it is recommended that the EPA postpone action and review the forthcoming report to determine if potential surface water and groundwater contamination are properly addressed.

SECTION 2

Naval Ordnance Station
Indian Head, MD
TDD No. F3-8112-03
EPA No. MD-64

BACKGROUND OF THE SITE

History

The Naval Ordnance Station (NOS) located in Indian Head, MD, began operations in 1890, and encompasses roughly 1,800 acres of the Indian Head Peninsula. The station provides a variety of material and technical support for the United States Navy. More specifically the facility provides material and technical support in all phases of weapons systems, propulsion, explosives development, cartridge and propellant activated devices and propellant and explosive chemistry.[1]

The Naval Ordnance Station has been issued, or is in the process of obtaining, the following permits regarding waste disposal:[2]

- 6 NPDES (5 industrial waste, 1 sewage waste)

- Sewage sludge disposal permit and permission to apply sewage sludge as a soil conditioner at a rate of 6 tons/acre (sludge is generated on site).

- Seeking a Designated Hazardous Substance Permit (RCRA Generator and TSD) with the State of Maryland (See Attachment I).

- Draft permit from Charles County via consent of State of Maryland, Air Quality Programs for open burning of explosives (See Attachment II). Final permit is in publication.

In addition, the station notified the EPA under Superfund as:[3] (See Attachment III)

- an interim storage area for PCBs.

- interim storage area for paint sludge and disposal of containerized paint sludge.

Four known areas of waste disposal exist at the NOS as noted below (See Figures 3 and 4).

- 3 open burning ares (pyrotechnics, explosives and decontamination open burning areas),
- an inactive sanitary landfill,

In addition, the site stores PCB's at the following locations:

- a scrap yard
- Building 1440

Previously, all hazardous wastes generated at the NOS were either recycled or burned on site at the open burning grounds. Presently only explosive and lead contaminated wastes are burned on site. Other hazardous wastes generated by the NOS (TCE and spent acids) are returned to vendors for recycling.[2]

The NOS began operating a sanitary landfill approximately 7 years ago in an on-site gravel pit. The sanitary landfill has been inactive for one to two years but was never formally closed, capped or seeded. During operations, the landfill accepted 150 cubic yards of sewage sludge annually (generated at the NOS) and a total of 1,100 gallons of containerized paint sludge.

Currently, sewage sludge is applied to wildlife support areas as a soil conditioner and paint sludge is stored on site.

The NOS previously stored all transformers containing PCBs in an on-site scrap yard. All transformers containing > 50 ppm PCBs were removed to building 1440 which is reportedly constructed according to applicable regulations. Several transformers of < 50 ppm PCBs remain in the scrap yard.

Recently, NACIP (Navy Assessment and Control of Installation Pollutants) has contracted Fred C. Hart to perform an assessment at the site in reference to waste handling practices. The assessment may be 1, 2 or 3 phases similar to those established by EPA's Dumpsite Program as defined below:

1. Initial assessment study.

   This is an extensive review of archives, and records, discussions with past and present employees, and an aerial survey of the site. The purpose is to identify areas of contamination at the station.

2. Confirmation study.

   If phase 1 identifies potential problem areas, these areas are investigated further through sampling and analysis.

3. Corrective action.

   The need to be determined by the confirmation study in phase 2.

Waste Types, Quantities and Characteristics

Site activities result in the annual generation of the following types and quantities of hazardous wastes:

- 461 tons of explosive wastes (RDX, nitroglycerine and ammonium perchlorate contaminated wastes)

- 1,645 tons of spent acid (50% conc. H_2SO_4 and 50% conc. HNO_3)

- 4 tons of TCE,

- 5 pounds of lead.

The station also stores 4 tons of PCBs.[1&2]

Utilizing the Hazardous Rating (Mitre) Model ranking system these wastes are characterized below (3 indicating the most severe condition).[5]

	Volatility	Toxicity Infec.	Persistence	Reactivity	Ignition	Physical State
RDX (D001)	0	3	2	3	3	2
Ammonium Perchlorate (D001)	0	1	0	3	3	2
Nitroglycerin (D001)	0	2	0	3	3	3
H_2SO_4 (D002)	1	3	0	2	0	3
HNO_3 (D002)	3	3	0	2	2	3
TCE (F001)	3	2	3	0	1	3
Lead (D008)	0	3	3	0	0	1
PCB	0	3	3	0	0	3

See Attachment IV for further information.

Other wastes generated on a yearly basis at the site are as follows:

- 150 cubic yards/year of sewage sludge (according to NOS personnel, testing indicates that sludge does not exhibit the characterisitics of EP toxicity),

- 110 gallons of paint sludge (has not been subjected to RCRA testing to determine hazard),

- 40-80 cubic yards daily of general refuse.[2]

Geology/Hydrology

The Indian Head Peninsula is bordered on the west by the Potomac River and on the east by the Mattawoman Creek. The burning grounds and scrap yard are adjacent to the Mattawoman Creek. These areas lie within the flood plain of the Mattawoman Creek. The landfill and building 1440 lie outside the flood plain area.

Surface waters in the vicinity of the NOS are designated class I waters. Surface waters are protected for water contact (recreation) and wildlife.[7]

The NOS is underlain by the Aquia Greensand and is comprised of moderately glauconitic quartz sand with a few layers of clay. Depth to unconsolidated bedrock is greater than 5 ft. The groundwater table at the areas of concern is shallow (<3 feet) except at the landfill where depth to the groundwater table is >4 feet. Direction of shallow groundwater flow at the landfill, scrap yard and burning areas is towards the Mattawoman Creek. Deep groundwater runs southwesterly towards the Potomac River.[6,8, 9]

Groundwater is utilized for drinking water at the Naval Ordnance Station (See Figure 1 and Table 1 for well locations, depths and pumpage rates).[1]

Municipal water supply from the Town of Indian Head is available to the NOS in case of emergency. The municipal water supplies arise from groundwater wells (See Figure 2 for locations, and pumpage rates).[10]

The landfill occupies a former gravel pit. According to Naval Ordnance personnel, the gravel pit was not excavated to groundwater level. The soil of the landfill is comprised chiefly of lowland deposits of gravel and sand in which cobbles and boulders lie near the base. The permeability of these soils is medium to high.[9]

The burning grounds are located in areas developed by cutting and filling. As such these soils are extremely variable in nature.[9] (See Attachment V for more detailed information).

Demographics

The station employs a staff of 1,825 with some employees also residing at the site.[1] Residential buildings at the site house roughly 1,000 people.[2]

Critical Environments

Areas of tidal marshland lie within 1/4 mile of the burning areas. In addition, the Potomac River area in the vicinity of the NOS is a nesting area for bald eagles. Disposal areas and bordering property may, at times, be utilized by the eagle.[11]

The Naval Ordnance Station supports a large deer population. No hunting is permitted at the station.[2]

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FOOTNOTES FOR BACKGROUND OF THE SITE

1. Hazardous Waste Permit Application (See Attachment I).

2. Telecons and meetings with NOS Personnel:

Caryle Miller	202-433-3760
Larry Sparks	202-433-3760
Thomas Woo	301-743-4534
Bob Steves	301-743-4343
Ken Mooren	202-433-3760

3. Paul Gothold, EPA Region III, 215-597-1230.

4. EPA/State File Information.

5. Information From:

   - o Dangerous Properties of Industrial Mtls., N. Irving Sax, 5th Edition.
   - o Fire Protection Guide on Hazardous Materials, (National Fire Protection Association), 7th Edition.
   - o Toxic and Hazardous Industrial Chemicals Safety Manual, The International Technical Information Institute, 1975 through 1979.
   - o The Merck Index, by Merck & Co., Inc., 9th Edition.

6. USGS Topogrphic Map, 7.5' Series, Indian Head Quad.

7. Jim Rasin, Potomac River Basin Commission, 1055 First Street, Rockville, MD, 20850.

8. Contamination Potential, prepared by EPA Region III.

9. Soil Survey of Charles County, MD, US Department of Agriculture, Soil Conservation Service, Issued July 1974 (See Attachment IV).

10. Betty Hamrick, Employee of Town of Indian Head, 301-743-5511.

11. Martha Carlisle, Department of Fish and Wildlife, Annapolis, MD, 301-269-6324.

SECTION 3

Naval Ordnance Station
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FIELD TRIP REPORT

Introduction

The on-site reconnaissance by FIT Region III addressed the 4 major areas of concern identified in EPA/State file information: open burning area, explosives open burning, pyrotechnics open burning area and a sanitary landfill. In addition, FIT Region III investigated two PCB storage areas.

On January 25, 1982 at 1100 hours, FIT Region III met with State of Maryland and Naval Ordnance Station personnel for the purposes of confirming background information and conducting an on-site survey. The State of Maryland was assisted in performing a RCRA inspection.

Contacts

Present on date of inspection:

T.M. Woo, NAVORDSTA, NOS	301-743-4534
Larry Sparks, Chesdiv, NOS	202-433-3760
Caryle Miller, Chesdiv, NOS	202-433-3760
Bob Steves, PDO, NOS	301-743-4343
Peter Wiggington, State of Maryland, Department of Health & Mental Hygiene (present for RCRA Inspection only)	301-383-6650
Beth Gross, FIT Region III	601-665-1515
Susan Belski, FIT Region III	609-665-1515

Observations

o Weather conditions on date of inspection were cold, overcast and slighly breezy.

o Field observations were somewhate limited on date of site survey due to presence of approixmately 4" of snow.

o No positive explosimeter or HNU readings were detected on date of inspection.

o The decontamination burning area borders the Mattawoman Creek and encompasses roughly 2-3 acres (See Figure 3). RDX, nitroglycerine and ammonium

perchlorate contaminated equipment (tanks, pipes, wooden palletes, cardboard, bulk metal and fiberbound containers) are flashed every 2 weeks resulting in approximately 250 tons of reclaimed scrap metal per year.

o The explosives open burning ground is roughly 1 acre in size and is located at the tip of the peninsula abutting the Mattawoman Creek. Missile propellants and warhead explosives are flashed every other day at a rate of approximately 215 tons/year.

o The pyrotechnics disposal area is located a few hundred yards southwest of the explosives open burning ground and is the site of flashing of initiators, igniters, caps and various hardware. Burning is confined to a 5,000 gallon (approximate size) open ended tank noted on site. Pyrotechnics burning is carried out once a week at a rate of 200 pounds/week.

o All burning activities are confined to restricted areas. Access roads to restricted areas are guarded by military personnel.

o The landfill occupies a former gravel pit and encompasses roughly 15 acres. The landfill was partially surrounded by a low cliff. A general refuse dumpster was noted at the landfill which is reportedly emptied once or twice a day.

o All PCBs were formerly stored on approximately 1/4 acre of the scrap yard. Transformers containing > 50 ppm PCB were removed to building 1440. Several transformers containing < 50 ppm PCB were noted in the scrap yard.

o Building 1440 currently stores 4 tons of PCBs. Building 1440 is reportedly constructed in accordance with Regulation 40 CFR.761.

o FIT Region III concluded the site survey and left the site by 1520 hours.

SECTION 4

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EPA

POTENTIAL HAZARDOUS WASTE SITE
IDENTIFICATION AND PRELIMINARY ASSESSMENT

REGION: III

SITE NUMBER (to be assigned by Hq):

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent forms as a result of additional inquiries and on-site inspections.

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II (Preliminary Assessment). File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: Naval Ordnance Station

B. STREET (or other identifier): Route 210

C. CITY: Indian Head

D. STATE: MD

E. ZIP CODE: 20640

F. COUNTY NAME: Charles

G. OWNER/OPERATOR (If known)

1. NAME: US Navy/Fred S. Underwood, Captain, USN, Commanding Officer

2. TELEPHONE NUMBER: (301) 743-4534

H. TYPE OF OWNERSHIP

[X] 1. FEDERAL [ ] 2. STATE [ ] 3. COUNTY [ ] 4. MUNICIPAL [ ] 5. PRIVATE [ ] 6. UNKNOWN

I. SITE DESCRIPTION: The Naval Ordnance Center provides material and technical support for assigned weapons systems, weapons and components. Areas of concern are 3 burning sites 1 landfill, and 2 PCB storage areas.

J. HOW IDENTIFIED (i.e., citizen's complaints, OSHA citations, etc.): 103 C of CERCLA, Notice Management System

K. DATE IDENTIFIED (mo., day, & yr.): 01-28-80

L. PRINCIPAL STATE CONTACT

1. NAME: Frank Henderson

2. TELEPHONE NUMBER: (301) 383-6650

II. PRELIMINARY ASSESSMENT (complete this section last)

A. [illegible]ENT SERIOUSNESS OF PROBLEM

[ ] 1. HIGH [ ] 2. MEDIUM [X] 3. LOW [ ] 4. NONE [ ] 5. UNKNOWN

B. RECOMMENDATION

[ ] 1. NO ACTION NEEDED (no hazard)

[ ] 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

[ ] 3. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

[X] 4. SITE INSPECTION NEEDED (low priority)

C. PREPARER INFORMATION

1. NAME: Susan Belski

2. TELEPHONE NUMBER: (609) 665-1515

3. DATE (mo., day, & yr.): 02-10-82

III. SITE INFORMATION

A. SITE STATUS

[X] 1. ACTIVE (Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)

[ ] 2. INACTIVE (Those sites which no longer receive wastes.)

[ ] 3. OTHER (specify): (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)

B. IS GENERATOR ON SITE?

[ ] 1. NO [X] 2. YES (specify generator's four-digit SIC Code): 2869, 2892, 8911, 3662

C. [illegible]F SITE (in acres): 1,742 acres

D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES

1. LATITUDE (deg.-min.-sec.): 38° 33' 45"

2. LONGITUDE (deg.-min.-sec.): 77° 12' 03"

E. ARE THERE BUILDINGS ON THE SITE?

[ ] 1. NO [X] 2. YES (specify): Buildings relevant to administration, R&D, manufacture of explosives and related devices, storage, housing, schools, etc

Continue On Reverse

IV. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

A. TRANSPORTER	B. STORER	C. TREATER	D. DISPOSER
			X 1. LANDFILL
		X 2. INCINERATION	X 2. LANDFARM
			3. OPEN DUMP
	X 4. TANK, ABOVE GROUND	X 4. RECYCLING/RECOVERY	4. SURFACE IMPOUNDMENT
			5. MIDNIGHT DUMPING
			X 6. INCINERATION
			7. UNDERGROUND INJECTION
			8. OTHER (specify):

E. SPECIFY DETAILS OF SITE ACTIVITIES AS NEEDED

Three burning areas are present at the site. Burning of explosives and explosive and lead contaminated wastes occur at these sites. Several years ago, all wastes generated on-site were recycled or burned in these areas. One landfill is present on-site and accepted only sewage and paint sludges.

V. WASTE RELATED INFORMATION

A. WASTE TYPE

☐ 1. UNKNOWN ☒ 2. LIQUID ☒ 3. SOLID ☒ 4. SLUDGE ☐ 5. GAS

B. WASTE CHARACTERISTICS

☐ 1. UNKNOWN ☒ 2. CORROSIVE ☒ 3. IGNITABLE ☐ 4. RADIOACTIVE ☒ 5. HIGHLY VOLATILE
☒ 6. TOXIC ☒ 7. REACTIVE ☒ 8. INERT ☒ 9. FLAMMABLE

☐ 10. OTHER (specify):

C. WASTE CATEGORIES

records of wastes available? Specify items such as manifests, inventories, etc. below.

...entories

2. Estimate the amount(specify unit of measure)of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT ~ 157	AMOUNT	AMOUNT 4	AMOUNT ~ 1,650	AMOUNT	AMOUNT 461
UNIT OF MEASURE cu. yds./yr.	UNIT OF MEASURE	UNIT OF MEASURE tons/yr.	UNIT OF MEASURE tons/yr.	UNIT OF MEASURE	UNIT OF MEASURE tons/yr.
(1) PAINT, PIGMENTS	(1) OILY WASTES	X (1) HALOGENATED SOLVENTS TCE	X (1) ACIDS 1,645 tons	(1) FLYASH	X (1) LABORATORY PHARMACEUT.
(2) METALS SLUDGES	(2) OTHER(specify):	(2) NON-HALOGNTD. SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		(3) OTHER(specify):	(3) CAUSTICS	(3) MILLING/ MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMLTG. WASTES	(4) MUNICIPAL
X (5) OTHER(specify): Sewage sludge (150 cubic yds./yr.) Paint sludge 6.5 cubic yds. landfilled on-site .65 cubic yds./yr. generated -currently stored on site.			(5) DYES/INKS	(5) NON-FERROUS SMLTG. WASTES	X (5) OTHER(specify): nitroglycerine RDX, and ammonium perchlorate contaminated wastes
			(6) CYANIDE	(6) OTHER(specify):	
			(7) PHENOLS		
			(8) HALOGENS		
			X (9) PCB 4 tons stored on-site		
			X (10) METALS 5 lbs. of Pb/yr.		
			(11) OTHER(specify)		

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V. WASTE RELATED INFORMATION (continued)

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH MAY BE ON THE SITE (place in descending order of hazard).

Explosives (RDX, nitroglycerin, ammonium perchlorate)
Nitric and sulfuric acids
TCE
Lead
PCBs

ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

The site is in the process of being permitted by the State of MD as a DHS facility. Prior to application for permit, site wastes were recovered or burned in open burning areas.

VI. HAZARD DESCRIPTION

A. TYPE OF HAZARD	B. POTENTIAL HAZARD (mark 'X')	C. ALLEGED INCIDENT (mark 'X')	D. DATE OF INCIDENT (mo., day, yr.)	E. REMARKS
1. NO HAZARD				
2. HUMAN HEALTH				
3. NON-WORKER INJURY/EXPOSURE				
4. WORKER INJURY				
5. CONTAMINATION OF WATER SUPPLY	X			A water supply well for the NOS is located in the vicinity of the landfill. SEE PAGE 3A
6. CONTAMINATION OF FOOD CHAIN	X			Potential groundwater contamination via leakage of containerized paint sludge.
7. CONTAMINATION OF GROUND WATER	X			
8. CONTAMINATION OF SURFACE WATER	X	X	01-03-77	SEE PAGE 3A
AMAGE TO LORA/FAUNA				
10. FISH KILL				
11. CONTAMINATION OF AIR	X			See PAGE 3A
12. NOTICEABLE ODORS				
13. CONTAMINATION OF SOIL	X			Potential contamination at the explos and decontamination burning areas.
14. PROPERTY DAMAGE				
15. FIRE OR EXPLOSION				
16. SPILLS/LEAKING CONTAINERS/ RUNOFF/STANDING LIQUIDS				
17. SEWER, STORM DRAIN PROBLEMS				
18. EROSION PROBLEMS				
19. INADEQUATE SECURITY				
20. INCOMPATIBLE WASTES				
DNIGHT DUMPING				
24. OTHER (specify):				

VI. 6. Aquatic organisms bioaccumulate lead.

VI. 8. Spill (12% caustic solution, 12% other salts - 130 ppm) entered the Mattawoman Creek.

Surface water contamination may be a potential problem as burning areas lie in flood prone area; also deposition of lead laden ash from open burning areas.

VI.11. Open burning of explosives.

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VII. PERMIT INFORMATION

A. INDICATE ALL APPLICABLE PERMITS HELD BY THE SITE.

*6 NPDES permits
5 sanitary & 1 industrial

[X] 1. NPDES PERMIT * [ ] 2. SPCC PLAN [ ] 3. STATE PERMIT (specify): #'s MD0003158

[X] 4. AIR PERMITS open burning [ ] 5. LOCAL PERMIT [ ] 6. RCRA TRANSPORTER MD0020893 MD0020885

[ ] 7. RCRA STORER [ ] 8. RCRA TREATER [ ] 9. RCRA DISPOSER MD0020907 MD0025135 MD0020915

. OTHER (specify): Sewage sludge disposal 57908469AFR /Seeking a Designated Hazardous Substance Permit W/State of MD (RCRA Generator and TSD).

B. IN COMPLIANCE?

[ ] 1. YES [X] 2. NO [ ] 3. UNKNOWN

4. WITH RESPECT TO (list regulation name & number): Effluent guidelines for NPDES permits have been exceeded.

VIII. PAST REGULATORY ACTIONS

[ ] A. NONE [ ] B. YES (summarize below)

See below

IX. INSPECTION ACTIVITY (past or on-going)

[ ] A. NONE [X] B. YES (complete items 1,2,3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
NPDES inspection	01-18-82	EPA (CRL)	Examined the facilities sampling strategy re NPDES, etc. Overall rating of satisfactor
NPDES	weekly daily	N.O.S.	Effluent exceeds guideline.
NPDES	monthly	State	Effluent exceeds guideline

X. REMEDIAL ACTIVITY (past or on-going)

[ ] A. NONE [X] B. YES (complete items 1, 2, 3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
See below			

NOTE: Based on the information in Sections III through X, fill out the Preliminary Assessment (Section II) information on the first page of this form.

Due to sample results exceeding effluent guidelines: the N.O.S. on its own initiative has implemented the following:

1) Re sanitary waste outfalls - project has been awarded for upgrading and centralizing sewage treatment at the N.O.S.

2) Re industrial waste outfall: A feasability study is being ensued to improve effluent conditions.

SECTION 5

WORK SHEET FOR RATING DISPOSAL SITES

Name of Site: Naval Ordnance Station — active / inactive / inactive & abandoned (CIRCLE ONE)

Location: Indian Head, MD

Owner/Operator: U. S. Navy

Comments: The landfill has been inactive for 1-2 years. Previously accepted STP sludge generated on site (now utilized as fertilizer) and containerized paint sludge no longer disposed of on site).

Prepared By: Susan Belski On February 9, 1982

FACTOR	OBSERVATION
RECEPTORS	
Population within 1000 feet	0
Distance to Nearest Drinking Water Well	< 1/4 mile (Well #18)
Distance to Nearest Off-Site Building	< 1/8 mile
Land Use/Zoning	restricted area, utilized only by N.O.S. personnel
Critical Environment	may be used by bald eagle tidal flats and tidal marsh-
Use of Site by Residents	not used — land, <1/2 mile
Use of Nearest Buildings	unknown
Presence of Public Water Supplies	Well #18 is one of the supply wells that services a population of 1,000 residents & approx. 1825 employees
Presence of Aquifer Recharge Area	at the site — no - site is an aquifer discharge area
Presence of Transportation Routes	roads utilized by facility personnel
Presence of Important Natural Resources	none
Other	--
PATHWAYS	
Evidence of Contamination	none noted
Type of Contamination	potential for groundwater contamination
Level of Contamination	unknown
Distance to Nearest Surface Water	< 1/2 mile
Depth to Ground Water	> 4 ft.
Net Precipitation	6"
Soil Permeability	medium to high
Bedrock Permeability	--
Depth to Bedrock	>5 ft. to unconsolidated bedrock
Erosion and Runoff Problems	none noted
Susceptibility to Flooding	mild susceptibility
Slope Instability	not noted
Seismic Activity	zone 2 (minor earthquake damage may be expected)
Other	--

WORK SHEET FOR RATING DISPOSAL SITES

FACTOR	OBSERVATION
WASTE CHARACTERISTICS (SEE NOTE *)	
Toxicity	varies according to type of metal
Persistence	metals are persistent
Radioactivity	--
Ignitability	--
Reactivity	--
Corrosiveness	--
Solubility	metals are soluble at low pH
Volatility	--
Physical State	particulate
Infectiousness	--
Bioaccumulation Potential	bioaccumulation
Carcinogenicity, Teratogenicity and Mutagenicity	--
Other	--
WASTE MANAGEMENT PRACTICES	
Site Security	adequate
Hazardous Waste Quantity	0-1100 gal. (paint sludge not subjected to RCRA testing)
Total Waste Quantity	approx. 600 cu. yds STP sludge, 6 cu. yds paint sludge
Waste Incompatibility	not noted
Use of Liners	not lined
Use of Leachate Collection Systems	no leachate collection system
Use of Gas Collection Systems	no gas collection system
Use and Condition of Containers	unknown (paint sludge containerized)
Lack of Safety Measures	none noted
Evidence of Open Burning	none
Dangerous Heat Sources	none
Inadequate Waste Records	adequate
Inadequate Cover	unknown
Other	--

* NOTE: Site accepted containerized paint sludges and STP sludge. Paint sludge was not subjected to RCRA analysis. STP sludge testing indicates that sludge does not exhibit the characteristics of EP toxicity.

WORK SHEET FOR OPEN BURNING AREAS

of Site:	Naval Ordnance Station	active inactive & abandoned (CIRCLE ONE)
tion:	Indian Head, MD	
Owner/Operator:	U.S. Navy	
Comments:		

Prepared By: Susan Belski On February 9, 19 82

FACTOR	OBSERVATION
	RECEPTORS
Population within 1000 feet	0
Distance to Nearest Drinking Water Well	approximately 1/4 mile from explosive and pyrotechnics burning grounds (Well 15)
Distance to Nearest Off-Site Building	pyrotechnics & open burning areas approx. 1/4 mile, decontamination burning area approximately 1 mile
Land Use/Zoning	restricted area/used by U.S. Navy for burning only
Critical Environment	used by bald eagle, TM in the vicinity
Use of Site by Residents	not used
Use of Nearest Buildings	control building utilized during flashing
sence of Public er Supplies	Well 15 is one of the supply wells that services a population of 1,000 residents and approx. 1825 employees
Presence of Aquifer Recharge Area	No, area is an aquifer discharge area
Presence of Transportation Routes	access road to site
Presence of Important Natural Resources	none
Other	--
	PATHWAYS
Evidence of Contamination	not noted
Type of Contamination	unknown, potential for surface water contamination
Level of Contamination	unknown
Distance to Nearest Surface Water	borders surface waters
Depth to Ground Water	<3 feet
Net Precipitation	6"
Soil Permeability	variable
Bedrock Permeability	--
Depth to Bedrock	>5 ft. to unconsolidated bedrock
Erosion and Runoff Problems	not noted
Susceptibility to Flooding	burning areas lie in flood prone area
e Instability	no
smic Activity	zone 2 (minor earthquake damage may be expected)
Other	--

WORK SHEET FOR RATING OPEN BURNING AREAS

FACTOR	OBSERVATION
WASTE CHARACTERISTICS RDX, nitroglycerine, ammonium perchlorate, lead	
Toxicity	high
Persistence	medium to high
Radioactivity	no
Ignitability	highly ignitable
Reactivity	highly reactive
Corrosiveness	not applicable (acid wastes are not flashed)
Solubility (water)	lead-pH dependent; explosives-slightly to moderately soluble
Volatility	low
Physical State	crystalls, liquid, particulate
Infectiousness	--
Bioaccumulation Potential	lead is bioaccumulate
Carcinogenicity, Teratogenicity and Mutagenicity	RDX is an experimental carcinogen
Other	--
WASTE MANAGEMENT PRACTICES	
Site Security	adequate
Hazardous Waste Quantity	approximately 461 tons/year
Total Waste Quantity	approximately 461 tons/year
Waste Incompatibility	no
Use of Liners	no
Use of Leachate Collection Systems	no
Use of Gas Collection Systems	no
Use and Condition of Containers	not applicable
Lack of Safety Measures	unknown
Evidence of Open Burning	yes
Dangerous Heat Sources	not evidenced
Inadequate Waste Records	inadequate records
Inadequate Cover	not applicable
Other	--

SECTION 6

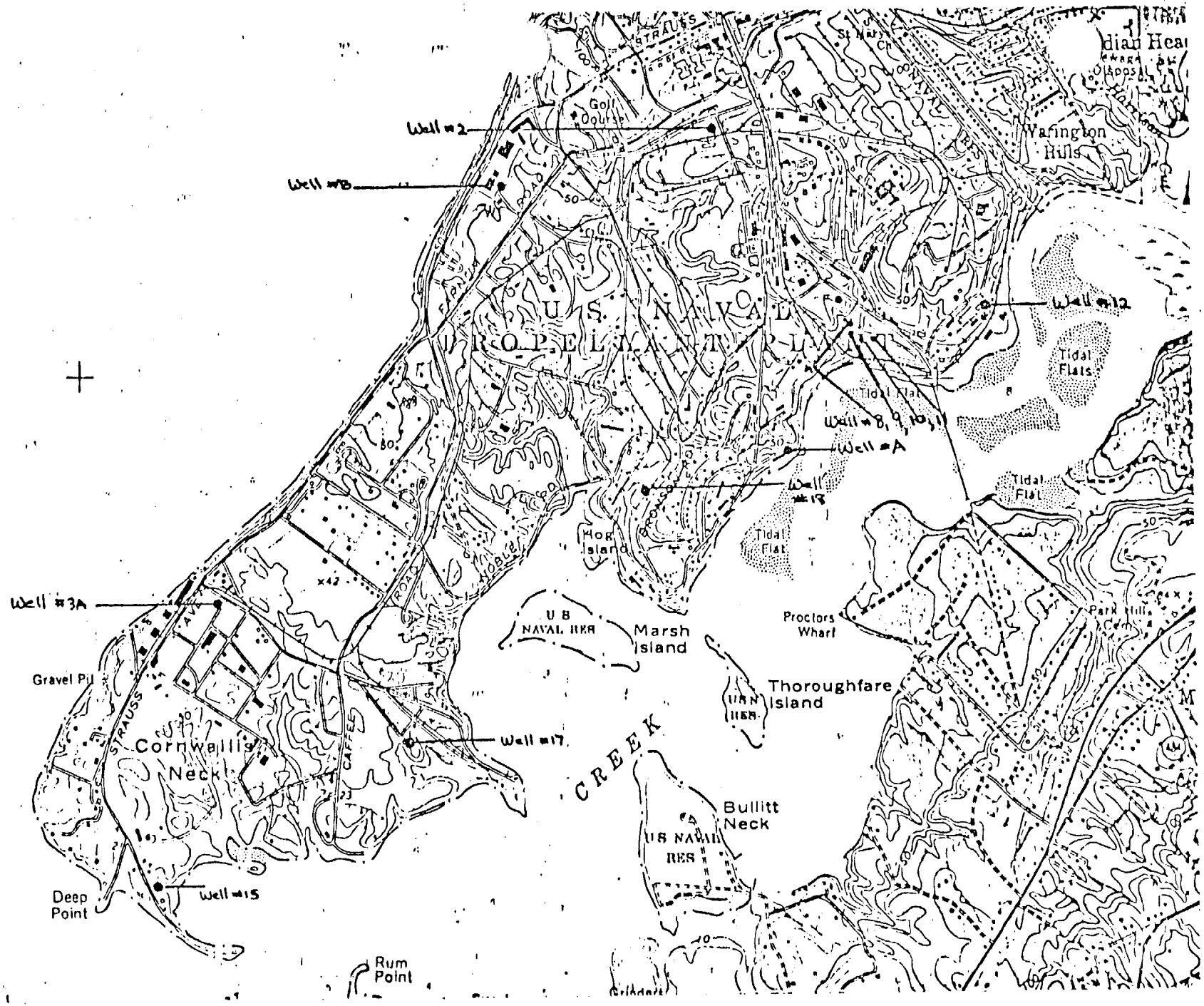
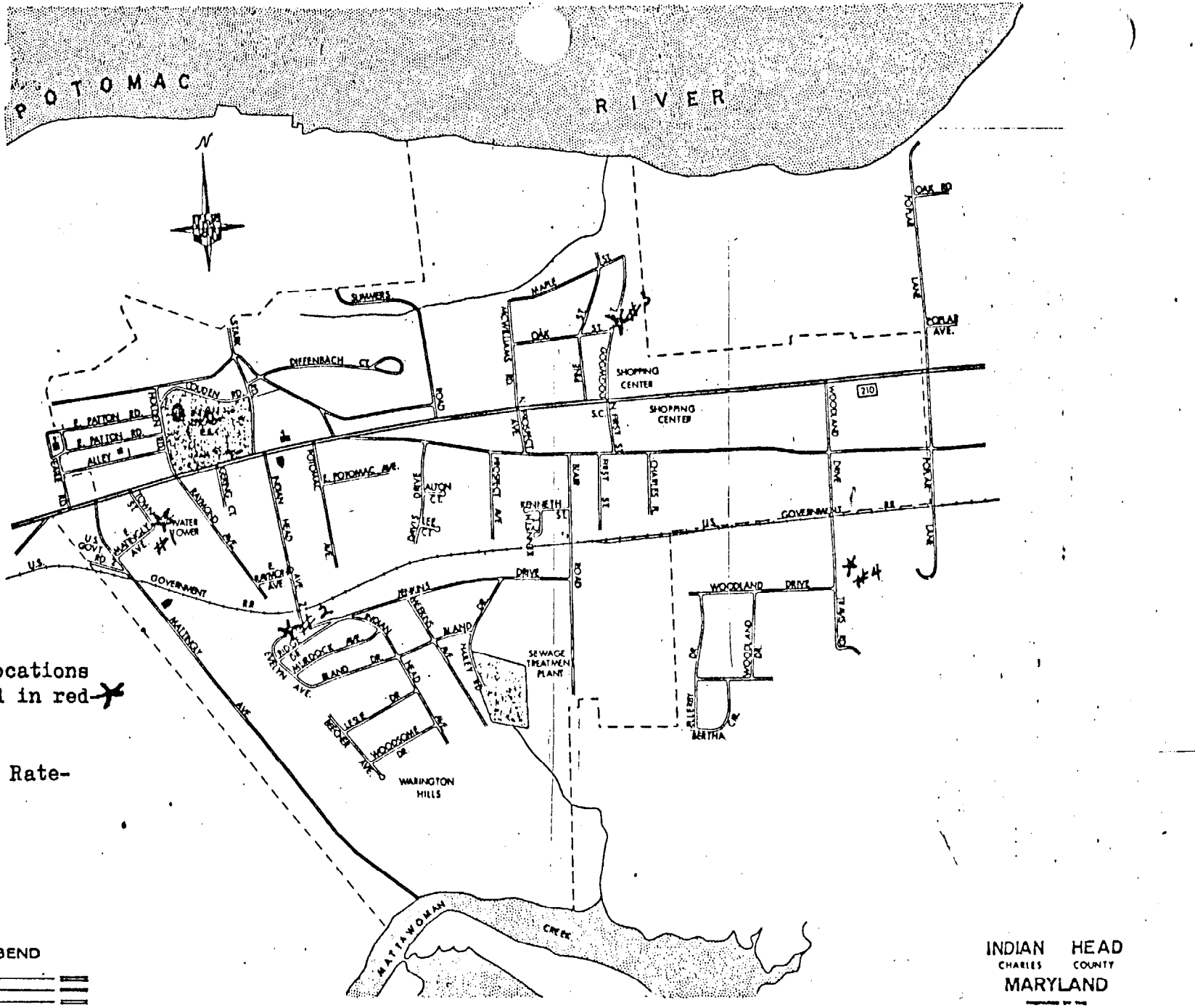


FIGURE 1
Location of drinking water wells for the NOS
TDD No. F3-8112-03, EPA No. MD-64

TABLE 1

Depths and pumpage rates of wells located at the NOS
TDD No. F3-8112-03
EPA No. MD-64

WELL NUMBER	LOCATION	DEPTH	PUMP RATE
2	Building 1534	unknown	88 gpm
6	Building 899	398 ft.	50 gpm
7	Building 899	395 ft.	50 gpm
15	Building 726	280 ft.	150 gpm
17	Building 788	295 ft.	125 gpm
18	Building 789	302 ft.	125 gpm
A (23)	Building 782	290 ft.	100 gpm
B (24)	Building 782	294 ft.	30 gpm



Well locations denoted in red

Pumpage Rate-
#1 -150
#2 -150
#3 -250
#4 -100

LEGEND

INDIAN HEAD
CHARLES COUNTY
MARYLAND

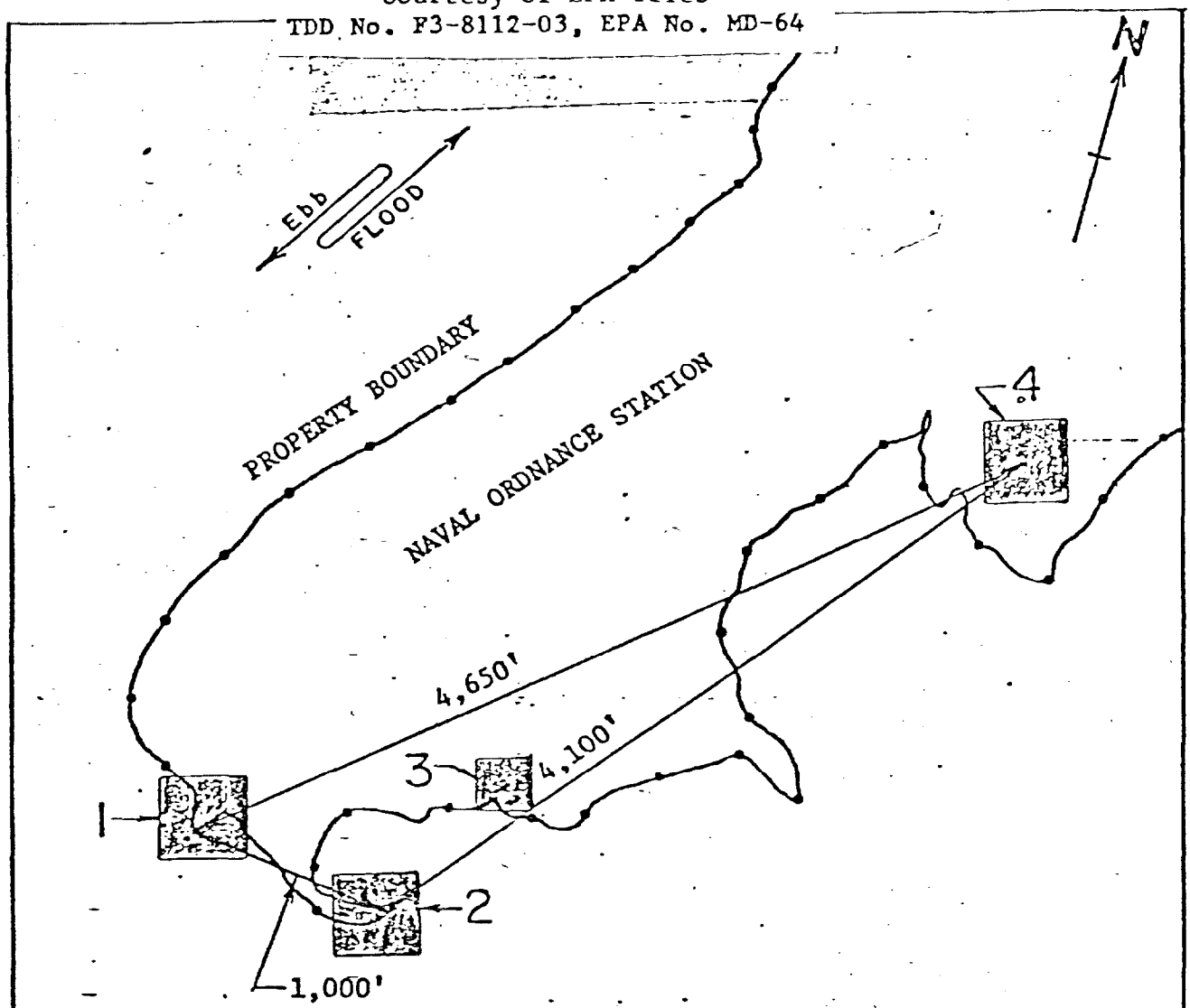
STATE HIGHWAY ADMINISTRATION
DIVISION OF PLANNING

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
1980

FIGURE 2
Location of drinking water wells
for the Town of Indian Head
TDD No. F3-8112-03, EPA No. MD-64

MD-64, 8112-03

FIGURE 3
Location of disposal areas
Courtesy of EPA files
TDD No. F3-8112-03, EPA No. MD-64



1. Pyrotechnics Burning Area
   Longitude 77° 12' 27" Latitude 38° 33' 50" (Approx.)
   Area - 120,000 Sq. Ft.

2. Explosives Burning Area
   Longitude 77° 12' 3" Latitude 38° 33' 45" (Approx.)
   Area - 48,000 Sq. Ft.

3. Decontamination Burning Area
   Longitude 77° 11' 48" Latitude 38° 33' 58" (Approx.)
   Area - 40,000 Sq. Ft.

4. Sludge Disposal Site and Landfill Area
   Longitude 77° 10' 5" Latitude 38° 34' 8" (Approx.)

SCALE: 1 INCH = 1,000 FE

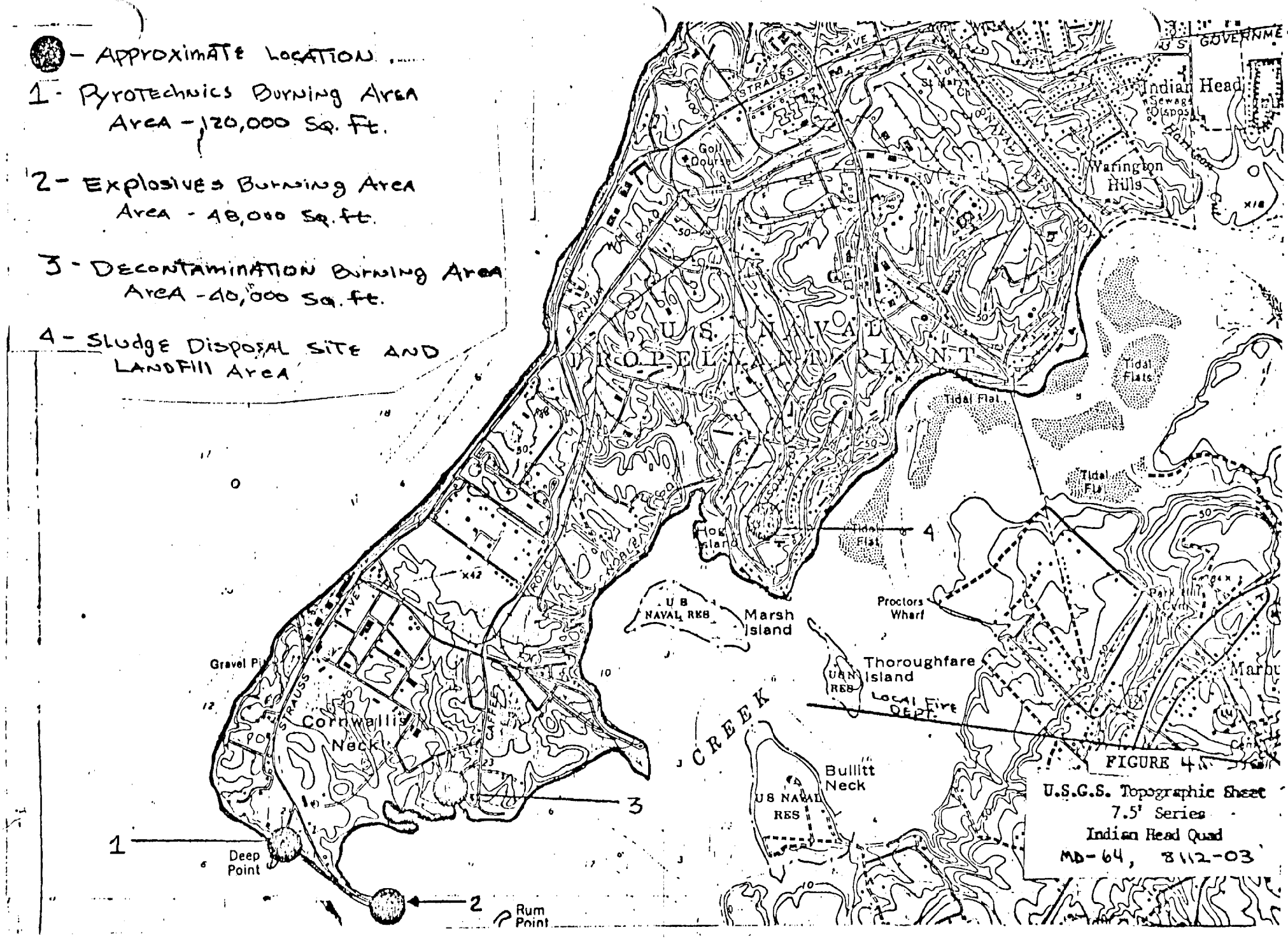


FIGURE 4

U.S.G.S. Topographic Sheet
7.5' Series
Indian Head Quad
MD-64, 8112-03

SECTION 7

Naval Ordnance Station
Indian Head, MD
TDD No. F3-8112-03
EPA No. MD-64

PHOTOGRAPHIC LOG

FIT Region III was requested by NOS personnel not to photograph the site. Photographs were taken by Bob Steves, N.O.S., on January 25, 1982 in the presence of FIT Region III.

Photograph #1

Decontamination burning area - Contaminated scrap pile awaiting flashing at the site.

Photograph #2

Decontamination burning area - Decontaminated scrap pile to be reclaimed.

Photograph #3

PCB storage area - Building 1440 stores approximately 4 tons of PCBs. The building is constructed according to applicable regulations (according to N.O.S. personnel) and labeled with EPA approved stickers. Photograph shows one transformer outside of the building.

Photograph #4

Pyrotechnics burning area - Burning of caps, initiators, etc. confined to 5,000 gallon drum (estimated size) at left in photograph. Pyrotechnics burning area, and other burning areas are not bermed due to the nature of the activities.

Photograph #5

Explosive open burning ground - Utilized for burning of missile propellants and warheads.

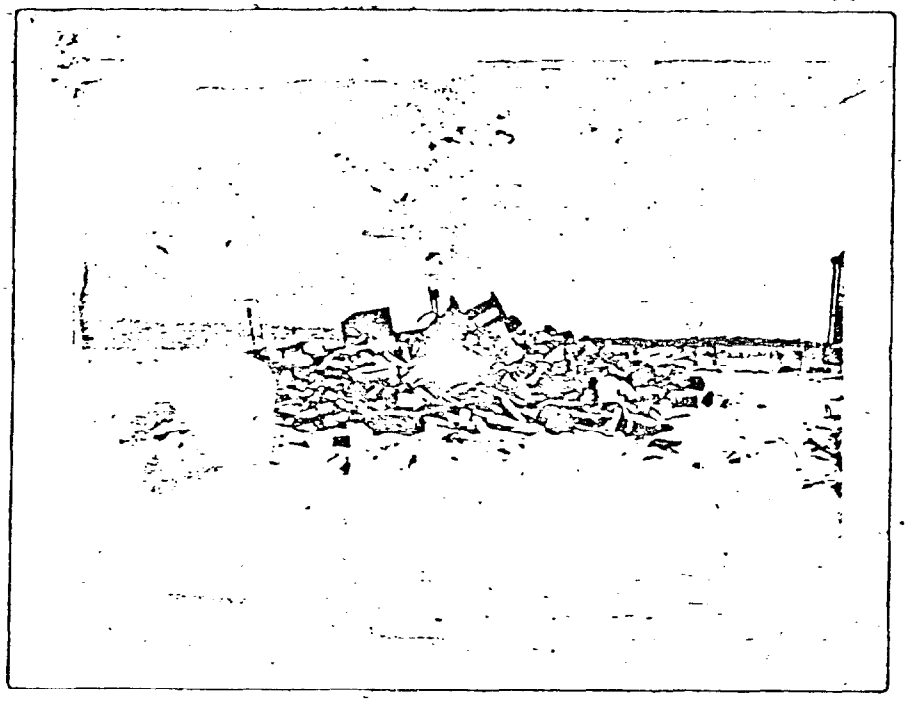
Photograph #6

Landfill - Inactive for 1-2 years. Previously sewage sludge and containerized paint sludge were landfilled in this area. A 40 cubic yard dumpster is located at the fringe of fill for general refuse generated at the site. Refuse is removed daily by a private contractor and disposed of in Charles County Landfill.

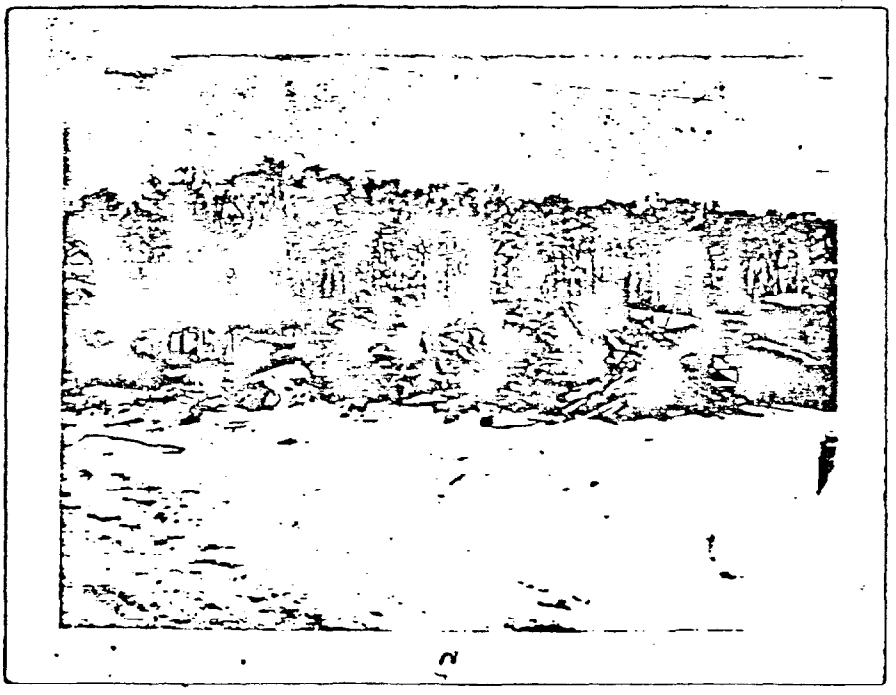
Photograph #7

Scrap yard - Previously utilized for all PCB storage. Transformers of 50 ppm or greater PCBs were removed to building 1440. Transformers less than 50 ppm PCB were visible at the left in the picture.

Naval Ordnance Station
Indian Head, MD
TDD No. F3-8112-03
EPA No. MD-64
Photographic Log
Page Three

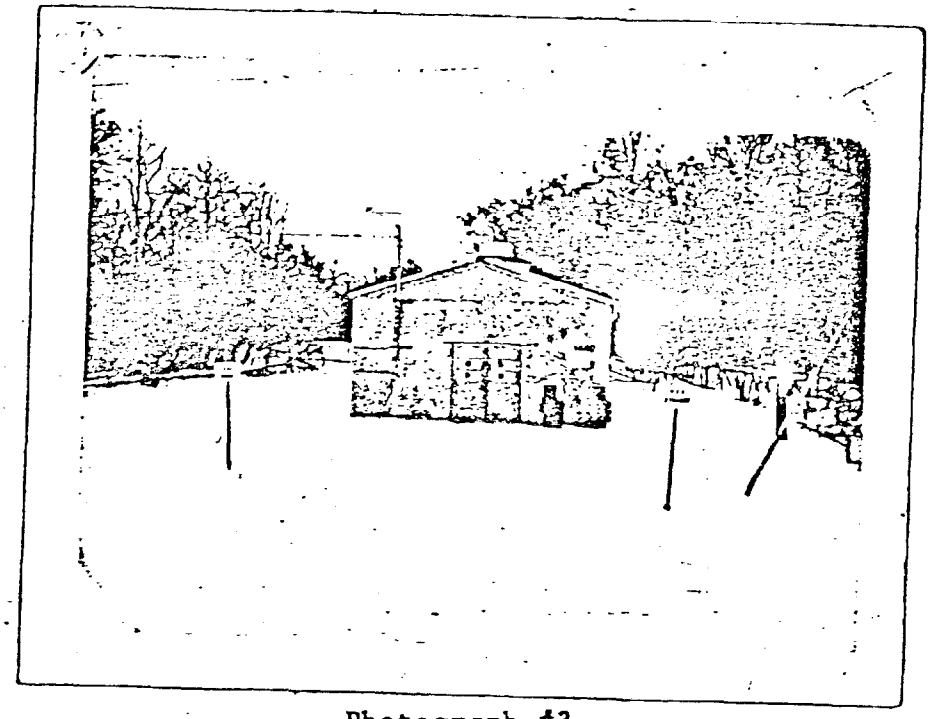


Photograph #1

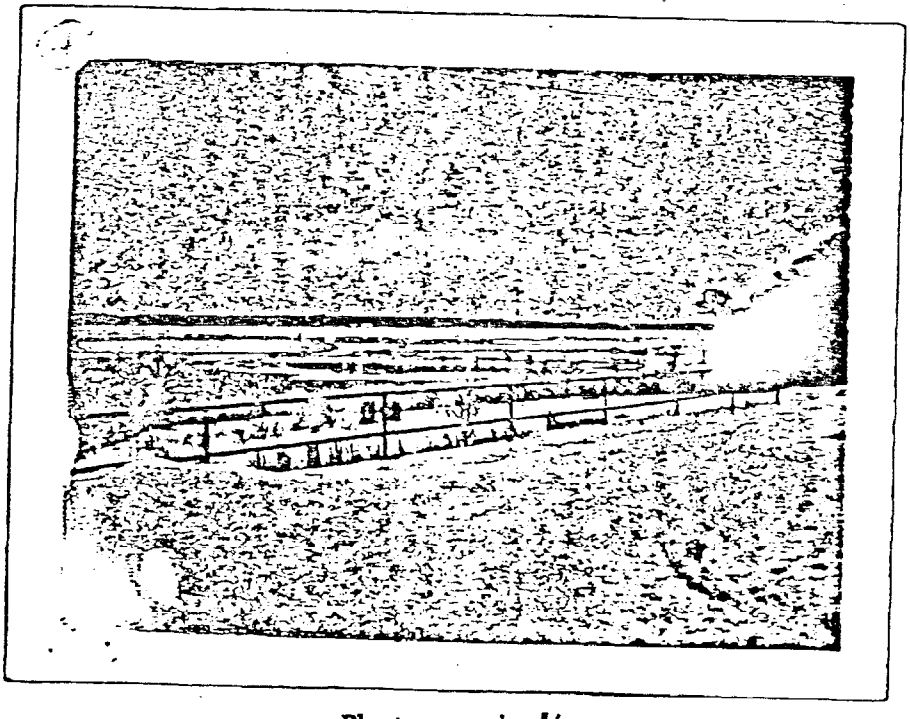


Photograph #2

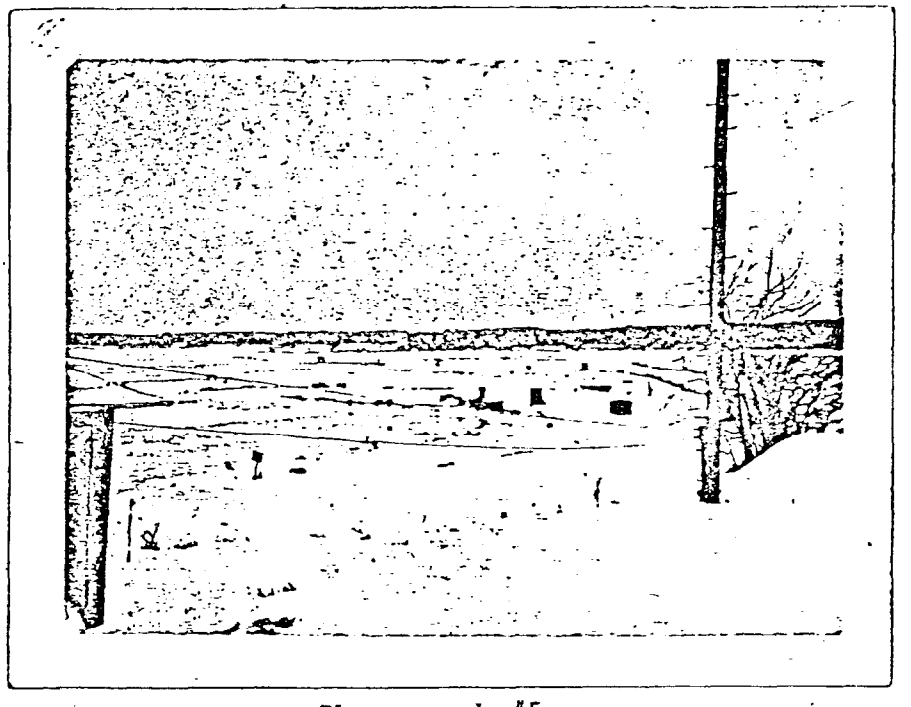
Naval Ordnance Station
Indian Head, MD
TDD No. F3-8112-03
EPA No. MD-64
Photographic Log
Page Four



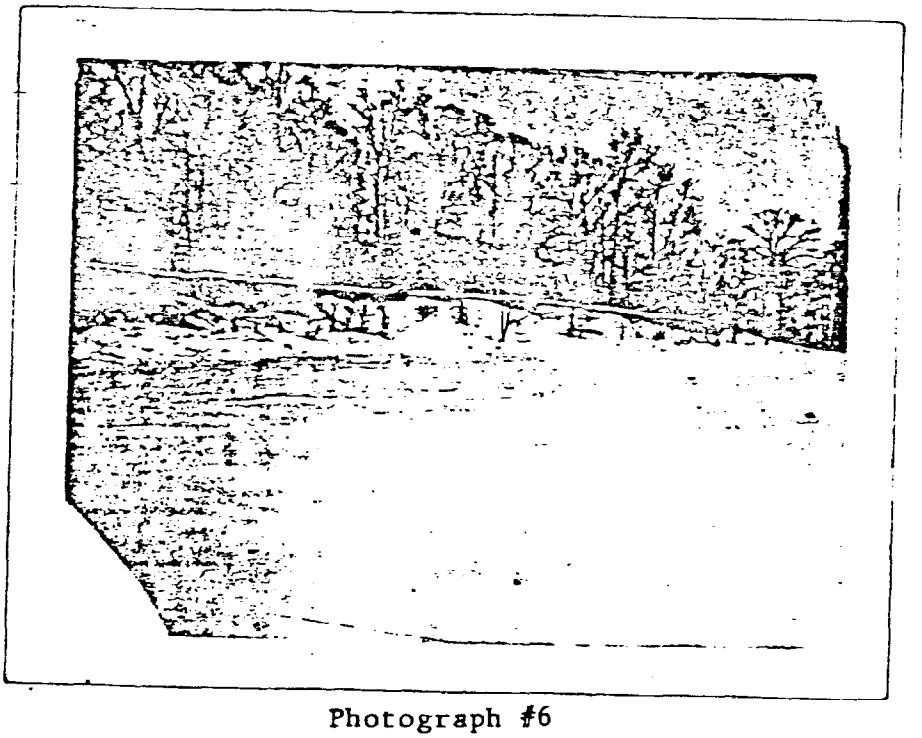
Photograph #3



Photograph #4

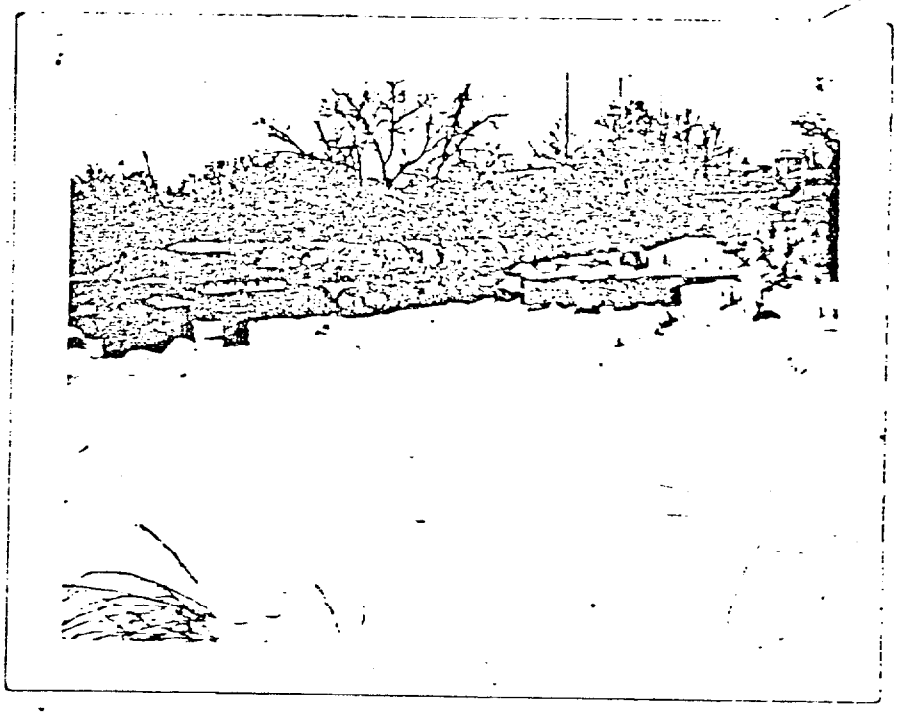


Photograph #5



Photograph #6

Naval Ordnance Station
Indian Head, MD
TDD No. F3-8112-03
EPA No. MD-64
Photographic Log
Page Six



Photograph #7

SECTION 8

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 W. Preston St., Balto. MD 21201

YR MO DY: 82 9 12 5

TIME: 1100

DHS Inspection Form
Generators/TSD Facilities

EPA ID Number: MD 7 1 7 0 0 2 4 6 8 4

TELEPHONE: 301-743-4534

Owner/Operator NAVAL ORDNANCE STA. Facility Name NAVAL ORD. STATION

Address INDIAN HEAD, MD. Zip 20640

Description of Work Activity MAN. of EXPLOSIVES AND PROPELLANTS

I. Generators

A. *Description (10.51.03.01-.03)*

1) Does the Facility generate or has it accumulated those quantities of hazardous waste described in 10.51.02.05 C.? ✓ Yes, ___ No.
2) Has the facility obtained an EPA identification number? ✓ Yes, ___ No.
3) Describe the amount of waste generated (day, week or month) EP. 4600 gal pcb (or 9T.) 1800 T. ban/yr. 5T./yr
4) Under which category is the waste(s)?
___ Ignitable ✓ Reactive ___ Corrosive
___ EP Toxic ✓ RCRA Listed (2005/MO. of everything)

B. *Manifest (10.51.03.04)*

1) Is Maryland manifest system in operation for off-site shipment? ✓ Yes, ___ No.
2) Is TSD Facility to receive DHS identified by ✓ Name, ✓ Address, ___ EPA ID Number?
3) Is alternate facility identified? ___ Yes, ✓ No.
4) Is generator identified by ✓ Name, ✓ Address, ✓ Telephone Number, ✓ MD/EPA ID Number?
Is each transporter identified by ✓ Name, ✓ EPA ID Number, ✓ Maryland Certification Number?
6) Is waste property described? ✓ Yes, ___ No.
7) Is shipment date marked? ___ Yes, ___ No.
8) Is quantity of waste described by ✓ Unit of Weight, ✓ Volume? AS NATURE of WASTE DICTATES
9) Are containers to be loaded identified by ✓ Type, ✓ Number?
10) Is proper certification noted and signed by generator? ___ Yes, ___ No.
11) Are adequate copies available for operator, transporter and TSD? ___ Yes, ___ No.

C. *Pre-Transport Requirements (10.51.03.05)* EMERGENCY

1) Is each container marked with date accumulation began? ✓ Yes, ___ No. If yes, has any waste been stored over 90 days? ✓ Yes, ___ No. How much VARIES THRU OUT YEAR
2) Are containers in good condition? ✓ Yes, ___ No. If no, explain ___
3) Are containers properly labeled? ✓ Yes, ___ No.
4) Does generator have approved emergency contingency plan? ✓ Yes, ___ No.

D. *Recordkeeping and Reporting (10.51.03.06)*

1) Does the generator have: copies of all signed manifests from the previous three years? ___ Yes, ✓ No; copies of each Annual Report and Exception Report? ___ Yes, ___ No. IN EFFECT LESS THAN 3 YRS
2) Does the generator retain, for a period of three years, all wastes analyses? ✓ Yes, ___ No. LS. INTENDS TO DO SO
3) Has the generator filed Exception Reports as required by 10.51.03.06 C? ___ Yes, ✓ No.

II. Treatment, Storage, Disposal (TSD)

Site characterization (10.51.05.02)

Facility Type

✓ Thermal Treatment	___ Biological Treatment
✓ Recycling/Recovery	___ Land Treatment
___ Waste Oil	___ Incineration
___ Chemical Treatment	___ Landfill Operation
___ Physical Treatment	___ Below Ground Tanks
___ Open Pile	___ Other ___
___ Surface Impoundment	___
✓ Drums	___
✓ Above Ground Tank(s)	___

2) Does facility generate DHS? ___ Yes, ___ No.
3) Does facility have waste analysis plan? ✓ Yes, ___ No. If yes, are the procedures of that plan being followed? ✓ Yes, ___ No.
4) Can facility personnel identify DHS being handled? ___ Yes, ___ No.
5) Can facility personnel confirm that DHS received equal those on manifest form? ___ Yes, ___ No. N/A
6) Is there a 24-Hour surveillance system to monitor active portion of facility? ___ Yes, ___ No.
If No, is there an artificial or natural boundary? ___ Yes, ___ No. Is there a means to control entry? ___ Yes, ___ No. Is there a restricted access sign posted? ___ Yes, ___ No.
7) Does facility have: ___ emergency equipment inspection log, ✓ written schedule for inspections, ___ security devices, operating & structural prevention equipment?
8) Have facility personnel completed classroom/on-site training? ✓ Yes, ___ No.
Are records maintained of: ___ Job titles/names of employees ___ job descriptions, ___ Type/amount of continuing training?
9) Are general requirements for Ignitable, Reactive or Incompatible Wastes as required in 10.51.05.02 H addressed? ___ Yes, ___ No.

B. *Preparedness and Prevention (10.51.05.03)*

1) Facility has the following equipment? ___ Internal communication/alarm system for on-site personnel, ___ device for summoning emergency assistance, ___ adequate fire control equipment, water, & suppression chemicals, ___ list of aforementioned equipment.
2) Does facility have adequate area for emergency movement? ___ Yes, ___ No.

C. *Contingency Plan and Emergency Procedures (10.51.05.04)*

1) Does facility have an approved contingency plan for: ___ Personnel to implement emergency procedures to fire, explosions, and unplanned releases to air, soil and water? YES; by NIL Forward, not yet by STATE ✓ Responding emergency units to provide assistance during emergency situations? ___ A list of emergency equipment needed to cope with situation?
2) Are emergency response coordinators listed by name, address, & phone number? ___ Yes, ___ No.
3) Is there an evacuation plan if recommended? ✓ Yes, ___ No.
4) Are emergency coordinators available on twenty-four hour basis? ___ Yes, ___ No.

D. *Manifest System, Recordkeeping, and Reporting (10.51.05.05)*

Facility has a written operating record which contains the following information:

1) ___ description & quantity of DHS received.
2) ✓ method & date of DHS treatment, storage, or disposal.
3) ___ location & quantity at each DHS location in facility.
4) ✓ detailed records & results of waste analysis & treatability tests performed.
5) ___ detailed operating summary reports.
6) ✓ description of emergency incidents that required implementation of contingency plan. NOT YET
7) ✓ records & results of inspections of emergency equipment. TSD systems & hazardous waste areas.
8) Has facility retained, for at least 3 years, copies of all manifests? ___ Yes, ___ No. N/A

E. Groundwater Monitoring (10.51.05.06)

1) Has facility implemented a groundwater monitoring program? _____Yes, _____No, ✓ N/A.
2) Are samples from the groundwater monitoring system being analyzed according to the groundwater sampling and analyses plan? _____Yes, _____No.
3) Is this plan set up in accordance with 10.51.05.06 C? _____Yes, _____No.
4) Has groundwater quality assessment program been prepared? _____Yes, _____No.
5) Are proper groundwater sampling and analyses records kept? _____Yes, _____No.
6) Are the necessary reports on groundwater monitoring information being forwarded to the Secretary? _____Yes, _____No.
7) Do the reports match the facility records? _____Yes, _____No.

F. Closure, Post-closure, and Financial Requirement (10.51.05.07 & .08) Yes by Mil. Auth; N/A yet by STATE

1) Does the facility have an approved closure plan that meets the financial requirements? ✓ Yes, _____No.
2) For surface impoundments, land treatment, and landfills, does the facility have an approved post-closure plan that meets the financial requirements? _____Yes, _____No. NA
3) Does facility maintain liability insurance? _____Yes, _____No. NA

G. Container Management (10.51.05.09)

1) Are all containers: (a)✓ in good condition, i.e., no signs of leakage, corrosion, or any other deterioration/deformation; (b)✓ lined or made of compatible material such that hazardous wastes placed into them will not result in reaction or corrosion; (c)✓ sealed during storage.
2) Are storage areas for hazardous waste containers inspected by owner/operator at least once a week? ✓ Yes, _____No.
   Is an inspection log maintained? _____Yes, ✓ No.
   Are containers holding ignitable or reactive waste located at least 50 feet from the facility's property line? ✓ Yes, _____No.
5) Are incompatible wastes placed in separate containers? ✓ Yes, _____No.
6) Are storage containers holding hazardous wastes which are incompatible with nearby materials stored in containers, tanks, piles, or surface impoundments separated by dikes, berms, walls, or other devices? _____Yes, _____No.

H. Tanks (10.51.05.10)

1) Are all tanks in good condition, i.e., no signs of leakage, corrosion, or any other deterioration: ✓ Yes, _____No.
2) Are uncovered tanks operated to ensure a minimum of two feet of freeboard? _____Yes, _____No. NA
   If not, is tank equipped with a containment structure (e.g., dike or trench), a drainage control system, or a diversion structure (e.g., standby tank) with a capacity that equals or exceeds the volume of top 2 ft. of the tank? _____Yes, _____No.
3) Are tanks with continuous inflow of hazardous waste equipped with a means to stop this inflow (e.g., waste feed cut-off system or by-pass to a standby tank)? _____Yes, _____No. NA
4) Are waste analyses conducted or written documentation obtained before placing a substantially different hazardous waste into tank used for storage or treatment? ✓ Yes, _____No.
5) Are daily inspections conducted for discharge control equipment (e.g., by-pass systems, waste feed cut-off systems and drainage systems)? ✓ Yes, _____No.
6) Is data gathered from monitoring equipment (e.g., pressure and temperature gauges) at least once each operating day? ✓ Yes, _____No.
7) Is the level of waste in the tank checked at least once each operating day? _____Yes, _____No. Needs further check
8) Is (are) the tank(s) inspected weekly to detect corrosion or leaking of fixtures or seams? ✓ Yes, _____No.
   Are the results of these inspections recorded in an inspection log or summary? _____Yes _____No. ? - Needs further check
10) Are ignitable or reactive wastes stored in tanks? _____Yes, ✓ No. If yes:
    a) Is the waste treated, rendered, or mixed before or immediately after placement in the tank so that the resulting waste, mixture, or dissolution of materials no longer meets the definition of ignitable or reactive wastes under Parts 261.21 or 261.23 of the RCRA Regulations? _____Yes, _____No.
    b) Is waste stored or treated in such a way that it is protected from material or conditions which may cause the waste to ignite or react? _____Yes, _____No.
    c) Is owner/operator of a facility which treats or stores ignitable or reactive wastes in covered tanks in compliance with the National Fire Protection Association's (NEPA's) buffer zone requirements for tanks contained in tables 2-1 through 2-6 of the "Flammable and Combustible Code—1977"? _____Yes, _____No.

I. Surface Impoundments (10.51.05.11)

1) Is two feet of freeboard maintained in the surface impoundment? _____Yes, _____No.
2) Do all earthen dikes have protective covers (e.g., grass, shale or rock) to minimize wind and water erosion and to preserve dike structural integrity? _____Yes, _____No.
3) Are waste analyses conducted or written documentation obtained before placing a substantially different hazardous waste into a surface impoundment used for storage or treatment? _____Yes, _____No.
4) Is the freeboard level inspected daily? _____Yes, _____No.
5) Is the surface impoundment, including dikes and vegetation, inspected weekly to detect leaks, deterioration, or failures in the impoundment? _____Yes, _____No.
6) Are the results of these inspections recorded in an inspection log or summary? _____Yes, _____No.
7) Are ignitable or reactive wastes stored in a surface impoundment? _____Yes, _____No. If yes:
   a) Is the waste treated, rendered, or mixed before or immediately after placement in the impoundment so that the resulting waste, mixture or dissolution of material no longer meets the definition of ignitable or reactive waste under Parts 261.21 or 261.23 of the RCRA Regulations? _____Yes, _____No.
   b) Are incompatible wastes segregated in separate surface impoundments so that spontaneous reactions are avoided? _____Yes, _____No.

J. Waste Pile (10.51.05.12)

1) Is wind dispersal of the pile controlled? _____Yes, _____No, _____Not Needed.
2) Are additions to the pile being analyzed prior to adding them to the pile? _____Yes, _____No.
3) Is hazardous waste leachate or runoff collected? _____Yes, _____No. Is the pile protected from precipitation and run-on? _____Yes, _____No.
4) Are ignitible or reactive wastes protected from materials or conditions that might cause it to ignite or react? _____Yes, _____No, _____N/A.
5) Are incompatible wastes hauled in a manner as to assure separation? _____Yes, _____No, _____N/A.

K. Land Treatment (10.51.05.13)

1) Will the use of land treatment result in the waste being less hazardous or non-hazardous? _____Yes, _____No.
2) Is run-on diverted away from the active portion of the facility? _____Yes, _____No. Is run-off from the active portion of the facility collected? _____Yes, _____No.
3) Has the proper waste analyses been peformed? _____Yes, _____No.
4) If food chain crops are to be grown on the active portion of the facility has the necessary documentation required been provided? _____Yes, _____No.
5) Has the owner/operator written and implemented an unsaturated zone monitoring plan? _____Yes, _____No.
6) Have the additional requirements for a closure and post-closure plan been addressed? _____Yes, _____No.
7) Are ignitable or reactive wastes immediately incorporated into the soil? _____Yes, _____No.
8) Are incompatible wastes hauled according to 10.51.05.13 I? _____Yes, _____No.

L. Landfills (10.51.05.14)

1) Is run-on diverted away from the facility's active portions? _____Yes, _____No.
2) Is run-off collected from the landfill's active portions? _____Yes, _____No.
3) Has a hazardous waste determination been made on the run-off? (Identification and Listing of Hazardous Waste) _____Yes, _____No.
4) Is the landfill managed so as to control wind dispersal? _____Yes _____No

5) Are the following items maintained in the operating record: _____on a map, the exact location and dimensions, including depth, of each cell with respect to permanently surveyed benchmarks? _____contents of each cell and approximate location of each hazardous waste type within the cell?
6) Are bulk, non-containerized or waste containing free liquids placed in the landfill? _____Yes, _____No. If yes: _____ Is a leachate collection system available to remove leachate?, and _____is the liquid stabilized or treated physically or chemically prior to disposal?
7) Are empty containers crushed flat or shredded before burial in the landfill? _____Yes, _____No.
8) Are containers holding liquid wastes (or waste containing free liquids placed in the landfill? _____Yes, _____No. If yes, describe containers on comments below.
9) Are ignitable or reactive wastes placed in a landfill? _____Yes, _____No. If yes: _____Is the waste treated, rendered, or mixed before or immediately after placement in the landfill so that the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste? _____Are incompatible wastes segregated in different landfill cells?

M. Incinerator/Thermal Treatment (10.51.05.15 & .16)

1) Prior to burning waste not previously incinerated or thermally processed, does the operator conduct waste analysis for the following:
✓ heating value of the waste;
_____halogen content and sulfur in the waste;
✓ concentrations of lead and mercury unless documented data is available which show these elements not to be present?
2) Are instruments related to combustion and emission control monitored at least every 15 minutes? _____Yes, _____No. N/A
3) the stack plume observed visually at least hourly for color and opacity? _____Yes, N/A No, _____N/A.
4) the incinerator or thermal process and associated equipment inspected daily for leaks, spills and fugitive emissions? _____Yes, _____No. N/A
5) Is all of the above information documented in the facility's operating record? ✓ Yes, _____No.

N. Chemical, Physical and Biological Treatment (10.51.05.17)

1) Are all treatment processes or equipment in good condition, i.e., no signs of leakage, corrosion or any other deterioration? _____Yes, _____No.
2) Are treatment processes or equipment with continuous inflow of hazardous waste equipped with a means to stop the inflow? (e.g., waste feed cutoff system or bypass system to a standby containment device) _____Yes, _____No.
3) Are waste analyses performed or written documentation obtained before placing a substantially different hazardous waste into treatment processes or equipment? _____Yes, _____No.
4) Is this information recorded in the facility's operating record? _____Yes, _____No.
5) Are daily inspections conducted for discharge control equipment (e.g., bypass systems, waste feed cutoff systems, drainage systems and pressure relief systems)? _____Yes, _____No.
6) Is data gathered from monitoring equipment (e.g., pressure and temperature gauges) daily? _____Yes, _____No.
7) Are construction materials of the treatment process or equipment and the immediate surrounding area inspected weekly for signs of leakage, corrosion or any other deterioration? _____Yes, _____No.
8) Are the results of these inspections recorded in an inspection log or summary? _____Yes, _____No.
9) Are ignitable or reactive wastes placed in a treatment process? _____Yes, _____No. If yes:
_____Are wastes treated, rendered, or mixed before or immediately after placement in the treatment process or equipment so that the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive wastes under Section 261.21 or 261.23 of the RCRA Regulations?
_____Are wastes treated in such a way that they are protected from any material or conditions which may cause the waste to ignite or react?
10) Are incompatible wastes kept from being placed in the same treatment process or equipment? _____Yes, _____No.

O. Permit Requirements (10.51.07)

1) Does the facility have a DHS permit for its activity? ✓ Yes, _____No. In process
If no, has the facility submitted an application for a DHS permit? ✓ Yes, _____No.
2) List any special Permit requirements that are not in full compliance.

N/A

Comments: _____

Inspector's Name: _____ Title: _____

Facility Location: _____

Facility Rep. present during inspection: _____

[illegible]	NMFS/SEFSC	745-4554
Beth Gross	Ecology & Environment	609 665-1515
Sue Belski	Ecology & Environment	609 665-1515
Larry Sparks	CHESDIV	202-433-3760
Carlyle Miller	CHESDIV	202 433-3760
Bill Wiggington	WMI, State Health	301-383-6650
Bob Stone	PDO	4343

SECTION 9

ATTACHMENT I

NOTIFICATION OF HAZARDOUS WASTE ACTIVITY

INSTRUCTIONS: If you received a prepri label, affix it in the space at left. If any of information on the label is incorrect, draw a through it and supply the correct informa in the appropriate section below. If the lab complete and correct, leave Items I, II, and below blank. If you did not receive a prepri label, complete all items. "Installation" mea single site where hazardous waste is genera treated, stored and/or disposed of, or a tr porter's principal place of business. Please r to the INSTRUCTIONS FOR FILING NOT CATION before completing this form. Information requested herein is required by *(Section 3010 of the Resource Conservation Recovery Act).*

INSTALLATION'S EPA I.D. NO.

I. NAME OF INSTALLATION

INSTALLATION MAILING ADDRESS

III. LOCATION OF INSTALLATION

PLEASE PLACE LABEL IN THIS SPACE

DETACH

FOR OFFICIAL USE ONLY

COMMENTS: C

INSTALLATION'S EPA I.D. NUMBER	APPROVED	DATE RECEIVED (yr., mo., & day)
F M 0 0 0 8 3 9 8 6 5 0 5 T/N C		8 0 0 8 1 8

I. NAME OF INSTALLATION

NAVAL ORDNANCE STATION

II. INSTALLATION MAILING ADDRESS

STREET OR P.O. BOX: 3 ROUTE 210 MARYLAND

CITY OR TOWN	ST.	ZIP CODE
4 INDIAN HEAD	MD	20640

III. LOCATION OF INSTALLATION

STREET OR ROUTE NUMBER: 5 ROUTE 210 MARYLAND

CITY OR TOWN	ST.	ZIP CODE
6 INDIAN HEAD	MD	20640

IV. INSTALLATION CONTACT

NAME AND TITLE (last, first, & job title)	PHONE NO. (area code & no.)
2 WOO THOMAS ENVIRONMENTAL COORD	301-743-4534

V. OWNERSHIP

A. NAME OF INSTALLATION'S LEGAL OWNER: 8 US NAVY

B. TYPE OF OWNERSHIP (enter the appropriate letter into box): F

F = FEDERAL
M = NON-FEDERAL

VI. TYPE OF HAZARDOUS WASTE ACTIVITY (enter "X" in the appropriate box(es))

- [X] A. GENERATION
- [ ] B. TRANSPORTATION (complete Item VII)
- [X] C. TREAT/STORE/DISPOSE
- [ ] D. UNDERGROUND INJECTION

VII. MODE OF TRANSPORTATION (transporters only – enter "X" in the appropriate box(es))

- [ ] A. AIR
- [ ] B. RAIL
- [ ] C. HIGHWAY
- [ ] D. WATER
- [ ] E. OTHER (specify):

VIII. FIRST OR SUBSEQUENT NOTIFICATION

Mark "X" in the appropriate box to indicate whether this is your installation's first notification of hazardous waste activity or a subsequent notificat This is not your first notification, enter your installation's EPA I.D. Number in the space provided below.

- [X] A. FIRST NOTIFICATION
- [ ] B. SUBSEQUENT NOTIFICATION (complete item C)

C. INSTALLATION'S EPA I.D. N

IX. DESCRIPTION OF HAZARDOUS WASTES

Please go to the reverse of this form and provide the requested information.

WMDD083986505

IX. DESCRIPTION OF HAZARDOUS WASTES *(continued from front)*

A. HAZARDOUS WASTES FROM NON–SPECIFIC SOURCES. Enter the four–digit number from 40 CFR Part 261.31 for each listed hazardous waste from non–specific sources your installation handles. Use additional sheets if necessary.

1	2	3	4	5	6
F001					
7	**8**	**9**	**10**	**11**	**12**

B. HAZARDOUS WASTES FROM SPECIFIC SOURCES. Enter the four–digit number from 40 CFR Part 261.32 for each listed hazardous waste fr specific industrial sources your installation handles. Use additional sheets if necessary.

13	14	15	16	17	18
19	**20**	**21**	**22**	**23**	**24**
25	**26**	**27**	**28**	**29**	**30**

C. COMMERCIAL CHEMICAL PRODUCT HAZARDOUS WASTES. Enter the four–digit number from 40 CFR Part 261.33 for each chemical substance your installation handles which may be a hazardous waste. Use additional sheets if necessary.

31	32	33	34	35	36
P081	U002	U013	U070	U088	U102
37	**38**	**39**	**40**	**41**	**42**
U105	U106	U107	U112	U117	U122
43	**44**	**45**	**46**	**47**	**48**
U159	U201	U220	U223	U228	

D. LISTED INFECTIOUS WASTES. Enter the four–digit number from 40 CFR Part 261.34 for each listed hazardous waste from hospitals, veterinar hospitals, medical and research laboratories your installation handles. Use additional sheets if necessary.

49	50	51	52	53	54

E. CHARACTERISTICS OF NON–LISTED HAZARDOUS WASTES. Mark "X" in the boxes corresponding to the characteristics of non–listed hazardous wastes your installation handles. *(See 40 CFR Parts 261.21 – 261.24.)*

[X] 1. IGNITABLE (D001) [X] 2. CORROSIVE (D002) [X] 3. REACTIVE (D003) [X] 4. TOXIC (D000)

X. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

SIGNATURE	NAME & OFFICIAL TITLE *(type or print)*	DATE SIGNED
Fred Underwood	FRED S. UNDERWOOD, CAPTAIN, USN COMMANDING OFFICER NAVAL ORDNANCE STATION INDIAN HEAD, MD	8/11/80

GENERAL

EPA GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

FORM APPROVED OMB #158-S80005

I. EPA I.D. NUMBER: MDD083986505

II. FACILITY NAME

III. FACILITY MAILING ADDRESS

IV. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

REV 1 '80

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if the preprinted data is absent (the area to the left of the label space lists the information that should appear), please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI (except VI-B which must be completed regardless). Complete all items if no label has been provided. Refer to the Instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK "X" YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)	X		
D. Is this a proposed facility (other than those described in A or B above) which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP: NAVAL ORDNANCE STATION

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)
2 WOO THOMAS POLL. ABATE. COORD.	301 743 4534

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX			
3 CODE E2			
B. CITY OR TOWN	**C. STATE**	**D. ZIP CODE**	
4 INDIAN HEAD	MD	20640	

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER			
5 ROUTE 210 INDIAN HEAD HWY			
B. COUNTY NAME			
CHARLES			
C. CITY OR TOWN	**D. STATE**	**E. ZIP CODE**	**F. COUNTY CODE (if known)**
6 INDIAN HEAD	MD	20640	

A. FIRST		B. SECOND	
2869	Propellants for missiles solid; organic	2892	Manufacture of explosives
C. THIRD		D. FOURTH	
8911	Engineering, Industrial, Civil, Electrical, Mechanical, Chemical,	3662	Weapon Simulators

III. OPERATOR INFORMATION

A. NAME: US NAVY

B. Is the name listed in Item VIII-A also owner? [X] YES [ ] NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)
F = FEDERAL; S = STATE; P = PRIVATE; M = PUBLIC (other than federal or state); O = OTHER (specify)

C: F (specify)

D. PHONE (area code & no.): A 301 743 4534

E. STREET OR P.O. BOX: OUTE 210

F. CITY OR TOWN: INDIAN HEAD

G. STATE: MD

H. ZIP CODE: 20640

IX. INDIAN LAND

Is the facility located on Indian lands? [ ] YES [X] NO

V. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water): N MD0003158

D. PSD (Air Emissions from Proposed Sources): 9 P NA

B. UIC (Underground Injection of Fluids): U NA

E. OTHER (specify): 9 5790846 9AEB (specify) Sewage Sludge Disposal

C. RCRA (Hazardous Wastes): R A

E. OTHER (specify): 9 NA (specify)

VI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property bounderies. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

VII. NATURE OF BUSINESS (provide a brief description)

Provides material and technical support for assigned weapons systems, weapons or components, and performs additional tasks as directed by the Naval Sea Systems Command. These tasks include research and development, engineering, production, and quality surveillance in the fields of weapons systems, propulsion, unconventional explosives, cartridge- and propellant-actuated devices and chemicals.

VIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
FRED UNDERWOOD CAPT, USN COMMANDING OFFICER	Fred L. Underwood	11/7/80

COMMENTS FOR OFFICIAL USE ONLY

Additional NPDES Permits for Discharges to Surface Water

MD0020893
MD0020907
MD0020915
MD0020885
MD0025135

- 1

4 cancelled d/peb's.
4 remaining

Dump Neck
Septic Tanks

RCRA — Consolidated Permits Program — (This information is required under Section 3005 of RCRA.)

F M D D 0 8 3 9 8 6 5 0 1

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

Pla... "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facili... re... plication. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your fac... EP... Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

[X] 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

C	YR.	MO.	DAY
8	5 9		

[ ] 2. NEW FACILITY *(Complete item belo...*

FOR NEW FACIL... PROVIDE THE D... *(yr., mo., & day)* C... TION BEGAN OR... EXPECTED TO B...

YR.	MO.	DAY

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

[ ] 1. FACILITY HAS INTERIM STATUS

[ ] 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided... entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.

1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR OR GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	
HECTARE-METER	
ACRES	
HECTARES	

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below)*: A facility has two storage tanks, one tank can hold 200 gallons and other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

C DUP T/A C 1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	B. 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S02	600	G		5	S01	13,750	G	
X-2	T03	20	E		6	S02	33,000	G	
1	T04	~~,5625~~ 1125	J		7		ADDED AS PER 11/4/81 LETTER		
2	4	~~,05~~ :100	J		8		& 11/30/81 PHONE RECORD.		
3	T04	~~,1875~~ 375	J		9				
4		(X) SEE NOTE 1			10				

T04 CHANGED FROM TONS/HOUR TO POUNDS/HR FOR KIRKBUILT...

INCLUDE DESIGN CAPACITY.

T04 Open Burning (Explosives Burning Area) Design Capacity - 9,000 lbs/day.

T04 Open Buring (Pyrotechness Burning Area) Design Capacity 800 lbs/day.

T04 Open Burning (Decontamination Burning Area) Design Capacity 3,000 lbs/day.

(*) NOTE 1:
THE ABOVE FIGURES ARE CONVERTED TO TONS/HR ON PAGE 1 BASED ON ON 8 HR. DAY OF BURNING THE AMOUNTS MENTIONED ABOVE.

WW 2/17/81

V. DESCRIPTION OF HAZARDOUS WASTES

EPA HAZARDOUS WASTE NUMBER — Enter the four-digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four-digit number(s) from 40 CFR, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

ESTIMATED ANNUAL QUANTITY — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

UNIT OF MEASURE — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If f ecords use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into acc e appropriate density or specific gravity of the waste.

PROCESSES

1. PROCESS CODES:
For listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in Item III to indicate how the waste will be stored, treated, and/or disposed of at the facility.
For non-listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that charecteristic or toxic contaminant.
Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

OTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER — Hazardous wastes that can be described by re than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

AMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds r year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes e corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 0 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	[illegible] 0 2	400	P	T 0 3 D 8 0	
X-3	D U 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2				included with above

EPA I.D. NUMBER (enter from page 1): W M D D 0 8 3 9 8 6 5 0 5 — C/A: 1

FOR OFFICIAL USE ONLY: W DUP — T/A: 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D001	461	T	T04	Open Burning
2	D002	1,645	T	~~T04~~ S02 (*)	~~Open Burning~~
3	D008	5	P	T04	Open Burning
4	F001	4	T	S01 (*)	
5					
6		(*) CHANGED & ADDED AS PER 11/4/81 LETTER & 11/30/81			
7					PHONE RECORD. WS
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

EPA I.D. NO. *(enter from page 1)*

M	D	D	0	8	3	9	8	6	5	0	5	T/N	C
													6

FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground—level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
38 33 045	77 12 003

FACILITY OWNER

☐ A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
	C G		

OWNER CERTIFICATION

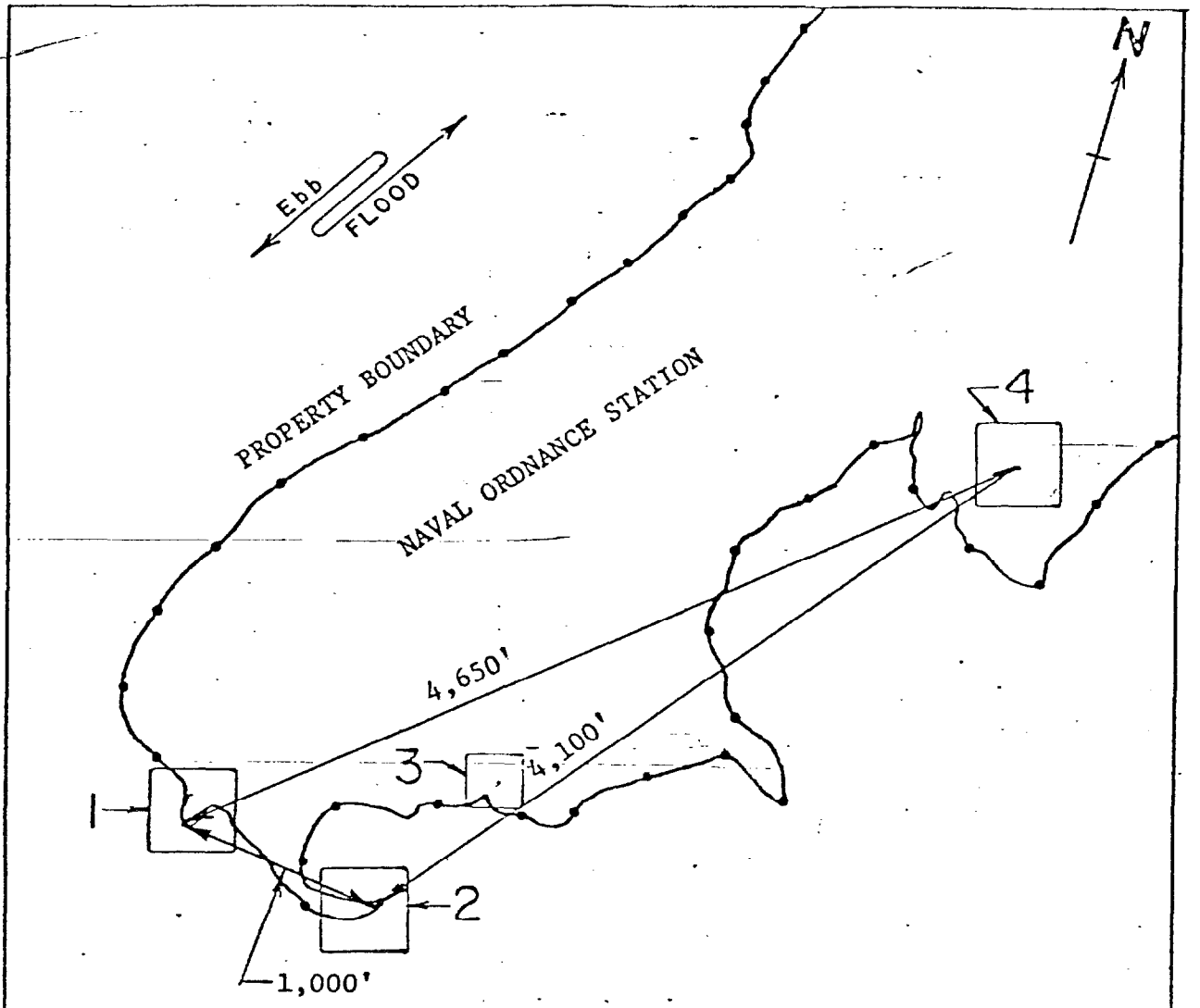
certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Fred S. Underwood	Fred S. Underwood	11/7/80

OPERATOR CERTIFICATION

certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Fred S. Underwood	Fred S. Underwood	11/7/80



1. Pyrotechnics Burning Area
   Longitude 77° 12' 27" W Latitude 38° 33' 50" N (Approx.)
   Area - 120,000 Sq. Ft.

2. Explosives Burning Area
   Longitude 77° 12' 3" W Latitude 38° 33' 45" N (Approx.)
   Area - 48,000 Sq. Ft.

3. Decontamination Burning Area
   Longitude 77° 11' 48" W Latitude 38° 33' 58" N (Approx.)
   Area - 40,000 Sq. Ft.

4. Sludge Disposal Site and Landfill Area
   Longitude 77° 10' 5" W Latitude 38° 34' 8" N (Approx.)

SCALE: 1 INCH = 1,000 FEET

ATTACHMENT II

OFFICE OF ENVIRONMENTAL PROGRAMS

2776

July 6, 1981

Frank
Charles
Co

Mr. William Purvis, Director
Environmental Health Services
Box 777
La Plata, Maryland 20646

Dear Mr. Purvis:

I have reviewed the material you transmitted to Bill Chicca on June 19, 1981 concerning the open burning of waste munitions at the Naval Ordnance Station, Indian Head. As in the past, the final decision to issue an open burning permit rests with the county in which the activity will occur. Be advised that we have no problem with the burning as proposed, provided no nuisance condition will be created.

Enclosed is a copy of RCRA subpart 265.382 which was published in the Federal Register, May 19, 1980. You will note that the open burning of waste explosives is excluded from the regulation governing the open burning of hazardous wastes, provided distance requirements are met.

The Navy has recently withdrawn its permit to construct application for the process intended for use in the disposal of these wastes. As far as I am aware, they have made no additional plans at this time. In light of this, it is apparent that the open burning of these materials is the most safe and practical solution for the present time.

I trust this information is helpful to you in making your decision. If I can be of further service, feel free to contact me directly.

Yours truly,

Frank D. Whitehead, Head
Field Services Section
Air Management Administration

FDW:ac

enclosure

DEPARTMENT OF THE NAVY

CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
BUILDING 212, WASHINGTON NAVY YARD
WASHINGTON, D.C. 20374

MAY 15 1981
CHARLES COUNTY HEALTH DEPT.
LA PLATA, MD. 20646

IN REPLY REFER TO:
114/FRP
6240
12 MAY 1981

W.J. Purvis
Director, Charles County Environmental Health Service
Box 777
La Plata, Maryland 20646

Re: Open Burning of Waste Munitions at the Naval Ordnance Station, Indian Head, Maryland

Dear Mr. Purvis:

This letter is a follow-up to the discussion of 16 April 1981 between Captain Fred S. Underwood, Commanding Officer, Naval Ordnance Station, Indian Head, Maryland (NAVORDSTA) and yourself concerning continued open burning of ordnance scrap material. In view of the difficulties encountered in the Station's attempts to develop a viable alternative, it is critical that the Station be allowed to continue the present practice of open burning utilizing current quantities until a practical alternative is found. Be aware that no near term alternatives appear viable.

NAVORDSTA currently disposes of waste munitions by open burning at three locations on station property. Enclosure (1) shows the location of each burning point. Enclosure (2) lists materials burned, quantities of each being burned, where they are being burned, and the frequency of burning at each location.

State of Maryland Air Regulation 10. 18. 07. 03 states that the control officer may grant approval for open burning if the following conditions are met:

1.) No practical alternative to open burning exists;

2.) No hazardous, air pollution or nuisance condition will be created;

3.) Fire control laws or regulations of other government agenies will not be violated;

4.) Materials which produce dense smoke will not be burned;

5.) The material to be burned originates on the premises on which it is to be burned.

Open burning of munitions waste at the NAVORDSTA meets all of the above conditions.

Because of the nature of the waste, no safe alternative to open burning currently exists. The Environmental Protection Agency (EPA) has reflected this situation in Hazardous Waste Regulation 40 CFR 265.382, exempting the disposal of munitions waste from their ban on open burning of hazardous waste. Specifically, they state: "The Agency agrees that open burning and open detonation are currently the only alternatives for disposal of most munitions." Transportation of these wastes for disposal off-station is not practical.

As of this date, no hazardous or nuisance conditions have been proven to be created by the subject burning. A citizen complaint was registered against the NAVORDSTA in connection with the burning; however, after investigation by monitoring, no nuisance was substantiated and the complaint was dropped.

All burning of munitions waste is conducted in accordance with strict Department of Defense and NAVORDSTA safety regulations. Only munitions waste will be burned, and of that, all will be generated on-station.

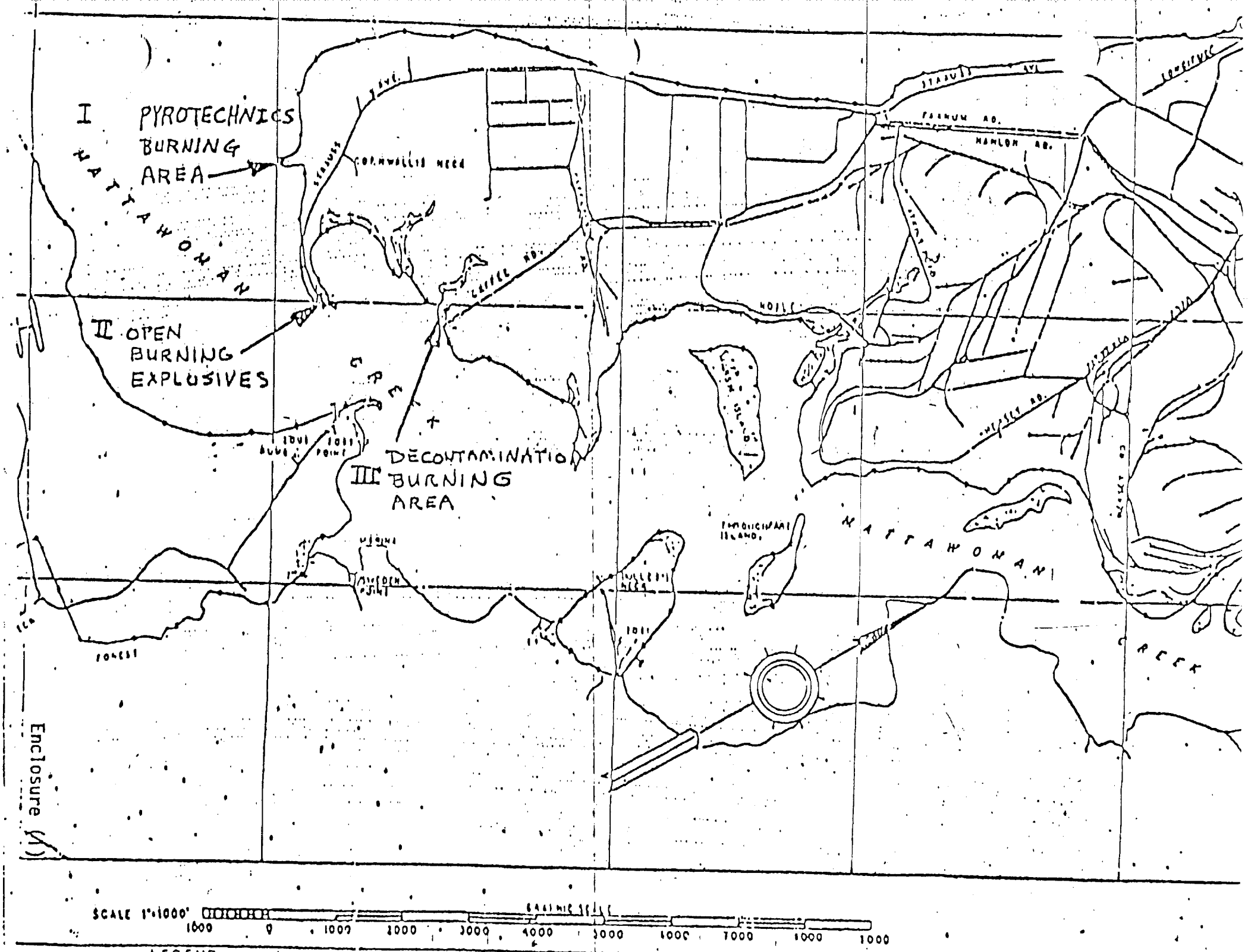
In view of the above, it is requested that a permit be issued to continue open burning of munitions waste at the NAVORDSTA.

Please send your reply to the attention of Code 114 of this Command. If you require additional information, please contact Mr. Frank Peters of this Command at (202) 433-3761.

Sincerely,

R. Scott Markert
Manager/Environmental Branch
Maintenance/Utilities Division
By direction of the Commanding Officer

Enclosures: (1) Location Map, NAVORDSTA
(2) Open Burning of Waste Munitions Data, NAVORDSTA


I PYROTECHNICS BURNING AREA
II OPEN BURNING EXPLOSIVES
III DECONTAMINATION BURNING AREA
NATTAHONAN
SCALE 1"=1000'
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000
LEGEND

Enclosure (1)

MATERIAL DISPOSED OF BY OPEN BURNING

Material Disposed of	Annual Weight Disposed of	Days/ Week	Duration of Burn
I. Pyrotechnics Burning Point:	25,000	Friday	15 min.
Pyrotechnics, squibs, ignitors, CAD/PAD's	25,000		
II. Propellant Burning Point:	832,300	Monday Wednesday Friday	30 min.
Single and double based propellants:			
Nitrocellulose	1,000		
Casting powder	120,000		
Grain end trims and slabs	227,000		
Shavings and chips from machining operations	2,000		
Carpet rolls	12,000		
Extrusion flashings	300		
Terrier booster & sustainer grains	272,000		
Composite propellants and ingrediants:			
Standard ARM sustainer & booster scrap (cured)	27,000		
Standard ARM propellant heels (uncured)	43,000		
Standard ARM booster grains (rejects)	14,400		
2.2 JATO scrap & grains (cured)	7,100		
2.2 JATO propellant heel (uncured)	8,400		
Ammonium perchlorate scrap	9,700		
CTBN (carboxyl-terminated polybutadiene nitrile)	3,000		
HMX and RDX	2,400		
HBNQ (high bulk nitroguanidine)	500		
HTPB (hydroxyl-terminated polybutadiene)	100		
Powdered alluminum scrap	100		
Fluorocarbon Propellants	300		
Plastic Bonded Explosives	1,100		
Flammable Liquids (acetone, heptane, OTTO fuel)	11,000		
Nitrate Ester Slumps	69,000		
Extrusion Wax-out Material	1,000		
III. Decontamination Point:	517,000	Friday	4 hours
Contamination production material	17,000		
Explosive contaminated equipment	500,000		

Enclosure (2)

ATTACHMENT III

F3-81.12-03

ENVIRONMENTAL PROTECTION AGENCY
NOTIS DATA MANAGEMENT SYSTEM

NOTIS REPORT 14 — LISTING BY FACILITY — PAGE: 5
REGION: 03 STATE: MD — REPORT DATE: 09/16/81

NOTIFICATION ID NO.	SITE NAME SITE STREET SITE CITY SITE COUNTY EPA SITE ID NO.	NOTIFIER NAME NOTIFIER STREET NOTIFIER CITY (CONTACT NAME/TITLE) (CONTACT PHONE)	STATE	ZIP	NOTIFIER STATUS (PRES OWN, PAST OWN PRES OP, PAST OP TRANSPORTER, VOLUNTEER)
MD8000081805	NAVAL ORDNANCE STATION RTE. 210 INDIAN HEAD CHARLES MD0083986505	20640	CAPT. FRED S. UNDERWOOD, USN RTE. 210 INDIAN HEAD (WOO, T.H., POLLUTION ABETEMENT) (301-743-4534)	MD	20640

RELEASES TO THE ENVIRONMENT: NONE

DATES OF WASTE HANDLING: 1973 TO 1980

WASTE AMOUNT: 1,100 GALLONS AREA: 21,780 SQ FT MAP PRESENT: NO FORM TYPE: 8900-1

NOTIF. POSTMARKED DATE: 81/06/11 SIGNATURE PRESENT: YES DATE OF LAST UPDATE: 81/09/09

TYPE OF FACILITY	TYPES OF WASTES	SOURCES OF WASTE
OTHER-(SEE COMMENTS) LANDFILL	OTHER	

COMMENTS	SEQ NO.
PAINT SLUDGE	300
CONTAINERIZED PAINT SLUDGE	600

VOA

paint from spray booths in 55 gallon drums

ENVIRONMENTAL PROTECTION AGENCY
NOTIS DATA MANAGEMENT SYSTEM

PAGE: 6

NOTIS REPORT 84 — LISTING BY FACILITY — REGION: 03 STATE: MD — REPORT DATE: 09/16/81

NOTIFICATION ID NO.	SITE NAME / SITE STREET / SITE CITY / SITE COUNTY / EPA SITE ID NO.		NOTIFIER NAME / NOTIFIER STREET / NOTIFIER CITY / (CONTACT NAME/TITLE) / (CONTACT PHONE)	STATE	ZIP	NOTIFIER STATUS (PRES OWN, PAST OWN, PRES OP, PAST OP, TRANSPORTER, VOLUNTEER)
MDS000901006	NAVAL ORDNANCE STATION RTE. 210 INDIAN HEAD CHARLES MDD083986808	20640	CAPT. FRED S. UNDERWOOD, USN RTE. 210 INDIAN HEAD (WOO, T.H. POLLUTION CONR. (301-743-4534),	MD	20640	

RELEASES TO THE ENVIRONMENT: LIKELY

DATES OF WASTE HANDLING: 1960 TO 1980

WASTE AMOUNT: 0 AREA: 1,742 ACRES MAP PRESENT: NO FORM TYPE: 8900-1

NOTIF. POSTMARKED DATE: 81/06/11 SIGNATURE PRESENT: YES DATE OF LAST UPDATE: 81/09/09

TYPE OF FACILITY	TYPES OF WASTES	SOURCES OF WASTE
OTHER-(SEE COMMENTS)	OTHER	

COMMENTS	SEQ NO.
SCRAP YARD USED TO HOLD PCB	1
SUSPECTED TRANSFORMERS	2
THIS PART OF YARD NOT USED TODAY	3
BLD. 1440 IS USED FOR STORAGE	4
PCB SUSPECTED TRANSFORMERS	300
TRANSFORMERS ABOVE GROUND	600

Y OW

MD-64-17

PCBs

ATTACHMENT IV

To Fight Fire: Dry chemical, alcohol foam, water spray, mist.

CYCLOPENTANONE. Syns: *dumasin, ketocyclopentane.* Liquid. C_5H_8O, mw: 84.1, mp: −58.2°, bp: 130.6°, flash p: 79°F, d: 0.9509 @ 18°/4°, vap. d: 2.3.
Acute tox data: ip LD_{50} (mouse) = 1950 mg/kg. [3]
THR = MOD via ip and probably oral and inhal routes also.
Fire Hazard: Dangerous, when exposed to flame; can react with oxidizing materials.
To Fight Fire: Alcohol foam, foam, CO_2, dry chemical.

CYCLOPENTANONE OXIME. Solid. C_5H_8NOH, mw: 99.13, mp: 57.5°.
THR = U.
Fire Hazard: Slight.

4H-CYCLOPENTA(def)PHENANTHRENE. $C_{15}H_{10}$, mp: 190.3.
THR = An exper carc. [3]

CYCLOPENTA(cd)PYRENE. $C_{18}H_{10}$, mw: 226.3.
THR = An exper neo. [3]

CYCLOPENTENE. Liquid. C_5H_8, mw: 68.1, mp: −93.3°, bp: 44.242°, fp: −135.2°, flash p: −20°F, d: 0.77199 @ 20°.
Acute tox data: Oral LD_{50} (rat) = 2140 mg/kg; dermal LD_{50} (rabbit) = 1590 mg/kg. [3]
THR = MOD via oral and dermal routes. Probably via inhal route too.
Fire Hazard: Dangerous, when exposed to flame or heat; can react with oxidizing materials.
Disaster Hazard: Dangerous. Keep away from heat and open flame.
To Fight Fire: Foam, CO_2, dry chemical.

2-CYCLOPENTENE-1-OL. $OHCHCH{:}CHCH_2CH_2$, mw: 84.
Acute tox data: Oral LD_{50} (rat) = 470 mg/kg; inhal LC_{Lo} (rat) = 1000 ppm for 4 hrs; dermal LD_{Lo} (rabbit) = 180 mg/kg. [3]
THR = HIGH via dermal, oral and inhal routes.

1,2-CYCLOPENTENO-5,10-ACEANTHRENE. $C_{19}H_{16}$, mw: 244.4.
THR = An exper neo. [3]

3-(2-CYCLOPENTENYL)-2-METHYL-4-OXO CYCLOPENTENYL ESTER OF CHRYSANTHEMUM MONOCARBOXYLIC ACID. Syn: *cyclethrin.*
THR = See pyrethrin I.

CYCLOPENTYL BROMIDE. Liquid. C_5H_9Br, mw: 149.04, bp: 137.5°, flash p: 108°F, d: 1.3866 @ 25°/4°, vap. d: 5.
THR = See bromides.
Fire Hazard: Mod, when exposed to heat or flame.
Disaster Hazard: Dangerous; see bromides; can react with oxidizing materials.

CYCLOPENTYL CHLORIDE. Liquid. C_5H_9Cl, mw: 104.58, bp: 113.5°, flash p: 60°F, d: 1.0024 @ 25°/4°, vap. d: 3.5.
THR = See chlorinated hydrocarbons, aliphatic and aromatic.
Fire Hazard: Dangerous; when exposed to heat or flame.
Explosion Hazard: U.
Disaster Hazard: Dangerous; see chlorides; can react with oxidizing materials.

CYCLOPENTYL ETHER. $(C_5H_9)_2O$, mw: 154.
Acute tox data: Oral LD_{50} (rat) = 470 mg/kg; inhal LC_{Lo} (rat) = 250 ppm for 4 hrs; dermal LD_{50} (rabbit) = 1410 mg/kg. [3]
THR = HIGH via oral and inhal; MOD via dermal routes. See also ethers.
Disaster Hazard: U. See ethers.

CYCLOPHOSPHAMIDE. See endoxan.

CYCLOPROPANE. Syn: *trimethylene.* Colorless gas. $CH_2CH_2CH_2$, mw: 42.08, mp: −126.6°, bp: −33.5°, lel = 2.4%, uel = 10.4%, d: 1.879 g/l @ 0°, autoign. temp.: 932°F.
THR = MOD via inhal route. High conc have narcotic action. Used as a surgical anesthetic.
Fire Hazard: Very dangerous, when exposed to heat or flame; can react with oxidizing materials.
Spont Heating: No.
Explosion Hazard: Mod, in the form of vapor when exposed to heat or flame.
Disaster Hazard: Dangerous. Keep away from heat and open flame.
To Fight Fire: Stop flow of gas. CO_2, dry chemical or water spray.

CYCLOPROPYL ETHYL ETHER. Liquid.
$C_3H_5OC_2H_5$, mw: 86.1.
THR = See ethers.

CYCLOPROPYL METHYL ETHER. Syn: *cypronic ether.* Liquid $C_3H_5OCH_3$, mw: 72.1, mp: −119°, bp: 44.7°, d: 0.786 @ 25°/4°.
THR = See ethers.

CYCLOPROPYL PROPYL ETHER. Liquid.
$C_3H_5OC_3H_7$, mw: 100.2.
THR = See ethers.

CYCLOTETRAMETHYLENE OXIDE. See tetrahydrofuran.

CYCLOTRIMETHYLENE TRINITRAMINE. Syns: *RDX, cyclonite, hexogen.* White, crystalline powder. $C_3H_6N_6O_6$, mw: 222.15, mp: 202°.
Acute tox data: Oral LD_{50} (rat) = 200 mg/kg; iv LD_{50}

(mouse) = 19 mg/kg; dermal LD_{Lo} (guinea pig) = 465 mg/kg. [3]

THR = HIGH via oral, dermal and iv routes. An exper carc. [23] Cases of epileptiform convulsions have been reported from exposure.

Fire Hazard: See nitrates.

Explosion Hazard: It is one of the most powerful high explosives in use today. See explosives, high. Has more shattering power than TNT and is often mixed with TNT as a bursting charge for aerial bombs, mines and torpedoes. Because it is easily initiated by mercury fulminate it may be used as a booster.

Disaster Hazard: See nitrates.

CYMENE. Syn: *isopropyl toluene*. Liquid.

$CH_3C_6H_4CH(CH_3)_2$, mw: 134.21, mp: −68.2°, bp: 176°, lel = 0.7%, @ 100°, ulc: 30–35, flash p: 117°F (CC), d: 0.86, autoign. temp.: 817°F, vap. d: 4.62, vap. press: 1 mm @ 17.3°, flash p: (technical) 127°F, uel (technical) = 5.6%.

Acute tox data: Oral TD_{Lo} (humans) = 86 mg/kg (affects the CNS), oral LD_{50} (rat) = 4750 mg/kg. [3]

THR = MOD via oral route, although humans sustain CNS effects at low dose rates.

Fire Hazard: Mod, when exposed to heat, flame or oxidizers.

Spont Heating: No.

Explosion Hazard: Slight, in the form of vapor.

Disaster Hazard: Mod dangerous; can react with oxidizing materials.

To Fight Fire: Foam, CO_2, dry chemical.

CYMOGENE. See liquefied petroleum gas.

CYPREX. See *n*-dodecyl guanidine acetate.

CYPROMID.

Acute tox data: Oral LD_{50} (rat) = 215 mg/kg. [3]

THR = HIGH via oral and probably inhal routes. An herbicide.

CYPRONIC ETHER. See cyclopropyl methyl ether.

CYPROSTERONE ACETATE. $C_{24}H_{29}O_4Cl$, mw: 417.

THR = An exper teratogen to rats. [3]

CYSTEINE. Syns: *α-amino-β-thiolpropionic acid*, *β-mercaptoalanine*. An amino acid derived from cystine, occurring naturally in the *l*-form, which will be considered here. Colorless crystals, sol in water, ammonium hydroxide and acetic acid, insol in ether, acetone, benzene, carbon disulfide and carbon tetrachloride. $HSCH_2CH(NH_2)COOH$, mw: 121.

THR = U. Probably not toxic. A nutrient and/or dietary supplement/food additive. [109]

CYSTINE. Syn: *β,β'-dithiobisalanine*, *di-α-amino-β-thiolpropionic acid*). The chief sulfur-containing amino acid of protein. White crystalline plates, sol in water, insol in alcohol. Occurs in *dl*, *l* and *d* form. We consider the *l* and *dl* forms here.

$HOOCCH(NH_2)CH_2SSCH_2CH \cdot (NH_2)COOH$, mw: 240, mp(*dl*): 260°, mp(*l*): 258°–261°.

THR = U. Probably not toxic. A nutrient and/or dietary supplement food additive. [109]

CYTARABINE. $C_9H_{13}O_5N_3$, mw: 243.3.

THR = An exper teratogen. [3]

CYTISUS. A wood dust.

THR = MILD irr and allergen.

Fire Hazard: Mod, when exposed to heat or flame.

Explosion Hazard: Slight, when exposed to flame.

CYTOSTASAN.

THR = An exper carc. [3]

CZA. See citrazinic acid.

AMMONIUM MAGNESIUM CHROMATE. Yellow crystals. $(NH_4)_2CrO_4 \cdot MgCrO_4 \cdot 6H_2O$, mw: 400.5, mp: decomp, d: 1.84.

THR = See Chromium compounds.

Fire Hazard: Mod, as a result of chemical reaction with reducing agents. An oxidizer.

ster Hazard: Mod dangerous; when heated, can plode.

AMMONIUM MOLYBDATE. Colorless or slightly greenish or yellowish crystals. $(NH_4)_6Mo_7O_{24} \cdot 4H_2O$, mw: 1236.0, mp: $-H_2O$ @ 90°, bp: decomp @ 190°, d: 2.398.

Acute tox data: Oral LD_{50} (rat) = 333 mg/kg. [3]

THR = HIGH via oral, inhal routes. An irr. No cases of human poisoning have been reported. Animal exper indicate relatively LOW systemic tox but MOD severe local irr of skin, eyes and mu mem. Large doses have produced kidney damage in exper animals. See molybdenum compounds.

AMMONIUM MOLYBDO TELLURATE. Colorless crystals. $(NH_4)_6(TeMo_6O_{24}) \cdot 7H_2O$, mw: 1321.7, mp: 550° (decomp), d: 2.78.

THR = See tellurium compounds.

AMMONIUM MONOHYDROGEN ARSENATE. White crystals or powder $(NH_4)_2HAsO_4$, mw: 176, mp: decomp, d: 1.989.

THR = See arsenic compounds.

AMMONIUM MONOSULFIDE. See ammonium sulfi

AMMONIUM NICKEL CHLORIDE. Green crystals. $NH_4Cl \cdot NiCl_2 \cdot 6H_2O$, mw: 291.2, d: 1.654.

THR = See nickel compounds and chlorides.

AMMONIUM NICKEL SULFATE. Syn: *double nickel salt*. Black to green crystals. $(NH_4)_2SO_4 \cdot NiSO_4 \cdot 6H_2O$, mw: 395, d: 1.923.

THR = See nickel compounds and sulfates.

AMMONIUM NITRATE. Colorless crystals. NH_4NO_3, mw: 80.05, mp: 169.6°, bp: 210° @ 11 mm, d: 1.725 @ 25°.

THR = LOW via irr; allergen. There have been reports of faintness and low blood pressure in workers exposed. These symptoms could be due to nitrites present as impurities. See also nitrates.

Fire Hazard: See nitrates; can ignite when mixed with acetic acid. [19]

To Fight Fire: Use water in large amounts. It is important that the mass of materials be kept cool and that burning be extinguished promptly. Ventilate well.

Explosion Hazard: May explode under confinement and high temperatures. Explosions have occurred in ships' holds, etc. There have been warehouse fires that did not detonate. See also nitrates. This material explodes more readily if contaminated, and must be kept cool and unconfined. Can react violently or explode when mixed with powdered metals, (NH_4Cl + heat), (C + heat), chlorides, organic matter, P, ($K + (NH_4)_2SO_4$), NaOCl, $NaClO_4$, ($NaK + (NH_4)_2SO_4$), S. [19] See also explosives, high.

Disaster Hazard: Dangerous; heat and confinement may explode it; when heated to decomp, emits highly toxic fumes of oxides of nitrogen; can react vigorously with reducing materials.

AMMONIUM NITRATE, FERTILIZER. See ammonium nitrate.

AMMONIUM NITRIDO OSMATE. NH_4OsNO_3, mw: 270.3.

THR = Explodes @ 150°. [19] See also osmium.

AMMONIUM NITRITE. White to yellow crystals. NH_4NO_2, mw: 64, mp: explodes @ 60°–70°, bp: subl. 30° in vacuo, d: 1.69.

THR = See nitrites.

Fire Hazard: See nitrites.

Explosion Hazard: Severe, when shocked or exposed to heat.

Disaster Hazard: See nitrites.

AMMONIUM OXALATE. Colorless crystals. $(NH_4)_2C_2O_4 \cdot H_2O$, mw: 142.12, mp: decomp, d: 1.50.

THR = See oxalates. Can react violently with (NaOCl + ammonium acetate). [19]

AMMONIUM PENTABORATE. Syn: *ammonium decaborate*. White solid. $NH_4B_5O_8 \cdot 4H_2O$, mw: 272.20.

THR = See boron compounds.

AMMONIUM PERCHLORATE. White crystals. NH_4ClO_4, mw: 117.50, mp: decomp, d: 1.95.

THR = See perchlorates.

Fire Hazard: MOD, when exposed to heat or flame or by spont chemical reaction with reducing materials. A very powerful oxidizer. Ignites violently with combustibles.

Explosion Hazard: Severe, decomp @ 130° and explodes @ 380°. When contaminated by powdered carbon, ferrocene, S, organic matter, powdered metals it becomes impact sensitive. [19] See also perchlorates.

Disaster Hazard: See perchlorates and explosives, high.

AMMONIUM PERCHROMATE. See ammonium peroxychromate.

THR = Details U. See iodine, ammonia.
Explosion Hazard: Severe. This material is extremely unstable when dry. The slightest shock or heat will cause it to decomp explosively. It should be kept moist.
Disaster Hazard: Dangerous; on decomp, emits highly toxic fumes of iodine and ammonia.

NITROGEN TRIOXIDE. Syn: NO_2. Bluish gas. NO_3, mw: 62.01, mp: decomp slightly at ordinary temp.
THR = See nitric oxide. Even a trace can cause PH_3 to self-ignite. [*19*]

NITROGEN TRIOXYFLUORIDE.
See fluorine nitrate.

NITROGLYCERIN. Syns: *glycerol trinitrate, blasting oil, soup*. Colorless to yellow liquid, sweet taste. $C_3H_5(ONO_2)_3$, mw: 227.09, mp: 13°, bp: explodes @ 218°, d: 1.601, vap. press: 1 mm @ 127°, vap. d: 7.84, autoign. temp.: 518°F.
Acute tox data: Oral LD_{LO} (rat) = 80 mg/kg; iv LD_{LO} (rabbit) = 40 mg/kg; im LD_{LO} (rabbit) = 450 mg/kg; sc LD_{LO} (cat) = 150 mg/kg. [*3*]
THR = HIGH via oral, iv, im and sc routes. The symptoms of nitroglycerin poisoning are headaches and reduced blood pressure, excitement, vertigo, fainting, respiratory rales and cyanosis. If this material is taken internally, it causes respiratory difficulties and death due to respiratory paralysis. Severe poisoning often manifests itself at first by confusion, pugnaciousness, hallucinations, and maniacal manifestations. The most common complaint is headache which is noted upon commencing work but soon passes off. A break in the work interrupts this acclimatization and workers sometimes resort to the device of moistening their hat bands with nitroglycerin when they are off the job so as to maintain this effect during absence from their occupation. Furthermore it can be absorbed through uninjured skin and may produce eruptions on the palms and intradigital spaces of the hands. In normal manufacture and use of dynamite, the physiological effects of nitroglycerine cause only temporary discomfort and are not injurious to health.
Fire Hazard: Dangerous, when exposed to heat or flame or by spont chemical reaction.
Spont Heating: No.
Explosion Hazard: Severe, when shocked or exposed to O_3, heat or flame. Nitroglycerine is a powerful explosive, very sensitive to mechanical shock. Small quantities of it can readily be detonated by a hammer blow on a hard surface, particularly when it has been absorbed in filter paper. Frozen nitroglycerine is somewhat less sensitive than the liquid. However, a half or partially thawed out mix more sensitive than either one. See also expl high and dynamites.
Disaster Hazard: Highly dangerous; shock, he flame will explode it, and toxic fumes evol decomp.

NITROGLYCERIN, LIQUID, DESENSITIZ
See nitroglycerin.

NITROGLYCERINE, SPIRITS OF.
See nitroglycerine.

NITROGUANIDINE. Yellow solid, high explosi $H_2NC(NH)NHNO_2$, mw: 104.1, mp: 246°.
Acute tox data: Oral LD_{50} (rat) = 500 mg/kg.
THR = HIGH via oral route. See also nitrat ganic.
Fire Hazard: Dangerous, when exposed to heat, or by chemical reaction with oxidizers.
Explosion Hazard: Severe, when shocked or ex to heat or flame. Nitroguanidine is known flashless or cool explosive. It is about as po as TNT and is normally used mixed with coll nitrocellulose in which form it yields a prop powder which gives no flash from the muzzle gun, thus serving as a great advantage to the tary. It has also been used mixed with ammo nitrate and paraffin wax as a trench morta munition.
Disaster Hazard: Dangerous; shock will explo when heated to decomp, emits highly toxic f can react vigorously with oxidizing materials.

3-NITRO-3-HEXENE. $CH_3CH_2NO_2C{:}CHCH_2C$ mw: 129.2.
Acute tox data: Oral LD_{LO} (rat) = 420 mg/k LD_{LO} (rat) = 80 mg/kg; dermal LD_{LO} (rab 940 mg/kg. [*103, 3*]
THR = HIGH via ip and MOD via oral and d routes. An exper neo to mice via inhal route.
Disaster Hazard: Dangerous; see nitrates, organ

2-NITRO-2-HEXANE.
Acute tox data: Oral LD_{LO} (rat) = 420 mg/k LD_{LO} (rat) = 120 mg/kg; dermal LD_{LO} (rab 1400 mg/kg. [*3*]
THR = HIGH via ip and MOD via oral and d routes.

4-NITRO-6-HEXYLQUINOLINE-1-OXIDE.
THR = An exper carc. [*23*]

NITROHYDRENE. An oil. Composition: nitrogly + nitrosucrose.
THR = U. See nitroglycerin.
Fire Hazard: Dangerous, when exposed to he flame or by chemical reaction.
Explosion Hazard: Severe, when shocked or exp

ppm for ½ hr; inhal LC_{Lo} (guinea pig) = 5000 ppm for 5 min. [3]

THR = HIGH irr via inhal route and to skin, eyes and mu mem.

This gas is dangerous to the eyes, as it causes irr and inflammation of the conjunctiva. It has a suffocating odor and is a corrosive and poisonous material. In moist air or fogs, it combines with water to form sulfurous acid, but is only very slowly oxidized to sulfuric acid. Conc of 6–12 ppm cause immediate irr of the nose and throat, while 0.3–1 ppm can be detected by the average individual possibly by taste rather than by sense of smell. 3 ppm has an easily noticeable odor and 20 ppm is the least amount which is irr to the eyes. 10,000 ppm is an irr to moist areas of the skin within a few minutes of exposure.

It chiefly affects the upper respiratory tract and the bronchi. It may cause edema of the lungs or glottis, and can produce respiratory paralysis. Conc of <1 ppm are believed to be injurious to plant foliage.

This material is so irr that it provides its own warning of toxic conc. 400–500 ppm is immediately dangerous to life and 50–100 ppm is considered to be the maximum permissible conc for exposures of 30–60 min. Excessive exposures to high enough conc of this material can be fatal. Its toxicity is comparable to that of hydrogen chloride. However, less than fatal conc can be borne for fair periods of time with no apparent permanent damage. It is used as a fumigant, insecticide and fungicide, and a chemical preservative food additive. [*109*] It is a common air contaminant. It reacts violently with acrolein, Al, $CsHC_2$, CsO, chlorates, ClF_3, Cr, FeO, F_2, Mn, KHC_2, $KClO_3$, Rb_2C_2, Na, Na_2C_2, SnO, lithium acetylene carbide diammino. [*19*]

Disaster Hazard: Dangerous; will react with water or steam to produce toxic and corrosive fumes.

Treatment and Antidotes: Personnel who have shown toxicity symptoms when exposed to this material should immediately be removed to fresh air. If the eyes are involved they should be irrigated with copious quantities of warm water. If the symptoms persist, call a physician.

SULFURETTED HYDROGEN. See hydrogen sulfide.

SULFUR FLOUR. See sulfur.

SULFUR FLUORIDE. Syn: *sulfur monofluoride.* Colorless gas. S_2F_2, mw: 102.12, mp: −104.5°, bp: −99°, d(liquid): 1.5 @ −100°.

THR = See fluorides and hydrofluoric acid.

SULFUR HEPTOXIDE. Syn: *persulfur heptoxide.* Viscous liquid or possibly needle-like crystals. S_2O_7, mw: 176.1, mp: 0°, bp: sublimes @ 10°.

THR = HIGH irr via oral and inhal to skin, eyes and mu mem.

Fire Hazard: Mod, when exposed to heat or flame or by chemical reaction. When heated, or in contact with water or alcohol, it liberates oxygen.

Disaster Hazard: Dangerous; when heated to decomp, emits highly toxic fumes of SO_x; can react with reducing materials.

To Fight Fire: CO_2, dry chemical.

SULFUR HEXAFLUORIDE. Colorless gas. SF_6, mw: 146.06, mp: −51° (sublimes @ −64°), vap. d: 6.602, d(liquid): 1.67 @ −100°.

THR = This material is chemically inert in the pure state and is considered to be physiologically inert as well. However, as it is ordinarily obtainable, it can contain variable quantities of the low sulfur fluorides. Some of these are toxic, very reactive chemically and corrosive in nature. These materials can hydrolyze on contact with water to yield hydrogen fluoride, which is highly toxic and very corrosive. In high conc and when pure it may act as a simple asphyxiant. Vigorous reaction with disilane. [*19*] May explode.

Disaster Hazard: Dangerous; when heated to decomp, emits highly toxic fumes of fluorides and SO_x.

SULFURIC ACID. Syns: *oil of vitriol, dipping acid.* Colorless, oily liquid. H_2SO_4, mw: 98.08, mp: 10.4°, bp: 330°, d: 1.834, vap. press 1 mm @ 145.8°.

Acute tox data: Oral LD_{50} (rat) = 2140 mg/kg. [3]

THR = MOD via oral route. Extremely irr, corrosive and toxic to tissue. Contact with the body results in rapid destruction of tissue, causing severe burns. No systemic effects due to continual ingestion of small amounts of this material have been noted. There are systemic effects secondary to tissue damage caused by contact with it. However, repeated contact with dilute solutions can cause a dermatitis, and repeated or prolonged inhal of a mist of sulfuric acid can cause an inflammation of the upper respiratory tract leading to chronic bronchitis. Sensitivity to sulfuric acid or mists or vapors varies with individuals. Normally 0.125–0.50 ppm may be mildly annoying and 1.5–2.5 ppm can be definitely unpleasant. 10–20 ppm is unbearable.

Workers exposed to low conc of the vapor gradually lose their sensitivity to its irr action. Inhal of conc vapor or mists from hot acid or oleum can cause rapid loss of consciousness with serious damage to lung tissue. In conc form it acts as a powerful caustic to the skin destroying the epidermis and penetrating some distance into the skin and sub-

acute fire hazards and easily oxidized materials. Ammonium nitrate must not be confined, because if a fire should start, confinement can cause detonation with extremely violent results. Also reacts violently with Al, BP, cyanides, esters, PN_3H, P, NaCN, $SnCl_2$, sodium hypophosphite, thiocyanates. [19]

Disaster Hazard: Dangerous, due to fire and explosion hazard. On decomp, they emit toxic fumes. They are powerful oxidizing agents which may cause violent reaction with reducing materials. Nitrates should be protected carefully, as discussed in detail in Section 7.

NITRATINE. See sodium nitrate.

NITRATING (MIXED) ACID. See nitric acid and sulfuric acid.

NITRE. See potassium nitrate.

NITRIC ACID. Syns: *aqua fortis*, *hydrogen nitrate*, *azotic acid*. Transparent colorless or yellowish, fuming, suffocating, caustic and corrosive liquid. HNO_3, mw: 63.02, mp: −42°, bp: 86°, d: 1.502.

THR = VERY HIGH irr to skin, eyes and mu mem. Can affect the teeth. It destroys tissue, causes burns, stains skin, destroys eyes. Causes upper respiratory irr which may seem to clear up only to return in a few hours and more severely. [88] The exact composition of the "fumes" or vapor produced by nitric acid depends upon such factors as temp., humidity and whether or not the acid comes in contact with other materials, such as heavy metals or organic compounds. Depending upon these factors, the vapor will consist of a mixture of the various oxides of nitrogen and of nitric acid vapor. Nitric acid vapor is high irr to the mu mem of the eyes and respiratory tract and to the skin. It is corrosive to the teeth. Because of its irr properties, chronic exposure to dangerous conc of the acid vapor seldom occur.

Fire Hazard: Mod, by chemical reaction with reducing agents. It is a powerful oxidizing agent.

Explosion Hazard: Reacts violently with acetic acid, acetic anhydride, (acetone + acetic acid), (acetone + H_2SO_4), acetylene, acrolein, acrylonitrile, allyl alcohol, allyl chloride, 2-amino ethanol, NH_3, NH_4OH, aniline, anion exchange resins, (dichromate + anion exchange resins), Sb, AsH_3, Bi, B, boron decahydride, BP, BrF_5, *n*-butyraldehyde, Ca hypophosphite, C, Cs_2C_2, 4-chloro-2-nitroaniline, ClF_3, chlorosulfonic acid, cresol, cumene, Cu_3N_2, CuN_3, cyanides, cyclic ketones, cyclohexanol, cyclohexanone, diborane, 2,6-di-*tert*-butyl phenol, diisopropyl ether, epichlorohydrin, ethanol, *m*-ethylaniline, ethylene diamine, ethylene imine, 5-ethyl-2-methyl pyridine, 5-ethyl-2-picoline, $C_2H_5PH_2$, FeO, F_2, furfuryl alcohol, Ge, glyoxal, hydrazine, HI, H_2O_2, H_2Se, H_2S, H_2Te, (indane + H_2SO prene, (ketones + H_2O_2), (lactic acid + Hi Li_6Si_2, Mg, Mg_3P_2, Mg-Ti alloy, Mn, mesi mesityl oxide, 2-methyl-5-ethyl pyridine, 4-m cyclohexanone, NdP, nitrobenzene, oleum, o matter, PH_3, PH_4I, P, P_4I_3, PCl_3, phthalic phthalic anhydride, KH_2PO_2, β-propiolacton pylene oxide, pyridine, Rb_2C_2, Se, selenium phosphide, (Ag + ethanol), Na, NaN_3, N SbH_3, sulfamic acid, (H_2SO_4 + glycerides penes, B_4H_{10}, thiocyanates, thiophene, Ti, Ti Ti-Mg alloy, (H_2SO_4 + $C_6H_5CH_3$), toluidine zine, uns-dimethyl hydrazine, U, U-Nd alloy, Zr alloy, vinylacetate, vinylidene chloride Zr-U alloys. [19]

Disaster Hazard: Dangerous; when heated to de emits highly toxic fumes of NO_x and hyd nitrate; will react with water or steam to pr heat and toxic and corrosive fumes.

To Fight Fire: Water.

NITRIC ACID, ANHYDROUS. See nitric acid, fuming.

NITRIC ACID, FUMING RED. Syn: *nitric aci hydrous*. Colorless to yellow to red corrosive l NHO_3 + N_2O_5, d: > 1.480.

Acute tox data: Inhal LC_{50} (rat) = 65 ppm of N 4 hrs. [3]

THR = VERY HIGH irr to skin, eyes and mu m corrosive poison.

Fire Hazard: Dangerous; very powerful ox agent.

Explosion Hazard: Mod; can react explosively many reducing agents.

Disaster Hazard: Dangerous; when heated to de emits highly toxic fumes of NO_x; will react water or steam to produce heat and toxic, cor and flam vapors.

NITRIC ACID, FUMING WHITE.

Acute tox data: Inhal LC_{50} (rat) = 244 ppm fo for 30 min. [3]

THR = VERY HIGH irr to skin, eyes and mu A corrosive poison.

NITRIC ANHYDRIDE. See nitrogen pentoxide.

NITRIC ETHER. See ethyl nitrate.

NITRIC OXIDE. Syn: NO_x. Colorless gas, blue l and solid. NO, mw: 30.01, mp: −161°, bp: −15 d: 1.3402 g/liter, liquid: 1.269 @ −150°.

Acute tox data: Inhal LD_{LO} (mouse) = 320 ppm; LC_{50} (rabbit) = 315 ppm for ½ hr. [3]

THR = HIGH irr via inhal route and to skin, eye mu mem. A poison gas. Exposure to such f

TRICHLOROETHYLENE. Syns: *ethinyl trichloride, ethylene trichloride*. Stable, colorless, heavy, mobile liquid, chloroform-like odor. $CHClCCl_2$, mw: 131.40, mp: −73°, bp: 87.1°, fp: −86.8°, d: 1.45560 @ 25°/4°, autoign. temp.: 788°F; vap. press: 100 mm @ 32°, vap d: 4.53, flash p: none, lel = 12.5%, uel = 90%.

tox data: Oral LD_{LO} (human) = 857 mg/kg; ... ppm for 83 min ⟶ human CNS effects; 110 ppm for 8 hrs ⟶ inhal human irr effects; oral LD_{50} (rat) = 4920 mg/kg; inhal LC_{LO} (rat) = 8000 ppm for 4 hrs; ip LD_{50} (dog) = 1900 mg/kg; iv LD_{LO} (dog) = 150 mg/kg. [*3*]

THR = HIGH via iv; MOD via ip, inhal, oral routes. An exper (S) carc. [*3, 13*] Inhal of high conc causes narcosis and anesthesia. A form of addiction has been observed in exposed workers. Prolonged inhal of mod conc causes headache and drowsiness. Fatalities following severe, acute exposure have been attributed to ventricular fibrillation resulting in cardiac failure. There is damage to liver and other organs from chronic exposure. Cases have been reported but are of questionable validity. Determination of the metabolites trichloracetic acid and trichloroethanol in urine reflects the absorption of trichloroethylene. A food additive permitted in food for human consumption. [*109*] A common air contaminant.

Fire Hazard: Low, when exposed to heat or flame. High conc of trichloroethylene vapor in high-temp. ... can be made to burn mildly if plied with a strong ... Though such a condition is difficult to produce, flames or arcs should not be used in closed equipment which contains any solvent residue or vapor. Can react violently with Al, Ba, N_2O_4, Li, Mg, liquid O_2, O_2, KOH, KNO_3, Na, NaOH, Tl. [*19*]

Spont Heating: No.

Disaster Hazard: Dangerous; see chlorides.

TRICHLOROETHYL SILANE. $C_2H_5SiCl_3$, mw: 163.5.

THR = Reacts violently with water. [*19*]

TRICHLOROFLUOROGERMANE. Colorless liquid. $GeCl_3F$, mw: 197.97, mp: −49°, bp: 37.5°.

THR = See fluorides, germanium compounds and chlorides.

1,1,1-TRICHLOROFLUOROETHANE. $C_2H_2Cl_3F$, mw: 151.4.

THR = No data. See fluorides. Violent reaction with Ba. [*19*]

TRICHLOROFLUOROMETHANE. See fluorotrichloromethane.

TRICHLOROGERMANE. Syn: *germanium chloroform*. Colorless liquid. $GeHCl_3$, mw: 179.98, mp: −71.0°, bp: 75.2°, d: 1.93 @ 0°C.

THR = See hydrochloric acid and germanium compounds.

TRICHLOROISOCYANURIC ACID. White crystals, chlorine odor, mod sol in water. $(ClNCO)_3$, mw: 232.5, mp: 225°–230° (decomp).

Acute tox data: Oral LD_{50} (rat) = 700–800 mg/kg.

THR = MOD–HIGH via oral route. Toxicity symptoms include emaciation, lethargy, weakness and delayed death. Autopsy shows inflammation of GI tract, liver discoloration and kidney hyperemia. A powerful oxidizer.

Disaster Hazard: Dangerous; when heated to decomp, emits chloride and carbon monoxide fumes.

1,1,1-TRICHLOROISOPROPYL ALCOHOL. Syns: *isopral, 1,1,1-trichloro-2-propanol*. Crystals, camphor-like odor, pungent taste, water-sol. $C_3H_5Cl_3O$, mw: 163.4, mp: 50°, bp: 162°.

Acute tox data: Oral LD_{LO} (rat) = 1000 mg/kg. [*3*]

THR = MOD via oral route. See also chlorinated hydrocarbons, aliphatic.

Disaster Hazard: Dangerous; see chlorides.

TRICHLOROMELAMINE. Syn: *TCM*. White powder, slightly water-sol. $C_3H_3Cl_3N_6$, mw: 229.4, autoign. temp.: 320°F.

Acute tox data: Oral LD_{50} (mice) = 490 mg/kg. [*3*]

THR = HIGH via oral route.

Fire Hazard: Mod, in the pure state, when heated or ignited by spark or flame; reacts vigorously to evolve smoke and heat; reacts with acetone, NH_3, aniline, diphenylamine, turpentine. [*19*] Vendor can supply directions for handling.

Disaster Hazard: Dangerous; when heated to decomp, emits highly toxic chloride and NO_x fumes.

TRICHLOROMETHANE. See chloroform.

TRICHLOROMETHANE SULFENYL CHLORIDE. See perchloromethyl mercaptan.

TRICHLOROMETHYL CHLOROFORMATE. See diphosgene.

TRICHLOROMETHYL ETHER. A liquid of pungent odor. $CHCl_2OCH_2Cl$, mw: 149.42, bp: 130°–132°, d: 1.5066 @ 10°.

THR = HIGH irr to skin, eyes and mu mem and via oral, inhal routes. See also ethers.

Disaster Hazard: Dangerous; when heated to decomp, emits highly toxic fumes; will react with water or steam to produce toxic and corrosive fumes.

TRICHLOROMETHYL PERCHLORATE. Cl_3CClO_4, mw: 217.8.

THR = Detonates @ 40°.

Fire Hazard: Slight, when exposed to heat or flame.
Disaster Hazard: Mod dangerous; when heated to decomp, emits toxic fumes; can react with oxidizing materials.
To Fight Fire: Foam, CO_2, dry chemical.

LA[illegible]L QUINALDINIUM BROMIDE.
[illegible]: U. See also bromides.
Fire Hazard: U.
Disaster Hazard: Dangerous. See bromides.

LAURYL QUINOLINIUM CHLORIDE. U. A fungicide.
Fire Hazard: U.
Disaster Hazard: Dangerous. See chlorides.

LAURYL THIOCYANATE. $CH_3(CH_2)_{10}CH_2SCN$, mw: 227.3.
Acute tox data: oral LD_{50} (rat) = 1250 mg/kg. [3]
THR = MOD via oral route. An insecticide.

LAWRENCITE. See ferrous chloride.

LAWRENCIUM. A synthetic transuranium element of atomic number 103 and atomic mass 257. Lw.
THR = Radioactive.
Radiation Hazard: Intensely radioactive and therefore highly radiotoxic.

LD-813. A mixture of aromatic amines. (approx 40% MOCA).
THR = An exper carc to rats via oral route. [3]

LEACHATE PRODUCTION FROM SOLID W[illegible]. See Section 6.

LEAD. Syn: *plumbum*. Bluish-gray, soft metal. Pb, atwt: 207.21, mp: 327.43°, bp: 1620°, d: 11.288 @ 20°/20°. vap. press: 1 mm @ 973°.
THR = See lead compounds. A common air contaminant. It is a (S) carc of the lungs and kidney and an exper teratogen. [3, 23]
Radiation Hazard: For permissible levels, see Section 5, Table 5A.5. Natural isotope ^{210}Pb (radium-D, uranium series), $T_{\frac{1}{2}}$ = 21y. Decays to radioactive ^{210}Pb via β's of 0.0015 (19%) MeV. Emits γ's of 0.046 MeV. ^{210}Pb usually exists in equilibrium with its daughters, ^{210}Bi and ^{210}Po. Natural isotope ^{212}Pb (Thorium-B, thorium Series), $T_{\frac{1}{2}}$ = 10.6 h. Decays to radioactive ^{212}Bi via β's of 0.16 (5%). 0.34 (81%), 0.58 (14%) MeV. Emits γ's of 0.24, 0.34 MeV and x-rays.
Fire Hazard: Mod, in the form of dust when exposed to heat or flame. See also powdered metals.
Explosion Hazard: Mod, in the form of dust when exposed to heat or flame. Violent reactions with NH_4NO_3, ClF_3, H_2O_2, NaN_3, Na_2C_2, Zr. [19]
Disaster Hazard: Dangerous; when heated, emits highly toxic fumes; can react vigorously with oxidi[illegible] materials.

LEAD ACETATE. Syn: *sugar of lead*. White crystals, sol in water. Commercial grades are frequently brown or gray lumps. $Pb(C_2H_3O_2)_2 \cdot 3H_2O$, mw: 379.35, mp: 75°, anhydrous mp: 280°. d: 2.55.
Acute tox data: ip LD_{Lo} (rat) = 204 mg/kg; iv LD_{50} (rat) = 120 mg/kg. [3]
THR = HIGH via ip and iv routes. See also lead compounds. A poison. An exper (+) carc and teratogen. [3, 9] Violent reaction with $KBrO_3$. [19] An insecticide.

LEAD ACETATE, BASIC. White powder.
$Pb_2OH(C_2H_3O_2)_3$, mw: 608.6.
THR = An exper (+) carc. [3, 9] See also lead acetate. A poison.

LEAD ACETATE (III) TRIHYDRATE.
THR = An exper (+) carc. [3, 9] See also lead acetate.

LEAD ANTIMONATE. Syns: *naples yellow*, *antimony yellow*. Orange yellow powder. $Pb_3(SbO_4)_2$, mw: 993.2.
THR = See lead and antimony compounds.

LEAD ARSENATES. Syn: *lead-o-arsenate*. White crystals. $PbHAsO_4$, mw: 327.1.
Acute tox data: Oral LD_{Lo} (human) = 1.4 mg/kg; oral LD_{50} (rat) = 100 mg/kg. [3]
THR = HIGH via oral route. See also lead and arsenic compounds. A poison. An exper carc. [3, 9]
Disaster Hazard: Dangerous; on heating, emits highly toxic fumes.

LEAD-*m*-ARSENATE. $AsH_3O_4 \cdot (Pb)x$.
Acute tox data: Oral LD_{50} (rat) = 100 mg/kg; oral LD_{50} (mouse) = 1000 mg/kg; oral LD_{50} (rabbit) = 125 mg/kg. [3]
THR = HIGH via oral to MOD via oral routes depending upon species. See also lead arsenate. A poison.

LEAD-*o*-ARSENATE. See lead arsenates.

LEAD ARSENITE. Syns: *lead-o-arsenite*, *lead-m-arsenite*. White powder; $PbAs_2O_4$, mw: 421.
THR = HIGH. See lead compounds and arsenic compounds.
Disaster Hazard: Dangerous; on heating, emits highly toxic fumes.

LEAD-*m*-ARSENITE. See lead arsenite.

LEAD-*o*-ARSENITE. See lead arsenite.

LEAD AZIDE. Colorless needles. $Pb(N_3)_2$, mw: 291.26.
THR = See lead compounds and azides.
Fire Hazard: U.
Explosion Hazard: Severe, when shocked or exposed to heat or flame. Explodes at 250°. Violent reaction with brass, calcium stearate. CS_2, Cu, Zn. [19]
Disaster Hazard: Highly dangerous; shock and heat

THR = Mod to high via oral route to women ⟶ CNS effects. Has been implicated in development of aplastic anemia. [3]

CHLOROETHANE. See ethyl chloride.

CHLOROETHYL BENZENE. Liquid. $C_6H_5ClC_2H_5$, mw: 141.6.
THR = See chlorinated hydrocarbons, aromatic.
Fire Hazard: Mod, when exposed to heat or flame.
Explosion Hazard: U.
Disaster Hazard: Dangerous; when heated to decomp, emits toxic fumes; reacts with oxidizing materials.

1-(2-CHLORETHYL)-3-CYCLOHEXYL-1-NITROSO UREA. $C_9H_{16}O_2N_3Cl$, mw: 233.7.
THR = HIGH via oral route. An exper teratogen. [3]

"CHLOREX." See dichloroethyl ether.

CHLORFENVINFOS. Syn: *2-chloro-1-(2,4-dichlorophenyl)-vinyl diethyl phosphate*. $C_{12}H_{14}O_4PCl_3$, mw: 359.6.
Acute tox data: Oral LD_{50} (rat) = 10 mg/kg; dermal LD_{50} (rat) = 30 mg/kg; sc LD_{50} (rat) = 16 mg/kg; iv LD_{50} (rat) = 7 mg/kg; oral LD_{50} (chicken) = 29 mg/kg. [3]
THR = HIGH via all routes of exposure.

CHLORGUANIDE. Syn: *1-(p-chlorophenyl)-5-isopropyl biguanide hydrochloride*. White powder.
$C_{11}H_{14}C_3H_7C_2H_5N_3HCl$, mw: 290.2, mp: 244°.
Acute tox data: Oral LD_{50} (mouse) = 50 mg/kg. [3]
THR = HIGH via oral route.
Disaster Hazard: Dangerous. See chlorides.

CHLORHYDROL ALUMINUM. Syn: *aluminum chlorohydroxide complex*. $Al(OH)_2Cl$, mw: 96.4.
THR = An allergen. Probably LOW.

CHLORIC ACID. Colorless solution. $HClO_3 \cdot 7H_2O$, mw: 210.58, mp: <−20°, bp: decomp @ 40°, d: 1.282 @ 14.2°.
THR = HIGH irr via oral and inhal routes. See also chlorates.
Fire Hazard: Dangerous; ignites organic matter upon contact; a very powerful oxidizing agent.
Explosion Hazard: >40% decomp, reacts violently with NH_3, Sb, Sb_2S_3, As_2S_3, Bi, CuS, PHI_4, SnS_2, SnS. [19]
Disaster Hazard: Dangerous; see chlorides; reacts vigorously with reducing material.

CHLORIC ETHER. A liquid solution of 60 cc chloroform and 940 cc alcohol.
THR = See also chloroform and ethanol.
Fire Hazard: Mod, when exposed to heat or flame.
Disaster Hazard: Dangerous; when heated to decomp, highly toxic fumes of phosgene; can react vigorously with oxidizing materials.

CHLORIDE OF LIME. See bleaching powder.

CHLORIDES.
THR = Varies widely. Sodium chloride (table salt) has very low toxicity, while carbonyl chloride (phosgene) is lethal in small doses. See specific entries.
Disaster Hazard: Dangerous; when heated to decomp or on contact with acids or acid fumes, they evolve highly toxic chloride fumes. Some organic chlorides decomp to yield phosgene.

CHLORIDINE. $C_{12}H_{13}N_4Cl$, mw: 248.7.
THR = An exper neo and teratogen. [3]

CHLORINATED ANTHRACENE OIL. See carbolineum.

CHLORINATED BIPHENOLS. See chlorinated diphenyls.

CHLORINATED CAMPHENE. See octachloro camphene.

CHLORINATED DIBENZO DIOXINS. Syns: *dibenzo-p-dioxin, 1-chlorodibenzo-p-dioxin, 2-chlorodibenzo-p-dioxin, 1,3-dichlorodibenzo-p-dioxin, 1,6-dichloro dibenzo-p-dioxin, 2,3-dichlorodibenzo-p-dioxin, 2,7-dichloro dibenzo-p-dioxin, 2,8-dichloro dibenzo-p-dioxin, 1,2,4-trichloro dibenzo-p-dioxin, 2,3,7-trichlorodibenzo-p-dioxin, 1,2,3,4-tetra chlorodibenzo-p-dioxin, 1,2,3,8-tetrachloro dibenzo-p-dioxin, 1,3,6,8-tetrachlorodibenzo-p-dioxin, 1,3,7,8-tetrachlorodibenzo-p-dioxin, 2,3,6,7-tetra chloro dibenzo-p-dioxin, 2,3,7,8-tetra chlorodibenzo-p-dioxin, 1,2,3,4,7-penta chlorodibenzo-p-dioxin, 1,2,3,7,8-penta chlorodibenzo-p-dioxin, 1,2,4,7,8-penta chlorodibenzo-p-dioxin, 1,2,3,4,7,8-hexachlorodibenzo-p-dioxin, 1,2,3,6,7,8-hexachlorodibenzo-p-dioxin, 1,2,3,6,7,9-hexachlorodibenzo-p-dioxin, 1,2,3,7,8,9-hexa chlorodibenzo-p-dioxin, 1,2,3,4,6,7,8-hepta chlorodibenzo-p-dioxin, 1,2,3,4,6,7,9-hepta chlorodibenzo-p-dioxin, 1,2,3,4,6,7,8,9-octachloro-dibenzo-p-dioxin.* For physical properties see individual entries. The chlorinated dibenzo dioxins are not manufactured on a commercial basis, but some are present as impurities in herbicide and fungicide formulations, such as 2,4,5-T, the penta chlorophenols, and hexachlorphene (from trichlorophenol). The chlorinated dibenzo dioxins include some with antibacterial action, flameproofing, insecticidal and fungicidal actions.
Acute tox data: MOD–HIGH; accumulate in organisms; some are carc, mutagens and teratogens. [81]

CHLORINATED DIPHENYL (AROCLOR 1221).
Acute tox data: Oral LD_{50} (rat) = 3980 mg/kg; dermal LD_{LO} (rabbit) = 3169 mg/kg. [3]
THR = MOD via oral and dermal routes. An exper (+) carc. [1, 3]

CHLORINATED DIPHENYL (AROCLOR 1232).
Acute tox data: Oral LD_{50} (rat) = 4470 mg/kg; dermal LD_{LO} (rabbit) = 2000 mg/kg. [3]
THR = MOD via oral and dermal routes. An exper (+) carc. [1, 3]

CHLORINATED DIPHENYL (AROCLOR 1242).
Acute tox data: Oral LD_{50} (rat) = 4250 mg/kg; inhal TC_{LO} (humans) = 10 mg/m^3 ⟶ irr; dermal LD_{LO} (rabbit) = 794 mg/kg. [3]
THR = MOD via oral, inhal and dermal routes. An exper (+) carc. [1, 3]

CHLORINATED DIPHENYL (AROCLOR 1248).
Acute tox data: Oral LD_{50} (rat) = 11000 mg/kg; dermal LD_{LO} (rabbit) = 1269 mg/kg. [3]
THR = MOD via dermal and LOW via oral routes.

CHLORINATED DIPHENYL (AROCLOR 1254).
Acute tox data: Oral LD_{50} (rat) = 1295 mg/kg; ip LD_{50} (mouse) = 2840 mg/kg; iv LD_{50} (rat) = 358 mg/kg. [3]
THR = HIGH via iv; MOD via ip, dermal and oral routes. An exper (+) neo via oral route. [1, 3]

CHLORINATED DIPHENYL (AROCLOR 1260).
Acute tox data: Oral LD_{50} (rat) = 1315 mg/kg; dermal LD_{LO} (rabbit) = 2000 mg/kg. [3]
THR = MOD via oral and dermal routes. An exper (+) carc. [3, 1]

CHLORINATED DIPHENYL (AROCLOR 1262).
Acute tox data: Oral LD_{50} (rat) = 11300 mg/kg; dermal LD_{LO} (rabbit) = 3160 mg/kg. [3]
THR = MOD via dermal and LOW via oral routes. An exper (+) carc via oral route. [1, 3]

CHLORINATED DIPHENYL (AROCLOR 1268).
Acute tox data: Oral LD_{50} (rat) = 10900 mg/kg; dermal LD_{LO} (rabbit) = 2500 mg/kg. [3]
THR = MOD via dermal and LOW via oral routes. An exper (+) carc. [1, 3]

CHLORINATED DIPHENYL (AROCLOR 2565).
Acute tox data: Oral LD_{50} (rat) = 6310 mg/kg; dermal LD_{LO} (rabbit) = 3160 mg/kg. [3]
THR = MOD via oral and dermal routes. An exper (+) carc. [3, 1]

CHLORINATED DIPHENYL (AROCLOR 4465).
Acute tox data: Oral LD_{50} (rat) = 1600 mg/kg; dermal LD_{LO} (rabbit) = 3160 mg/kg. [3]
THR = MOD via dermal and LOW via oral routes. An exper (+) carc. [3, 1]

CHLORINATED DIPHENYL (KANECLOR 300).
THR = An exper (S) carc via oral route. [1, 3]

CHLORINATED DIPHENYL (KANECLOR 400).
THR = An exper (S) carc via oral route. [1, 3]

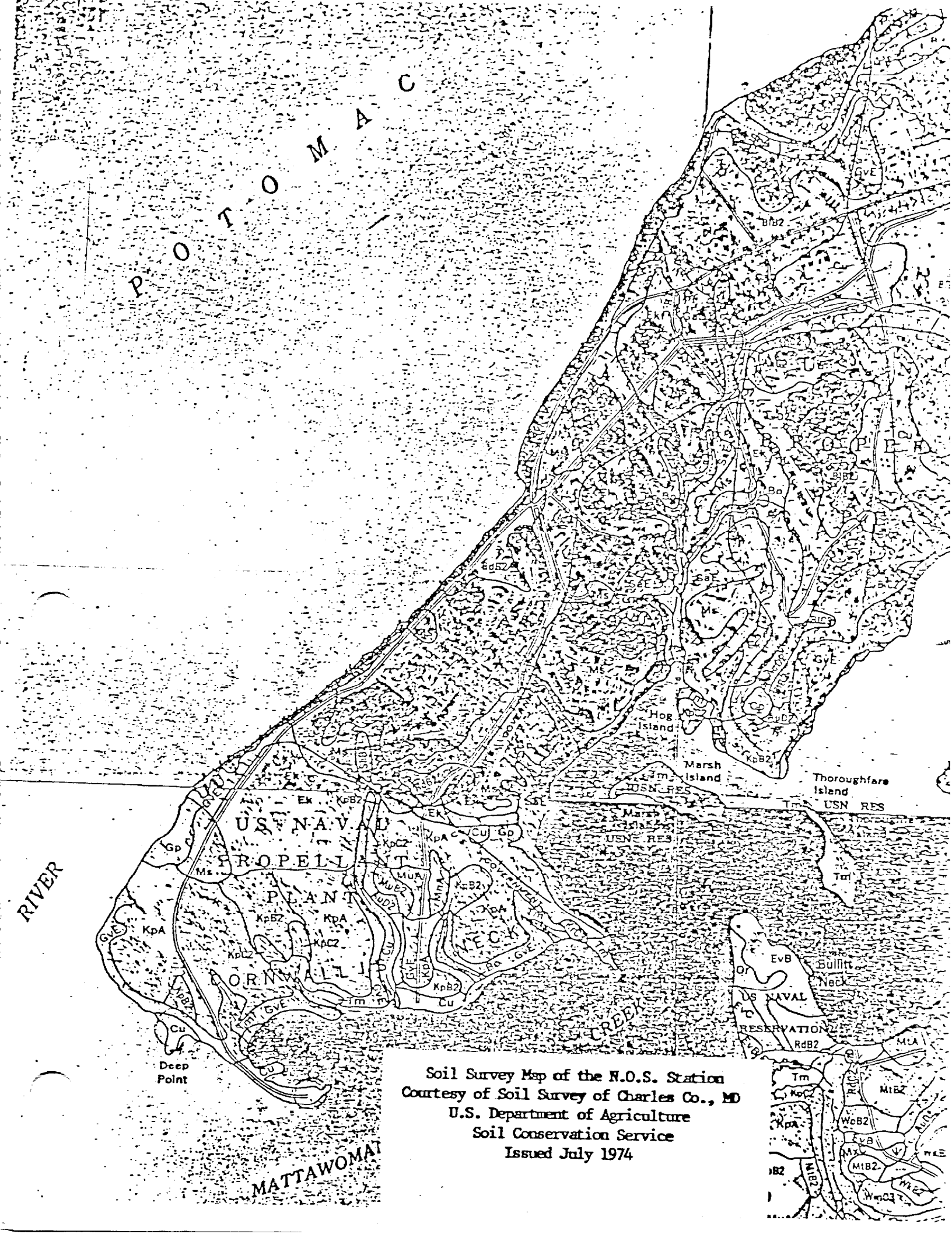
CHLORINATED DIPHENYL (KANECLOR 500).
THR = An exper (+) carc via oral route. [1, 3]

CHLORINATED DIPHENYL OXIDE.
THR = HIGH via oral and inhal; MOD via dermal routes. A powerful irr.
Disaster Hazard: Dangerous; when heated to decomp, emits highly toxic fumes.

CHLORINATED DIPHENYLS. Syns: *aroclor, aroclor 1221, aroclor 1232, aroclor 1242, aroclor 1248, aroclor 1254, aroclor 1260, aroclor 1262, aroclor 1268, aroclor 2565, aroclor 4465, chlophen, clorinated biphenyl, chlorinated diphenyl, chlorinated diphenylene, chlorextol, chloro biphenyl, chloro-1,1-biphenyl, dykanol, fenclor, inerteen, kanechlor, kanechlor 300, kanechlor 400, kanechlor 500, montar, nonflamol, PCBs, phenochlor, phenoclor, polychlorobiphenyl, pyralene, pyranol, santotherm FR, sovol, therminol, therminol FR-1.* A series of technical mixtures, consisting of many isomers and compounds that vary from mobile oily liquids to white, crystalline solids and hard non-crystalline resins. They vary in composition and degree of chlorination and perhaps by batch. [1, 3] bp: 340°–375°, flash p: 383°F (COC), d: 1.44 @ 30°.
THR = MOD via dermal and oral routes. A strong irr. Oral exposure can cause (+) neo and carc. [3, 1] Also causes a chloracne. Like the chlorinated naphthalenes, the chlorinated diphenyls have 2 distinct actions on the body, namely, a skin effect and a toxic action on the liver. The lesion produced in the liver is an acute yellow atrophy. This hepatotoxic action of the chlorinated diphenyls appears to be increased if there is exposure to carbon tetrachloride at the same time. The higher the chlorine content of the diphenyl compound, the more toxic is it liable to be. Oxides of chlorinated diphenyls are more toxic than the unoxidized materials. The skin lesion is known as chloracne, and consists of small pimples and dark pigmentation of the exposed areas, initially. Later, comedones and pustules develop. In persons who have suffered systematic intoxication, the usual signs and symptoms are nausea, vomiting, loss of weight, jaundice, edema and abdominal pain. Where the liver damage has been severe the patient may pass into coma and die.
Fire Hazard: Slight, when exposed to heat or flame.
Disaster Hazard: Dangerous; when heated to decomp, they emit highly toxic fumes.

CHLORINATED HYDROCARBONS, ALIPHATIC. The substitution of a Cl (or other halogen) atom for a hydrogen greatly increases the anesthetic action of a member of the aliphatic hydrocarbons. In addition, the chlorine derivative is usually less specific in its

ATTACHMENT V


POTOMAC
RIVER
US NAVAL PROPELLANT PLANT
CORNWALL
Deep Point
MATTAWOMAN CREEK
Hog Island
Marsh Island
Thoroughfare Island
USN RES
US NAVAL RESERVATION
Bullitt Neck
Soil Survey Map of the N.O.S. Station
Courtesy of Soil Survey of Charles Co., MD
U.S. Department of Agriculture
Soil Conservation Service
Issued July 1974

B1—11 to 20 inches, yellowish-brown (10YR 5/6) loamy sand; single grain; loose to very friable; many roots; strongly acid; clear, smooth boundary.

B2t—20 to 41 inches, strong-brown (7.5YR 5/8) loamy fine sand; very weak, medium, blocky structure; very friable; roots are common in upper portion; sand grains are strongly coated; distinct clay bridging; very strongly acid; abrupt, wavy boundary.

C—41 to 60 inches, light yellowish-brown (10YR 6/4) fine sand, with a few thick bands of strong brown (7.5YR 5/6); single grain; loose; very few roots; very strongly acid.

The solum is about 27 to 45 inches in thickness. The profile generally is free of gravel. In the A horizon, the matrix is 10YR or 7.5YR in hue, 2 to 5 in value, and 1 to 4 in chroma. The A1 horizons less than 6 inches thick are 2 and 3 in value and 1 in chroma. In the B horizon, the matrix most commonly is 7.5YR in hue. The B1 horizon is about 10YR in hue, and the Bt horizon is 5YR. These horizons are 4 to 6 in value, and the chroma is 4 to 8. The B horizon generally is loamy sand, but in places it is sand or fine sand. In some profiles, a B3 horizon is between the B2t and C horizons. The C horizon is commonly yellower in hue, and is higher in value and lower in chroma than the B horizon. In the C horizon of some profiles, are very thin bands that resemble material in the B horizon.

Galestown soils resemble Evesboro soils, but Evesboro soils generally are yellower in color and do not have Bt horizons. Also, Galestown soils are not so excessively drained and droughty as Evesboro soils.

Galestown loamy sand, 0 to 8 percent slopes (GoB).—This is the only Galestown soil mapped in the county. The low available moisture capacity is the chief concern of management. This soil is used mostly for tobacco, corn, and soybeans. Without good management that includes supplemental irrigation during dry seasons, crop yields are low. Capability unit IVs–1; woodland subclass 3s.

Gravel and Borrow Pits

Gravel and borrow pits (Gp) consist of excavations from which gravel and other materials have been or are being removed. These materials are used mainly for road fill or for other kinds of construction. Most pits are exploited for gravel, others for sand, and still others for both gravel and sand. In some pits soil material is removed. The total area of these pits is increasing. Possible uses of these pits must be determined after onsite investigation. Capability unit VIIIs–4; woodland subclass not assigned.

Gravelly Land

Gravelly land, steep, (GvE) consists of gravelly deposits of soil material. Some of these represent areas that may have once been profiles of the Aura and Croom soils, but if so the profiles have been so severely eroded that they cannot be identified. Other areas are mostly relatively unaltered deposits of gravelly materials that have some similarity to the underlying material of various soils in the county.

The gravel content of this mapping unit ranges from about 20 to 80 percent, by volume. Most of the gravel is quartz pebbles that are smooth, rounded to subangular, and mostly less than 2 inches in diameter. Slopes range from about 15 to 50 percent.

Gravelly land is not suitable for crops or for grazing. Many areas are idle or in woodland. It is best suited to woodland, watershed protection, wildlife habitat, and a source of gravel. Capability unit VIIe–2; wo class 4f.

Iuka Series

The Iuka series consists of nearly level to ge deep, moderately well drained soils on flood p upland depressions. These soils formed in posited alluvium that was washed mainly fr the uplands in the county. Where these soils oc plains, they are subject to flooding from stre they occur in upland depressions, they are sat water for short periods. The native vegetation mixed wetland hardwoods.

In a representative profile, the surface layer inches thick. It is dark yellowish-brown fine s in the upper part and is yellowish-brown fine s in the lower part. The upper part of the unde terial, about 10 inches thick, is pale-brown lo mottled with light gray and dark brown. Below brown silt loam, about 8 inches thick, that is mo brown or dark brown. Below this layer, to a d inches, is gray or light-gray fine sandy loam t tled with yellowish-brown in places.

Iuka soils are easy to work at a favorable mo tent. They have a high water table late in spri fairly slow to warm. Seasonal wetness, impeded and the hazard of flooding are moderate to seve tions on these soils for nearly all purposes. They available moisture capacity. Permeability on the moderate to moderately slow.

Representative profile of Iuka fine sandy loam, cultivated area on the flood plain of Port Toba about 2½ miles northwest of La Plata:

Ap—0 to 9 inches, dark yellowish-brown (10YR 4/4) loam; weak, medium, granular structure many roots; medium acid (limed); abr boundary.

A1—9 to 18 inches, yellowish-brown (10YR 5/4) loam; weak, fine, granular structure; friabl sticky; many roots; medium acid; clea boundary.

C1—18 to 28 inches, pale-brown (10YR 6/3) loam; distinct mottles of light gray (10YR 7/2) brown (10YR 3/3); massive; friable, slight a few roots; strongly acid; clear, smooth bo

C2g—28 to 36 inches, grayish-brown (2.5Y 5/2) ligh common, fine, distinct mottles of brown or da (7.5YR 4/4); massive; friable, slightly s slightly plastic; a few roots; strongly ac smooth boundary.

C3g—36 to 42 inches, gray (5Y 5/1), variegated with (5Y 6/1) fine sandy loam; massive, ver slightly sticky; a few roots; very strong abrupt, smooth boundary.

C4g—42 to 60 inches, light-gray (2.5Y 7/2) fine san common, medium, distinct mottles of yellow (10YR 5/8); massive; very friable; extreme

Iuka soils do not have a B horizon. The C horizon tles and variegations less than 2 in chroma. In the the matrix is 10YR or 7.5YR in hue, 3 to 6 in value 4 in chroma. The surface subhorizons, less than 6 inc are 3 in value. The A horizon is sandy loam, fine san or silt loam. In the C1 horizon, the matrix color is 2.5Y in hue, 4 to 6 in value, and 3 to 6 in chroma. Mo similar in hue and are 4 to 7 in value. Mottles are 2 or 2 in chroma. Within 20 inches of the soil surface higher in chroma may or may not be present. The the C2 and C3 horizons differ from the C1 in having as low as 1 or 2. The C4 horizon is highly variable in c

are present. Included in mapping are areas where the exposed subsoil is not so dense and hard as described in the representative profile. Even under very good management, crops are seldom grown. Woodland improvement is economical, and will provide important watershed protection. Capability unit IVe-7; woodland subclass 4d.

Cut and Fill Land

Cut and fill land (Cu) consists, in part, of land areas where the soil has been cut away by grading and similar operations. Most of the remaining areas generally are filled with soil and other materials to a depth of many feet, but others are filled only to a depth of 1 or 2 feet. Included in mapping are small areas where the fill is garbage or other solid wastes. Also included are a few shopping plazas and other paved areas.

Cut and fill land is never farmed. Where used, it is chiefly for commercial or residential purposes. It is so variable in nature that the suitability of any area for a specific use must be determined by onsite investigation. Capability unit and woodland subclass not assigned.

Elkton Series

The Elkton series consists of nearly level, poorly drained soils in areas bordering major rivers and on higher upland flats. These soils have a fine subsoil that is slowly permeable to very slowly permeable. They formed in old deposits of very clayey marine and alluvial sediment. The native vegetation is wetland hardwoods, mainly red or swamp maple, willow oak, and birch. In other areas are stands of loblolly and other pines.

In a representative profile the surface layer, about 6 inches thick, is gray silt loam. The upper part of the subsoil, about 6 inches thick, is light-gray, friable heavy silt loam mottled with pale brown and yellowish brown. The lower part of the subsoil, about 28 inches, is gray or light-gray silty clay that is firm, sticky and plastic and mottled with brighter colors. The underlying material, to a depth of about 70 inches, is light-gray, mottled fine sandy loam.

If cultivated, Elkton soils must be worked when the moisture content is favorable. When dry, these soils are rough and hard and when wet, they do not support heavy machinery. These soils have high available moisture capacity. They have a high water table and are wet for long periods. Permeability in these soils generally is slow, but it is slow to very slow in the lower part of the subsoil. Artificial drainage is necessary if these soils are farmed. Poor drainage and the high water table are severe limitations for most nonfarm uses.

Representative profile of Elkton silt loam, in a level rewooded area about 1½ miles west of Riverside:

Ap—0 to 6 inches, gray (5Y 5/1) silt loam; very weak, fine, granular structure; friable, slightly sticky; many roots; extremely acid; abrupt, smooth boundary.

B1g—6 to 12 inches, light-gray (5Y 7/1) heavy silt loam; common, medium, distinct mottles of pale brown (10YR 6/3) and a few fine, prominent mottles of yellowish brown (10YR 5/8); weak, fine, granular structure; friable, sticky and slightly plastic; a few roots; extremely acid; clear, wavy boundary.

B21g—12 to 21 inches, gray or light-gray (5Y 6/1) silty clay; common, medium, prominent mottles of brownish yellow (10YR 6/6); moderate, coarse, blocky structure; very firm, plastic and sticky; a few roots; distinct, almost continuous, gray (5Y 5/1) clay films; very strongly acid; gradual, smooth boundary.

B22tg—21 to 40 inches, light-gray (5Y 7/2) silty clay; many, medium, prominent mottles of brownish yellow (10YR 6/6) and a few, medium, prominent mottles of strong brown (7.5YR 5/8); moderate, medium and coarse, blocky structure; firm, plastic and sticky; a few roots; faint, almost continuous, gray or light gray (5Y 6/1) clay films; very strongly acid; clear, smooth boundary.

IICg—40 to 70 inches, light-gray (5Y 7/1) fine sandy loam; many, medium, faint mottles of light olive gray (5Y 6/2) and common, medium, prominent mottles of reddish yellow (7.5YR 6/8); massive; friable; medium to strongly acid.

The solum ranges from about 30 to 40 inches in thickness. Fine, smooth gravel is likely to occur anywhere in the profile, but is common only in the IICg horizon. Hue throughout the profile is 10YR to 5Y, or the colors are neutral. The A horizon is 3 to 5 in hue and 1 or 2 in chroma. Very thin A1 horizons are 3 in value. In the B horizon the matrix is 5 to 7 in value, and 0 to 2 in chroma. Mottles are 7.5YR in hue or yellower, 4 in value and 2 to 8 in chroma. The Bt horizon is clay, silty clay, or silty clay loam in places. Generally, the clay content is 35 to 50 percent. The color range of the C horizon is the same as that of the B horizon. In texture the C horizon ranges from loamy sand to clay.

Elkton soils are similar to Bibb, Fallsington, Leonardtown, Othello, and Osier soils in drainage and in color. They are more clayey than Fallsington and Osier soils. They have a Bt horizon that is not present in Bibb, Osier, and Elkton soils. This horizon has more clay and less silt than similar horizons in Leonardtown and Othello soils. Although they formed in similar clayey sediment, Elkton soils are more poorly drained than Keyport soils.

Elkton silt loam (Ek).—This is the only Elkton soil mapped in the county. Included in mapping are small areas where the surface layer has a little more sand or clay and is more sticky than that of this soil. Also included are scattered small areas where the surface layer, to a depth of about 4 inches, is very dark gray or black. If this soil is artificially drained, it is well suited to corn and soybeans. It is not suitable for tobacco. Most undrained areas are wooded. Capability unit IIIw-9; woodland subclass 3w.

Eroded Land

This land type is represented by one mapping unit, Eroded land, steep (ErE). It consists of steep areas that have been so severely eroded that the soil profile largely has been destroyed. Slopes range from about 15 to more than 40 percent. Adjacent soils commonly are of the Sassafras and Westphalia series, but included with this unit in mapping are areas of Woodstown, Beltsville, Bourne, Exum, Wickham, Marr, Keyport, Matapeake, Mattapex, and Chillum soils. In most places the surface layer and the subsoil have been lost, have been severely gullied, or both. In some places, soil has been left between the gullies. These gullies, however, are either very close together or very deep, or both.

This unit is not suitable for crops or grazing. Many areas are in woodland that has been regenerated on what was once open cropland or pasture. Erosion caused by runoff on this land results in damage to surrounding areas. The soil lost from this land can clog ditches and drainageways and cause silting-in of ponds or other bodies of water. Keeping the areas of this land under a cover of protective vegetation helps to control erosion. The vegetation

ATTACHMENT VI

Hazardous Waste Site [illegible]

SIA _____

CONTAMINATION POTENTIAL

NAME/LOCATION US NAVAL PROPELLANT PLANT (INDIAN HEAD)

ADDRESS INDIAN HEAD, MD CHARLES CO.

NPDES # _____ SIC 3489 LAT. 38 33 45 LONG. 77 12 03

THE CONTAMINATION POTENTIAL IS LOW MODERATE HIGH (VERY HIGH)

NO. OF SITES 1 AGE — LINER — THICKNESS — AREA —

UNSATURATED ZONE 9H-B WATER QUALITY 5-B GROUND WATER AVAILABILITY 5A-B

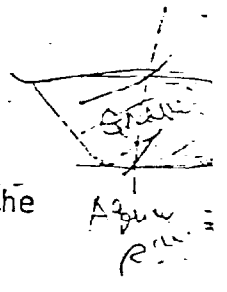
HAZARD OF CONTAMINANT 8-A TOTAL GROUND WATER CONTAMINATION POTENTIAL 27

ENDANGERMENT TO CURRENT WATER SUPPLIES 8B-B MONITORING WELLS 0

FREQUENCY OF MONITORING — SIGNIFICANT CHANGES IN GROUND WATER —

ADVERSELY —

REMARKS:



Reference: "Ground-water Aquifers and Mineral Commodities of Maryland"

The site is underlain by the Aquia Greensand, which consist of moderately glauconitic quartz sand with a few clay layers. The water table is near the surface and the saturated thickness in approximately 70 feet.

Ground water is expected to flow in the direction of the Potomac River. Generally, the water quality is very good.

The hazard of contaminant is based on the waste identification number, 2103, Heavy Metals.

There do not appear to be any surface impoundments or injection wells in the area. The population which relies on groundwater, within 3 miles, is less than 1,000.

cc: Bill Hagel (3SA30)
R.M. Twitchell (3WA32)
~~Sheila Borr (3WA32)~~
Benjamin A. Lacy (3WA32)
Ronald M. Naman (Ecology & Environmental, Inc.
8021 Route #130, Pennsauken, N.J. 08110)

Prepared By: Jeffrey J. Burke JJB

Date: January 6, 1982