

# DESIGN ANALYSIS BASIS OF DESIGN AND CALCULATIONS

## SPENT ACID & PCB CONTAMINATED SOIL REMEDIATION

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Navy Contract No.: N62472-88-D-1294

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# ATLANTIC

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## **1.0 INTRODUCTION**

### **1.1 Purpose and Scope**

The Naval Submarine Base of New London (NSB-NLON) consists of approximately 547 acres of land and associated buildings in southeastern Connecticut in the towns of Ledyard and Groton. NSB-NLON is on the east bank of the Thames River, approximately 6.0 miles north of Long Island Sound. NSB-NLON was placed on the National Priorities List (NPL) on August 28, 1991, by the U.S. Environmental Protection Agency (U.S. EPA) pursuant to the comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980.

The purpose of this project is to provide remedial design for contaminated soils at two locations on the NSB-NLON in Groton, Connecticut. Both remedial designs are source-excavation actions. Excavated contaminated material will be disposed of in accordance with applicable regulations.

The designs represent the actions necessary to prevent the release of contaminants into the environment and prevent human exposure to the contaminants. The Navy's goal is to begin remedial actions at NSB-NLON as quickly as possible to protect human health and the environment and to comply with applicable or relevant and appropriate requirements (ARARs).

The basis for this design regarding limits of excavation and appropriate levels of contaminants are the prior studies listed below, produced for Northern Division by Atlantic.

- Design Work Plan, Interim Remedial Design, Spent Acid Storage and Disposal Area, and Area A Landfill-Concrete Pad, October 19, 1993.
- Focused Feasibility Study, Spent Acid Storage and Disposal Area, February 4, 1994.
- Focused Feasibility Study, Area A Landfill.

### **1.2 Site Locations and Descriptions**

The Spent Acid Site is near the southeast corner of the Subase, between Buildings 409 and 410. The work includes removal of a former acid tank (open top), previously abandoned

and filled, at grade, in a paved parking lot and excavation and disposal of adjacent lead-contaminated soils. The PCB site is adjacent to the bituminous concrete pad, in Area "A," north of Wahoo Avenue and west of the deployed parking. The work includes excavation and disposal of PCB-contaminated soils from two locations adjacent to a bituminous concrete pad.

## **2.0 CHARACTERISTICS OF THE SPENT ACID SITE**

### **2.1 Adjacent Buildings**

The location of the spent acid tank and surrounding removal limits are within a parking lot fronting on Buildings 408, 409, and 410. These are active buildings and must remain operational during the work.

### **2.2 Site Access**

There are two existing access points to the parking lot, one west of Building 408 and one (Golet Avenue) south and east of Building 410.

### **2.3 Surface and Drainage Conditions**

The entire vicinity of the spent acid tank is paved. North of the tank, between Buildings 409 and 410, is concrete pavement; the remainder of the vicinity is bituminous concrete pavement. Storm runoff is sheet flow across the tank vicinity, flowing south to curbing near Tang Avenue. Most of this flow then continues westward along the gutter to a catch basin in front of Building 408. A minor amount flows eastward to a catch basin in front of Building 410. The pavement gradient generally ranges from 1 to 5 percent.

### **2.4 Utilities and Subsurface Conditions**

There are numerous utilities within the parking lot, including a sanitary sewer, stormdrain, electric and water lines, and others. The only item which appears to intersect the excavation limits for this project is an electrical duct. The material under the pavement, based on borings, is primarily dry sand and gravel to approximately 6 feet in depth and wet sand and silt below 6 feet in depth. For detailed information, the boring logs should be reviewed directly.

### **3.0 CHARACTERISTICS OF THE PCB SITE**

#### **3.1 Adjacent Building and Operations**

There are several buildings, including storage sheds, at the western edge of the bituminous concrete pad, at the PCB site, which is within Area A. The activities within these buildings are to remain operational during the implementation of this project, a requirement which will be easy to accomplish. The only other building on the site is the electrical shop, Building 496, which is fairly close to (just south of) the deeper of two excavations for this project. Activities within this building are also to remain operational, but there may be some temporary problem with access. The door at the north end will be kept closed during the work aspects of the project.

Just west of Building 496 is the salt-storage area, for mixing with sand piles east of the PCB site; the salt is used during ice and snow conditions for Subbase maintenance and safety. At the north edge of the site is a large area of sand bags stored on wood pallets. There is intermittent east-west truck traffic passing through the site, which will continue during project activities. Access to the site is by way of a gravel drive from Wahoo Avenue.

#### **3.2 Surface/Drainage Conditions**

A portion of the site is a bituminous concrete pad, normally used for storage and for testing cranes. The remaining surface is sand/gravel, and all excavation work is expected to comprise this material. Site storm runoff is generally overland flow, in a northerly direction, and no concentrated flow is anticipated. Surface gradient varies between 2 and 5 percent.

#### **3.3 Subsurface Conditions**

Based on borings, the site is generally sand, gravel, and rubble to approximately ten feet, with groundwater approximately at or below ten feet. For more detailed information, the boring logs should be reviewed directly. No subsurface utilities are anticipated in the work area, but

there is a 30-inch diameter stormdrain, with an invert approximately ten feet below the surface. This location approximately matches one edge of the deeper of the two required excavations at this site. This drain is to remain undisturbed during this contract.

#### **4.0 DESIGN REQUIREMENTS FOR THE SPENT ACID SITE**

##### **4.1 Limits of Contaminated Material**

Based on analysis of samples from borings and as previously reported in the Focused Feasibility Study, the limits of material to be excavated (as contaminated) are shown on the construction drawings. The area of excavation is an irregularly shaped area approximately 30 feet by 40 feet, with the north end approximately 5 feet into the concrete area and the remainder in bituminous concrete. The depth of the excavation is to be four feet. Testing of the sides and bottom, after initial excavation, will indicate whether contamination criteria have been met. If not, additional excavation could be necessary, at additional cost. All contaminated material is to be disposed of off site, and clean material from an off-site borrow source will be used to replace the contaminated material. Earthwork calculations are included in Appendix A.

##### **4.2 Surface Requirements**

This site is an active parking lot and the surface will be replaced to match existing materials and grades. One exception is a 10-foot square concrete slab. In discussion with Subbase personnel, no current purpose for this slab could be determined, and it was agreed upon that replacement would be bituminous concrete to match the surrounding parking lot. The required pavement section has been determined from government standards to be 2 inch (minimum) bituminous concrete on a 4-inch base course (see Appendix A).

The removed portion of the main concrete slab area will be replaced with a 6-inch concrete slab, and one joint will be installed to match the adjacent existing joint.

Grades of new pavements will match the existing grades, and the final construction will result in no change to operations or drainage. Any surface damage, including holes from temporary fencing, will be repaired to match existing materials and grades.

#### **4.3 Utilities and Monitoring Wells**

The only utility to be encountered in this excavation is expected to be an electric duct. The contractor will be required to support this utility area during the work and to backfill and compact to assure this area remains properly supported after construction.

There are two monitoring wells shown as existing: one shallow and one deep, within the excavation limits. The contractor will be required to protect these monitoring wells from damage during the work and reset the tops to match grade. At the time the design was prepared, these wells had not yet been installed. It is understood that they will be installed (by others) prior to commencing this project.

If the confirmation sampling requires expansion of the excavation limits, additional utilities may be impacted. The contractor will be required to coordinate with the Subbase Department of Public Works to verify utility locations.

#### **4.4 Control of Hazardous Materials**

Detailed specifications have been prepared regarding the handling of the contaminated materials. The tank, associated concrete and fill, bituminous concrete and concrete, and soil are all to be disposed of (as contaminated) in accordance with applicable regulations. The plans provide limits of three zones to assure that adequate areas are available to control this material and prevent contamination of adjacent areas. The contractor will be required to provide a work plan, for approval, to provide for the safe handling of these contaminated materials and for protection of all personnel. An environmental protection plan will be similarly required, which will also help prevent migration of contaminated materials. Restoration of the site at the conclusion of the work will include proper disposal of contaminated items.

## **5.0 DESIGN REQUIREMENTS FOR THE PCB SITE**

### **5.1 Limits of Contaminated Material**

Based on analysis of samples from borings and as previously reported in the Focused Feasibility Study, the limits of the contaminated material to be excavated are shown on the construction drawings. There are two areas, one on the surface, two feet deep, and the second below the surface, four-to-ten feet deep, under materials considered not contaminated. These surface soils are not clean, but the levels of contamination are below the threshold for disposal. Since this soil matches the condition of all other soils in this landfill, it is to be used as backfill (after confirmation sampling of the completed deep excavation) in the bottom of the deep excavation. There will need to be additional clean borrow brought to the site for upper soil replacement in both excavations. Earthwork calculations are included in Appendix A.

### **5.2 Surface Requirements**

This site is a landfill area and will be capped under another contract. This work is not likely to occur until approximately a year after this contract for removal of the contaminated soil. Government operations will continue on the surface of this site in the interim, and so a slight improvement to the existing sand/gravel surface of these excavations is appropriate, to be sure these disturbed areas do not deteriorate more than surrounding surfaces. A six-inch layer of crushed stone, as used for base course at the Spent Acid site, should be sufficient to accomplish this requirement. New grades will be unchanged from original, matching adjacent surfaces, and drainage will also be unchanged.

### **5.3 Site Operational Requirements**

The contractor will be required to relocate salt stockpiles and sandbags. The salt will be moved adjacent to the sand stockpiles to allow mixing by the government and retained to the original location at the end of the work. The sandbags and the wood pallets holding them will

be moved as directed by the contracting officer. The purpose of this activity is to provide an access path around the work site for east-west traffic during the work.

#### **5.4 Control of Contaminated Material**

Detailed specifications have been prepared regarding the handling of the contaminated materials. The shallow (two feet deep) excavation is all to be disposed of as contaminated, and volumes are based on vertical side walls. The deeper (10 feet deep) excavation is beyond the depth where OSHA regulations permit vertical side walls. Appendix A includes a brief analysis of expected requirements for this excavation, resulting in an estimated slope of 1:1 for side walls. The earthwork calculations assume that the material below 4 feet in depth between the sloped limits of this 20 foot by 30 foot rectangular excavation will be contaminated, and this assumption has been included in the volume for bidding purposes.

When the contractor does the work, he is required to provide engineering data on his method of excavation. The data could be in the form of verification of side wall slope requirements or vertical shoring. If shoring is to be used, the contractor will be required to allow for side wall sampling. Confirmation testing results could require additional excavation beyond the vertical supports, which may be handled as an additional cost item, but only if it exceeds the total contract volume. The method of carrying out the work will be decided by the contractor, with the approval of the Contracting Officer.

The plans provide limits for three zones to assure that adequate areas are available to control these materials and prevent contamination of adjacent areas. The contractor will be required to provide a work plan for approval, providing for safe handling of these materials and for protection of all personnel. An environmental protection plan will also be required, which will help prevent migration of contaminated materials. Restoration of the site at the conclusion of the work will include proper disposal of items which are contaminated.

## **6.0 CONCLUSIONS**

This project includes work at two sites which are separated by considerable distance. The contractor may work at both sites simultaneously but sufficient time has been allowed in the contract to allow him to sequence the work, finishing one site before proceeding on the second site. The sequenced method is probably more cost effective, allowing for lower costs for items like office trailer and protective gear, that may otherwise be duplicated. The construction work is fairly minor, consisting primarily of digging three holes and repairing them. The contract is less simple, and therefore more costly, because of the removal of contaminated materials and associated testing and safety requirements.

**APPENDIX A**  
**CALCULATIONS**

# **EARTHWORK CALCULATIONS**

BY SMC DATE 2/21/94 SUBJECT NAVAL SUBMARINE BASE - N. LONDON SHEET NO. 1 OF 5  
 CHKD. BY [Signature] DATE 2-22-94 GROTON, CT - SPENT ACID - JOB NO. 1256-30-05-04  
Material Balance

### MATERIAL BALANCE - SPENT ACID

#### Source area Delineation -

source area =  $2,929.5 \text{ si} \left( \frac{20^2 \text{ sf}}{1 \text{ si}} \right) = 1,171.8 \text{ sf}$  (based on averaging 3 passes of planimeter)  
 depth of excavation = 4'

$$\therefore V_{\text{source}} = 1,171.8 \text{ sf} \times 4' = 4,687.2 \text{ cf} \blacktriangleleft$$

#### total volume of concrete to be removed -

@ a depth of 6"

$$V_{\text{conc.}} = [(2(\frac{1}{2})9' \times 4') + (22' \times 9') + (10' \times 10') + 2(3' \times 15')] \frac{6'}{12}$$

$$= 212 \text{ cf} = 7.85 \text{ cy} \blacktriangleleft$$

Portion of concrete in source area:

$$V_{\text{conc}} = [(2(\frac{1}{2})5' \times 2') + (16.5' \times 5') + 2(3' \times 15') + \frac{1}{2}(10' \times 5')] \frac{6'}{12}$$

$$= 103.75 \text{ cf} = 3.84 \text{ cy} \blacktriangleleft$$

#### total volume of bituminous concrete to be removed -

@ a depth of 2"

$$V_{\text{BIT CONC}} = [1,171.8 \text{ sf} + 1.0451 \text{ si} \left( \frac{20^2 \text{ sf}}{1 \text{ si}} \right) - (207.5 \text{ sf} - 45 \text{ sf})] \frac{2'}{12}$$

$$= 237.9 \text{ cf} = 8.81 \text{ cy} \blacktriangleleft$$

Portion of bit. concrete in source area:

$$V_{\text{BIT CONC.}} = [1,171.8 \text{ sf} - 2[\frac{1}{2}(5' \times 2')] - (3' \times 15') - (16.5' \times 5') - \frac{1}{2}(10' \times 5')] \frac{2'}{12}$$

$$= 168.25 \text{ cf} = 6.23 \text{ cy} \blacktriangleleft$$

#### total volume of soil to be disposed = $V_T - V_{\text{conc}} - V_{\text{BIT CONC.}} = V_{\text{DISP}}$

$$V_{\text{DISP}} = 4,687.2 \text{ cf} - 103.75 \text{ cf} - 168.25 \text{ cf} = 4,415.2 \text{ cf} = 163.5 \text{ cy} \blacktriangleleft$$

#### total volume of available fill -

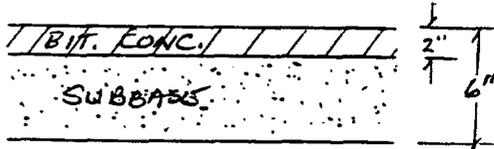
$$V_{\text{FILL}} = 1.0451 \text{ si} \left( \frac{20^2 \text{ sf}}{1 \text{ si}} \right) \times \frac{4'}{12} = 139.35 \text{ cf}$$

ASSUMING A 10% COMPACTION LOSS  $\Rightarrow V_{\text{FILL}} = 139.35 \text{ cf} (0.9) = 125.4 \text{ cf} \blacktriangleleft$

BY SMC DATE 2/21/94 SUBJECT NAVAL SUBMARINE BASE - N. LONDON SHEET NO. 2 OF 5  
 CHKD. BY [Signature] DATE 2-22-94 GROTON, CT - SPENT ACID - JOB NO. 1256-30-05-04  
Material Balance

total volume of new pavement and subbase -

$$V_{LOT} = 4,526 \text{ sf} \left( \frac{20^2 \text{ sf}}{1 \text{ si}} \right) \times \frac{6'}{12} - \underbrace{\left[ (2(\frac{1}{2})9' \times 4') + (22' \times 9') \right]}_{\text{concrete}} \frac{6'}{12} = 788.2 \text{ cf}$$



$$V_{BIT \text{ CONC. NEW}} = \frac{1}{3} (788.2 \text{ cf}) = 262.7 \text{ cf}$$

$$V_{SUBBASE NEW} = \frac{2}{3} (788.2 \text{ cf}) = 525.5 \text{ cf}$$

volume deficit -

$$V_{DEFICIT} = (\text{surface area of the source area} \times 3.5') - \text{volume of available fill}$$

$$V_{DEFICIT} = (1,171.8 \text{ sf} \times 3.5') - 125.4 \text{ cf}$$

$$V_{DEFICIT} = 3,975.9 \text{ cf} = 147.25 \text{ cy borrow}$$

DISPOSAL QUANTITIES

Item	QUANTITY
source material volume = 4,415.2 cf (includes tank) assume $\rho_{soil} = 110 \#/\text{cf}$ $\therefore 4,415.2 \text{ cf} \left( \frac{110 \#}{\text{cf}} \right) \left( \frac{1}{2000 \#} \right) = 242.8 \text{ tons}$	243 TONS
concrete volume = 212 cf assume $\rho_{conc} = 150 \#/\text{cf}$ $\therefore 212 \text{ cf} \left( \frac{150 \#}{\text{cf}} \right) \left( \frac{1}{2000 \#} \right) = 15.9 \text{ tons}$	16 TONS
Bituminous Concrete volume = 237.9 cf assume $\rho_{BIT \text{ CONC}} = \frac{135 \#}{\text{cf}}$ $\therefore 237.9 \text{ cf} \left( \frac{135 \#}{\text{cf}} \right) \left( \frac{1}{2000 \#} \right) = 16.1 \text{ tons}$	16 TONS
<b>TOTAL TONNAGE OF WASTE FROM SPENT ACID STORAGE AREA TO BE DISPOSED OF AT A TSCA LANDFILL = 275 TONS</b>	

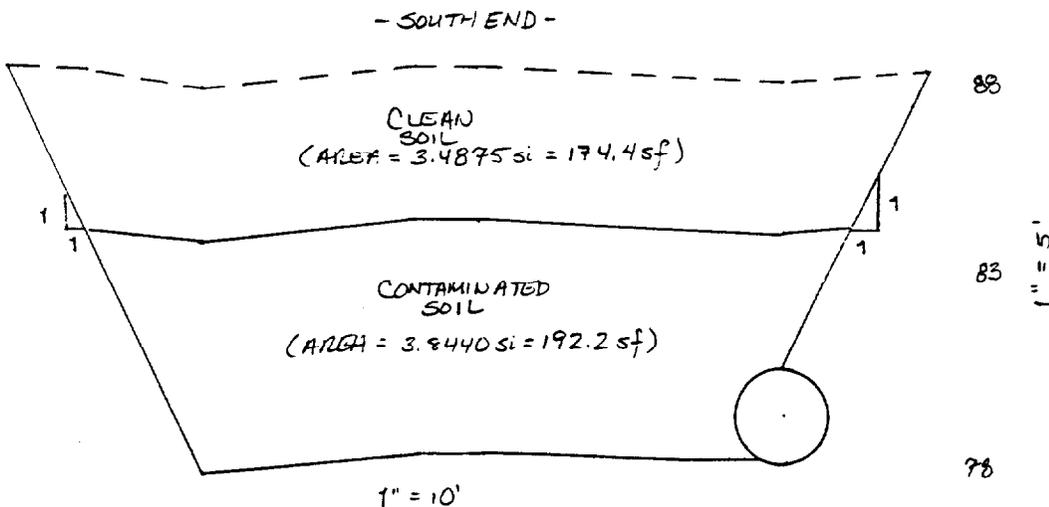
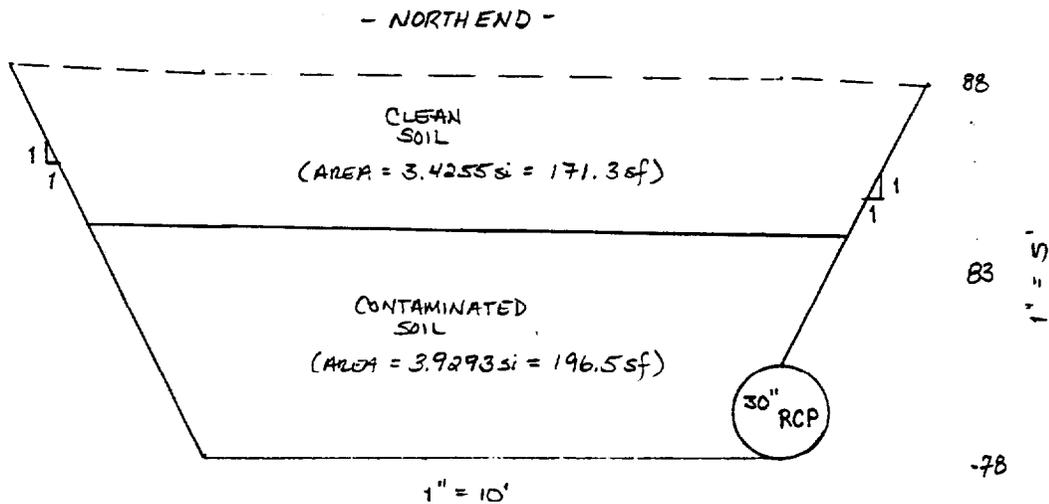
BY SMC DATE 2/28/94 SUBJECT NAVAL SUBMARINE BASE - N. LONDON SHEET NO. 3 OF 5  
CHKD. BY [Signature] DATE 3-8-94 GROTON, CT - PCB PAD AREA - JOB NO. 12576-30-05-04

## MATERIAL BALANCE - PCB PAD AREA (see pg. 5 of 5 FOR PLAN)

### SOURCE AREA DELINEATION -

AREA I REMOVAL:  $15' \times 33' \times 2' = 990 \text{ cf} = 36.7 \text{ cy} \approx 37 \text{ cy}$   
(2' DEEP EXCAVATION)

AREA II REMOVAL:



\* ALL AREAS WERE OBTAINED BY AVERAGING 3 PASSES OF A PLANIMETER.

BY SMC DATE 2/28/94 SUBJECT NAVAL SUBMARINE BASE - N. LONDON SHEET NO. 4 OF 5  
 CHKD. BY W/C DATE 3/8/94 GROTON, CT - PCB PAD AREA - JOB NO. 1256-30-05-04

TOTAL VOLUME (AREA II) EXCAVATION =  $V_x$  (Using Average End Area Method)

$$V_x = \left[ 0 + (171.3sf + 196.5sf) \right] \frac{10'}{2} + \left[ (171.3sf + 196.5sf) + (174.4sf + 192.2sf) \right] \frac{20'}{2} + \left[ (174.4sf + 192.2sf) + 0 \right] \frac{10'}{2}$$

$$V_x = 11,014.7 cf = 408 cy \blacktriangleleft$$

VOLUME OF CONTAMINATED SOIL =  $V_{cs}$

$$V_{cs} = \left[ 0 + 196.5sf \right] \frac{10'}{2} + \left[ 196.5sf + 192.2sf \right] \frac{20'}{2} + \left[ 192.2sf + 0 \right] \frac{10'}{2}$$

$$V_{cs} = 5,830.5 cf = 216 cy \blacktriangleleft$$

VOLUME OF CLEAN SOIL AVAILABLE FOR FILL =  $V_F$

ASSUME A 10% COMPACTION LOSS

$$V_F = V(.9)$$

$$\text{where } V = V_x - V_{cs} = 408 cy - 216 cy = 192 cy$$

$$V_F = 192 cy (.9) = 172.8 cy \blacktriangleleft$$

DEFICIT VOLUME =  $V_{DEF}$

$$V_{DEF} = V_x - V_F = 408 cy - 173 cy = 235 cy \text{ of borrow } \blacktriangleleft$$

TOTAL QUANTITIES FOR PCB PAD AREA ARE:

TOTAL VOLUME EXCAVATION	=	37 cy + 408 cy	=	445 cy
TOTAL VOLUME CONTAM. SOIL	=	37 cy + 216 cy	=	253 cy
TOTAL VOLUME FILL AVAIL.	=	172.8 cy	≈	173 cy
TOTAL VOLUME DEFICIT	=	445 cy - 173 cy	=	272 cy

BY SMM DATE 2/28/94  
 CHKD. BY MLB DATE 3-8-94

SUBJECT NAVAL SUBMARINE BASE - N. LONDON  
GROTON, CT - PCB PAD AREA -

SHEET NO. 5 OF 5  
 JOB NO. 1256-30-05-04

## Material Balance Summary Sheet

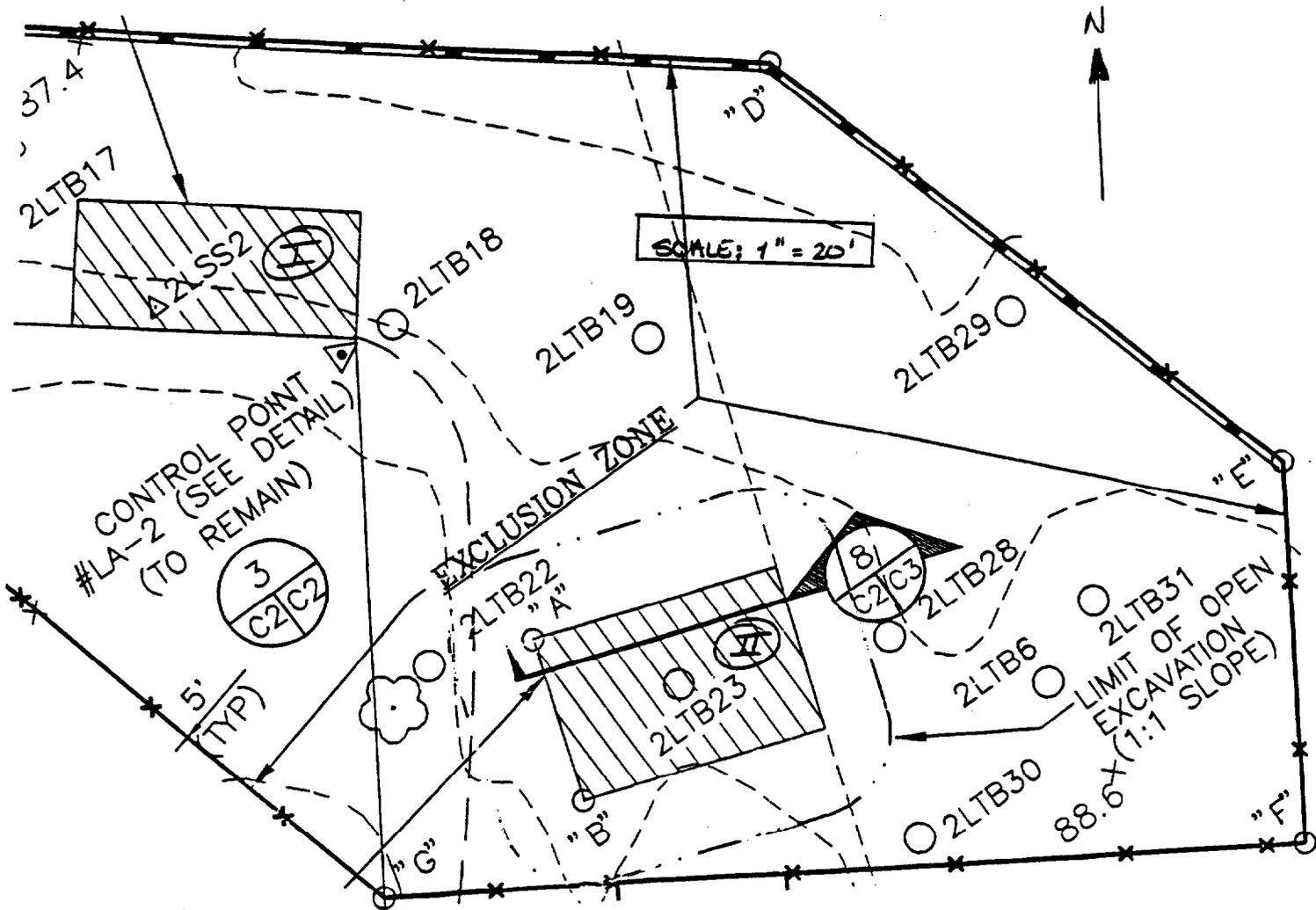
- FOIL PCB PAD AREA + SPENT ACID COMBINED -

TOTAL SOIL VOLUME EXCAVATED =  $163.5 \text{ cy} + 445 \text{ cy} = 608.5 \text{ cy} \approx 610 \text{ cy}$  ◀

TOTAL VOLUME OF DISPOSAL =  $253 \text{ cy} \left( \frac{27 \text{ cf}}{1 \text{ cy}} \right) \left( \frac{110 \#}{\text{cf}} \right) \left( \frac{1 \text{ T}}{2000 \#} \right) + 275 \text{ T}$   
 =  $650.7 \text{ tons} \approx 650 \text{ T}$  ◀

TOTAL VOLUME DEFICIT =  $147.25 \text{ cy} + 272 \text{ cy} = 419.25 \text{ cy} \approx 419 \text{ cy}$  of borrow required ◀

### PLAN OF PCB PAD AREA



**PAVEMENT DESIGN  
SPENT ACID SITE**

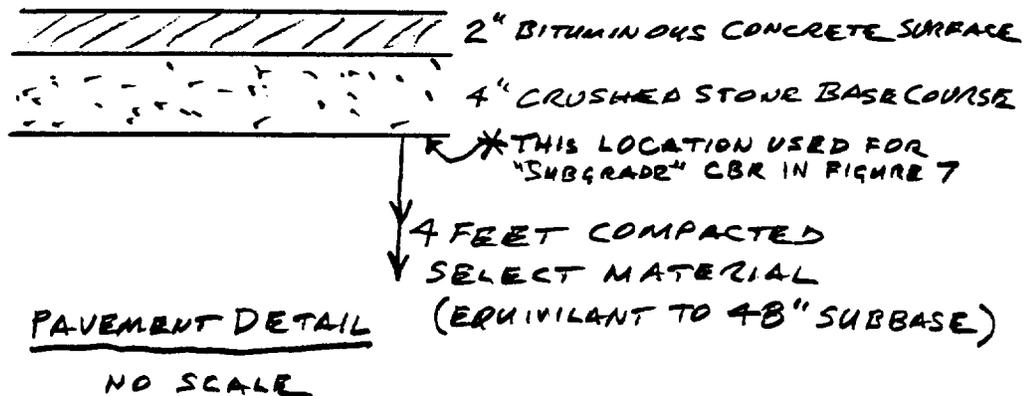
BY CCC DATE 3-11-94 SUBJECT PAVEMENT DESIGN SHEET NO. 1 OF 2  
CHKD. BY SMU DATE 3-11-94 SPENT ACID SITE JOB NO. 1256.30.05.04

THE SPENT ACID SITE IS LOCATED IN A PARKING LOT BETWEEN BLDGS. # 409 & 410, ON THE NORTH SIDE OF TANG AVE. THIS PAVEMENT DESIGN IS BASED ON PROCEDURES OBTAINED IN NAVFAC DESIGN MANUAL 5.4, "PAVEMENTS". PRESENTLY, THE PARKING LOT IS PAVED WITH BITUMINOUS CONCRETE.

THIS CONTRACT INCLUDES REMOVAL OF APPROXIMATELY 1580 S.F. OF PAVEMENT, TO ALLOW REMOVAL AND DISPOSAL BELOW, AND REPLACEMENT WITH NEW SELECT MATERIAL (GRANULAR) FILL. SECTION 7 OF DM-5.4, "FLEXIBLE PAVEMENT THICKNESS DESIGN", APPLIES FOR REPLACEMENT PAVEMENT REQUIREMENTS, ABOVE THE SELECT MATERIAL.

DM-5.4, SECTION 3, TABLE 5, PROVIDES THE DESIGN INDEX (DI) BASED ON EQUIVILANT AXEL LOADS (EAL). ANTICIPATED TRAFFIC VOLUMES WOULD PUT THIS SITE IN  $DI=2$ ; HOWEVER, SITE TRAFFIC INCLUDES LARGER TRUCKS. THE USE OF (SEE COPY OF TABLE ON SHEET 2 OF 2.)  $DI=3$  CRITERIA APPEARS WARRANTED.

SECTION 4, SUBGRADES, INDICATES NATURAL MATERIAL CBR WOULD BE  $>18$ . THIS PROJECT PROVIDES 4" OF COMPACTED SAND/GRAVELL\* (SELECT MATERIAL) BELOW THE PAVEMENT. ASSUME  $CBR=20$ , WHICH IS VERY CONSERVATIVE. ACTUAL CBR WILL PROBABLY EXCEED 30. USING SECTION 7, FIGURE 7 (COPY ON 2 OF 2) FOR THE CBR AND DI PREVIOUSLY DETERMINED, THE MINIMUM PAVEMENT THICKNESS REQUIRED IS  $5\frac{1}{4}$ ". SECTION 7 ALSO LISTS THE MINIMUM THICKNESS FOR ASPHALT CONCRETE SURFACE AS 2 INCHES, WHICH WOULD LEAVE A MINIMUM  $3\frac{1}{4}$  INCH BASE COURSE. FOUR INCHES IS A MORE APPROPRIATE THICKNESS FOR PLACING & COMPACTING A CRUSHED STONE BASE. SECTION 7 ALSO NOTES THE MINIMUM BASE THICKNESS OF 6"; 4" IS PROVIDED HERE DUE TO THE HIGH QUALITY (48") SUBBASE AND THIS IS A PARKING AREA.



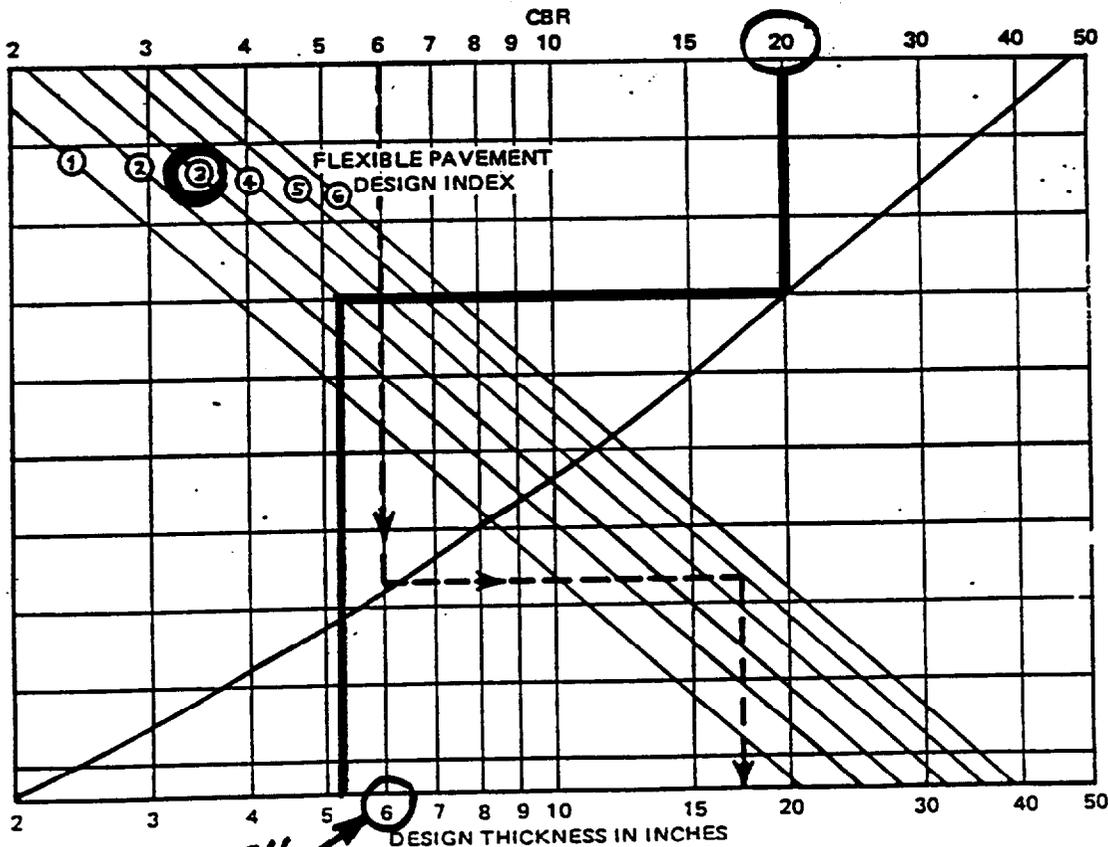
BY CCC DATE 3-11-94  
 CHKD. BY Smo DATE 3-11-94

SUBJECT PAVEMENT DESIGN  
SPENT ACID SITE

SHEET NO. 2 OF 2  
 JOB NO. 1256.30.05.04

TABLE 5  
 Vehicular Traffic Design Index

DI	Traffic Characteristics	Approx. Daily EAL
1.....	Passenger Vehicles and Light Trucks. No trucks in Groups 2 or 3.	1-5
2.....	Medium-Light Traffic, <u>less than 1000 VPD</u> , 10% in Group 2 and none in Group 3. <b>ANTICIPATED TRAFFIC</b>	6-20
<b>3.....</b> <b>USE</b>	Medium traffic up to 3000 VPD. Up to 10% Group 2 plus Group 3. 1% <u>Group 3 vehicles, INCLUDE FOR;</u>	21-75
4.....	Medium-heavy traffic up to 6000 VPD. Up to 15% Group 2 plus Group 3. 10% Group 3 vehicles.	76-250
5.....	Heavy traffic to 6000 VPD. Maximum 25% Group 2 plus Group 3 and 15% Group 3.	251-900
6.....	Very heavy traffic exceeding 6000 VPD. Over 25% Group 2 or Group 3.	901-3000



**USE 6"**  
 FIGURE 7  
 CBR Thickness Design Chart—Flexible Pavements

## **EXCAVATION AT PCB SITE**

BY CCC DATE 3-11-94 SUBJECT EXCAVATION AT PCB SITE SHEET NO. 1 OF 2  
 CHKD. BY (SMO) DATE 3-14-94 GREATER THAN 5 FEET DEEP JOB NO. 1256.30.05.04

THE PCB SITE REQUIRES EXCAVATION AND DISPOSAL OF ONE VOLUME OF CONTAMINATED MATERIAL 20' X 30' AT DEPTH OF 4 FEET TO 10 FEET. THIS EXCAVATION REQUIRES THE CONTRACTOR TO PERFORM THE WORK IN ACCORDANCE WITH OSHA REGULATIONS FOR EXCAVATIONS GREATER THAN 5 FEET DEEP. THE CONTRACTOR WILL PROVIDE VERIFICATION OF THE ADEQUACY OF HIS CONSTRUCTION METHOD TO THE GOVERNMENT. THIS WILL BE BASED ON ACTUAL SOILS ENCOUNTERED AND THE CONSTRUCTION METHOD THE CONTRACTOR PROPOSES (i.e. SLOPED SIDES OR SUPPORTED WALLS).

THE PURPOSE OF THIS CALCULATION SHEET IS TO ESTIMATE THE REQUIREMENTS TO PROVIDE REASONABLE QUANTITIES FOR UNIT PRICES. OPTIONS INCLUDE:

A. SLOPED SIDES;  $\frac{1}{3/4}$ ,  $\frac{1}{1}$  OR  $\frac{1}{1/2}$ , AND,

B. SUPPORTED SIDES; SHEET PILING, HYDRAULIC BOX, WALLS OR SIMILAR.

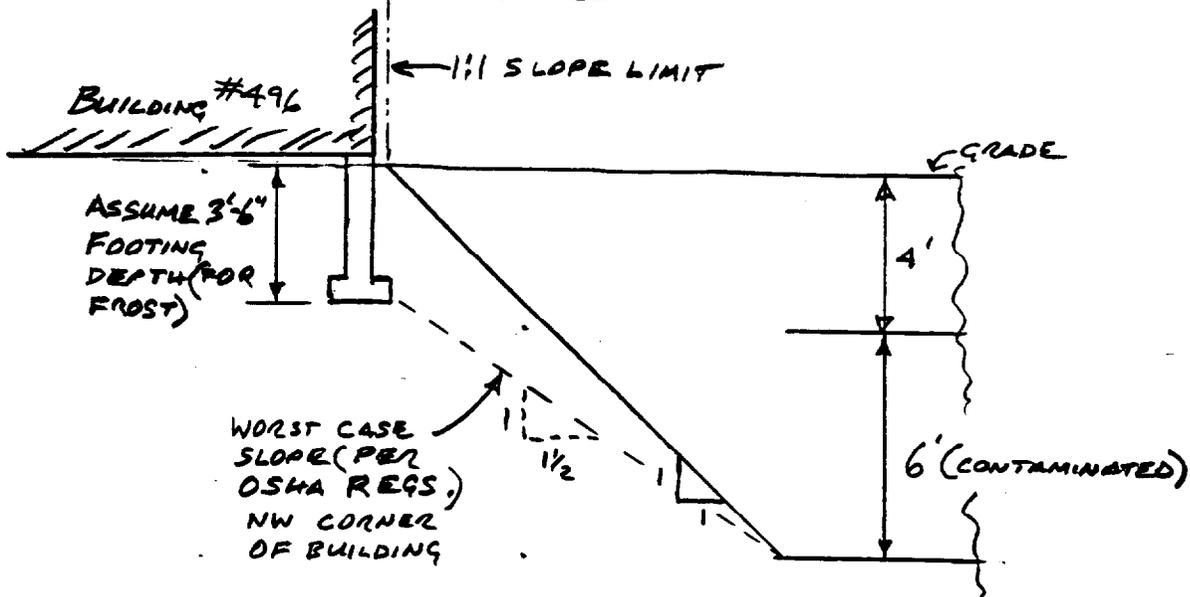
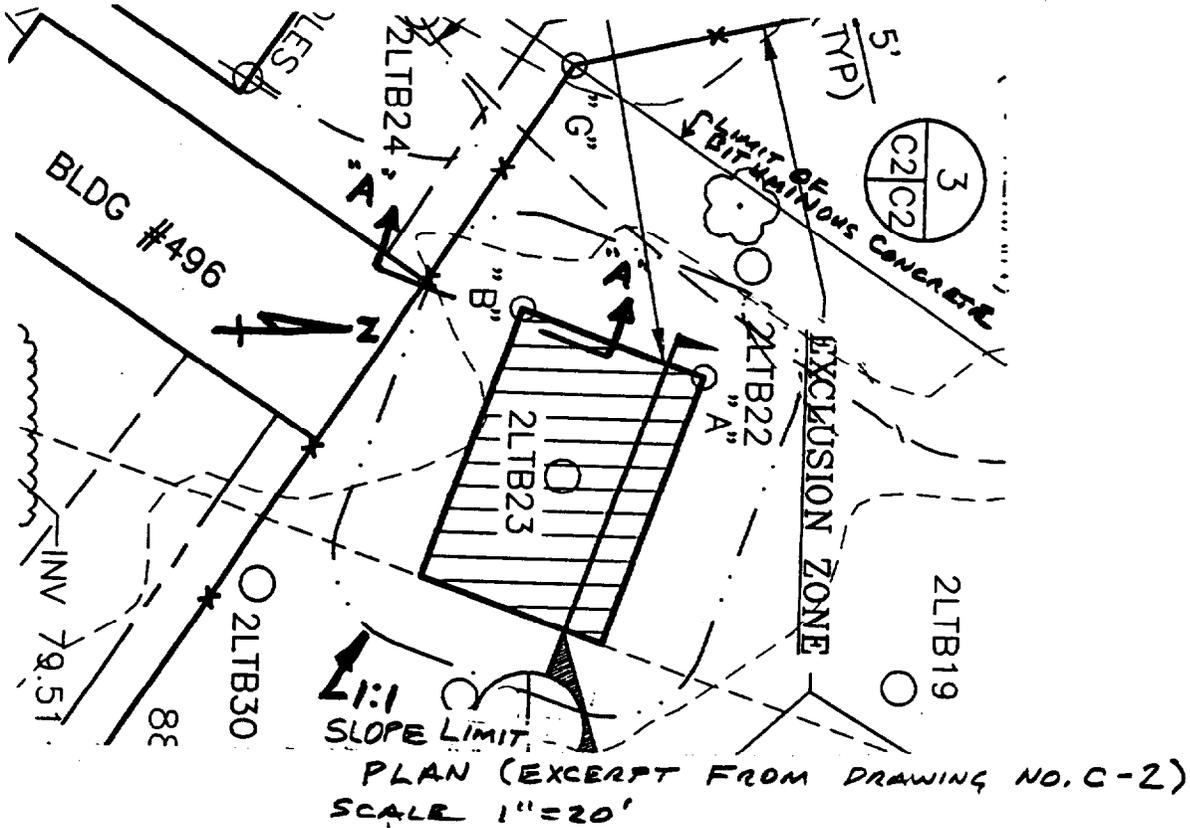
IF THIS WAS TO BE A STANDARD TRENCH EXCAVATION, A TRENCH BOX WOULD BE ASSUMED MOST ECONOMICAL. DUE TO THE SIZE (MIN. WIDTH 10') AND TESTING REQUIREMENTS, WE WILL ASSUME SLOPED SIDES. OSHA REGULATIONS INDICATE THAT A  $1/2:1$  SLOPE IS ALLOWABLE FOR ANY SOILS. BASED ON A REVIEW OF BORING LOGS, THIS SITE CONSISTS PRIMARILY OF PLACED (i.e. DISTURBED) AND COMPACTED FILL. OSHA STANDARDS WOULD MOST LIKELY CATEGORIZE THIS SOIL AS TYPE "B", WHICH REQUIRES A  $1:1$  SLOPE.

FOR ESTIMATING PURPOSES, VOLUMES HAVE BEEN CALCULATED USING A  $1:1$  SLOPE; ALL BIDDING WILL BE DONE WITH THE SAME AVAILABLE INFORMATION. IF THE CONTRACTOR USES SOME FORM OF SUPPORTED VERTICAL WALLS, HE (OR SHE) MAY SAVE ADDITIONAL COSTS FOR SUPPORT BY LESS REQUIRED VOLUME OF DISPOSED CONTAMINATED MATERIAL. THE CONTRACTOR WOULD NEED TO EVALUATE THE RISK OF ADDITIONAL EXCAVATION, IF CONFIRMATION SOIL TEST RESULTS SO INDICATE, AND RELOCATING THE SUPPORTS. THE WORK PLAN ALSO REQUIRES GOVERNMENTAL APPROVAL. BUILDING NO. 496 IS OUTSIDE THE LIMITS OF THE  $1:1$  SLOPE. IF CONDITIONS DURING THIS WORK REQUIRE A FLATTER SLOPE OR ADDITIONAL CONTAMINATED MATERIAL MUST BE REMOVED (BASED ON CONFIRMATION TESTING) ALONG THE SOUTH FACE (TOWARD BLDG 496), THE CONTRACTOR WILL BE REQUIRED TO INVESTIGATE THE IMPACT ON THE FOUNDATION OF BUILDING # 496. IT APPEARS (ASSUMING FROST DEPTH FOR FOUNDATION) THAT SPECIAL SUPPORT REQUIREMENTS ARE NOT LIKELY. (SEE SH. 20F2)

BY CCC DATE 3-11-94  
CHKD. BY Sme DATE 3-14-94

SUBJECT EXCAVATION AT PCB SITE  
(10' DEPTH EXCAVATION)

SHEET NO. 2 OF 2  
JOB NO. 1256.30.05.04



**APPENDIX B**  
**ENVIRONMENTAL PERMIT**  
**CHECKLIST**

**ENVIRONMENTAL PERMIT CHECKLIST  
INTERIM REMEDIAL ACTION - SPENT ACID AND PCB  
(NORTHNAVFACENGCOMINST 5090.5A)**

	YES	NO	COMMENTS
<b>HAZARDOUS WASTE</b>			
1. Does the project involve a hazardous waste transfer or storage facility?	X		Ultimate waste disposal to a RCRA permitted Landfill
2. If yes, will the waste be stored longer than 90 days?		X	
3. Is the required containment provided for spills?	X		
4. Are incompatibles stored separately ?	X		No anticipated incompatible waste streams
5. Is the floor sloped to allow spill collection or, alternatively, are containers elevated to prevent contact with spills ?	X		Soils will be stockpiled on and covered with 6 mil HDPE with a hay bale berm
6. Is the truck loading apron bermed to collect spills?	X		
7. Is the facility at least 50 feet from the property line?	X		Separation distance not required (non-reactive waste)
8. Is a construction permit required ?		X	CERCLA exemption
9. Is an operating permit required ?		X	CERCLA exemption
<b>UNDERGROUND STORAGE TANKS</b>			
10. Does the project involve underground storage of regulated substances ?	X		Abandoned Spent Acid Tank
11. Will there be closure or removal of an UST ?	X		Abandoned Spent Acid Tank
12. Will there be installation or modification of a UST?		X	
13. Is a construction permit required ?		X	CERCLA exemption
14. Is notification or registration required ?		X	
15. Is leak detection provided ?		X	
16. Is the UST used to store heating oil only for consumptive use on the premises ?		X	
17. Are regulatory design criteria met ?		X	No hazardous waste tanks involved with project
<b>HAZARDOUS WASTE TANKS</b>			
18. Does the project involve either under or aboveground storage of hazardous waste in tanks ?		X	
19. Will the hazardous waste be stored longer than 90 days?		X	
20. Is a construction permit required ?		X	CERCLA exemption
21. Is an operating permit required ?		X	CERCLA exemption
22. Is notification required ?		X	
23. Is leak detection provided ?		X	
24. Is the tank double walled ?		X	
25. Is the tank compatible with what will be stored?		X	
26. Is a RCRA permit required ?		X	No hazardous waste tanks involved with project
<b>AIR PERMITS</b>			
27. Does the project involve an air pollution source?		X	
28. Compare air source emission with state allowable emissions standards and determine if registration with the state is required.		X	Project will not involve an air pollution source
29. Will boilers be installed or modified ?		X	
30. Will a painting/blasting facility be installed or modified?		X	

**ENVIRONMENTAL PERMIT CHECKLIST  
INTERIM REMEDIAL ACTION - SPENT ACID AND PCB  
(NORTHNAVFACENGCOMINST 5090.5A)**

	YES	NO	COMMENTS
<b>AIR PERMITS (continued)</b>			
31. Are regulated operations or sources such as boilers, incinerators, petroleum storage tanks, fire-fighting training, munition disposal by burning, plating, sand-blasting, rocket and jet engine testing, asbestos application by spraying, fuel transfer, or painting be involved ?		X	
32. Are there other potential air sources ?	X		Potential odors, fugitive dust from excavation activities
33. Is a construction permit required ?		X	CERCLA exemption
34. Are sources rated at over 100 million BTU per hour?		X	
35. Are other permits required ?		X	CERCLA exemption
36. Are emission controls provided (Particulate, SOX, VOX, etc.) ?		N/A	
37. Will there be an air emission source from an Installation Restoration Program (IRP) removal or remedial project ?		X	
38. If yes, will a CERCLA permit exemption apply? (Remedial action conducted entirely on-site)		N/A	
<b>VAPOR RECOVERY</b>			
39. Does the project involve a gasoline filling station?		X	
40. Is a stage I and/or stage II vapor recovery required?		X	
41. Are permits required ?		X	
<b>ACQUISITION OF LAND/BUILDINGS</b>			
42. Does the project involve land or building acquisition?		X	
43. Has an environmental site survey been completed?	X		
44. Is the site known to have been used to store, handle, or dispose of hazardous material wastes?	X		
45. Is the site, or has it been, occupied by bulk storage tanks?		X	
46. Is asbestos present or likely to be present ?		X	
47. Are PCB transformers present ?		X	
48. Will necessary permits require environmental testing/cleanup ?		X	
49. Will public hearings be required ?		X	
<b>DEMOLITION</b>			
50. Does the project involve demolition ?	X		Demolition of a concrete pad
51. Is asbestos present or likely to be present ?		X	
52. Will asbestos removal notification be required?		N/A	
53. Is lead paint present ?		X	
54. Are PCB transformers present ?		X	
55. Are any permits required, including concurrence from State Historic Preservation Office on historic/cultural resources ?		X	

**ENVIRONMENTAL PERMIT CHECKLIST  
 INTERIM REMEDIAL ACTION - SPENT ACID AND PCB  
 (NORTHNAVFACENGCOMINST 5090.5A)**

	YES	NO	COMMENTS
<b>WITHDRAWAL FROM AQUIFERS</b>			
56. Are underground storage tanks present ?		X	
57. Does the project involve water withdrawal from an aquifer ?		X	
58. If yes, is the aquifer sole-source ?		N/A	
59. Is notification required ?		N/A	
60. Are any permits required ?		X	
61. Is water withdrawal a result of an Installation Restoration removal or remedial action project?		N/A	
62. If yes, will a CERCLA permit exemption apply?		N/A	
<b>WATER PERMITS</b>			
<b>WATER WITHDRAWALS</b>			
<b>SURFACE WATER WITHDRAWALS</b>			
63. Does the project involve the withdrawal of water from surface water sources for domestic (potable) uses of industrial usage ?		X	
64. Is a water allocation permit required ?		X	
65. Are construction permits required for intake structures?			
66. Is notification of regulatory agencies required?		X	
<b>GROUND WATER WITHDRAWALS</b>			
67. Does the project involve the direct withdrawal of groundwater for potable, industrial uses or groundwater clean-up ?		X	
68. Is a water allocation permit required ?		X	
69. Is notification of regulatory agencies required?			
70. Are well construction permits required ?		X	
<b>TREATMENT FACILITIES</b>			
71. Does the project include potable water storage (tanks, reservoirs) or treatment (disinfection, pH control, filtering) facilities or expansion of the basewide water distribution systems?		X	
72. If yes, are potable water construction/operating permits needed ?		X	
<b>WASTEWATER DISCHARGES</b>			
<b>DOMESTIC SEWAGE</b>			
73. Will domestic (sanitary) sewage be discharged from the project ?		X	
74. Does the project discharge to a sanitary sewage collection system ?		X	
75. Will new sewer mains be constructed or will the effluent flow increase ?		X	
76. Are construction, operating, or sewer extension permits required ?		X	
77. Does the discharge flow to Navy owned STP ?		N/A	

**ENVIRONMENTAL PERMIT CHECKLIST  
INTERIM REMEDIAL ACTION - SPENT ACID AND PCB  
(NORTHNAVFACENGC MINST 5090.5A)**

	YES	NO	COMMENTS
<b>DOMESTIC SEWAGE (continued)</b>			
78. Will the discharge affect the ability of the sewage treatment plant to meet the flow parameters of the NPDES permit ? (If yes, a new permit may be required)		X	
79. Is notification of regulatory agencies required?		X	
80. Does the discharge flow to a publicly owned treatment plant ?		X	
81. Is notification required ?		X	
82. Is a connection permit required ?		X	
83. Does the discharge flow to a septic system ?		X	
84. Is the septic system new ?		N/A	
85. Is a construction permit required ?		X	
86. Is a discharge (to groundwater) permit required?		X	
87. Is the septic system existing ?		N/A	
88. Does it have a permit ?		N/A	
89. Are there flow limitations ?		N/A	
90. Is notification of increased flow required ?		N/A	
91. Does the project involve the construction of a sewage treatment plant ?		X	
92. If yes, is a NPDES permit required ?		X	
<b>INDUSTRIAL DISCHARGES</b>			
93. Is there going to be a discharge of industrial wastewater from the facility ? An industrial discharge can be considered any wastewater generated by any source other than sanitary facilities, such as sinks, urinals water closets, and floor drains. Examples are photographic labs, laundries, plating operations, pesticide-formulation operations, hospitals, explosive manufacturing, numerous organic and inorganic chemical processes, and cooling and blowdown water boilers.		X	
94. Is the discharge going to flow into a sanitary sewage collection system ?		X	
95. If yes, is pretreatment required ?		X	
96. If yes, is a permit required ? (local ordinances may require permits for any industrial connection)		X	
97. Is the discharge going to flow to a storm sewer system, surface water or groundwater ?		X	
98. If yes, is a NPDES permit required ?		X	
99. Construction permits may be required for outfall structures or wells.		N/A	
100. Will there be a discharge to the sanitary sewer from an Installation Restoration program removal or remedial action project?		X	
101. If yes, is a permit required?		X	

**ENVIRONMENTAL PERMIT CHECKLIST  
INTERIM REMEDIAL ACTION - SPENT ACID AND PCB  
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	YES	NO	COMMENTS
<b>STORM WATER DISCHARGES</b>			
102. Facilities that "discharge storm water associated with industrial activity," includes any site where certain activities are performed. Projects which propose to perform any industrial activity may require (1) modification of an existing NPDES storm water permit or, (2) submission of an application for a new permit. NPDES permits will also be needed if a facility, currently without a permit, constructs an industrial facility.		N/A	
103. Does the project involve construction activities that disturb more than 5 acres?		X	
104. If yes, is a NPDES permit required?		X	
105. Will there be discharge to the storm sewer from an Installation Restoration Program removal or remedial action project?		X	
106. If yes, will a NPDES permit be required?		X	
<b>CORPS OF ENGINEERS PERMITS</b>			
107. Does the project describe work in or adjacent to the coastal zone or aquatic sites such as, but not limited to, rivers, streams, lakes, creeks, ponds, estuaries, etc.?		X	
108. Does the project describe work in or adjacent to wetlands?		X	
109. Is the project adjacent to or within a wetland or aquatic environment or will have an impact upon a wetland or aquatic environment, has a wetland delineation been completed? (by Northdiv Code 20)		X	
110. If the project will have an impact upon wetlands, or an aquatic environment, has a site approval been issued? (by Northdiv Code 20)		N/A	
111. Has the wetland delineation been confirmed by the U.S. Army Corps of Engineers or state regulatory agency?		N/A	
112. If a coastal zone consistency determination is required has it been completed? (by Northdiv Code 20)		X	
113. Does the project require utility runs that might cross wetlands or navigable waters? (these may be included in other projects)		X	
114. Does the project include or require access roads that cross wetlands or navigable waters?		X	
115. Does the project include construction of intake/discharge structures or headwalls within a wetland or waterway?		X	

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	YES	NO	COMMENTS
<b>STATE WETLANDS PERMITS</b>			
116. Does the state in which the project is sited have wetland and/or dredging regulations which may apply to the project?		X	
117. Does the project describe work within 100' of wetlands?		X	
<b>STATE WATER QUALITY CERTIFICATION</b>			
118. Does the project require state review and approval under the provisions of Section 401, of the Clean Water Act? (Water Quality Certification)		X	CERCLA exemption
<b>APPLIED BIOLOGY PROJECTS</b>			
119. Does the project include installation or maintenance of wood piles, poles, or ties?		X	
120. Is the project a waterfront structure, pier wharf or bulkhead?		X	
121. Does the project include wood structural components?		X	
122. Does the project include landscaping with plants or maintenance of turf, shrubs or trees?		X	
123. Does the project include the application of pesticides other than for the prevention of termites?		X	
124. Has preconstruction treatment to prevent termites (NFGS02284) been omitted from the specification?	X		
125. Is preconstruction treatment to prevent termites other than as specified in NFGS02285?		X	
<b>ASBESTOS REMOVAL</b>			
126. Does the project include the construction, repair or rehabilitation of food service or food storage facilities?		X	
127. Does the project involve potential disturbance of asbestos ?		X	
128. Has an asbestos survey been performed ?		X	
129. Does the project involve renovation, demolition or repair work		X	
130. Is federal, state or local notification required ?		X	
131. Are any state or local permits required ?		X	
132. Is third party monitoring required or recommended ?		X	
133. Is the NAVFAC spec section 02080 included and edited correctly ?		N/A	Not believed to be present
<b>LEAD PAINT REMOVAL</b>			
134. Does the project involve potential disturbance of lead paint ?		X	
135. Has a lead paint survey been performed ?		X	
136. Does the project involve renovation, demolition or repair work ?		X	
137. Is federal, state or local notification required ?		X	
138. Are any state or local permits required ?		X	
139. Is the project at an activity where radon readings of greater than 4 picoCuries/liter have been found in existing buildings ?		X	

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 (NORTHNAVFACENGCOMINST 5090.5A)**

	YES	NO	COMMENTS
<b>LEAD PAINT REMOVAL (continued)</b>			
140. Does the project involve construction of a new building ?		X	
141. Is slab on grade construction involved ?		X	
142. Is the vapor barrier thickness 6 mil or greater ?		N/A	
143. Are all penetrations through the vapor barrier sealed around openings ?		N/A	