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9/30/98-01886

SITE ASSESSMENT TECHNICAL ASSISTANCE

EPA CONTRACT 68-S5-3002

30 September 1998

TDD No. 9802-02C
DCN D0000663

Mr. Robert Thomson (3HS50)
Remedial Project Manager
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

Subject: Cheatham Annex Site Trip Report #1

Dear Mr. Thomson:

Enclosed you will find the trip report for the site reconnaissance visit conducted on 15 September 1998 for your review. If you have any questions or comments regarding this trip report, please feel free to contact me at (215) 238-0338, Ext. 234.

Sincerely,

ROY F. WESTON, INC.

Robert McGlade
Site Leader

cc: TDD File

SATA0300005:\cheatham trip report #1 cover letter.doc

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Trip Report #1

USN Supply Center Cheatham Annex
Williamsburg, Virginia

30 September 1998

Prepared for

U.S. Environmental Protection Agency Region III

Remedial Branch

Philadelphia, PA

SATA
Site Assessment

TDD No. 9802-02C
Contract No. 68-S5-3002

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TRIP REPORT

USNC Cheatham Annex Site
Williamsburg, York County, VA

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1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986, the U.S. Environmental Protection Agency (EPA) Region III Remedial Response Section, Remedial Project Manager Robert Thomson directed the Roy F. Weston, Inc. (WESTON®), Site Assessment Technical Assistance (SATA) team to conduct a site reconnaissance at the U.S. Naval Supply Center (USNC) Cheatham Annex Site, Williamsburg, York County, Virginia. The purpose of this reconnaissance visit was to identify sampling locations for a sampling event to occur in late November 1998, meet with U.S. Navy (USN) and Virginia Department of Environmental Quality (DEQ) representatives, and collect information concerning potential unexploded ordnance (UXO) at the site. This site reconnaissance was conducted as part of the scope of work specified in Work Plan 1.0, dated 19 March 1998, prepared by SATA, and approved by EPA.

SATA conducted this site reconnaissance on 15 September 1998.

2.0 BACKGROUND

2.1 Site Location

The site is located just north of Williamsburg, York County, Virginia as illustrated in Figure 1, Site Location Map (DOI, 1982). The approximate site coordinates are 37° 17' 30" north latitude and 76°.37' 30" west longitude (DOI, 1982).

2.2 Site Description

The United States Naval Supply Center Cheatham Annex Site (the site) consists of approximately four thousand acres just outside of Williamsburg, York County, Virginia. The site is currently divided between the United States Navy (Supply Center Cheatham Annex), the United States Department of the Interior (DOI) National Park Service (National Colonial Park), the United States Army (Camp Peary), and the Virginia Department of Emergency Services (Fuel Farm). All of these parcels were, at one time, utilized for the manufacturing, storage, and shipment of explosives and military ordnance as far back as 1916 (Goodwin, 1996). The site is bordered by the York River to the north, the United States Naval Weapons Station to the south, and the Busch Gardens Amusement Park to the west.

WESTON® MANAGERS DESIGNERS/CONSULTANTS FEDERAL PROGRAMS DIVISION	USNSC Cheatham Annex Site York County, Virginia	TDD #:9802-02C PCS #: 4618

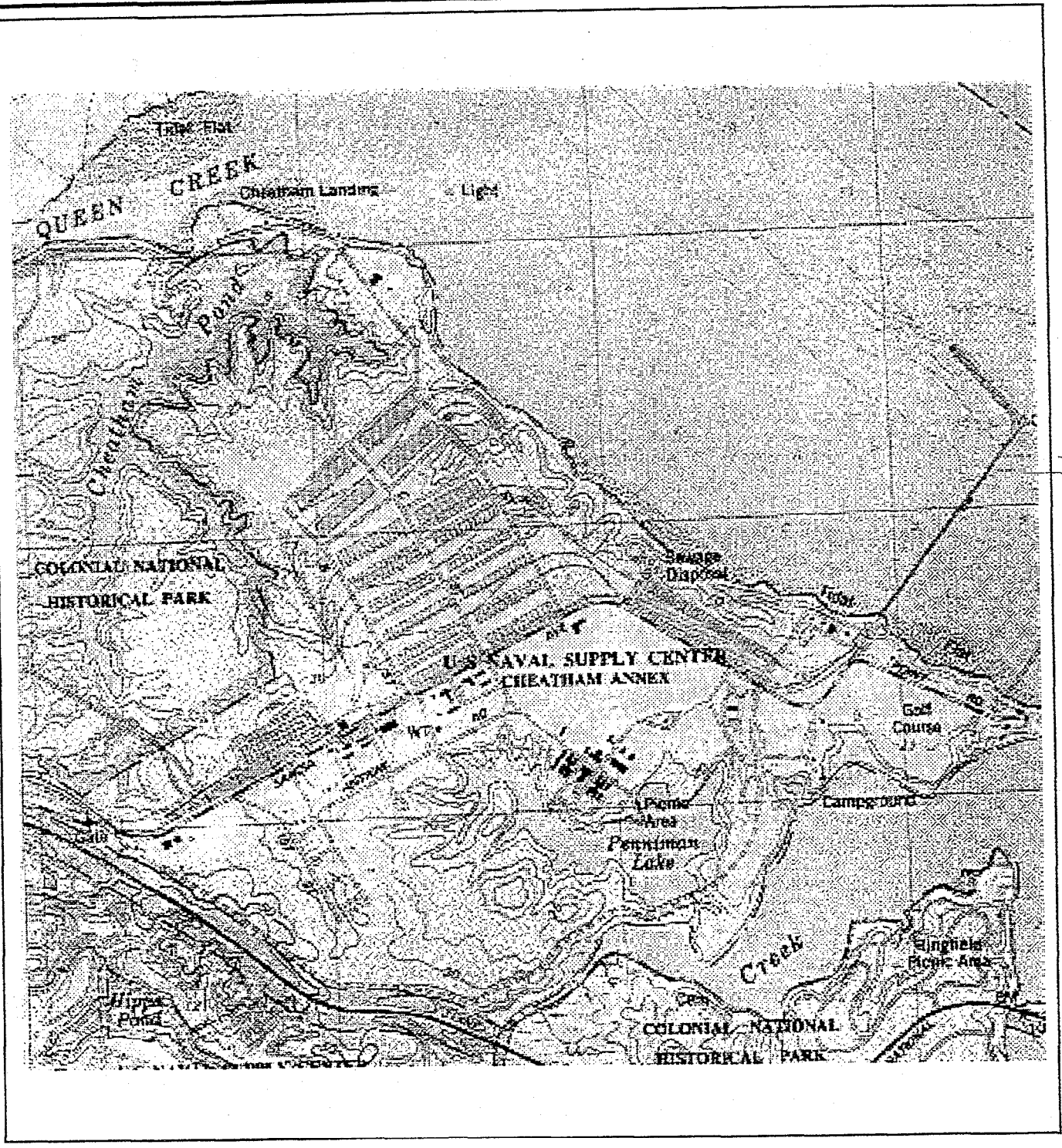

Figure 1 - Site Location Map
USN Supply Center Cheatham Annex Site

CLAY BANK, VA.
37076-CS-TF-024
DMA 5658 I SE-SERIES V834
PHOTOREVISED 1978

Scale

1 Km 1/2 Km 0 1 Km

The Penniman Shell Loading Plant was an explosives manufacturing facility operated by the DuPont de Nemours Company on what is now the USNC Cheatham Annex and the National Colonial Park properties. According to historical information, this facility operated as a trinitrotoluene (TNT) manufacturing plant beginning in approximately 1916, and subsequently began loading artillery shells for the war effort in 1918 (Goodwin, 1996, AG, Ellis). Between 1918 and 1925, following the end of World War I, this facility was demolished and reverted to farmland (Goodwin, 1996). The United States Navy established the USNC Cheatham Annex (USN CAX) on a portion of this property in 1942.

A fuel storage depot was operated by the USN from approximately 1940 until the mid 1980s, at which time the property was purchased by the Virginia Department of Emergency Services (VADES). VADES conducted a sampling assessment of the site, which identified areas of total petroleum hydrocarbon (TPH), polychlorinated biphenyl (PCB), and asbestos contamination. A corrective actions plan was developed for the site, and corrective actions were initiated by VADES. According to VADES, all identified PCB and asbestos contamination was removed. In the early 1990's, the fuel storage tanks were pumped and cleaned.

All of the properties, with the exception of the DOI parcel, are secured with fencing. Since the DOI parcel is a National Park, its access is unrestricted. The contaminants of concern at the site (currently the USN CAX and DOI parcels) are primarily those associated with military activities and the manufacturing of explosives.

3.0 CHRONOGLOGY OF EVENTS

The following is a chronological summary of the site reconnaissance conducted on 15 September 1998. Representatives from SATA, EPA, United States Navy Atlantic Division (USN LANTDIV), USN Cheatham Annex (USN CAX), and the Virginia Department of Environmental Quality (VADEQ) were present and comprised the reconnaissance group until approximately 1230 hours, at which time the VADEQ representative departed the site and the remaining agencies continued the reconnaissance.

0815 hours - SATA members Robert McGlade and Melissa Conklin, along with WESTON military ordnance expert Joseph Kendall, met on site with EPA RPM Thomson, USN LANTDIV Schirmer, USN CAX Folson, and VADEQ Wilcox for a briefing of the anticipated activities for the day.

IR Site 12
AOC-1

0920 hours - The reconnaissance group began the site reconnaissance activities at the dump area located on Navy property near Jones Pond. This area consisted of a wooded ravine which had been utilized as a dump site for construction debris, automobile parts, and other types of waste materials. During the investigation of this area, WESTON ordnance expert Kendall identified several smokeless powder drums which he estimated to date from the 1930's or 1940's. These drums were empty. USN LANT DIV Schirmer pointed out two gas cylinders which were part of the wastes dumped in this area. These cylinders were 8

inches in diameter and 54 inches long and were severely corroded. Markings were distinguishable on both of these cylinders, and included raised lettering around the neck which stated "THE PROPERTY OF THE LIQUID CARBONIC CO". Additional markings on one of these cylinders included stamped lettering as follows:

THE L.C. Co.
TESTED TO 3200 LBS PER □ INCH
2114 1910 0 NET WEIGHT 10° 49 LBS
CAPACITY 54.97 LBS

These cylinders had intact valves and welded base supports.

Runoff from this dump area was noted to enter Jones Pond, and USN personnel confirmed that Jones pond is utilized as a source of potable water for Cheatham Annex. RPM Thomson directed SATA to target this area as part of the first sampling event, tentatively scheduled for late November or early December 1998.

WOODS NEAR PENNIMAN LAKE

1000 hours - The reconnaissance group arrived at an area identified on 1916 engineering drawings as the "soldering and assembly house," and then proceeded to the "TNT graining house" area and the "ammonia evaporating" area. In these areas, a subsurface water/air transfer system was located by SATA. RPM Thomson directed SATA to target this transfer system, as well as the TNT graining house, the TNT catch basin, and the ammonia evaporating area settling pits, for sampling during the November/December sampling event.

WOODS NEAR PENNIMAN LAKE

1245 hours - SATA, USN CAX, USN LANTDIV, and EPA continued the site reconnaissance in the "shipping house" portion of the property. RPM Thomson identified what appeared to be an underground mixing tank located along the access road leading from the TNT grainer area towards the shipping house area and directed SATA to target this tank for sampling in November/December. SATA located three steel pipes protruding from the ground in the bottom of a shallow (approximately 18 inches) ditch which ran roughly north-south in this area. These pipes were approximately 3 inches in diameter and appeared to run from the area of the underground mixing tank in a northerly direction. It appeared that these pipes were buried under approximately 6 inches of soil in the bottom of the shallow ditch. RPM Thomson directed SATA to provide an amendment to the Cheatham Annex Site Work Plan which would detail a scope of work and labor estimate for tracking and mapping these pipes and other similar pipes on site, if located.

AOC-2 SAMPLING BY NAVY IN FALL '99

1300 hours - The reconnaissance group investigated the "landfill" area located among what is believed to be the remains of foundation footings of a Penniman shipping house. This area appears to contain medical and general waste materials dating from World War II or later. This area was identified as a clearing and disturbed area in an aerial photograph dated 1971.

BUTCH'S CONC BUNKER HUNT STAND →

1335 hours - The reconnaissance group arrived at the remains of the TNT daily store bunker to investigate this area. The bunker was filled with approximately 3 feet of water,

and therefore no internal investigation of this bunker could be made. SATA attempted to locate the area identified on 1916 engineering drawings as the "booster test pit," but this pit could not be located.

DoI Property

1410 hours - The reconnaissance group arrived at the blast hole area, which extends over several acres in the magazine area to the north of Sanda Avenue. This area consisted of a large number of blast craters, ranging in size from approximately 6 feet in diameter by 3 feet deep to approximately 20 feet in diameter by approximately 8 feet deep. WESTON's military ordnance expert indicated that these blast holes were most likely utilized in quality assurance tests of explosive batches or shell batches prior to shipment. According to the ordnance expert, blast testing would be conducted in one area until the resulting crater became too large to enter, at which time a new location would be selected for testing. From observations at the site, it did not seem to be common practice to refill these test craters. WESTON's ordnance expert indicated that the potential for finding live blasting agents or UXO in these pits was unlikely; however, shell fragments would likely be found which could be identified to more accurately characterize the activities at the site. RPM Thomson directed SATA to collect a subsurface soil sample from one of the larger blast pits in this area. The RPM also directed SATA to make attempts to locate and collect shell fragments in these pits for identification by the WESTON ordnance expert.

DoI Barrell

1415 hours - The reconnaissance group arrived at the abandoned empty drum in the magazine area. This drum was larger than a normal shipping drum, having a capacity of approximately 70 to 110 gallons, and had two steel reinforcing bands which were located at approximately 1/3 and 2/3 of the drums height. The drum was in extremely poor condition and was empty. According to RPM Thomson, previous inspections of this drum identified a steel manufacturers plate with the words "American Steel Barrel, Brooklyn, New York." This plate was not observed during the time of the 15 September reconnaissance. The WESTON ordnance expert tentatively identified the drum as an intermediate container used for either the chemical warfare agent mustard gas, or the chemical concealment agent FM smoke. This drum could potentially date to the World War I era. It was noted that a relatively large area around this drum was free of vegetative growth, which appeared unusual for the time of year and the location of the drum. The RPM directed SATA to collect several soil samples from around this drum area for standard EPA contract laboratory program (CLP) analytical parameters as well as mustard gas and FM smoke breakdown compounds. The RPM also directed SATA to complete a comprehensive reconnaissance of this area during the winter months to locate any additional drums.

DoI property, maybe some CAX

1445 hours - The reconnaissance group arrived at the nitro-starch drying house and nitro-starch dry storage house area. These consisted of numerous bunkers, abandoned fire hydrants, and building foundation remains. Based upon field observations and 1916 engineering drawings, there were two types of bunkers in this area, a larger type appearing to be the drying houses, and a smaller type appearing to be dry store houses. The larger bunkers were identified as having brick-lined "sumps," and piping which extended through the bunker and into a shallow ditch which led to the swamp area. The RPM directed SATA to collect a sample from one of these sumps, and to collect several samples from one of the drainage ditches leading to the swamp area.

A debriefing meeting was held between USN LANTDIV, SATA, and the EPA at the CAX maintenance administrative building after the site reconnaissance. During this debriefing, RPM Thomson directed SATA to locate the area where empty wooden barrels were stored, as shown in the 1918 panoramic photographs, and collect subsurface soil samples from this area. In addition, the RPM directed SATA to collect a sample of the slag material identified in several locations on site for lead analysis. The RPM also directed SATA to begin collection of background information for the Data Acquisition/Summary Report (DA/SR), to include a search at the National Archives, and to begin collection of information for a deed search and identification of the true boundaries of the site for sampling and mapping purposes. Site activities concluded at 1700 hours on 15 September 1998.

CAX

4.0 MILITARY ORDNANCE EXPERT'S OBSERVATIONS AND RECOMMENDATIONS

Following the site reconnaissance conducted on 15 September 1998, WESTON's military ordnance expert collected information on the Penniman Shell Loading Plant, the containers found on-site, several of the buildings identified in the engineering drawings, and chemical warfare agents. In addition, the ordnance expert made recommendations regarding the future course of action at the site.

4.1 Container Information

DOI Drum

Based upon U.S. military documentation, the ordnance expert confirmed that the chemical drum located in the magazine area may have contained FS smoke, FM smoke, H mustard agent, or HD mustard agent if it was a U.S. military drum. The U.S. military designation for this drum is believed to be type A model A, which is normally a 55-gallon drum with a 2¼-inch bung located on the side and a ¾-inch bung located on the top (US Army 1946a and 1946b). The drum located at the site is larger than a 55-gallon drum, and therefore it is suspected that this drum contained FS or FM smoke rather than mustard agent and likely dates from the 1930's or 1940's (US Army 1946b). It is recommended that the diameter and length of this drum be recorded to determine the exact capacity of the container. The most common FS or FM smoke containers are 110-gallon, and are 32 inches in diameter and 44 inches in length (US Army 1946b). Fifty-five gallon drums are 26 inches in diameter and 35 inches in length.

IRSITE 12 DOC 1

The two cylinders found in the landfill area near Jones Pond are currently unidentified. WESTON is awaiting additional information from the Liquid Carbonic Company and other sources on these cylinders. This information will be provided to the RPM in letter format when it is received.

4.2 Recommended Sampling Locations for Explosives Parameters

Based upon a review of the 1916 engineering drawings, the 1918 panoramic photographs, and knowledge of the explosives manufacturing process, the ordnance

expert recommends that sampling be conducted in the following locations for explosives analysis (Kendall, 1998):

CAX
- The three "settling pools" located near the ammonia evaporating building ruins.

CAX/DOI
- Inside the foundation ruins of any building which had a wooden or earthen floor and where explosives were mixed or stored.

CAX/DOI
- Any area where sumps are located.

CAX
- The waste barrel storage area pictured in the 1918 panoramic photographs.

DOI
- In and around the blast holes located near the magazine area.

Several of these areas are already targeted for sampling during the first sampling event, to occur in late November or early December 1998. The other recommended areas can be targeted for sampling either during the first sampling event or during the second sampling event, which will occur sometime in early 1999. SATA will await the RPM's direction on this issue.

4.3 Recommended Sampling Locations for Other Parameters

The ordnance expert made recommendations for sampling other areas on site based upon the potential for chemical contamination. These locations are as follows (Kendall, 1998):

IR SITE 12 AOC-2
- The landfill area near Jones Pond, especially under the black powder drum found leaking a black, grease-like material and around the type B drum found riddled with pick holes.

DOI
- Around the type A chemical drum ~~found~~ in the magazine area.

200' EAST OF WAREHOUSE — CAX?
- In and around the ruins of the building designated as the "dope house" in the 1916 engineering drawings.

SOUTH OF COLONIAL PKWY. — ~~CAX~~
- In and around the ruins of the building designated as the "isolation hospital" in the 1916 engineering drawings.

AOC-2
- In and around the landfill area containing dextrose solution IV bottles.

CAX
- In and around the areas identified as "caustic storage" in the 1916 engineering drawings.

CAX
- In and around the ruins of the building designated as "paint and clean" in the 155-mm line and 9.5-inch line in the 1916 engineering drawings.

CAX/DOI
- In and around the ruins of any buildings with wooden or earthen floors which stored or mixed chemicals as identified in the 1916 engineering drawings.

Several of these areas are already targeted for sampling during the first sampling event to occur in late November or early December 1998. The other recommended areas can be targeted for sampling either during the first sampling event or during the second sampling event, which will occur sometime in early 1999. SATA will await the RPM's direction on this issue.

4.4 Recommended Magnetic Surveys

Based upon the potential for buried UXO, the ordnance expert recommended that magnetic surveys be conducted in areas which may have been utilized as waste burial areas. Since waste burial areas have not been specifically identified to date, the ordnance expert recommends that magnetometer surveys be conducted in two likely waste burial locations. These areas have been selected based upon proximity to areas which may have produced a significant amount of waste during the plant's operation, the lack of buildings or structures in these areas as indicated on the 1916 engineering drawings, and observations made during the 15 September site reconnaissance. These areas are as follows (Kendall, 1998):

VA
- The trench area located on current VADES property (formerly the USN fuel farm).

CAX
- The area south of the buildings identified as the "isolation hospital" on 1916 engineering drawings.

DoI
In addition, the ordnance expert recommends that a magnetic survey be conducted in and around several of the blast holes located near the magazine area to locate shell fragments. These fragments, if found, will be identified by the ordnance expert in order to determine the exact types of shells loaded at this facility. This identification will aid in determining whether chemical munitions were loaded at the Penniman plant.

4.5 Requested Additional Information

As part of the continued background information search being conducted for this site, the ordnance expert has requested that SATA collect additional information regarding certain aspects of this project. This additional information is needed in order to aid in determining where waste burial may have occurred and whether chemical munitions were loaded at the Penniman facility. The following information has been requested:

- Enlargements of the 1918 panoramic photographs in order to more clearly determine where a waste burial area may be located.
- Enlargements of the 1937 aerial photograph in order to more clearly determine where a waste burial area may be located.
- Copies of any documents pertaining to the Penniman facility which are located in the National Archives in Washington, D.C.
- An official map which specifies the exact location of the property boundaries and the actual size of the property.
- GPS or civil survey information for sampling locations, gravel roads present, and certain foundation ruins as deemed appropriate.
- Deed information on the ownership of the property dating as far back as possible.

- County tax maps of the property.
- Any information from DuPont de Nemours which could pinpoint the location of a landfill on the property utilized during the facilities operation (or confirmatory information which indicates that waste was disposed off site).
- Any information from DuPont de Nemours which details the activities conducted at the isolation hospital.
- Any information from DuPont de Nemours which identifies where medical waste from the isolation hospital was disposed.
- Any information from DuPont de Nemours which identifies the function of the buildings identified as "kaustine" on the 1916 engineering drawings.
- Historical federal railroad information which specifies the types of cargo going to and from the Penniman plant.

SATA will begin to collect this information if so directed by the RPM. In consideration of the circumstances and potential legal issues, SATA recommends that the RPM make first contact with DuPont de Nemours in order to obtain the information which may be needed from them.

4.6 Other Information

In addition to the above information, the ordnance expert provided SATA with documentation on:

- The environmental fate of chemical warfare agents.
- The manufacturing process of nitro-containing compounds and explosives.
- The construction and design of cooling mechanisms utilized in manufacturing explosives during WWI.
- Warfare trench design of the Civil War era.
- Warfare trench design of the World War I era.
- Shell filling materials.
- MSDS for explosives compounds and chemical warfare agents.
- General information on the role of the United States explosives manufacturing capabilities during WWI.

Based upon this information, review of the 1918 panoramic photographs, review of the 1916 engineering drawings, and field observations, several general comments can be made.

It appears that the Penniman Shell Loading facility utilized a brine solution for cooling the explosive compounds in the buildings identified as "nitrating houses" on the 1916 engineering drawings. Documentation provided by the ordnance expert details the design of this system, which includes an above-ground 4-inch brine water line placed inside a wooden box duct which is filled with granulated cork pieces as insulation. This line would carry very cold brine water to the nitrating houses where explosive nitro-compounds would be synthesized. This cold brine

water kept the reaction cool to prevent detonation (Van Nostrand, Report, Hackh's, Report, and Compton). The 1918 panoramic photograph which faces northward (Attachment 1, photograph #11) appears to depict a wooden, insulating water line duct extending into the nitrating houses.

Based upon field observations and the design of the trenches located on VADES property (the fuel farm area), these trenches may date from the Civil War era as part of the peninsula defenses established around Fort Magruder (Cooling). These trenches do not appear to meet the design of those constructed during WWI (Ellis).

5.0 CONCLUSION

To date, there is no significant information gathered with regards to the Penniman Shell Loading Plant which indicates that chemical munitions were manufactured or loaded at this facility. It appears that all of the shells loaded at this facility were high explosive, including TNT, Amatol, and Triton. It should be noted, however, that a considerably large amount of information remains to be gathered, including cargo shipping and receiving information, DuPont de Nemours historical information, and government contracting information. Until this additional information can be gathered and reviewed, the presence of chemical warfare agents at this facility should be considered a possibility.

A sampling plan will be prepared for the first sampling event tentatively scheduled for late November or early December 1998. Prior to that sampling event, SATA believes that one more site visit should be conducted in order to collect shell fragments from the blast holes, obtain deed and tax map information from York County, and to collect civil survey information of the gravel roads and certain significant sampling locations (such as the blast holes and the slag area).

An amendment to the work plan for the site will be prepared which will detail the scope of work for locating, mapping, and identifying the buried steel pipes found on site. In addition, a Labor Hour Pool level of effort (LOE) estimate and request for additional hours will be prepared in order to detail the LOE requirement for shell fragment identification and additional research.

6.0 REFERENCES

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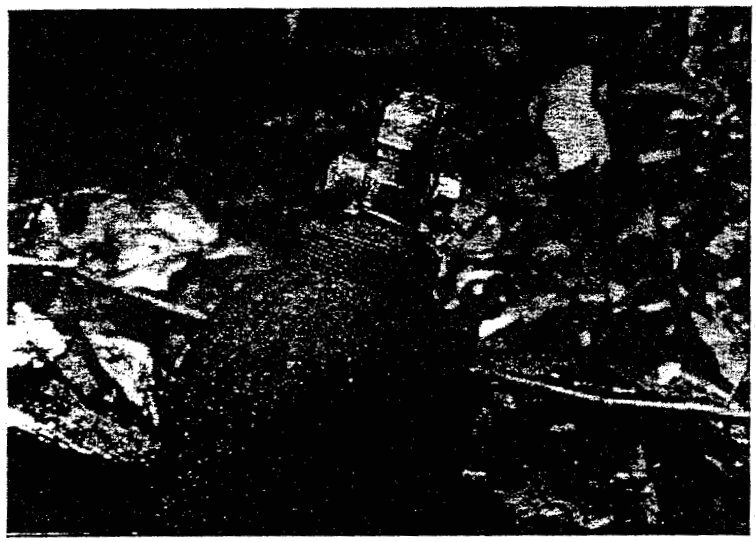
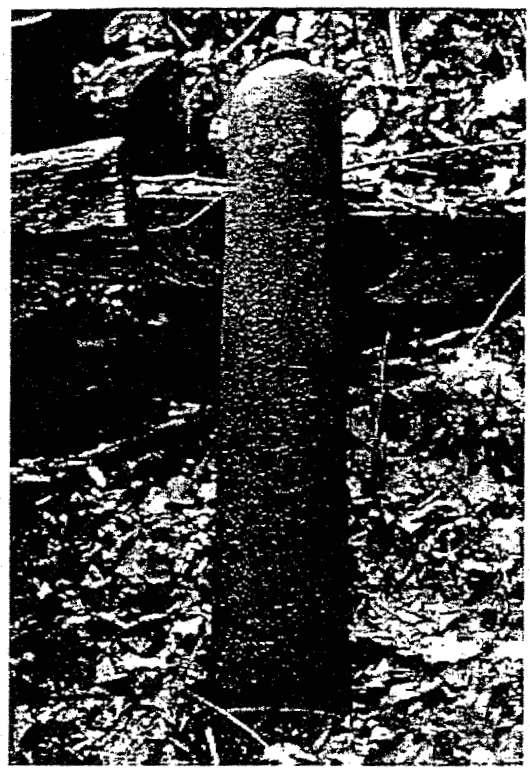
Attachment: 1 - Photographic Documentation Log

ATTACHMENT 1
PHOTOGRAPHIC DOCUMENTATION LOG

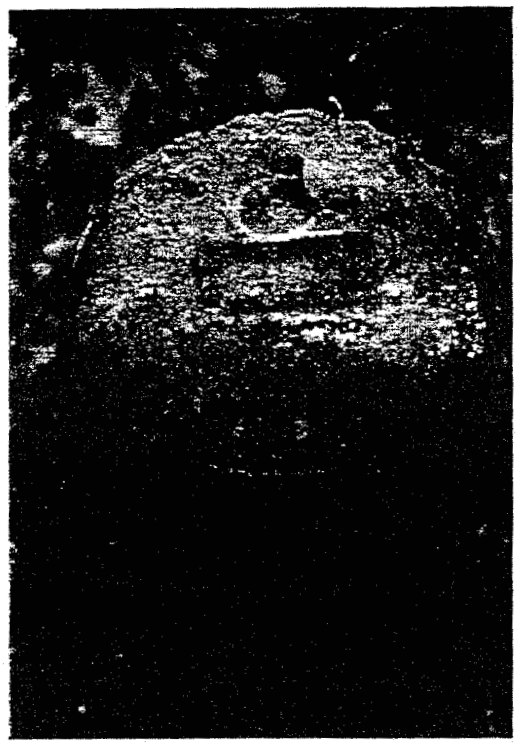


Photograph 1. One of two cylinders found at Jones Pond landfill area.

Both
IR Site 12
AOC-2



Photograph 2. An overview of one of the cylinders found at Jones Pond landfill area.



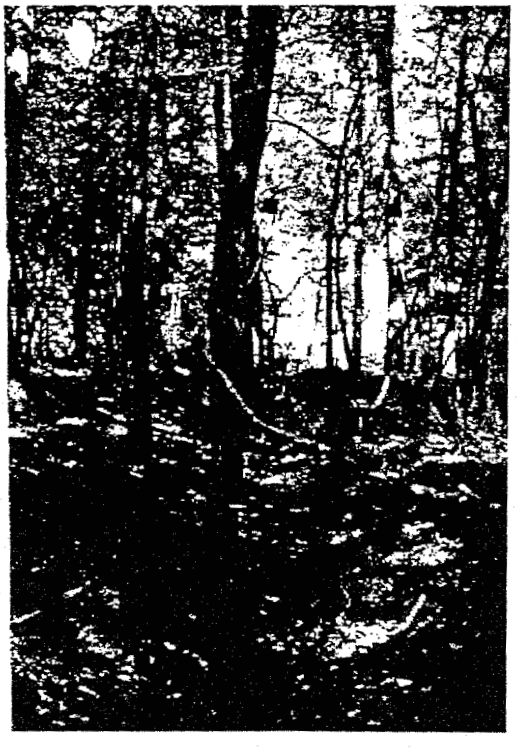
Both
IR Site 12
AOC-2

Photograph 3. A black powder drum found at Jones Pond landfill area.

Photograph 4. The oozing drum found at the Jones Pond landfill area.

BOTH
CAX
WOODS
NEAR
PENNIMAN
LAKE

Photograph 5.
The underground "mixing tank" found in the shipping house portion of the property.



Photograph 6. The shallow ditch containing 3" steel pipes near the shipping house area.

DOI property

Photograph 7. A typical example of the blast holes found in the magazine area.

DOI Property

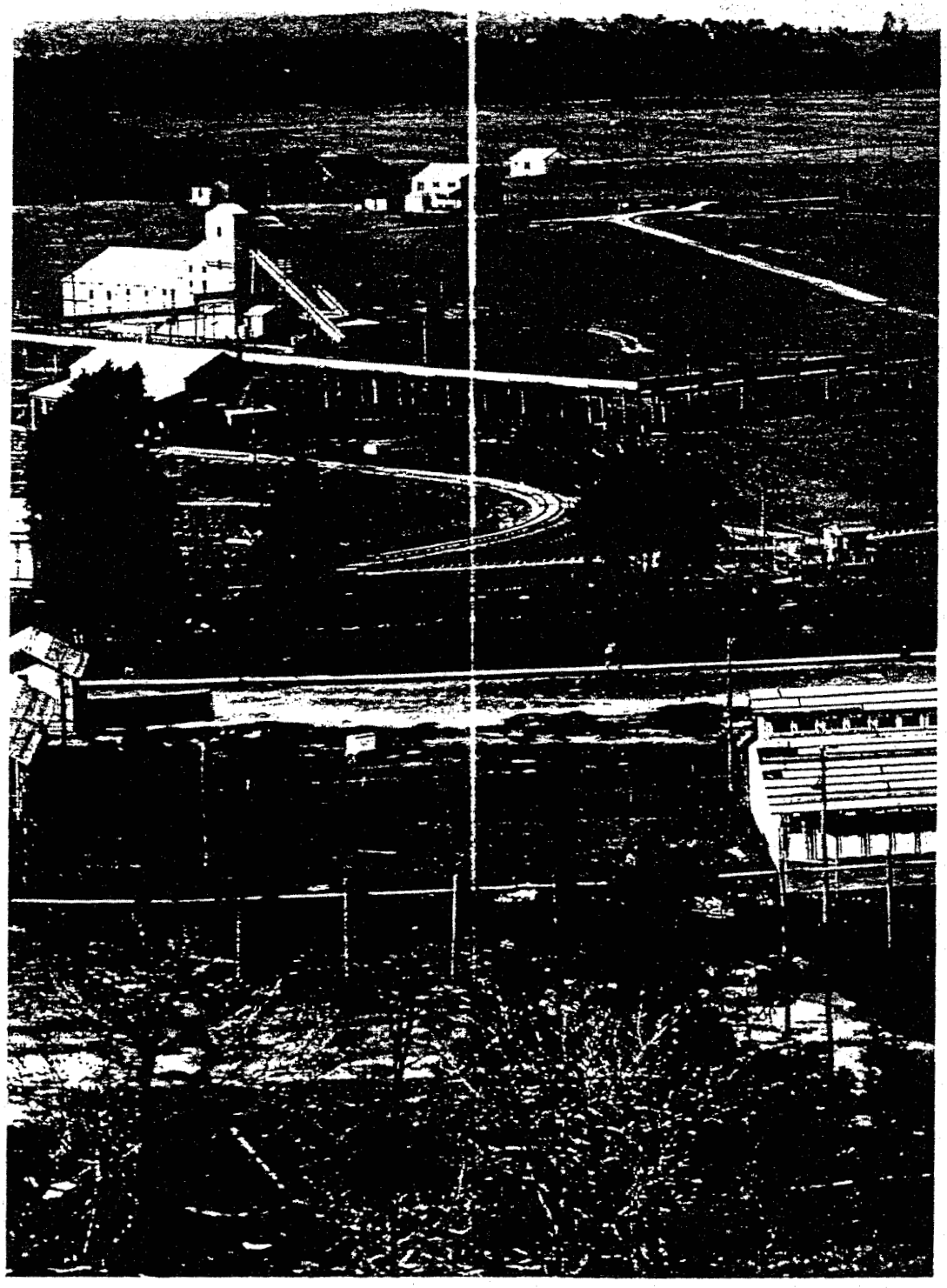
Photograph 8. The FM/FS smoke drum found in the magazine area

DOI
Property

Photograph 9. A typical example of the remains of the nitro-starch house bunkers.

CAY
woods
NEAR
perimeter RD

Photograph 10. A "mixing tank" found above ground in the shipping house area.



CAX

Photograph 11.
1918 photograph showing a wooden pipe box which is suspected
to be an insulating line for brine cooling water.
(1918 panoramic photograph # 6 of 12, Hagley Museum, Wilmington, DE.)