62.03-07/01/95-[redacted]
00713

079501/P

DESIGN ANALYSIS
FOR
OPERABLE UNIT 1, SITE 16, DEBRIS PILE

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Atlantic Division
Environmental Restoration Branch, Code 1823
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, Virginia 23511-2699

Submitted by:
Halliburton NUS Corporation
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0191

JULY 1995

PREPARED BY:

J. RANDALL ELDER, P.E.
PROJECT MANAGER
HALLIBURTON NUS CORPORATION
PITTSBURGH, PENNSYLVANIA

APPROVED BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
HALLIBURTON NUS CORPORATION
WAYNE, PENNSYLVANIA

TABLE OF CONTENTS

1.0 INTRODUCTION

Halliburton NUS Corporation has prepared this report in response to unilateral Contract Task Order (CTO) 191, under Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62472-90-D-1298. CTO 191 requests that Halliburton NUS prepare remedial design documents to support a removal action at MCAS Cherry Point, North Carolina. The removal action is being performed as a CERCLA time-critical removal action in order to remove the immediate threat of exposure in the unsecured area of Operable Unit 1, Site 16. In order to meet this goal asbestos containing material, debris, and TPH, asbestos, and lead contaminated soil are being removed for treatment/disposal. Other contaminants identified during the predesign investigation (pesticides, metals, and semi-volatiles) will be addressed during continuing RI/FS activities at Operable Unit 1.

1.1 BACKGROUND AND OBJECTIVE

This design is aimed at the remediation of the debris piles at Operable Unit 1 (OU-1), Site 16 at Marine Corps Air Station (MCAS) Cherry Point, North Carolina. The site is described below.

Site 16 is located on East Prong Slocum Creek adjacent to Sandy Branch near the southern boundary of the Cherry Point Facility. The site consists of approximately 20 acres, which were associated with landfilling activities between 1946 and 1948.

Several debris piles are located in an area on the southern portion of Site 16, adjacent to an unnamed tributary to Slocum Creek. This area was used as a scrap yard and disposal area for an unknown period of time and currently has numerous debris piles, tanks, empty storage vessels and other construction debris scattered across its surface.

1.2 PRE-DESIGN INVESTIGATION RESULTS

Prior to the start of design activities, Halliburton NUS performed a pre-design investigation to determine the presence of contaminants at the site. All work was performed in accordance with the Work Plan developed of these activities. During the performance of the investigation 23 soil samples were collected for full analyses (TAL, TCL, and TPH), and 6 soil and 21 debris samples were taken for asbestos analyses. All soil samples were biased towards areas of staining, visible asbestos, stressed vegetation, drainage areas downstream of piles or vessels, or directly underneath piles or vessels. Asbestos containing material

samples were collected from each distinct area on the site, with samples of all different materials (i.e., insulation, mastic, covering) being included.

A summary of the analytical results is included as Appendix A. The locations of the samples is shown on Drawing C-1.

2.0 DESCRIPTION

The removal action for the OU-1, Site 16, Debris Piles is being performed to eliminate the risk to humans and the environment, which is posed by the asbestos containing material that is present in both the debris and the soils at the site. In addition, soils that are contaminated with TPH above calculated levels will be removed in accordance with the State of North Carolina regulations. The approximate area of Site 16, including maintenance operations, is 3.5 acres. The approximate area to be disturbed is 1.5 acres.

The actions that will be taken to accomplish the removal action include site preparation, construction of access roads and support facilities, excavation of debris and contaminated soils, landfilling of debris and asbestos and lead contaminated soil, treatment of TPH contaminated soil, and site restoration. These tasks are described in further detail below.

2.1 SITE PREPARATION

Site preparation will start with the mobilization of equipment and trailers that are necessary for the performance of work. Once the equipment is onsite, silt fencing will be installed along the down gradient perimeter of the areas to be disturbed. Sedimentation curtains will be placed in the creek due to the close proximity of the site to the creek. Clearing and grubbing of support zone and road ways will be performed, and in the area between piles 1 and 2 where soil is contaminated by asbestos, the contaminated soils will be excavated and staged for later disposal. The resulting areas will then be rough graded and proof-rolled in preparation for construction of the access roads.

The contaminated materials resulting from site preparation may be disposed of immediately upon their generation. However, in anticipation of the absence of needed equipment during the initial stage of work, the Contractor will have the option of staging the soil. Staging may be performed in appropriate containers (drums, covered roll-offs, etc.) or stockpiled. Stockpiles will be placed on impermeable materials (plastic sheeting), bermed to prevent run-off of storm water, and covered to prevent erosion.

Following surfacing of the support zone, as described in section 2.2 below, office and decontamination trailers will be placed and secured, and temporary utilities will be installed. At the direction of MCAS Cherry Point, the Contractor must run the electric and phone service to their trailer and the Navy will provide the metering for these utilities. In addition, water and sanitary facilities must be supplied by the Contractor.

The last item under site preparation is the construction of equipment decontamination facilities to ensure that no contamination is released from the work areas. The Air Station will permit disposal of the decontamination water. Disposal must be coordinated with utilities and may be made easier if discharge is done off-peak hours. The total toxic organics in the water must be below 280 μg/L and any levels above that will require pre-treatment.

During the performance of work, only those involved with the removal action will be allowed access. MCAS Cherry Point will coordinate with maintenance to move the materials they may need during the performance of the work. Any materials remaining in the area may be relocated by the Contractor as necessary to improve movement within the defined work area.

The roads, support zones, and decontamination facilities are shown on Figure C-2.

2.2 CONSTRUCTION OF ACCESS ROADS

Two classes of roads will be constructed for the performance of the removal action. The first is an improved dirt road that is to be used to access piles 3 through 6 and the southern TPH area. This road type is selected due to adequate soil conditions in the eastern portion of the site and the limited volume of material to be removed from the remaining piles. Following grading and proof-rolling as described in section 2.1, above the roads will be ready for use.

The second class of road will be a graveled road, which will be used to access piles 1 and 2, and the tanks just south of these piles. Following grading and proof-rolling as described in Section 2.1 above, an 8-oz geofabric will be laid on the prepared subase, with an 18-inch overlap at all seams, then 6-inches of AASHTO No. 57 crushed stone will be placed and compacted. This treatment will also be provided for the western support area.

With Navy concurrence, spur roads may be constructed for pile access.

2.3 DEBRIS AND CONTAMINATED SOILS

Although preliminary risk calculations were included in the draft version of this document, the decision has since been made to remove them and all references from the document. Removal of soils for the interim removal action was based on published standards and guidelines for contaminants in soils. This results in removal at 12 locations for TPH, asbestos, or lead. To ensure that levels of contaminants remaining in the soils following the interim removal action were within reasonable levels, preliminary risk levels were

calculated using the U.S. EPA, Region III, risk-based concentration memo (dated November 8, 1994) for ingestion and U.S. EPA, Region IV, guidance for dermal exposure. The results of this assessment indicate that the significant risks have been removed and the need for additional action at the site can be assessed during the RI/FS for Operable Unit 1.

PCBs were detected in 8 samples ranging in concentration from 0.078 to 0.49 ppm. Current action levels in non-industrial areas at MCAS Cherry Point are 1 ppm for remediation, therefore PCBs are not being considered as a driver for the removal action. The metals that were detected at the site are below the background levels at MCAS Cherry Point, except in the cases of lead and magnesium. The lead is present at 10 locations (concentrations of 163 to 1,110 ppm) at levels above background (141 ppm), 4 of which are above the 400 ppm screening level for lead recommended by OSWER directive No. 9355.4-12. While not directly applicable for this site (the directive is based on the IUBK model, children age 0-6), the level will be used. This results in the cleanup of one additional area around SO-12.

Asbestos was detected at levels above the regulatory level of 1 percent in 3 of the soil samples and 13 of the debris samples. Due to its presence above the regulatory level, asbestos is considered a driver in this removal action.

TPHs were detected in 3 locations above the preliminary calculated action levels (10 ppm for gas, 40 ppm for diesel, and 250 ppm for oil and grease). Due to its presence above the regulatory level, TPH is considered a driver in this removal action.

Materials of concern at the site include approximately 492 cubic yards of demolition debris, 410 cubic yards of asbestos contaminated debris, 271 cubic yards of asbestos contaminated soils, 591 cubic yards of TPH contaminated soil (of which 52 cubic yards is assumed to also contain asbestos) and 69 cubic yards of lead-contaminated soil.

The contents of the piles consists mostly of metal, concrete, and asbestos pipes. Specifically, Pile 1 contains scrap metal, metal antenna section, concrete pipes, and asbestos pipes. Pile 2 contains trash, tires, metal antenna section, lumber, pre-cast concrete beams, bituminous material, and asbestos pipes. Pile 3 contains asbestos pipes. Pile 4 contains buried corrugated metal and concrete pipe and asbestos pipes. Pile 5 contains asbestos pipes and scrap metal. Pile 6 contains concrete pipes, concrete debris, rebar, and corrugated metal pipe.

The total volume of debris was calculated using the areal extent of the six piles and half of the difference between the top and base of the piles. The volume of asbestos and demolition debris was determined by

multiplying the pile volumes with a percentage containing asbestos. The percentage was derived from site walk throughs and analytical information.

The volumes of asbestos contaminated soil were calculated by assuming a 25-foot affected boundary around the piles that had contaminated soil samples, and assuming that only the upper 3-inches of soil will be affected. The TPH contaminated soil volumes are based on preliminary action levels of 10 ppm for gasoline, 40 ppm for diesel, and 250 ppm for oil and grease. In this case three locations are affected and assume aerial extents are assumed as 50-foot by 50-foot squares centered on the sample location. The contamination is expected to be 1-foot deep. The lead contaminated soil volumes are based on an action level of 400 ppm. The result is one area (SB12) which is assumed to have an aerial extent of 50-feet by 50-feet with a depth of 1-foot.

The location and type of contamination and/or materials is shown on Drawing C-1. A summary of data results is included as Appendix A. A summary of asbestos disposal facilities is contained in Appendix D.

2.3.1 Excavation of Debris and Soils

Excavation of debris and contaminated soils will be performed in a manner that minimizes the generation of additional waste and fugitive dust. During the excavation and handling of asbestos containing materials techniques such as wetting or encapsulation will be employed to eliminate the migration of asbestos fibers and air sampling will be performed to determine the effectiveness of the methods.

Following completion of contaminated soil excavation at each area, the Contractor will collect verification samples for analysis. Excavation and treatment/disposal of soils will be performed to the limits indicated on the drawings. Excavation will not be performed below the groundwater surface. No dewatering will be necessary as the scheduling of the work during dry periods will minimize the potential for site flooding. No excavation will be performed outside the original limits unless specifically approved by the Navy Technical Representative.

2.3.2 Disposal of Debris and Soils

Following excavation of each of the types of materials, they will be loaded into DOT approved containers for transportation to the intended treatment/disposal facilities. Disposal of the materials will be as follows:

- Demolition Debris - Dispose of at landfill located at MCAS Cherry Point.

- Asbestos Debris - Dispose of at an approved, permitted offsite landfill.
- Asbestos Soil - Dispose of at an approved, permitted offsite landfill.
- TPH Soil - Dispose of at an approved, permitted offsite treatment facility.
- Lead Soil - Dispose of at an approved, permitted, offsite landfill.
- Multiple Contaminant Soil - Dispose of at an approved, permitted, offsite treatment/disposal facility.
- Scrap Tanks - Dispose of at an approved offsite facility.

Where materials are to be treated/disposed offsite, all applicable local, State, and Federal regulations regarding handling will be followed. These include, but are not be limited to: waste manifesting (hazardous and asbestos) and North Carolina DOT requirements.

The scrap tanks will be reduced to manageable pieces of a size acceptable to DRMO. Currently the accepted size is no larger than 10-feet by 10-feet.

A summary of landfills that accept asbestos contaminated soil and debris is included in Appendix D.

2.3.3 Treatment and Disposal of TPH Contaminated Soil

In accordance with the State of North Carolina regulations regarding TPH contaminated soils, these materials may not be landfilled and require treatment. Two cost effective alternatives for the treatment of TPH contaminated soil currently exist (biological and thermal treatment). Soils contaminated with both TPH and asbestos may not be treated and will therefore be landfilled in a facility permitted to accept these contaminants.

2.4 SITE RESTORATION

At the completion of all excavation and disposal of the debris and soils, the site will be restored to a degree equal to the pre-construction site conditions. Necessary backfill will be taken from available borrow on the Air Station property. All roads and support zones will be removed and the material will be tested to certify

its reuse by MCAS Cherry Point. The areas will be regraded to reflect pre-construction grades, and the areas will be revegetated as discussed below.

Following certification (by testing for materials within contaminated areas), the material will be accepted by MCAS Cherry Point for reuse. Materials failing certification will be disposed of according to the type of contamination present. Backfill, where needed, will be borrowed from the Air Station property and will be certified clean by the Contractor.

2.4.1 Wetlands

The areas delineated as wetlands on the drawings will be replanted with species native to adjacent areas including trees, vines, and ground-cover. Currently identified species include cypress, maple, black and sweet gum, loblolly pine, wax myrtle, and buttonbush. Only containerized stock will be used due to the low survivability of roots. The expected planting schedule is 10 feet on center for trees and 6 feet on center for shrubs. The Contractor will provide fertilization and water as necessary during the first year to ensure a 90-percent viability of the plantings. All local, State, and Federal regulations regarding wetlands disturbance and restabilization will be followed.

2.4.2 General

All other areas disturbed during the work will be replanted with the grasses and/or trees native to adjacent areas. In areas where only grass is present hydro-seeding will be used and the Contractor will ensure the viability of the seeding through the maintenance of cover and watering.

2.5 PLANNING DOCUMENTS

Prior to the start of construction activities the Contractor will prepare and submit for acceptance a Work Plan, which will include a Quality Control Plan, a Sampling and Analysis Plan, and a Health and Safety Plan.

Additional plans to be submitted, which may be included in the Work Plan to reduce repetition, are: Asbestos Hazard Abatement Plan and Excavation and Material Handling Plan.

2.5.1 Quality Control Plan

The Contractor will prepare a Quality Control Plan, which details procedures to be used and personnel responsible for the maintenance of project quality, documentation procedures, a list of subcontractors, and

a list of definable features of the work. This document will be used to maintain quality, in accordance with the specifications, throughout the duration of the removal action.

Proof of the certification/accreditation of workers removing asbestos will be provided.

2.5.2 Sampling and Analysis Plan

The Contractor will prepare a Sampling and Analysis Plan that describes the sampling and analysis activities required for the performance of work. Portions of this plan pertaining to asbestos activities will be prepared by accredited asbestos personnel as required by the North Carolina Asbestos Hazard Management Program.

2.5.3 Health and Safety Plan

The Contractor will prepare a Health and Safety Plan in accordance with the applicable local, State, and Federal regulations and standards, which include, but are not limited to, 29 CFR 1910 (Occupational Safety and Health Standards), 29 CFR 1926 (Safety and Health Regulations for Construction), COE EM-385-1-1 (Corps of Engineers 1992 Safety and Health Requirements Manual), and NIOSH 85-115 (1985 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities).

2.5.4 Asbestos Abatement Hazard Plan

The Contractor will prepare an Asbestos Abatement Hazard Plan that details the methods used to remove the asbestos-contaminated material, work zones, protective methods, decontamination, and air sampling. In addition, names of disposal facilities and proof of permit compliance will be included. This plan will be prepared by accredited asbestos personnel as required by the North Carolina Asbestos Hazard Management Program.

2.5.5 Excavation and Material Handling Plan

The Contractor will prepare an Excavation and Material Handling Plan that describes work methods and sequencing, equipment, and fill sources. In addition, names of disposal facilities and proof of permit compliance will be included.

2.6 NAVY RESPONSIBILITIES

Prior to the start of construction the Navy will address issues related to permits, erosion and sedimentation control, and stormwater management.

2.6.1 Permits

Permits that have been identified for the removal action are included in the Table 2-1. The applicability of each permit and the issuing agency have been provided.

2.6.2 Erosion and Sedimentation Control

Since the area to be disturbed is greater than one acre, an Erosion and Sediment Control Plan has been prepared by Halliburton NUS for project activities at MCAS Cherry Point for the removal action. The Erosion and Sediment Control Plan will identify the site vicinity, the specific project location, site features (including streams and potential discharge points), the limits of disturbance (including size, in acres, of disturbed areas), the erosion and sediment control measures (including design details and cross sections), wetlands areas, and restabilization measures (including revegetation specifications). Design for erosion and sediment control will be based on a 10-year, 24-hour storm event. This plan is required to be submitted by the Marine Corps to the State of North Carolina, Division of Land Resources, Land Quality Section.

2.6.3 Stormwater Management Plan

A Stormwater Management Plan or waiver is not expected to be needed for the removal action because no impervious surfaces are being constructed. However, the Erosion and Sediment Control Plan will be reviewed by the State's Regional Office, Stormwater Division and at their request a plan or waiver may be necessary.

2.7 CLOSEOUT REPORT

Following completion of the work, the Contractor will prepare a Contractor's Closeout Report that will detail the work performed at the site. Items included in the report are as follows: Introduction, summary, health and safety report, record documents, changes and modifications, photo log, field tests and analytical results, data validation, transportation and treatment, QC report, field screening methods and calibration, applicable figures, additional work items, and contaminants left for future consideration.

TABLE 2-1

PROJECT PERMITS
OPERABLE UNIT 1, SITE 16
MCAS CHERRY POINT, NORTH CAROLINA

Type of Project	Type of Permit	Issuing Agency	Applicability	Reason
Asbestos Containing Material Removal Permit	Removal Notification (Joint application made on NCDEHNR Form 3768)	State of N.C. Asbestos Hazard Management Branch	Applicable	Notification to the state of asbestos work to be performed. Allows review for accreditation of workers.
Asbestos Abatement (Air Quality) - NESHAP requirements	NESHAP Notification (Joint application made on NCDEHNR Form 3768).	State of N.C. Asbestos Hazard Management Branch	Applicable	Notification to the state of asbestos work to be performed.
Wetlands	Nationwide 38	Army COE	Applicable	Required where hazardous materials removal is performed or ordered by a government agency.
Wetlands	401/404 Water Quality Certification	N.C. Division of Environmental Management/Army COE	Applicable	To review the effect of construction activities on water quality.
Coastal	Federal Consistency Determination	N.C. Division of Coastal Management	Applicable	To determine if the project is consistent with the North Carolina Coastal Management Program.
Excavation and Filling in Estuarian Waters	State Dredge and Fill Permit	State Division of Coastal Management	Not Applicable	Slocum Creek is not an estuarian waterway.
Construction requiring a Sediment Control Plan	Stormwater Certification	State of N.C.	Not Applicable	No impervious surfaces will be constructed.
Erosion and Sediment Control	Plan required if over 1 acre	State of N.C. Land Quality Section	Applicable	Required to identify measures to be used to mitigate erosion at the site.
Construction resulting in stormwater discharge into streams	NPDES Permit	State of N.C. Water Quality Section	Not Applicable	Disturbed area will not exceed 5 acres.

3.0 DESIGN DOCUMENTS

The work described in Section 2.0 will be performed in accordance with design documents that will be submitted to the Navy as Final Design Documents. Following is a list of the specification sections and design drawings that have been developed:

Specifications

Division 01	General Requirements
01010	General Paragraphs
01561	Erosion and Sediment Control
Division 02	Site Work
02050	Demolition and Removal
02081	Engineering Control of Asbestos Containing Materials
02082	Removal and Disposal of Storage Tanks
02102	Clearing and Grubbing
02222	Excavation, Removal, and Treatment of Contaminated Soil
02950	Mitigated Wetlands Area, Shrubs, Plants, and Grass

Drawings

Dwg. 1 - Title Sheet

Dwg. 2 - Existing Site Conditions

Dwg. 3 - Remedial Action Site Plan

Dwg. 4 - Construction Details

Dwg. 5 - Existing Wetlands and Plant Communities

Dwg. 6 - Wetlands Restoration Plan

APPENDIX A
DATA SUMMARY

Westmont, NJ 609-858-4800 | Piscataway, NJ 908-981-0550 | Carle Place, NY 516-997-7251 | Manhattan, NY 212-290-0052 | Melbourne, FL 407-725-5223 | Ann Arbor, MI 313-668-6810 | San Mateo, CA 415-570-5401 | Smyrna, GA 404-333-6066

EMSL

Halliburton NUS Corporation
Attn: Mr. Steve Hughes
Foster Plaza 7 661 Andersen Drive
Pittsburgh, PA 15220-2745

Monday, December 12, 1994

Ref Number: WT945773

POLARIZED LIGHT MICROSCOPY (PLM)

Project: 4435/Cherry Point MCAS

SAMPLE	LOCATION	APPEARANCE	SAMPLE TREATMENT	ASBESTOS % TYPE	NONASBESTOS % FIBROUS	% NONFIBROUS
DP16-AS-01 I		Tan Fibrous Heterogeneous	Teased	25% Amosite 8% Chrysotile	8% Cellulose 2% Synthetic 7% Glass	50% Other
DP16-AS-01 O		Black Fibrous Heterogeneous	Teased	28% Chrysotile	15% Cellulose 8% Synthetic	49% Other
DP16-AS-02 I		Brown Fibrous Heterogeneous	Teased	20% Chrysotile	10% Cellulose 5% Synthetic	65% Other
DP16-AS-03 O		Black Fibrous Heterogeneous	Teased	None Detected	3% Cellulose 12% Glass	85% Other
DP16-AS-04		Brown/Black Fibrous Heterogeneous	Teased/Crushed	None Detected	60% Cellulose 2% Glass 8% Synthetic	30% Other
DP16-AS-05 I		Tan Fibrous Heterogeneous	Teased	None Detected	35% Cellulose 8% Min. Wool 7% Glass	50% Other

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "# of Layers" refers to number of separable subsamples.

Essie J. Spencer
Analyst

Laboratory
Supervisor

Other Approved
Signatory

Westmont, NJ 609-858-4800 | Piscataway, NJ 908-981-0550 | Carle Place, NY 516-997-7251 | Manhattan, NY 212-290-0052 | Melbourne, FL 407-725-5223 | Ann Arbor, MI 313-668-6810 | San Mateo, CA 415-570-5401 | Smyrna, GA 404-333-6086

EMSL

Halliburton NUS Corporation
Attn: Mr. Steve Hughes
Foster Plaza 7 661 Andersen Drive
Pittsburgh, PA 15220-2745

Monday, December 12, 1994

Ref Number: WT945773

POLARIZED LIGHT MICROSCOPY (PLM)

Project: 4435/Cherry Point MCAS

SAMPLE	LOCATION	APPEARANCE	SAMPLE TREATMENT	ASBESTOS %	ASBESTOS TYPE	NONASBESTOS %	NONASBESTOS FIBROUS	NONASBESTOS %	NONASBESTOS NONFIBROUS
DP16-AS-06 O		Black Fibrous Heterogeneous	Teased/Crushed	15%	Chrysotile	8% 2%	Cellulose Synthetic	75%	Other
DP16-AS-07 O		Black Fibrous Heterogeneous	Teased/Crushed	10%	Chrysotile	10% 20%	Cellulose Glass	60%	Other
DP16-AS-08 I		Tan Fibrous Heterogeneous	Teased		None Detected	35% 5%	Cellulose Synthetic	60%	Other
DP16-AS-09 O		Black Fibrous Heterogeneous	Teased	10%	Chrysotile	8% 5% 5%	Cellulose Synthetic Glass	72%	Other
DP16-AS-10 I		Tan Fibrous Heterogeneous	Teased		None Detected	10% 20%	Cellulose Glass	70%	Other
DP16-AS-11 I		Tan Fibrous Heterogeneous	Teased		None Detected	25% 8%	Cellulose Synthetic	67%	Other

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "# of Layers" refers to number of separable subsamples.

Essie J. Spencer
Analyst

Laboratory
Supervisor

Other Approved
Signatory

Westmont, NJ 609-858-4800 | Piscataway, NJ 908-981-0550 | Carle Place, NY 516-997-7251 | Manhattan, NY 212-290-0052 | Melbourne, FL 407-725-5223 | Ann Arbor, MI 313-668-6810 | San Mateo, CA 415-570-5401 | Smyrna, GA 404-333-6066

EMSL

Halliburton NUS Corporation
Attn: Mr. Steve Hughes
Foster Plaza 7 661 Andersen Drive
Pittsburgh, PA 15220-2745

Monday, December 12, 1994

Ref Number: WT945773

POLARIZED LIGHT MICROSCOPY (PLM)

Project: 4435/Cherry Point MCAS

SAMPLE	LOCATION	APPEARANCE	SAMPLE TREATMENT	ASBESTOS %	ASBESTOS TYPE	NONASBESTOS %	NONASBESTOS FIBROUS	NONASBESTOS %	NONASBESTOS NONFIBROUS
DP16-AS-12 O		Black Fibrous Heterogeneous	Teased		None Detected	20% 20% 5%	Cellulose Glass Synthetic	55%	Other
DP16-AS-13 I		Grey Fibrous Heterogeneous	Teased		None Detected	60% 8%	Cellulose Min. Wool	32%	Other
DP16-AS-14 O		Black Fibrous Heterogeneous	Teased	10%	Chrysotile	8% 5% 5%	Cellulose Synthetic Glass	72%	Other
DP16-AS-15 I		Tan Fibrous Heterogeneous	Teased	20% 5%	Amosite Chrysotile	8% 2% 5%	Cellulose Synthetic Glass	60%	Other
DP16-AS-16 I		Black Fibrous Heterogeneous	Teased	45%	Chrysotile	15% 5%	Cellulose Synthetic	35%	Other
DP16-AS-17 O		Black Fibrous Heterogeneous	Teased	20%	Chrysotile	8% 2% 5%	Cellulose Synthetic Glass	65%	Other

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "# of Layers" refers to number of separable subsamples.

Essie J. Spencer
Analyst

Laboratory
Supervisor

Other Approved
Signatory

Westmont, NJ 609-858-4800 | Piscataway, NJ 908-981-0550 | Carle Place, NY 516-997-7251 | Manhattan, NY 212-290-0052 | Melbourne, FL 407-725-5223 | Ann Arbor, MI 313-668-6810 | San Mateo, CA 415-570-5401 | Smyrna, GA 404-333-6066

EMSL

Halliburton NUS Corporation
Attn: Mr. Steve Hughes
Foster Plaza 7 661 Andersen Drive
Pittsburgh, PA 15220-2745

Monday, December 12, 1994

Ref Number: WT945773

POLARIZED LIGHT MICROSCOPY (PLM)

Project: 4435/Cherry Point MCAS

SAMPLE	LOCATION	APPEARANCE	SAMPLE TREATMENT	ASBESTOS %	ASBESTOS TYPE	NONASBESTOS %	NONASBESTOS FIBROUS	NONASBESTOS %	NONASBESTOS NONFIBROUS
DP16-AS-18 I		Tan Fibrous Heterogeneous	Teased	5% 30%	Chrysotile Amosite	8% 5% 2%	Cellulose Glass Synthetic	50%	Other
DP16-AS-19 I		Tan Fibrous Heterogeneous	Teased	5% 30%	Chrysotile Amosite	8% 5% 2%	Cellulose Glass Synthetic	50%	Other
DP16-AS-20 O		Black Fibrous Heterogeneous	Teased	20%	Chrysotile	2% 8%	Cellulose Synthetic	70%	Other
DUP-112994-01		Tan Fibrous Heterogeneous	Teased		None Detected	5% 10%	Cellulose Glass	85%	Other
DUP-112994-02		Black Fibrous Heterogeneous	Teased	35%	Chrysotile	10% 5%	Cellulose Synthetic	50%	Other

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "# of Layers" refers to number of separable subsamples.

Essie J. Spencer
Analyst

Laboratory
Supervisor

Other Approved
Signatory

Disclaimers: PLM has been known to miss asbestos in a small percentage of samples which contain asbestos. Thus negative PLM results cannot be guaranteed. Floor tiles and wipes should be tested with either SEM or TEM. The above test report relates only to the items tested. This report may only be reproduced in full with written approval by EMSL. The above test must not be used by the client to claim product endorsement by NVLAP nor any agency of the United States Government. All "NVLAP" reports with NVLAP logo must contain at least one signature to be valid. Laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

Westmont, NJ 609-858-4800 | Piscataway, NJ 908-981-0550 | Carle Place, NY 516-997-7251 | Manhattan, NY 212-290-0052 | Melbourne, FL 407-725-5223 | Ann Arbor, MI 313-668-6810 | San Mateo, CA 415-570-5401 | Smyrna, GA 404-333-6066

EMSL

Halliburton NUS Corporation
Attn: Mr. Steve Hughes
Foster Plaza 7 661 Andersen Drive
Pittsburgh, PA 15220-2745

Thursday, December 15, 1994

Ref Number: WT945948

POLARIZED LIGHT MICROSCOPY (PLM)

Project: 4435/Cherry Point MCAS

SAMPLE	LOCATION	APPEARANCE	SAMPLE TREATMENT	ASBESTOS %	ASBESTOS TYPE	NONASBESTOS %	NONASBESTOS FIBROUS	NONASBESTOS %	NONASBESTOS NONFIBROUS
DP16-AS-26		Black Fibrous Heterogeneous	Teased	8%	Chrysotile	10% 8% 2%	Cellulose Synthetic Glass	72%	Other
DP16-AS-25		Black Fibrous Heterogeneous	Teased	2%	Amosite	25% 8% 2%	Cellulose Synthetic Glass	63%	Other
DP16-AS-24		Black Fibrous Heterogeneous	Teased	2% 8%	Chrysotile Amosite	20% 10% 2%	Cellulose Synthetic Glass	58%	Other
DP16-AS-23		Black Fibrous Heterogeneous	Teased	< 1%	Chrysotile	25% 10% 5%	Cellulose Synthetic Glass	60%	Other
DP16-AS-22		Black Fibrous Heterogeneous	Teased		None Detected	30% 10% 5%	Cellulose Synthetic Glass	55%	Other
DP16-AS-21		Black Fibrous Heterogeneous	Teased		None Detected	30% 10% 5%	Cellulose Synthetic Glass	55%	Other

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "# of Layers" refers to number of separable subsamples.

Essie J. Spencer
Analyst

Laboratory
Supervisor

Other Approved
Signatory

Westmont, NJ 609-858-4800 | Piscataway, NJ 908-981-0550 | Carle Place, NY 516-997-7251 | Manhattan, NY 212-290-0052 | Melbourne, FL 407-725-5223 | Ann Arbor, MI 313-668-6810 | San Mateo, CA 415-570-5401 | Smyrna, GA 404-333-6066

EMSL

Halliburton NUS Corporation
Attn: Mr. Steve Hughes
Foster Plaza 7 661 Andersen Drive
Pittsburgh, PA 15220-2745

Thursday, December 15, 1994

Ref Number: WT945948

POLARIZED LIGHT MICROSCOPY (PLM)

Project: 4435/Cherry Point MCAS

SAMPLE	LOCATION	APPEARANCE	SAMPLE TREATMENT	ASBESTOS %	ASBESTOS TYPE	NONASBESTOS %	NONASBESTOS FIBROUS	NONASBESTOS %	NONASBESTOS NONFIBROUS
DUP-120294-01		Black Fibrous Heterogeneous	Teased		None Detected	30% 10% 5%	Cellulose Synthetic Glass	55%	Other

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "# of Layers" refers to number of separable subsamples.

Essie J. Spencer
Analyst

Laboratory
Supervisor

Other Approved
Signatory

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			S001-0001	S002-0001	S003-0001	S004-0001	SB04-0102	SB04-0102	S005-0001	S0-06-0001	S007-0001
LABORATORY ID:			20761.02	20761.03	20761.04	20761.05	20761.06	DUP	20761.07	20761.08	20761.09
% SOLIDS:			68	71	79	79	78	70	77	75	44
TCL VOLATILES SOILS (UG/KG)	CRQL	MDL									
CHLOROMETHANE	10	1.9	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
BROMOMETHANE	10	2.8	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
VINYL CHLORIDE	10	1.9	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
CHLOROETHANE	10	2.9	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
METHYLENE CHLORIDE	10	2.1	29	3 J	2 J	3 J	60	14 U	61	21	42
ACETONE	10	3.7	89	14 U	6 J	13 U	16	19	13 U	16	23 U
CARBON DISULFIDE	10	1.4	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
1,1-DICHLOROETHENE	10	1.1	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
1,1-DICHLOROETHANE	10	1.6	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
1,2-DICHLOROETHENE(TOTAL)	10	1.2	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
CHLOROFORM	10	1.3	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
1,2-DICHLOROETHANE	10	2.8	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
2-BUTANONE	10	3.9	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
1,1,1-TRICHLOROETHANE	10	0.6	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
CARBON TETRACHLORIDE	10	1.2	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
BROMODICHLOROMETHANE	10	0.7	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
1,2-DICHLOROPROPANE	10	1	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
CIS-1,3-DICHLOROPROPENE	10	1	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
TRICHLOROETHENE	10	1.1	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
DIBROMOCHLOROMETHANE	10	1.4	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
1,1,2-TRICHLOROETHANE	10	1.1	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
BENZENE	10	1.2	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
TRANS-1,3-DICHLOROPROPEN	10	0.9	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
BROMOFORM	10	2.5	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
4-METHYL-2-PENTANONE	10	4	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
2-HEXANONE	10	4.8	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
TETRACHLOROETHENE	10	1.3	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
1,1,2,2-TETRACHLOROETHAN	10	1.7	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
TOLUENE	10	0.9	11 J	4 J	4 J	3 J	7 J	14 U	13 U	13 U	23 U
CHLOROBENZENE	10	0.8	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
ETHYLBENZENE	10	2.6	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
STYRENE	10	0.9	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U
XYLENE (TOTAL)	10	1.7	15 U	14 U	13 U	13 U	13 U	14 U	13 U	13 U	23 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO07-0001	SO08-0001	SO09-0001	SO10-0001	SO11-0001	SO12-0001	SO13-0001	SO14-0001	SO15-0001
LABORATORY ID:			DUP	20761.10	20761.11	20761.12	20769.02	20769.03	20769.04	20769.08	20769.09
% SOLIDS:			40	45	61	67	57	36	60	54	76
TCL VOLATILES SOILS (UG/KG)	CRQL	MDL									
CHLOROMETHANE	10	1.9	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
BROMOMETHANE	10	2.8	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
VINYL CHLORIDE	10	1.9	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
CHLOROETHANE	10	2.9	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
METHYLENE CHLORIDE	10	2.1	25 U	23	20	38	18 U	63	17 U	59	26
ACETONE	10	3.7	25 U	24	16 U	15 U	18 U	40	17 U	59	14
CARBON DISULFIDE	10	1.4	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
1,1-DICHLOROETHENE	10	1.1	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
1,1-DICHLOROETHANE	10	1.6	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
1,2-DICHLOROETHENE(TOTAL)	10	1.2	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
CHLOROFORM	10	1.3	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
1,2-DICHLOROETHANE	10	2.8	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
2-BUTANONE	10	3.9	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
1,1,1-TRICHLOROETHANE	10	0.6	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
CARBON TETRACHLORIDE	10	1.2	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
BROMODICHLOROMETHANE	10	0.7	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
1,2-DICHLOROPROPANE	10	1	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
CIS-1,3-DICHLOROPROPENE	10	1	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
TRICHLOROETHENE	10	1.1	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
DIBROMOCHLOROMETHANE	10	1.4	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
1,1,2-TRICHLOROETHANE	10	1.1	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
BENZENE	10	1.2	25 U	22 U	16 U	11 J	18 U	28 U	17 U	18 U	13 U
TRANS-1,3-DICHLOROPROPEN	10	0.9	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
BROMOFORM	10	2.5	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
4-METHYL-2-PENTANONE	10	4	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
2-HEXANONE	10	4.8	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
TETRACHLOROETHENE	10	1.3	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
1,1,2,2-TETRACHLOROETHAN	10	1.7	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
TOLUENE	10	0.9	25 U	22 U	16 U	15 J	4 J	28 U	3 J	3 J	13 U
CHLOROBENZENE	10	0.8	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
ETHYLBENZENE	10	2.6	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
STYRENE	10	0.9	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U
XYLENE (TOTAL)	10	1.7	25 U	22 U	16 U	15 U	18 U	28 U	17 U	18 U	13 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO16-0001	SO17-0001	SB17-0102	SO18-0001	SB18-0102	SO19-0001	SO19-0001	SB19-0102
LABORATORY ID:			20769.10	20769.11	20769.12	20769.13	20769.14	20769.15	DUP	20769.19
% SOLIDS:			34	84	87	84	89	84	84	90
TCL VOLATILES SOILS (UG/KG)	CRQL	MDL								
CHLOROMETHANE	10	1.9	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
BROMOMETHANE	10	2.8	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
VINYL CHLORIDE	10	1.9	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
CHLOROETHANE	10	2.9	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
METHYLENE CHLORIDE	10	2.1	72	12 U	2 J	12 U	11 U	1 J	12 U	2 J
ACETONE	10	3.7	29 U	12 U	26	12 U	11 J	12 U	12 U	11 U
CARBON DISULFIDE	10	1.4	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
1,1-DICHLOROETHENE	10	1.1	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
1,1-DICHLOROETHANE	10	1.6	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
1,2-DICHLOROETHENE(TOTAL)	10	1.2	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
CHLOROFORM	10	1.3	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
1,2-DICHLOROETHANE	10	2.8	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
2-BUTANONE	10	3.9	29 U	12 U	8 J	12 U	11 U	12 U	12 U	11 U
1,1,1-TRICHLOROETHANE	10	0.6	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
CARBON TETRACHLORIDE	10	1.2	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
BROMODICHLOROMETHANE	10	0.7	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
1,2-DICHLOROPROPANE	10	1	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
CIS-1,3-DICHLOROPROPENE	10	1	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
TRICHLOROETHENE	10	1.1	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
DIBROMOCHLOROMETHANE	10	1.4	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
1,1,2-TRICHLOROETHANE	10	1.1	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
BENZENE	10	1.2	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
TRANS-1,3-DICHLOROPROPEN	10	0.9	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
BROMOFORM	10	2.5	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
4-METHYL-2-PENTANONE	10	4	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
2-HEXANONE	10	4.8	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
TETRACHLOROETHENE	10	1.3	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
1,1,2,2-TETRACHLOROETHAN	10	1.7	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
TOLUENE	10	0.9	29 U	12 U	2 J	12 U	11 U	12 U	12 U	11 U
CHLOROBENZENE	10	0.8	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
ETHYLBENZENE	10	2.6	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
STYRENE	10	0.9	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U
XYLENE (TOTAL)	10	1.7	29 U	12 U	11 U	12 U	11 U	12 U	12 U	11 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO01-0001	SO02-0001	SO03-0001	SO04-0001	SB04-0102	SB04-0102	SO05-0001
LABORATORY ID:			20761.02	20761.03	20761.04	20761.05	20761.06	DUP	20761.07
% SOLIDS:			68	71	79	79	78	70	77
PURGEABLE TPH SOILS (UG/KG)	CRQL	MDL							
GASOLINE	10	NA	14.7 U	10.2 J	12.7 U	12.6 U	12.7 U	18.6	13 U
DIESEL C10-C22	1	NA	1.47 U	1.42 U	1.27 U	1.26 U	1.27 U	1.43 U	1.3 U
KEROSENE C9-C18	1	NA	1.47 U	1.42 U	1.27 U	1.26 U	1.27 U	1.43 U	1.3 U
JP-4 C6-C14	1	NA	1.47 U	1.42 U	1.27 U	1.26 U	1.27 U	1.43 U	1.3 U
NAPHTHA C6-C12	1	NA	1.47 U	1.42 U	1.27 U	1.26 U	1.27 U	1.43 U	1.3 U
#6 FUEL OIL C12-C24	1	NA	1.47 U	1.42 U	1.27 U	1.26 U	1.27 U	1.43 U	1.3 U
OIL & GREASE	10	NA	205	77.8	329	82	458	272	117

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:				SO-06-0001	SO07-0001	SO07-0001	SO08-0001	SO09-0001	SO10-0001	SO11-0001
LABORATORY ID:				20761.08	20761.09	DUP	20761.10	20761.11	20761.12	20769.02
	% SOLIDS:			75	44	40	45	61	67	57
PURGEABLE TPH SOILS	(UG/KG)	CRQL	MDL							
GASOLINE		10	NA	13.3 U	22.7 U	25 U	22 U	16.3 U	23	10.4 J
DIESEL C10-C22		1	NA	1.33 U	2.27 U	2.5 U	2.2 U	1.63 U	1.49 U	1.76 U
KEROSENE C9-C18		1	NA	1.33 U	2.27 U	2.5 U	2.2 U	1.63 U	1.49 U	1.76 U
JP-4 C6-C14		1	NA	1.33 U	2.27 U	2.5 U	2.2 U	1.63 U	1.49 U	1.76 U
NAPHTHA C6-C12		1	NA	1.33 U	2.27 U	2.5 U	2.2 U	1.63 U	1.49 U	1.76 U
#6 FUEL OIL C12-C24		1	NA	1.33 U	2.27 U	2.5 U	2.2 U	1.63 U	1.49 U	1.76 U
OIL & GREASE		10	NA	24	31.8	40.1	50.6	53.7	403	113

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:				SO12-0001	SO13-0001	SO14-0001	SO15-0001	SO16-0001	SO17-0001
LABORATORY ID:				20769.03	20769.04	20769.08	20769.09	20769.10	20769.11
	% SOLIDS:			36	60	54	76	34	84
PURGEABLE TPH SOILS	(UG/KG)	CRQL	MDL						
GASOLINE		10	NA	27.8 U	16.6 U	18.7 U	13.2 U	29.7 U	14.1
DIESEL C10-C22		1	NA	2.78 U	1.66 U	1.87 U	1.32 U	2.97 U	1.18 U
KEROSENE C9-C18		1	NA	2.78 U	1.66 U	1.87 U	1.32 U	2.97 U	1.18 U
JP-4 C6-C14		1	NA	2.78 U	1.66 U	1.87 U	1.32 U	2.97 U	1.18 U
NAPHTHA C6-C12		1	NA	2.78 U	1.66 U	1.87 U	1.32 U	2.97 U	1.18 U
#6 FUEL OIL C12-C24		1	NA	2.78 U	1.66 U	1.87 U	1.32 U	2.97 U	1.18 U
OIL & GREASE		10	NA	228	164	59.8	48.7	122	71

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO17-0102	SO18-0001	SB18-0102	SO19-0001	SO19-0001	SB19-0102
LABORATORY ID:			20769.12	20769.13	20769.14	20769.15	DUP	20769.19
% SOLIDS:			87	84	89	84	84	90
PURGEABLE TPH SOILS (UG/KG)	CRQL	MDL						
GASOLINE	10	NA	42	11.9 U	11.2 U	16.3	13.4	14.3
DIESEL C10-C22	1	NA	1.15 U	1.19 U	1.12 U	1.2 U	1.19 U	1.12 U
KEROSENE C9-C18	1	NA	1.15 U	1.19 U	1.12 U	1.2 U	1.19 U	1.12 U
JP-4 C6-C14	1	NA	1.15 U	1.19 U	1.12 U	1.2 U	1.19 U	1.12 U
NAPHTHA C6-C12	1	NA	1.15 U	1.19 U	1.12 U	1.2 U	1.19 U	1.12 U
#6 FUEL OIL C12-C24	1	NA	1.15 U	1.19 U	1.12 U	1.2 U	1.19 U	1.12 U
OIL & GREASE	10	NA	3570	46.4	14.6	311	322	112

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO01-0001	SO02-0001	SO03-0001	SO04-0001	SB04-0102	SB04-0102	SO05-0001	SO-06-0001
LABORATORY ID:			20761.02	20761.03	20761.04	20761.05	20761.06	DUP	20761.07	20761.08
% SOLIDS:			68	71	79	79	78	70	77	75
TCL SEMIVOLATILE SOILS (UG/KG)	CRQL	MDL								
PHENOL	330	75	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
BIS(2-CHLOROETHYL)ETHER	330	63	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2-CHLOROPHENOL	330	65	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
1,3-DICHLOROBENZENE	330	57	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
1,4-DICHLOROBENZENE	330	55	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
1,2-DICHLOROBENZENE	330	65	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2-METHYLPHENOL	330	23	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
BIS(2-CHLOROISOPROPYL)ETHER	330	195	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
4-METHYLPHENOL	330	60	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
N-NITROSO-DI-N-PROPYLAMINE	330	100	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
HEXACHLOROETHANE	330	52	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
NITROBENZENE	330	21	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
ISOPHORONE	330	46	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2-NITROPHENOL	330	29	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2,4-DIMETHYLPHENOL	330	78	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2,4-DICHLOROPHENOL	330	42	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
1,2,4-TRICHLOROBENZENE	330	52	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
NAPHTHALENE	330	45	28 J	460 U	33 J	420 U	61 J	90 J	24 J	440 U
4-CHLOROANILINE	330	89	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
BIS(2-CHLOROETHOXY)METHANE	330	35	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
HEXACHLOROBUTADIENE	330	78	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
4-CHLORO-3-METHYLPHENOL	330	41	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2-METHYLNAPHTHALENE	330	29	48 J	460 U	40 J	420 U	46 J	78 J	47 J	440 U
HEXACHLOROCYCLOPENTADIEN	330	259	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2,4,6-TRICHLOROPHENOL	330	54	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2,4,5-TRICHLOROPHENOL	800	83	1200 U	1100 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U
2-CHLORONAPHTHALENE	330	33	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2-NITROANILINE	800	60	1200 U	1100 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U
DIMETHYL PHTHALATE	330	25	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
ACENAPHTHYLENE	330	29	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2,6-DINITROTOLUENE	330	39	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
3-NITROANILINE	800	164	1200 U	1100 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U
ACENAPHTHENE	330	37	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
2,4-DINITROPHENOL	800	87	1200 U	1100 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U
4-NITROPHENOL	800	68	1200 U	1100 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U
DIBENZOFURAN	330	28	480 U	460 U	420 U	420 U	420 U	30 J	430 U	440 U
2,4-DINITROTOLUENE	330	46	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
DIETHYLPHTHALATE	330	37	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
4-CHLOROPHENYL-PHENYLETHE	330	61	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			S001-0001	S002-0001	S003-0001	S004-0001	SB04-0102	SB04-0102	S005-0001	S0-06-0001
LABORATORY ID:			20761.02	20761.03	20761.04	20761.05	20761.06	DUP	20761.07	20761.08
% SOLIDS:			68	71	79	79	78	70	77	75
TCL SEMIVOLATILE SOILS (UG/KG)	CRQL	MDL								
FLUORENE	330	30	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
4-NITROANILINE	800	89	1200 U	1100 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U
4,6-DINITRO-2-METHYLPHENOL	800	68	1200 U	1100 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U
N-NITROSODIPHENYLAMIN(1)	330	31	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
4-BROMOPHENYL-PHENYLETHER	330	96	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
HEXACHLOROBENZENE	330	95	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
PENTACHLOROPHENOL	800	287	1200 U	1100 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U
PHENANTHRENE	330	45	67 J	61 J	110 J	32 J	84 J	120 J	59 J	440 U
ANTHRACENE	330	56	480 U	460 U	24 J	420 U	22 J	30 J	430 U	440 U
CARBAZOLE	330	73	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
DI-N-BUTYLPHTHALATE	330	43	480 U	460 U	34 J	29 J	420 U	36 J	28 J	290 J
FLUORANTHENE	330	41	97 J	120 J	210 J	52 J	160 J	160 J	76 J	23 J
PYRENE	330	92	90 J	100 J	160 J	48 J	170 J	180 J	60 J	440 U
BUTYLBENZYLPHTHALATE	330	86	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
3,3'-DICHLOROBENZIDINE	330	80	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
BENZO(A)ANTHRACENE	330	29	74 J	79 J	150 J	47 J	130 J	96 J	47 J	440 U
CHRYSENE	330	27	100 J	90 J	160 J	55 J	160 J	130 J	73 J	23 J
BIS(2-ETHYLHEXYL)PHTHALATE	330	91	120 J	220 J	54 J	69 J	44 J	49 J	1600	72 J
DI-N-OCTYL PHTHALATE	330	43	480 U	460 U	420 U	420 U	420 U	470 U	430 U	440 U
BENZO(B)FLUORANTHENE	330	142	130 J	120 J	170 J	50 J	180 J	160 J	120 J	23 J
BENZO(K)FLUORANTHENE	330	166	100 J	74 J	140 J	51 J	140 J	100 J	430 U	440 U
BENZO(A)PYRENE	330	31	100 J	100 J	160 J	42 J	170 J	150 J	64 J	440 U
INDENO(1,2,3-CD)PYRENE	330	67	92 J	66 J	140 J	39 J	140 J	140 J	60 J	440 U
DIBENZ(A,H)ANTHRACENE	330	81	34 J	41 J	46 J	420 U	43 J	55 J	430 U	440 U
BENZO(G,H,I)PERYLENE	330	66	100 J	80 J	140 J	41 J	140 J	160 J	71 J	440 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO07-0001	SO07-0001	SO08-0001	SO09-0001	SO10-0001	SO11-0001	SO12-0001	SO13-0001
LABORATORY ID:			20761.09	DUP	20761.10	20761.11	20761.12	20769.02	20769.03	20769.04
% SOLIDS:			44	40	45	61	67	57	36	60
TCL SEMIVOLATILE SOILS (UG/KG)	CRQL	MDL								
PHENOL	330	75	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
BIS(2-CHLOROETHYL)ETHER	330	63	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2-CHLOROPHENOL	330	65	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
1,3-DICHLOROBENZENE	330	57	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
1,4-DICHLOROBENZENE	330	55	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
1,2-DICHLOROBENZENE	330	65	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2-METHYLPHENOL	330	23	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
BIS(2-CHLOROISOPROPYL)ETHER	330	195	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
4-METHYLPHENOL	330	60	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
N-NITROSO-DI-N-PROPYLAMINE	330	100	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
HEXACHLOROETHANE	330	52	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
NITROBENZENE	330	21	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
ISOPHORONE	330	46	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2-NITROPHENOL	330	29	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2,4-DIMETHYLPHENOL	330	78	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2,4-DICHLOROPHENOL	330	42	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
1,2,4-TRICHLOROBENZENE	330	52	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
NAPHTHALENE	330	45	77 J	140 J	77 J	540 U	490 U	580 U	920 U	550 U
4-CHLOROANILINE	330	89	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
BIS(2-CHLOROETHOXY)METHANE	330	35	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
HEXACHLOROBUTADIENE	330	78	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
4-CHLORO-3-METHYLPHENOL	330	41	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2-METHYLNAPHTHALENE	330	29	150 J	300 J	150 J	55 J	43 J	580 U	59 J	550 U
HEXACHLOROCYCLOPENTADIEN	330	259	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2,4,6-TRICHLOROPHENOL	330	54	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2,4,5-TRICHLOROPHENOL	800	83	1800 U	2000 U	1700 U	1300 U	1200 U	1400 U	2200 U	1300 U
2-CHLORONAPHTHALENE	330	33	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2-NITROANILINE	800	60	1800 U	2000 U	1700 U	1300 U	1200 U	1400 U	2200 U	1300 U
DIMETHYL PHTHALATE	330	25	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
ACENAPHTHYLENE	330	29	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
2,6-DINITROTOLUENE	330	39	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
3-NITROANILINE	800	164	1800 U	2000 U	1700 U	1300 U	1200 U	1400 U	2200 U	1300 U
ACENAPHTHENE	330	37	750 U	820 U	720 U	540 U	29 J	580 U	920 U	550 U
2,4-DINITROPHENOL	800	87	1800 U	2000 U	1700 U	1300 U	1200 U	1400 U	2200 U	1300 U
4-NITROPHENOL	800	68	1800 U	2000 U	1700 U	1300 U	1200 U	1400 U	2200 U	1300 U
DIBENZOFURAN	330	28	42 J	83 J	40 J	540 U	490 U	580 U	920 U	550 U
2,4-DINITROTOLUENE	330	46	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
DIETHYLPHTHALATE	330	37	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
4-CHLOROPHENYL-PHENYLETHE	330	61	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			S007-0001	S007-0001	S008-0001	S009-0001	S010-0001	S011-0001	S012-0001	S013-0001
LABORATORY ID:			20761.09	DUP	20761.10	20761.11	20761.12	20769.02	20769.03	20769.04
% SOLIDS:			44	40	45	61	67	57	36	60
TCL SEMIVOLATILE SOILS (UG/KG)	CRQL	MDL								
FLUORENE	330	30	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
4-NITROANILINE	800	89	1800 U	2000 U	1700 U	1300 U	1200 U	1400 U	2200 U	1300 U
4,6-DINITRO-2-METHYLPHENOL	800	68	1800 U	2000 U	1700 U	1300 U	1200 U	1400 U	2200 U	1300 U
N-NITROSODIPHENYLAMIN(1)	330	31	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
4-BROMOPHENYL-PHENYLETHER	330	96	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
HEXACHLOROBENZENE	330	95	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
PENTACHLOROPHENOL	800	287	1800 U	2000 U	1700 U	1300 U	1200 U	1400 U	2200 U	1300 U
PHENANTHRENE	330	45	170 J	310 J	170 J	80 J	320 J	58 J	310 J	240 J
ANTHRACENE	330	56	750 U	820 U	720 U	540 U	67 J	580 U	920 U	550 U
CARBAZOLE	330	73	750 U	820 U	720 U	540 U	28 J	580 U	920 U	550 U
DI-N-BUTYLPHTHALATE	330	43	38 J	72 J	39 J	540 U	490 U	49 J	56 J	42 J
FLUORANTHENE	330	41	140 J	220 J	240 J	140 J	340 J	98 J	520 J	360 J
PYRENE	330	92	110 J	210 J	250 J	120 J	480 J	130 J	670 J	530 J
BUTYLBENZYLPHTHALATE	330	86	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
3,3'-DICHLOROBENZIDINE	330	80	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
BENZO(A)ANTHRACENE	330	29	78 J	120 J	160 J	87 J	200 J	48 J	230 J	180 J
CHRYSENE	330	27	120 J	220 J	250 J	110 J	240 J	78 J	400 J	270 J
BIS(2-ETHYLHEXYL)PHTHALATE	330	91	99 J	160 J	120 J	88 J	200 J	330 J	220 J	200 J
DI-N-OCTYL PHTHALATE	330	43	750 U	820 U	720 U	540 U	490 U	580 U	920 U	550 U
BENZO(B)FLUORANTHENE	330	142	160 J	270 J	470 J	110 J	310 J	86 J	570 J	360 J
BENZO(K)FLUORANTHENE	330	166	750 U	820 U	720 U	110 J	210 J	62 J	920 U	550 U
BENZO(A)PYRENE	330	31	80 J	130 J	190 J	97 J	200 J	75 J	360 J	250 J
INDENO(1,2,3-CD)PYRENE	330	67	62 J	110 J	170 J	70 J	160 J	63 J	320 J	200 J
DIBENZ(A,H)ANTHRACENE	330	81	750 U	820 U	56 J	38 J	490 U	580 U	93 J	72 J
BENZO(G,H,I)PERYLENE	330	66	68 J	130 J	160 J	86 J	230 J	92 J	410 J	270 J

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO14-0001	SO15-0001	SO16-0001	SO17-0001	SB17-0102	SO18-0001	SB18-0102	SO19-0001
LABORATORY ID:			20769.08	20769.09	20769.10	20769.11	20769.12	20769.13	20769.14	20769.15
% SOLIDS:			54	76	34	84	87	84	89	84
TCL SEMIVOLATILE SOILS (UG/KG)	CRQL	MDL								
PHENOL	330	75	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
BIS(2-CHLOROETHYL)ETHER	330	63	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2-CHLOROPHENOL	330	65	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
1,3-DICHLOROBENZENE	330	57	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
1,4-DICHLOROBENZENE	330	55	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
1,2-DICHLOROBENZENE	330	65	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2-METHYLPHENOL	330	23	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
BIS(2-CHLOROISOPROPYL)ETHER	330	195	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
4-METHYLPHENOL	330	60	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
N-NITROSO-DI-N-PROPYLAMINE	330	100	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
HEXACHLOROETHANE	330	52	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
NITROBENZENE	330	21	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
ISOPHORONE	330	46	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2-NITROPHENOL	330	29	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2,4-DIMETHYLPHENOL	330	78	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2,4-DICHLOROPHENOL	330	42	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
1,2,4-TRICHLOROBENZENE	330	52	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
NAPHTHALENE	330	45	610 U	430 U	970 U	390 U	380 U	390 U	370 U	25 J
4-CHLOROANILINE	330	89	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
BIS(2-CHLOROETHOXY)METHANE	330	35	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
HEXACHLOROBUTADIENE	330	78	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
4-CHLORO-3-METHYLPHENOL	330	41	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2-METHYLNAPHTHALENE	330	29	610 U	430 U	970 U	390 U	49 J	390 U	370 U	50 J
HEXACHLOROCYCLOPENTADIEN	330	259	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2,4,6-TRICHLOROPHENOL	330	54	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2,4,5-TRICHLOROPHENOL	800	83	1500 U	1000 U	2400 U	950 U	920 U	950 U	900 U	950 U
2-CHLORONAPHTHALENE	330	33	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2-NITROANILINE	800	60	1500 U	1000 U	2400 U	950 U	920 U	950 U	900 U	950 U
DIMETHYL PHTHALATE	330	25	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
ACENAPHTHYLENE	330	29	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2,6-DINITROTOLUENE	330	39	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
3-NITROANILINE	800	164	1500 U	1000 U	2400 U	950 U	920 U	950 U	900 U	950 U
ACENAPHTHENE	330	37	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2,4-DINITROPHENOL	800	87	1500 U	1000 U	2400 U	950 U	920 U	950 U	900 U	950 U
4-NITROPHENOL	800	68	1500 U	1000 U	2400 U	950 U	920 U	950 U	900 U	950 U
DIBENZOFURAN	330	28	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
2,4-DINITROTOLUENE	330	46	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
DIETHYLPHTHALATE	330	37	610 U	430 U	970 U	390 U	380 U	22 J	370 U	390 U
4-CHLOROPHENYL-PHENYLETHE	330	61	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO14-0001	SO15-0001	SO16-0001	SO17-0001	SB17-0102	SO18-0001	SB18-0102	SO19-0001
LABORATORY ID:			20769.08	20769.09	20769.10	20769.11	20769.12	20769.13	20769.14	20769.15
% SOLIDS:			54	76	34	84	87	84	89	84
TCL SEMIVOLATILE SOILS (UG/KG)	CRQL	MDL								
FLUORENE	330	30	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
4-NITROANILINE	800	89	1500 U	1000 U	2400 U	950 U	920 U	950 U	900 U	950 U
4,6-DINITRO-2-METHYLPHENOL	800	68	1500 U	1000 U	2400 U	950 U	920 U	950 U	900 U	950 U
N-NITROSODIPHENYLAMIN(1)	330	31	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
4-BROMOPHENYL-PHENYLETHER	330	96	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
HEXACHLOROBENZENE	330	95	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
PENTACHLOROPHENOL	800	287	1500 U	1000 U	2400 U	950 U	920 U	950 U	900 U	950 U
PHENANTHRENE	330	45	50 J	430 U	55 J	49 J	63 J	390 U	370 U	58 J
ANTHRACENE	330	56	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
CARBAZOLE	330	73	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
DI-N-BUTYLPHTHALATE	330	43	35 J	23 J	64 J	22 J	35 J	390 U	370 U	390 U
FLUORANTHENE	330	41	77 J	30 J	80 J	100 J	56 J	390 U	370 U	51 J
PYRENE	330	92	96 J	41 J	110 J	97 J	120 J	22 J	370 U	80 J
BUTYLBENZYLPHTHALATE	330	86	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
3,3'-DICHLOROBENZIDINE	330	80	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
BENZO(A)ANTHRACENE	330	29	39 J	430 U	52 J	60 J	37 J	390 U	370 U	34 J
CHRYSENE	330	27	63 J	26 J	71 J	90 J	64 J	390 U	370 U	38 J
BIS(2-ETHYLHEXYL)PHTHALATE	330	91	180 J	80 J	300 J	67 J	100 J	140 J	99 J	70 J
DI-N-OCTYL PHTHALATE	330	43	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
BENZO(B)FLUORANTHENE	330	142	52 J	41 J	65 J	120 J	56 J	390 U	370 U	82 J
BENZO(K)FLUORANTHENE	330	166	29 J	430 U	54 J	390 U	35 J	390 U	370 U	390 U
BENZO(A)PYRENE	330	31	56 J	25 J	65 J	65 J	54 J	390 U	370 U	30 J
INDENO(1,2,3-CD)PYRENE	330	67	49 J	430 U	50 J	51 J	60 J	390 U	370 U	390 U
DIBENZ(A,H)ANTHRACENE	330	81	610 U	430 U	970 U	390 U	380 U	390 U	370 U	390 U
BENZO(G,H,I)PERYLENE	330	66	71 J	33 J	63 J	58 J	110 J	390 U	370 U	390 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO19-0001	SB19-0102
LABORATORY ID:			DUP	20769.19
% SOLIDS:			84	90
TCL SEMIVOLATILE SOILS (UG/KG)	CRQL	MDL		
PHENOL	330	75	390 U	370 U
BIS(2-CHLOROETHYL)ETHER	330	63	390 U	370 U
2-CHLOROPHENOL	330	65	390 U	370 U
1,3-DICHLOROBENZENE	330	57	390 U	370 U
1,4-DICHLOROBENZENE	330	55	390 U	370 U
1,2-DICHLOROBENZENE	330	65	390 U	370 U
2-METHYLPHENOL	330	23	390 U	370 U
BIS(2-CHLOROISOPROPYL)ETHER	330	195	390 U	370 U
4-METHYLPHENOL	330	60	390 U	370 U
N-NITROSO-DI-N-PROPYLAMINE	330	100	390 U	370 U
HEXACHLOROETHANE	330	52	390 U	370 U
NITROBENZENE	330	21	390 U	370 U
ISOPHORONE	330	46	390 U	370 U
2-NITROPHENOL	330	29	390 U	370 U
2,4-DIMETHYLPHENOL	330	78	390 U	370 U
2,4-DICHLOROPHENOL	330	42	390 U	370 U
1,2,4-TRICHLOROBENZENE	330	52	390 U	370 U
NAPHTHALENE	330	45	37 J	370 U
4-CHLOROANILINE	330	89	390 U	370 U
BIS(2-CHLOROETHOXY)METHANE	330	35	390 U	370 U
HEXACHLOROBUTADIENE	330	78	390 U	370 U
4-CHLORO-3-METHYLPHENOL	330	41	390 U	370 U
2-METHYLNAPHTHALENE	330	29	69 J	370 U
HEXACHLOROCYCLOPENTADIEN	330	259	390 U	370 U
2,4,6-TRICHLOROPHENOL	330	54	390 U	370 U
2,4,5-TRICHLOROPHENOL	800	83	950 U	890 U
2-CHLORONAPHTHALENE	330	33	390 U	370 U
2-NITROANILINE	800	60	950 U	890 U
DIMETHYL PHTHALATE	330	25	390 U	370 U
ACENAPHTHYLENE	330	29	390 U	370 U
2,6-DINITROTOLUENE	330	39	390 U	370 U
3-NITROANILINE	800	164	950 U	890 U
ACENAPHTHENE	330	37	390 U	370 U
2,4-DINITROPHENOL	800	87	950 U	890 U
4-NITROPHENOL	800	68	950 U	890 U
DIBENZOFURAN	330	28	390 U	370 U
2,4-DINITROTOLUENE	330	46	390 U	370 U
DIETHYLPHTHALATE	330	37	41 J	370 U
4-CHLOROPHENYL-PHENYLETHE	330	61	390 U	370 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO19-0001		SB19-0102	
LABORATORY ID:			DUP		20769.19	
% SOLIDS:			84		90	
TCL SEMIVOLATILE SOILS (UG/KG)	CRQL	MDL				
FLUORENE	330	30	390	U	370	U
4-NITROANILINE	800	89	950	U	890	U
4,6-DINITRO-2-METHYLPHENOL	800	68	950	U	890	U
N-NITROSODIPHENYLAMIN(1)	330	31	390	U	370	U
4-BROMOPHENYL-PHENYLETHER	330	96	390	U	370	U
HEXACHLOROBENZENE	330	95	390	U	370	U
PENTACHLOROPHENOL	800	287	950	U	890	U
PHENANTHRENE	330	45	60	J	370	U
ANTHRACENE	330	56	390	U	370	U
CARBAZOLE	330	73	390	U	370	U
DI-N-BUTYLPHTHALATE	330	43	390	U	370	U
FLUORANTHENE	330	41	37	J	370	U
PYRENE	330	92	78	J	370	U
BUTYLBENZYLPHTHALATE	330	86	390	U	370	U
3,3'-DICHLOROBENZIDINE	330	80	390	U	370	U
BENZO(A)ANTHRACENE	330	29	41	J	370	U
CHRYSENE	330	27	53	J	370	U
BIS(2-ETHYLHEXYL)PHTHALATE	330	91	89	J	42	J
DI-N-OCTYL PHTHALATE	330	43	390	U	370	U
BENZO(B)FLUORANTHENE	330	142	48	J	370	U
BENZO(K)FLUORANTHENE	330	166	38	J	370	U
BENZO(A)PYRENE	330	31	44	J	370	U
INDENO(1,2,3-CD)PYRENE	330	67	26	J	370	U
DIBENZ(A,H)ANTHRACENE	330	81	390	U	370	U
BENZO(G,H,I)PERYLENE	330	66	55	J	370	U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			S001-0001	S002-0001	S003-0001	S004-0001	SB04-0102	SB04-0102	S005-0001	S006-0001
LABORATORY ID:			20761.02	20761.03	20761.04	20761.05	20761.06	DUP	20761.07	20761.08
% SOLIDS:			68	71	79	79	78	70	77	75
TCL PESTICIDES/PCB SOILS (UG/KG)	CRQL	MDL								
ALPHA-BHC	1.7	0.07	2.5 U	2.4 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
BETA-BHC	1.7	0.15	2.5 U	2.4 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
DELTA-BHC	1.7	0.07	2.5 U	2.4 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
GAMMA-BHC (LINDANE)	1.7	0.07	2.5 U	2.4 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
HEPTACHLOR	1.7	0.16	2.6	2.4 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
ALDRIN	1.7	0.07	2.5 U	2.4 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
HEPTACHLOR EPOXIDE	1.7	0.05	2.5 U	2.4 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
ENDOSULFAN I	1.7	0.08	2.5 U	2.4 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
DIELDRIN	3.3	0.24	9	4.8	4.2 U	4.2 U	4.2 U	4.7 U	4.3 U	4.4 U
4,4'-DDE	3.3	0.1	7.1	4.6 U	4.2 U	4.2 U	4.2 U	4.7 U	4.3 U	4.4 U
ENDRIN	3.3	0.15	14	4.6 U	4.2 U	4.2 U	4.2 U	4.7 U	4.3 U	4.4 U
ENDOSULFAN II	3.3	0.13	4.9 U	4.6 U	4.2 U	4.2 U	4.2 U	4.7 U	4.3 U	4.4 U
4,4'-DDD	3.3	0.09	4.9	4.6 U	4.2 U	4.2 U	4.2 U	4.7 U	4.3 U	4.4 U
ENDOSULFAN SULFATE	3.3	2.9	4.9 U	4.6 U	4.2 U	4.2 U	4.2 U	4.7 U	4.3 U	4.4 U
4,4'-DDT	3.3	0.14	26	11	7	5.4	4.2 U	4.7 U	9.1	4.4 U
METHOXYCHLOR	17	0.66	25 U	24 U	22 U	22 U	22 U	24 U	22 U	23 U
ENDRIN KETONE	3.3	0.12	5.7	4.6 U	4.2 U	4.2 U	4.2 U	4.7 U	4.3 U	4.4 U
ENDRIN ALDEHYDE	3.3	0.1	4.9 U	4.6 U	4.2 U	4.2 U	4.2 U	4.7 U	4.3 U	4.4 U
ALPHA-CHLORDANE	1.7	0.12	12	2.4 U	3.5	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
GAMMA-CHLORDANE	1.7	0.09	7.1	2.4 U	3.2	2.2 U	2.2 U	2.4 U	2.2 U	2.3 U
TOXAPHENE	170	1	250 U	240 U	220 U	220 U	220 U	240 U	220 U	230 U
AROCLOR-1016	33	1	49 U	46 U	42 U	42 U	42 U	47 U	43 U	44 U
AROCLOR-1221	67	1.3	99 U	94 U	85 U	85 U	85 U	96 U	87 U	89 U
AROCLOR-1232	33	0.33	49 U	46 U	42 U	42 U	42 U	47 U	43 U	44 U
AROCLOR-1242	33	0.33	49 U	46 U	42 U	42 U	42 U	47 U	43 U	44 U
AROCLOR-1248	33	1.3	49 U	46 U	42 U	42 U	42 U	47 U	43 U	44 U
AROCLOR-1254	33	1.7	49 U	46 U	86	42 U	42 U	47 U	130	44 U
AROCLOR-1260	33	1.3	260	46 U	78	42 U	42 U	70	130	44 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			S007-0001	S007-0001	S008-0001	S009-0001	S010-0001	S011-0001	S012-0001	S013-0001
LABORATORY ID:			20761.09	DUP	20761.10	20761.11	20761.12	20769.02	20769.03	20769.04
% SOLIDS:			44	40	45	61	67	57	36	60
TCL PESTICIDES/PCB SOILS (UG/KG)	CRQL	MDL								
ALPHA-BHC	1.7	0.07	3.9 U	4.2 U	3.7 U	2.7 U	2.5 U	3 U	17	13
BETA-BHC	1.7	0.15	3.9 U	4.2 U	3.7 U	2.7 U	2.5 U	3 U	20	23
DELTA-BHC	1.7	0.07	3.9 U	4.2 U	3.7 U	2.7 U	2.5 U	11	85	53
GAMMA-BHC (LINDANE)	1.7	0.07	3.9 U	4.2 U	3.7 U	2.7 U	2.5 U	4.9	31	26
HEPTACHLOR	1.7	0.16	3.9 U	4.2 U	3.7 U	2.7 U	2.5 U	3 U	11	5.3
ALDRIN	1.7	0.07	3.9 U	4.2 U	3.7 U	2.7 U	2.5 U	3 U	13	4.4
HEPTACHLOR EPOXIDE	1.7	0.05	3.9 U	4.2 U	3.7 U	3	2.5 U	33	210	95
ENDOSULFAN I	1.7	0.08	3.9 U	4.2 U	3.7 U	2.7 U	2.5 U	45	4.7 U	2.8 U
DIELDRIN	3.3	0.24	7.5 U	8.2 U	8.5	7.7	4.9 U	140	670	150
4,4'-DDE	3.3	0.1	17	17	14	8.4	5.4	180	850	440
ENDRIN	3.3	0.15	7.5 U	8.2 U	12	11	4.9 U	12	170	56
ENDOSULFAN II	3.3	0.13	7.5 U	8.2 U	7.2 U	5.3 U	4.9 U	5.8 U	9.2 U	5.5 U
4,4'-DDD	3.3	0.09	7.8	11	8.6	5.3 U	4.9 U	42	290	270
ENDOSULFAN SULFATE	3.3	2.9	7.5 U	8.2 U	7.2 U	5.3 U	4.9 U	5.8 U	82	37
4,4'-DDT	3.3	0.14	18	29	29	19	24	300	1000	500
METHOXYCHLOR	17	0.66	39 U	42 U	37 U	27 U	25 U	30 U	47 U	28 U
ENDRIN KETONE	3.3	0.12	7.5 U	8.2 U	7.2 U	5.3 U	4.9 U	5.8 U	9.2 U	5.5 U
ENDRIN ALDEHYDE	3.3	0.1	9.7	22	7.2 U	5.3 U	4.9 U	5.8 U	9.2 U	5.5 U
ALPHA-CHLORDANE	1.7	0.12	3.9 U	5.9	20	12	2.6	400	4300	2200
GAMMA-CHLORDANE	1.7	0.09	3.9 U	4.2 U	12	7.1	2.5 J	420	4900	2400
TOXAPHENE	170	1	390 U	420 U	370 U	270 U	250 U	300 U	470 U	280 U
AROCLOR-1016	33	1	75 U	82 U	72 U	53 U	49 U	58 U	92 U	55 U
AROCLOR-1221	67	1.3	150 U	170 U	150 U	110 U	100 U	120 U	190 U	110 U
AROCLOR-1232	33	0.33	75 U	82 U	72 U	53 U	49 U	58 U	92 U	55 U
AROCLOR-1242	33	0.33	75 U	82 U	72 U	53 U	49 U	58 U	92 U	55 U
AROCLOR-1248	33	1.3	75 U	82 U	72 U	53 U	49 U	58 U	92 U	55 U
AROCLOR-1254	33	1.7	260	310	340	300	140	58 U	92 U	55 U
AROCLOR-1260	33	1.3	320	510	490	340	130	58 U	92 U	55 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO14-0001	SO15-0001	SO16-0001	SO17-0001	SB17-0102	SO18-0001	SB18-0102	SO19-0001
LABORATORY ID:			20769.08	20769.09	20769.10	20769.11	20769.12	20769.13	20769.14	20769.15
% SOLIDS:			54	76	34	84	87	84	89	84
TCL PESTICIDES/PCB SOILS (UG/KG)	CRQL	MDL								
ALPHA-BHC	1.7	0.07	3.1 U	2.2 U	5 U	2 U	2 U	2 U	1.9 U	2 U
BETA-BHC	1.7	0.15	3.1 U	2.2 U	5 U	2 U	2 U	2 U	1.9 U	2 U
DELTA-BHC	1.7	0.07	3.1 U	2.2 U	5 U	2 U	2 U	2 U	1.9 U	2 U
GAMMA-BHC (LINDANE)	1.7	0.07	3.1 U	2.2 U	5 U	2 U	2 U	2 U	1.9 U	2 U
HEPTACHLOR	1.7	0.16	3.1 U	2.2 U	5 U	2 U	2 U	2 U	1.9 U	2 U
ALDRIN	1.7	0.07	3.1 U	2.2 U	5 U	2 U	2 U	2 U	1.9 U	2 U
HEPTACHLOR EPOXIDE	1.7	0.05	3.1 U	2.2 U	5 U	2 U	2 U	2 U	1.9 U	2 U
ENDOSULFAN I	1.7	0.08	3.1 U	2.2 U	5 U	2 U	2 U	2 U	1.9 U	2 U
DIELDRIN	3.3	0.24	42	4.5	9.7 U	3.9 U	3.8 U	3.9 U	3.7 U	3.9 U
4,4'-DDE	3.3	0.1	29	4.3 U	9.7 U	32	3.8 U	3.9 U	3.7 U	3.9 U
ENDRIN	3.3	0.15	6.1 U	4.3 U	9.7 U	3.9 U	3.8 U	3.9 U	3.7 U	3.9 U
ENDOSULFAN II	3.3	0.13	6.1 U	4.3 U	9.7 U	3.9 U	3.8 U	3.9 U	3.7 U	3.9 U
4,4'-DDD	3.3	0.09	9.5	4.3 U	9.7 U	36	12	3.9 U	3.7 U	3.9 U
ENDOSULFAN SULFATE	3.3	2.9	6.1 U	4.3 U	9.7 U	3.9 U	3.8 U	3.9 U	3.7 U	3.9 U
4,4'-DDT	3.3	0.14	30	6.3	100	49	3.8 U	17	3.7 U	6.7
METHOXYCHLOR	17	0.66	31 U	22 U	50 U	20 U	20 U	20 U	19 U	20 U
ENDRIN KETONE	3.3	0.12	6.1 U	4.3 U	9.7 U	3.9 U	3.8 U	3.9 U	3.7 U	3.9 U
ENDRIN ALDEHYDE	3.3	0.1	8.2	4.3 U	51	6.7	3.8 U	3.9 U	3.7 U	3.9 U
ALPHA-CHLORDANE	1.7	0.12	86	7	5 U	2 U	6.4	2.7	1.9 U	2 U
GAMMA-CHLORDANE	1.7	0.09	46	2.2 U	5 U	2 U	4.5	2.3	1.9 U	2 U
TOXAPHENE	170	1	310 U	220 U	500 U	200 U	200 U	200 U	190 U	200 U
AROCLOR-1016	33	1	61 U	43 U	97 U	39 U	38 U	39 U	37 U	39 U
AROCLOR-1221	67	1.3	120 U	88 U	200 U	80 U	77 U	80 U	75 U	80 U
AROCLOR-1232	33	0.33	61 U	43 U	97 U	39 U	38 U	39 U	37 U	39 U
AROCLOR-1242	33	0.33	61 U	43 U	97 U	39 U	38 U	39 U	37 U	39 U
AROCLOR-1248	33	1.3	61 U	43 U	97 U	39 U	38 U	39 U	37 U	39 U
AROCLOR-1254	33	1.7	61 U	43 U	97 U	39 U	38 U	39 U	37 U	39 U
AROCLOR-1260	33	1.3	61 U	43 U	97 U	39 U	38 U	190	37 U	39 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:				
LABORATORY ID:			SO19-0001 DUP	SB19-0102 20769.19
% SOLIDS:			84	90
TCL PESTICIDES/PCB SOILS (UG/KG)	CRQL	MDL		
ALPHA-BHC	1.7	0.07	2 U	1.9 U
BETA-BHC	1.7	0.15	2 U	1.9 U
DELTA-BHC	1.7	0.07	2 U	1.9 U
GAMMA-BHC (LINDANE)	1.7	0.07	2 U	1.9 U
HEPTACHLOR	1.7	0.16	2 U	1.9 U
ALDRIN	1.7	0.07	2 U	1.9 U
HEPTACHLOR EPOXIDE	1.7	0.05	2 U	1.9 U
ENDOSULFAN I	1.7	0.08	2 U	1.9 U
DIELDRIN	3.3	0.24	3.9 U	3.7 U
4,4'-DDE	3.3	0.1	3.9 U	4.7
ENDRIN	3.3	0.15	3.9 U	3.7 U
ENDOSULFAN II	3.3	0.13	3.9 U	3.7 U
4,4'-DDD	3.3	0.09	3.9 U	39
ENDOSULFAN SULFATE	3.3	2.9	3.9 U	3.7 U
4,4'-DDT	3.3	0.14	6.8	3.7 U
METHOXYCHLOR	17	0.66	20 U	19 U
ENDRIN KETONE	3.3	0.12	3.9 U	3.7 U
ENDRIN ALDEHYDE	3.3	0.1	3.9 U	3.7 U
ALPHA-CHLORDANE	1.7	0.12	2 U	1.9 U
GAMMA-CHLORDANE	1.7	0.09	2 U	1.9 U
TOXAPHENE	170	1	200 U	190 U
AROCLOR-1016	33	1	39 U	37 U
AROCLOR-1221	67	1.3	80 U	74 U
AROCLOR-1232	33	0.33	39 U	37 U
AROCLOR-1242	33	0.33	39 U	37 U
AROCLOR-1248	33	1.3	39 U	37 U
AROCLOR-1254	33	1.7	39 U	37 U
AROCLOR-1260	33	1.3	39 U	37 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			S001-0001	S002-0001	S003-0001	S004-0001	SB04-0102	SB04-0102	S005-0001	SO-06-0001
LABORATORY ID:			20761.02	20761.03	20761.04	20761.05	20761.06	DUP	20761.07	20761.08
% SOLIDS:			70	72	82	77	78	76	72	81
TAL METAL SOILS (MG/KG)	CRQL	IDL								
ALUMINUM	20	7.4	6080	2730	2870	2450	2540	3110	3320	8470
ANTIMONY	6	2	1.1 U	1.1 U	2.8	1.6	14.5	12.1 B	1.1 U	0.99 U
ARSENIC	1	0.2	7.4	1.7 U	2.3	1.9	2.8	2.6 B	2.6	1.5 U
BARIUM	20	0.8	53.3	8.3	169	64.6	203	224	95.2	19
BERYLLIUM	5	0.1	0.41	0.28 U	0.24 U	0.26 U	0.26 U	0.26 U	0.28 U	0.25 U
BORON	5	5	9.1	2.8	1.2	1.7	5.6	4.8 B	3	2.5
CADMIUM	0.5	0.2	3.8	0.54	0.3	0.31	0.52	0.35 B	24.5	0.25 U
CALCIUM	500	24	10400	1370	1790	3700	6240	3810	20400	2600
CHROMIUM	1	0.3	20.7	8.9	13.7	11.1	10.2	14.6	15.5	10.4
COBALT	5	0.4	2.7	0.67	2.6	1.6	1.3	1.3 B	2.3	0.68
COPPER	2.5	0.2	31.1	4	46.2	30.7	156	83	37.9	2.2
IRON	10	0.5	8290	2310	18400	7680	4540	6150	17200	3420
LEAD	0.3	0.1	145	106	341	106	708	570	164	14.9
MAGNESIUM	500	17.3	1770	572	553	702	552	569 B	949	674
MANGANESE	1.5	0.1	174	22.8	239	59	50.1	48.6	84.7	23.6
MERCURY	0.1	0.1	0.29	0.15	0.14	0.19	0.13 U	0.13 U	0.16	0.13
NICKEL	4	1.1	8.2	2	16.4	10.4	3.4	5.5 B	12.1	2
POTASSIUM	500	42.7	483	215	197	199	246	259 B	223	314
SELENIUM	0.5	0.2	1.4 U	1.4 U	1.2 U	1.3 U	1.3 U	1.3 U	1.4 U	1.2 U
SILVER	1	0.3	0.36	0.28 U	1.6	6.6	0.32	0.34 B	0.63	0.25 U
SODIUM	500	29.8	924	651	351	360	488	425 B	582	752
THALLIUM	1	0.3	1.7 U	1.7 U	1.5 U	1.6 U	1.5 U	1.6 U	1.7 U	1.5 U
VANADIUM	5	0.3	23	8.4	9.2	6.7	6.8	8.1 B	8	11.6
ZINC	2	0.3	1810	114	181	142	416	384	252	27.3
CYANIDE	0.5	NA	0.72 U	0.7 U	0.61 U	0.65 U	0.65 U	0.66 U	0.7 U	0.62 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			S007-0001	DUP-120194-	S008-0001	S009-0001	S010-0001	S011-0001	S012-0001	S013-0001
LABORATORY ID:			20761.09	20761.14	20761.10	20761.11	20761.12	20769.02	20769.03	20769.04
% SOLIDS:			43	38	43	62	63	54	33	61
TAL METAL SOILS (MG/KG)	CRQL	IDL								
ALUMINUM	20	7.4	14500	11100	12300	7080	6880	14400	9650	2420
ANTIMONY	6	2	1.8 U	2.1 U	1.9 U	1.3 U	1.3 U	0.75 U	1.6	0.66 U
ARSENIC	1	0.2	21.9	15.3	9.8	5.2	3.4	7	10.9	6.1
BARIUM	20	0.8	76.2	65.9 B	103	50.9	76.5	210	214	22.2
BERYLLIUM	5	0.1	0.91	0.73 B	0.54	0.34	0.38	0.37 U	0.6 U	0.33 U
BORON	5	5	8.6	10 B	13.4	5.8	19.6	10.3	11.2	1.9
CADMIUM	0.5	0.2	2.7	4	2.9	1.7	2.6	6.3	11.7	2.1
CALCIUM	500	24	6580	7580	23200	16100	14200	39100	36300	8440
CHROMIUM	1	0.3	87.7	131	34.9	21.8	18.9	210	148	19.8
COBALT	5	0.4	5.7	4.9 B	3.5	2	3.2	5.5	5.5	0.33 U
COPPER	2.5	0.2	27.9	78.3	27.5	33.9	21.1	67	114	17.8
IRON	10	0.5	19000	18200	18000	6960	7500	15500	25900	9820
LEAD	0.3	0.1	210	209	181	163	115	644	1110	118
MAGNESIUM	500	17.3	1960	2090 B	1740	1420	1930	2180	1490	241
MANGANESE	1.5	0.1	181	227	75.3	59.2	55	427	795	23.4
MERCURY	0.1	0.1	0.42	0.43	0.51	0.27	0.29	3.1	5.9	0.85
NICKEL	4	1.1	15.6	20.5 B	11.3	7.9	10.4	16	29.3	2.3
POTASSIUM	500	42.7	861	777 B	885	475	683	1320	1520	402
SELENIUM	0.5	0.2	2.3 U	2.7 U	2.3 U	1.6 U	1.6 U	2	4	0.66 U
SILVER	1	0.3	0.82	1.1 B	0.72	0.44	0.42	1.1	2.8	0.38
SODIUM	500	29.8	1890	2250 B	1380	232	741	811	236	47 U
THALLIUM	1	0.3	2.8 U	3.2 U	2.8 U	1.9 U	1.9 U	1.1 U	1.8 U	0.99 U
VANADIUM	5	0.3	46.4	36.4	40.2	26.6	26.5	30.2	67.7	10.9
ZINC	2	0.3	237	262	935	646	2390	443	594	68.4
CYANIDE	0.5	NA	1.2 U	1.3 U	1.2 U	0.81 U	0.79 U	0.93 U	1.5 U	0.82 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

CLIENT ID:			SO14-0001	SO15-0001	SO16-0001	SO17-0001	SB17-0102	SO18-0001	SO18-0102	SO19-0001
LABORATORY ID:			20769.08	20769.09	20769.10	20769.11	20769.12	20769.13	20769.14	20769.15
% SOLIDS:			54	79	31	85	90	83	89	82
TAL METAL SOILS (MG/KG)	CRQL	IDL								
ALUMINUM	20	7.4	3580	1670	4300	5350	3460	4640	3610	2970
ANTIMONY	6	2	1.1	0.51 U	10.9	0.98	0.45 U	0.48 U	0.45 U	0.49 U
ARSENIC	1	0.2	5.8	1.6	4.5	4.1	4	1.8	1.1	3.5
BARIUM	20	0.8	33.3	8.7	67.6	60.7	39.1	25.2	7.9	32.8
BERYLLIUM	5	0.1	0.37 U	0.25 U	0.65 U	0.24 U	0.22 U	0.24 U	0.23 U	0.24 U
BORON	5	5	4.3	1.4	9.3	1.2	2.1	1.1	0.71	2.5
CADMIUM	0.5	0.2	2.1	0.49	1.2	0.67	0.88	0.46	0.23 U	0.98
CALCIUM	500	24	7250	2290	11900	30200	14200	25500	452	5910
CHROMIUM	1	0.3	20	5.8	12.9	7.4	10.7	9.7	4.9	8.7
COBALT	5	0.4	1.3	0.32	1.1	1.1	1.2	0.53	0.41	0.93
COPPER	2.5	0.2	14.5	4	13	6.5	20.9	6	1.3	18.8
IRON	10	0.5	5330	1760	11800	5110	6810	3850	1850	3170
LEAD	0.3	0.1	162	34.7	84	30.3	45	29.3	3	84.2
MAGNESIUM	500	17.3	387	192	844	1100	2570	633	174	642
MANGANESE	1.5	0.1	94.5	17.3	159	46	44	10.9	5.2	23.9
MERCURY	0.1	0.1	0.7	0.13 U	0.46	0.17	0.17	0.12 U	0.74	0.8
NICKEL	4	1.1	4.2	1.3	3.8	2.2	9.7	3.8	1.4	5.2
POTASSIUM	500	42.7	574	224	798	434	327	500	378	321
SELENIUM	0.5	0.2	1.7	0.51 U	4.1	0.51	0.5	0.79	0.45 U	0.97
SILVER	1	0.3	0.37 U	0.25 U	0.65 U	0.24 U	0.22 U	0.24 U	0.23 U	0.24 U
SODIUM	500	29.8	398	176	316	61.2	50.7	53	32.3 U	248
THALLIUM	1	0.3	1.1 U	0.76 U	2 U	0.71 U	0.67 U	0.72 U	0.68 U	0.73 U
VANADIUM	5	0.3	19.2	6.3	19.1	8.2	11.1	18.2	6.1	9.5
ZINC	2	0.3	178	486	130	53.7	139	48.7	2.7	549
CYANIDE	0.5	NA	0.93 U	0.63 U	1.6 U	0.59 U	0.56 U	0.6 U	0.56 U	0.61 U

CTO 191
MCAS CHERRY POINT
SITE 16 DEBRIS PILES

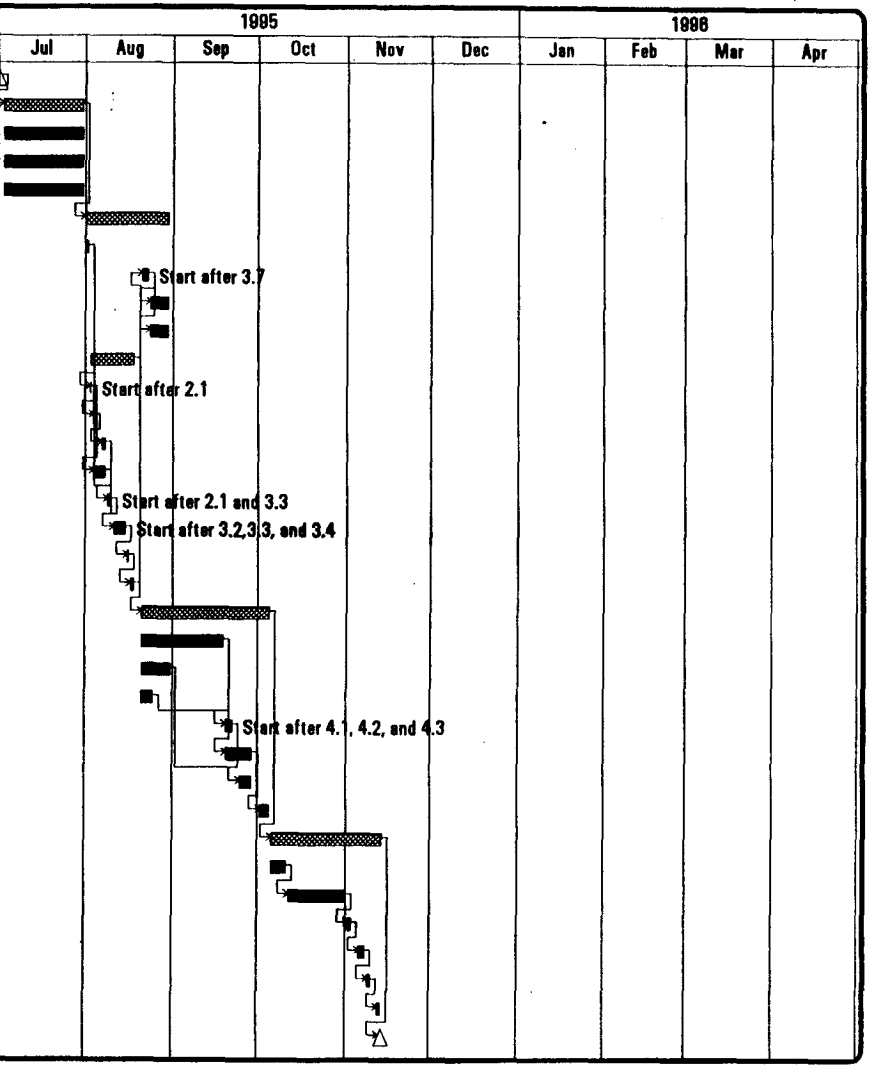
CLIENT ID:			SO19-0001		SB19-0102	
LABORATORY ID:			DUP		20769.19	
% SOLIDS:			83		89	
TAL METAL SOILS (MG/KG)	CRQL	IDL				
ALUMINUM	20	7.4	4100		4780	
ANTIMONY	6	2	0.48	U	0.45	U
ARSENIC	1	0.2	4.7		2.3	
BARIUM	20	0.8	39.5		18.1	
BERYLLIUM	5	0.1	0.24	U	0.22	U
BORON	5	5	2.4		2.2	
CADMIUM	0.5	0.2	1		0.22	U
CALCIUM	500	24	12700		11700	
CHROMIUM	1	0.3	9.7		6	
COBALT	5	0.4	1.2		0.42	
COPPER	2.5	0.2	21.1		2.2	
IRON	10	0.5	4160		2610	
LEAD	0.3	0.1	95.1		40.8	
MAGNESIUM	500	17.3	863		550	
MANGANESE	1.5	0.1	41		12.5	
MERCURY	0.1	0.1	0.96		0.11	U
NICKEL	4	1.1	5.8		1.8	
POTASSIUM	500	42.7	559		519	
SELENIUM	0.5	0.2	0.7		0.94	
SILVER	1	0.3	0.24	U	0.22	U
SODIUM	500	29.8	142		34.5	
THALLIUM	1	0.3	0.72	U	0.67	U
VANADIUM	5	0.3	12.9		6.9	
ZINC	2	0.3	497		15.3	
CYANIDE	0.5	NA	0.6	U	0.56	U

APPENDIX B

SCHEDULE

OU-1, SITE 16, DEBRIS PILE REMEDIATION
MCAS CHERRY POINT
CHERRY POINT, NORTH CAROLINA

WBS	Task Name	Duration	Start	End
0	AWARD OF CONTRACT	0.00 d	Jul/01/95	Jul/01/95
1.0	PLANNING	20.00 d	Jul/03/95	Jul/31/95
1.1	Prepare Quality Assurance Plan	20.00 d	Jul/03/95	Jul/31/95
1.2	Prepare Disposal Plan	20.00 d	Jul/03/95	Jul/31/95
1.3	Prepare Health & Safety Plan	20.00 d	Jul/03/95	Jul/31/95
2.0	MOBILIZATION	22.00 d	Aug/01/95	Aug/30/95
2.1	Deliver Equipment	2.00 d	Aug/01/95	Aug/02/95
2.2	Install Trailers	3.00 d	Aug/21/95	Aug/23/95
2.3	Connect Utilities	5.00 d	Aug/24/95	Aug/30/95
2.4	Construct Decon	5.00 d	Aug/24/95	Aug/30/95
3.0	SITE PREPARATION	12.00 d	Aug/03/95	Aug/18/95
3.1	Install Silt Fencing	1.00 d	Aug/03/95	Aug/03/95
	Install Turbidity Curtain	1.00 d	Aug/04/95	Aug/04/95
3.2	Clear Grass and Brush	2.00 d	Aug/07/95	Aug/08/95
3.3	Clear and Grub Trees	3.00 d	Aug/04/95	Aug/08/95
3.4	Excavate Asbestos Soil from Road	2.00 d	Aug/09/95	Aug/10/95
3.5	Proof Roll Roads and Support	3.00 d	Aug/11/95	Aug/15/95
3.6	Place Geotextile on Gravel Roads	1.00 d	Aug/16/95	Aug/16/95
3.7	Place Gravel	2.00 d	Aug/17/95	Aug/18/95
4.0	REMEDIATION	33.00 d	Aug/21/95	Oct/05/95
4.1	Excavate Asbestos Debris	21.00 d	Aug/21/95	Sep/19/95
4.2	Excavate Demolition Debris	9.00 d	Aug/21/95	Aug/31/95
4.3	Remove Miscellaneous Debris	5.00 d	Aug/21/95	Aug/25/95
4.4	Excavate Asbestos Soil	3.00 d	Sep/20/95	Sep/22/95
4.5	Excavate TPH Soil	8.00 d	Sep/20/95	Sep/29/95
4.6	Dismantle Tanks and Dispose	5.00 d	Sep/25/95	Sep/29/95
	Backfill Wetlands	4.00 d	Oct/02/95	Oct/05/95
5.0	SITE RESTORATION	27.00 d	Oct/06/95	Nov/14/95
5.1	Remove Temporary Roads	3.00 d	Oct/06/95	Oct/11/95
5.2	Replant Wetlands	15.00 d	Oct/12/95	Nov/01/95
5.3	Disconnect Temporary Utilities	2.00 d	Nov/02/95	Nov/03/95
5.4	Remove Temporary Facilities	3.00 d	Nov/06/95	Nov/08/95
5.5	Remove Support Zone	2.00 d	Nov/09/95	Nov/10/95
5.6	Reseed Other Areas	2.00 d	Nov/13/95	Nov/14/95
6.0	DEMOBILIZE	0.00 d	Nov/14/95	Nov/14/95



Printed: Mar/23/95
Page 1

Milestone △ Summary
Fixed Delay

APPENDIX C
SUPPORT INFORMATION

HALLIBURTON NUS AND SUBSIDIARIES *TELECON NOTE*

CONTROL NO: 4435	DATE: 1/3/94	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson S. Hughes File (CTO191)		
BETWEEN: Keene Kruchenburgh	OF: Piedmont Sanitary Landfill	PHONE: 919-466-5391
AND: Randy Elder		

They can accept asbestos contaminated material at a cost of $44/cy. They do not do transportation. He will send me a brochure and a profile as an example of the approval process.

If only asbestos is present the approval can be done in 24-hours. They cannot accept TPH contamination of any type, but can accept other types of contamination on an as reviewed basis.

HALLIBURTON NUS AND SUBSIDIARIES *TELECON NOTE*

CONTROL NO: 4435	DATE: 1/3/94	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson S. Hughes File (CTO191)		
BETWEEN: Jack Kurlings	OF: East Carolina Regional Landfill	PHONE: 919-348-3322
AND: Randy Elder		

The can accept friable asbestos containing material at a cost of $45/cy. They do not provide transportation. Approval for acceptance is a regular profile and takes 7 to 10 days. They are approximately 125 miles from MCAS Cherry Point.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 1/3/94	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson S. Hughes File (CTO191)		
BETWEEN: Frank Smith	OF: BFI	PHONE: 910-525-4132
AND: Randy Elder		

Frank is going to fax me some info on pricing, transportation, and profiling requirements for the disposal of asbestos containing material.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 01/09/95	TIME: 1135

DISTRIBUTION: J.R. Elder
S. Hughes
Project File CTO 191

BETWEEN: David Noble	OF: MCAS Cherry Point	PHONE:(919)466-5917

AND: S. Ruffing

DISCUSSION:
I contacted David Noble to discuss permit and wetland requirements to support the Asbestos Abatement project at MCAS Cherry Point. David indicated that he could help me with the wetlands requirements, but John Meyers (919-466-4903) would need to provide information regarding asbestos abatement and Tom Fitzgerald (919-466-4674) would provide information regarding stromwater and erosion and sediment controls for the Air Station. David indicated that he prefers doing the permits himself to insure all bases covered and because he has a good relationship with the state. I told him this is not a problem and we are only identifying the requirements at this point in time. David said the first requirement is to identify and delineate the different types and areas of wetlands at the site. David said a nationwide permit would be required from the Army Corps of Engineers. Also, a consistency permit from the State Division of Coastal Management would be required at some point. David felt that restoration of the wetlands would need covered but may be able to be included in the Erosion and Sediment Control Plan for the site. Any sites disturbing greater than 1 acre of soil will require a E&S Control Plan. In addition, any sites disturbing greater than 5 acres will require a NPDES permit. David said that the final permit requirements for working in a wetlands are dependent on the type of equipment used and on how access is gained. Davis said that cutting trees in the wetlands does not require a permit but disturbing hydrology or soil does require a permit. He identified three types of permits:

1. Nationwide - issued by Army Corps of Engineers
2. General - issued by the regional office of the Army Corps of Engineers
3. Individual - issued by the specific Army Corps of Engineers representative for MCAS Cherry Point

It is likely that only a nationwide permit will be required. David identified the following personnel at the State regional office: Debra Sawyer or Bill Moore - Wetlands and stormwater.
Floyd Williams or Pat McLain - Erosion and Sediment Control.

These individuals can be reached at 919-946-6481. In addition, David identified Mike Bell as the Army Corps of Engineers representative for MCAS Cherry Point.

ACTION ITEMS:
Follow up on permit requirements with John Meyers and Tom Fitzgerald as well as with the State of North Carolina and the Army Corps of Engineers.

HALLIBURTON NUS AND SUBSIDIARIES — TELECON NOTE

CONTROL NO: 4435	DATE: 01/09/95	TIME: 1305

DISTRIBUTION: J.R. Elder
S. Hughes
Project File CTO 191

BETWEEN: Tom Fitzgerald	OF: MCAS Cherry Point	PHONE:(919)466-4674

AND: S. Ruffing

DISCUSSION:
Tom Fitzgerald is responsible for the Erosion and Sediment control and Stormwater requirements at MCAS Cherry Point. Tom said a E&S Control Plan will be required because the site is in excess of 1 acre. He also said that if the site, contiguous or noncontiguous areas exceed 5 acres a NPDES permit is required. The plan must be submitted to the Land Quality Section at the State. A stormwater management plan is not required if no additional impervious surfaces are created at the site. Tom identified the permit for coastal management consistency as 401 water quality certification. This is required to determine if the project is consistent with coastal management requirements. Tom indicated the following as potential requirements for the project. Asbestos Abatement Permit, Solid Waste Disposal Certificates, Transportation Certificates, Disposal Facility Certification, Asbestos Manifesting.

ACTION ITEMS:
Follow up on additional permit requirements with John Meyers and with the State of North Carolina and the Army Corps of Engineers.

HALLIBURTON NUS AND SUBSIDIARIES — TELECON NOTE

CONTROL NO: 4435	DATE: 01/09/95	TIME: 1500

DISTRIBUTION: J.R. Elder
S. Hughes
Project File CTO 191

BETWEEN: Mr. Pat Curran	OF: State Of N.C., Asbestos Management Branch	PHONE:(919)733-0820

AND: S. Ruffing

DISCUSSION:
I contacted Pat to determine the required permits for asbestos abatement at MCAS Cherry Point. Pat indicated that North Carolina accredited personnel must perform field work associated with asbestos removal and abatement. Also, the state requirements are similar to NESHAP. A permit notification form for asbestos abatement is required and must be submitted 10 days prior to commencement of work. No special permits are required for transportation of asbestos. The disposal facility receiving the asbestos waste must be state certified. Pat will send me a copy of the permit form, copies of the waste shippment records, a copy of the worker accreditation form, and rules related to asbestos abatement. Pat requested that these waste shippment record forms be used because within the next year all disposal facilities in North Carolina will be required to use the same form.

ACTION ITEMS:
Follow up on additional permit requirements with John Meyers and with the State of North Carolina and the Army Corps of Engineers.

HALLIBURTON NUS AND SUBSIDIARIES — TELECON NOTE

CONTROL NO: 7873	DATE:11/15/94	TIME:
DISTRIBUTION: G. Zimmerman D. Wroblewski M. Cochran File		
BETWEEN: Mark Patterson	OF: Cherokee Environmental	PHONE: (919) 775-2121
AND: Randy Elder		

DISCUSSION: I was referred to Mark by Gary McSmith of LANTDIV and explained that I was interested in information regarding thermal treatment of petroleum contaminated soils.

Mark provided the following details:

- They treat the soil in a brick kiln at 2000 deg F, and the resulting material is bricks which are sold for reuse. They test the bricks at the generators request and to date have not failed any treatment standards.
- The kiln is fixed base, so the treatment is offsite. They can provide transportation services and are capable of treating 500,000 tons per year.
- The cost of treatment was quoted as $20/ton and loading and transportation was quoted as $18-20 per ton. These prices are subject to change.
- They require the following analyses, which they can do, for waste acceptance: TPH, full TAL/TCL, and TCLP metals.

ACTION ITEMS:

HALLIBURTON NUS AND SUBSIDIARIES *TELECON NOTE*

CONTROL NO: 4435	DATE: 1/3/94	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson S. Hughes File (CTO191)		
BETWEEN: Billy Morris	OF: NC State Solid Waste Management	PHONE: 919-946-6481
AND: Randy Elder		

I called Billy to get the name of some landfills which can accept friable asbestos for disposal. MCAS Cherry Point wants to save the space in their landfill.

He gave me the following info:

East Carolina Regional Landfill
Windsor NC
Greg Elkins
919-348-3322

Piedmont Sanitary Landfill
Winston-Salem NC
Bill Lewis
910-595-6677

BFI
Clinton NC
Frank Sniff
910-525-4132

He also noted that we may want to talk to Pat Curran (919-733-0820) of the Asbestos Hazard Management Branch because they will have a hand in the remediation.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 01/09/95	TIME: 1515

DISTRIBUTION: J.R. Elder
S. Hughes
Project File CTO 191

BETWEEN: John Meyers	OF: MCAS Cherry Point	PHONE:(919)466-4903

AND: S. Ruffing

DISCUSSION:
John Meyers handles the asbestos projects for MCAS Cherry Point. John initially felt that because no demolition was involved with this project, no permit would be required. I told John that I talked with Pat Curran at the State and he implied that a permit would be required. John said he would call Pat and verify what permits are required.

John called back at 1605 on the same day and said that after discussions with Pat Curran that a permit notification form is required. This permit requires the volume of material containing asbestos.

ACTION ITEMS:
Follow up on additional permit requirements with the State of North Carolina and the Army Corps of Engineers.

HALLIBURTON NUS AND SUBSIDIARIES — TELECON NOTE

CONTROL NO: 4435	DATE: 01/10/95	TIME: 0925
DISTRIBUTION: J.R. Elder S. Hughes Project File CTO 191		
BETWEEN: Bill Moore	OF: State of N.C. Regional Office	PHONE:(919)946-6481
AND: S. Ruffing		

DISCUSSION:
Talk to Bill Moore with the state of N.C. to verify wetlands and stormwater requirements. Bill said he handles stormwater but Debra Sawyer handles wetlands. Bill referred me to Pat McLain for erosion and sediment control and Buddy Bulow for air quality. Debra, Pat, and Buddy are all located in the regional office and at the same phone number. Bill said that 1 copy of the E&S Control Plan needs to be submitted to someone at Stormwater Management and a determination of the need for a Stormwater Management Plan will then be made. However, Bill indicated that because no impervious surfaces are being constructed, a Stormwater Management Plan is not applicable. Bill talked to Buddy Bulow regarding air quality requirements and Buddy indicated that air requirements for asbestos would be dictated by the North Carolina Division of Environmental Management, Asbestos Group at 919-733-0820. This is were Pat Curran is located and I have already contacted him on 1/9/95. Bill left messages for Debra Sawyer and Pat McLain to call me.

ACTION ITEMS:
Follow up on additional permit requirements with Debra and Pat at the State of North Carolina Regional Office and also with the Army Corps of Engineers.

HALLIBURTON NUS AND SUBSIDIARIES — TELECON NOTE

CONTROL NO: 4435	DATE: 01/10/95	TIME: 0940
DISTRIBUTION: J.R. Elder S. Hughes Project File CTO 191		
BETWEEN: Pat McLain	OF: State of N.C. Regional Office	PHONE:(919)946-6481
AND: S. Ruffing		

DISCUSSION:
Talk to Pat McLain with the state of N.C. to verify erosion and sediment control requirements. Pat said that areas exceeding 1 acre require a E&S Control Plan and sites exceeding 5 acres also required an NPDES permit. The E&S Control Planmust include: the site vicinity, the areas of construction, the means of erosion and sediment control, the specifications for restabilization (Pat said the Navy has specsf for this), Drawings (site vicinity map, wetlands locations, E&S controls, etc.). Pat said the erosion and sediment controls must be designed for a 10 year storm. The state does not have specific E&S controls details, however, they do request that on open channels the side slopes are designed with a 2 to 1 slope. Pat also said that High Quality Water areas have different E&S requirements. NOTE: Verify if these requriements need included in your design. Pat identified Mike Bell (919-975-3025) with the Army Corps of Engineers (representative for MCAS Cherry Point) for additional information pertinent to wetlands. He also suggested calling the Wilmington District of the Corps at 910-251-4511 if Mike cannot be contacted.

ACTION ITEMS:
Follow up on additional permit requirements with Debra at the State of North Carolina Regional Office and also with Mike Bell at the Army Corps of Engineers.

HALLIBURTON NUS AND SUBSIDIARIES *TELECON NOTE*

CONTROL NO: 4435	DATE: 1/12/94	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson S. Hughes File (CTO191)		
BETWEEN: Mark Kraus	OF: Environmental Concerns Inc.	PHONE: 410-745-9620
AND: Randy Elder		

Environmental Concerns is a not for profit wetlands restoration company. I called Mark looking for concerning revegetation of the wetlands following remediation of the debris piles at MCAS Cherry Point.

Mark provided the following input for planting the native species (bald cypress, sweet gums, and water tupelo) on the project;

- Only containerized stock should be used. Root plantings have an extremely low viability.
- Shrubs should be planted on 10-foot centers, and trees should be planted on 12 to 16-foot centers.
- Environmental permits for restoration of wetlands usually specify 85% viability after 1-year. Real world expectations should be as high as 95%.
- The Navy should have the right to inspect and approve all stock prior to its planting. They should also oversight the restoration work.
- A price for supplying the plants, long-term slow-release fertilization, and planting, for the native vegetation mentioned, is approximately $20,000 to $25,000 per acre.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/14/95	TIME: 4:00pm
DISTRIBUTION: R. Elder T. Riley File (CTO191)		
BETWEEN: Pat McLain	OF: NC Regional Office	PHONE: (919)946-6481
AND: Chris Neumann		

He informed me that we cannot have 10% increase in peak flow from preconstruction to after.

Slocum Creek is considered high quality waters. Therefore any construction within 570 ft of high quality waters must meet design criteria for 25 year storm instead of 10 year storm. Also the time period for reestablishing permanent ground cover is changed: Soggy non working days do count. 1/2-inch of snow locks everything up.
From: within 30 working or 120 calendar days
To: withing 15 working or 60 calendar days.

He also informed me that sediment control devices are designed to capture 70% of the +40 micron size generated in a 2 yr storm:

-aspect ratio 3:1 for sediment basin
-silt fences, check dams for 25 year storm

HALLIBURTON NUS AND SUBSIDIARIES — TELECON NOTE

CONTROL NO: 4435	DATE: 2/9/95	TIME: 8:45am
DISTRIBUTION: R. Elder T. Riley File (CTO191)		
BETWEEN: Tom Fitzgerald	OF:MCAS Cherry Point	PHONE: (919)466-4674
AND: Chris Neumann		

Randy said that Tom Fitzgerald mentioned that float booms would be needed for E&S. My purpose is to seek information about float booms. Off the top of his head, he doesn't believe he has any info on float booms. If he doesn't he will contact DOT and get something from them. DOT uses it alot for road construction purposes. He will fax me any info he receives.

HALLIBURTON NUS AND SUBSIDIARIES *TELECON NOTE*

CONTROL NO: 4435	DATE: 3/6/95	TIME: 10:30am
DISTRIBUTION: R. Elder File (CTO191)		
BETWEEN: Jim Edgerton	OF:NC DOT Engineering Services	PHONE: (919)733-7621
AND: Chris Neumann		

I asked him what float booms are and to what capacity they are used. He said they are used for dredging, oil spills or for fuel spill contamination. He referred me to:

Marine Engineering
Moorehead City
(919)726-6446
They may have design for float boom.

Transferred to Bridge Maintenance and talked to Fred Mehfar. He is calling around for info and will call back.

HALLIBURTON NUS AND SUBSIDIARIES *TELECON NOTE*

CONTROL NO: 4435	DATE: 3/6/95	TIME: 4:20pm
DISTRIBUTION: R. Elder File (CTO191)		
BETWEEN: Shawn	OF:American Boom & Barrier Corp.	PHONE: (407)784-2110
AND: Chris Neumann		

North Carolina usually uses permeable curtains.
cost:at 3 ft depth, $8.05/linear ft with 22 oz. fabric

He is faxing me information based on 1000 plus or minus 1linear ft and info related to the product. They do not manufacture EC-1 anymore.

HALLIBURTON NUS AND SUBSIDIARIES *TELECON NOTE*

CONTROL NO: 4435	DATE:	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Jerry Locklear	OF:Laidlaw Environmental, Pinewood, SC	PHONE: (803)452-5003
AND: Ellen Bjerklie		

I called to get cost and requirements information for the landfill. He said that the waste must be received by them in either cubic yard boxes or drums because they don't allow any trucks except their own into the landfill. The waste would be put in one place and backhoed before their own trucks would take it to the landfill. so the waste cannot be in bags. No testing is required by us for them to accept the waste. Soil would be $60.00/ton with $15.70/ton taxes. Debris would be $72.00/cy box plus $15.70/box taxes. Debris in drum would be $75.00/drum plus $15.70 tax/drum.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE:	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Bob Gardner	OF:Sandy Pines Landfill, Dorchester, SC	PHONE: (803) 563-2672
AND: Ellen Bjerklie		

I called to get cost and requirements information. He said that both soil and debris contaminated with asbestos would cost $35.00/ton to dispose of. There are no packaging requirements, but we would have to notify the DEHEC (air quality) to get permission to transport the waste from out of state. He said that he would prefer that we use their North Carolina landfill (Piedmont) and that I should call Keene Kruckenburg at (910) 595-6677. If the North Carolina landfill couldn't take it, he would.

HALLIBURTON NUS AND SUBSIDIARIES *TELECON NOTE*

CONTROL NO: 4435	DATE:	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Ralph DePorter	OF:Mine Rd. Pr & C, landfill, TN	(615) 745-5900PHONE:

AND: Ellen Bjerklie

I called to get cost/requirements information regarding landfill. They are a class I sanitary landfill and accept friable asbestos. The state would require a permit for special waste and an analytical test to make sure it was contaminated with asbestos. He quoted a price of $50/cubic yard but said the price is negatiable for large quantities of waste because they are a private landfill. He estimated that he could go as low as $35.00/cubic yard.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/7/95	TIME: 1150
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: John King	OF:Scott Cty Landfill, TN	PHONE: (615)569-5702
AND: Ellen Bjerklie		

He called me from the landfill and said that they do accept out of state friable asbestos. The landfill has a blanket asbestos permit. It will cost $25/yard for both debris and soil waste. We must provide transportation and unloading. The waste must be double bagged and be accompanied by required paper work. He asked me to fax him information on the quantities and samples. Fax: (615)569-6370

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE:	TIME:
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Carl Cressler (his sales rep)	OF: Chestnut Ridge Landfill, Knoxville CTY, TN F.O. 6	PHONE: (615)525-6575
AND: Ellen Bjerklie		

I called to get cost, requirements information for the landfill and Mr. Cressler forwarded me to his special waste sales representative. The sales rep said that they accept out of state friable asbestos waste at $24.50/ton for soil and $20.00/cubic yard of loose debris. The waste must be tested to certify that it is contaminated with onluy asbestos. He suggested that I call Keene Kruckenburg in North Carolina at (919) 595-6677.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/10/95	TIME: 0830
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: John McGarvey	OF:Meadowfill Landfill, Bridgeport, WV	PHONE: (304)842-2784
AND: Ellen Bjerklie		

Mr. McGarvey said that the landfill does take out of state asbestos waste. The cost for soil and debris would be $31.00/ton. The waste can be either double bagged, or transported in a lined dump trailer (bladder bag) depending on what the EPA says is o.k. for that particular waste. The waste must be manifested to ensure that it meets NESHAP requirements.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE:2/10/95 and 2/14/95	TIME: 8:40
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: John Miller	OF:S & S Landfill, Clarksburg, WV	PHONE: (304)745-3234
AND: Ellen Bjerklie		

I called Mr. Miller to get information on cost and requirements. The landfill accepts out of stat asbestos waste. The cost for soil contaminated with asbestos is $20/ton and is usually transported to the landfill in a dump trailer lined with 6 mil polyfilm and wrapped over the top of the soil (envelop) so that there are no visible emissions. The debris would be $10/cubic yard. They have no problem with the length of the piping of the diameter that we have (about one and a half feet diameter). If we ship the waste in dump trailers, whatever size we can fit into the trailers is acceptable for the landfill. They require an asbestos waste manifest. The NC waste manifest would be fine because it fills NESHAP requirements. He also has a credit application for payment depending on how we would be paying. He suggested a transporter that we could call to get cost quotes for shipping: Bill Sacco of NHD at 800-360-6431.

HALLIBURTON NUS AND SUBSIDIARIES — **TELECON NOTE**

CONTROL NO: 4435	DATE: 2/15/95	TIME: 12:00
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Ronald Mann	OF:Han Sanitary Landfill, Peterstown, WV	PHONE: (304)753-9470
AND: Ellen Bjerklie		

I called to get information on costs and requirements for the landfill. Mr. Mann said that the landfill does accept friable asbestos waste. The soils would cost $33.75/ton to dispose of, and the debris would be $15.00/cubic yard plus $8.75 tax/ton. A waste manifest is required. If the landfill has to unload the waste, he has size requirements for the piping: if a box trailer is used, the piping must be no longer than 4 feet in length (for the 1 1/2 foot diameter piping that we have), but if a flat bed or dump trailer is used, there are no size requirements, just whatever we can load onto the truck. These kinds of trucks are easier to unload the debris from. He said that he could give information on trucking if we need it.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/7/95	TIME: 1140
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Charels Jones	OF:NC Div. of Coastal Management	PHONE: (919)726-7021

AND: Ellen Bjerklie

I called to find whether we might need a dredge and fill permit for the removal of asbestos contaminated material at MCAS. He said that a dredge and fill permit is only required if work is going on within 75 feet of estuarian waters. Slocum Creek is not an estuarian waterway so the dredge and fill permit does not apply. However, since wetlands will be disturbed by the excavation, a permit for coastal consistency determination will be required. He has already done consistency determination for Cherry Point and will check his records and call Cherry Point to see if he's already covered the area and will call me back with more details.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/8/95	TIME: 1030
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Charles Jones	OF:NC Div. of Coastal Management	PHONE: (919)726-7021
AND: Ellen Bjerklie		

He called me back with more details on the consistency determination. He said that federal activities require a consistency determination for coastal management to make sure that they are in line iwth NC regulations. He talked to someone at MCAS to confirm that the NAVY would write the consistency determination and then send it to the Division of Coastal Management for review. He also noted that we would need a permit to disturb wetlands from the Army COE, a 401 Water Quality Certification and an Erosion and Sediment Control Plan. The Navy needs to send the consistency determination to NC Division of Coastal Management, attn. Steve Benton, P.O. Box 27687, Raleigh, NC 27611. The Div. of Coastal Mgt. would send it for review to other agencies including the NC Wildlife Commission, Div. of Marine Fisheries, Div. of Environmental Management, and the Div. of Water Resources. For more details on their own review process, he suggested that I call Steve Benton at (919) 733-2293.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/8/95	TIME: 1035
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Pat McLain	OF:NC DEHNR	PHONE: (919)946-6481
AND: Ellen Bjerklie		

Pat McLain returned my call. He said that the Erosion and Sedimentation Plan should be sent to him to be reviewed. NC DEHNR, att. Pat McLain, 1424 Carolina Ave., Washington, NC 27889. There is a review fee of $30.00 for the first disturbed acre, and $20.00 for each additional whole or fractional disturbed acre. The review does not start until the fee has been received.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/9/94	TIME: 0930
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Pat Curran	OF:NC Asbestos Management Branch	PHONE: (919)733-0820
AND: Ellen Bjerklie		

I called Pat Curran to find out about fees for permitting. However, when he had previously sent us material, he did not know that the removal of asbestos would not be in a building. It turns out that there is no requirement to submit a permit notification form. Due to a loop hole in the law, the workers need not be accredited. However, federal OSHA requires that the workers be trained. This training amounts to the same amount that accredited personnel require. If we had non-accredited trained personnel perform the work, we would not have to pay the fees ($100.00 for each supervisor, and $25.00 for each worker). However, since the same training is required, we would only be able to find accredited personnel. Even though accredtied personnel would be performing work where accredidation is not required, we must still pay the fees for each supervisor and worker. He also said that the waste dispoal form that he had sent to Steve Ruffing would put us in compliance with NESHAP and DOT regulations for transporting the waste. He suggested that we should monitor the employees' exposure to determine what kind of protective gear they should wear, and that we should do air quality monitoring on site for an visible asbestos emissions. we don't want to have any visible emissions. Federal OSHA requirements apply, not stat OSHA requirements, because the activity is taking place on a federal facility. He suggested that I call the Federal OSHA Regional Office in Raleigh.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/9/95	TIME: 1045
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Albert Smith	OF:U.S. Department of Labor	PHONE: (919)856-4770
AND: Ellen Bjerklie		

I called the U.S. Department of Labor to follow up onPat Curran's suggestion. Albert Smith said that the removal action would be a Class IV type of situation and is sending me a copy of the standards. They do not require any permits for this action and no fees are involved.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/9/95	TIME: 1120
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Lt. Gray	OF:NC DOT	PHONE: (919) 733-4077
AND: Ellen Bjerklie		

Lt. Gray said that friable asbestos is listed under Code of Federal Regulations (CFR) 49 and is therefore regulated by the DOT. The NC Asbestos Waste Shipment Record covers all of DOT requirements. The Div. of Environemental Management, Asbestos Abatement Group and the DOT developed the form together. He suggested that I call Jeff Dellinger for information regarding asbestos waste manifests at (919)733-0820, and Margaret Babb about solid waste disposal certificates at (919) 733-2178.

HALLIBURTON NUS AND SUBSIDIARIES — **TELECON NOTE**

CONTROL NO: 4435	DATE: 2/9/95	TIME: 1030
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Debra Sawyer	OF:NC State Regional Office	PHONE: (919) 946-6481
AND: Ellen Bjerklie		

I called her for information regarding the 401 Water Quality Certification for disturbing wetlands. She is sending me a copy of the application. There are no fees. Seven copies and the original application are to be sent to John Dorny for review and he will distribute to the appropriate people to review. She also said that we would need a 404 Nationwid permit from the Army Corps of Engineers (probably a form #38-cleanup of hazardous and toxic waste). This permit will require written concurrence from the State regional office. She suggested that I call Mike Bell at the Army COE at (919) 975-3025 about the Nationwide permit. I called and left a message. He had originally referred me to Debra Sawyer.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/9/95	TIME:0230
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Mickey Sugg	OF:Army COE	PHONE: (919)975-3609
AND: Ellen Bjerklie		

I called him for information about the 404 Nationwide permit. He said that the site needed to be surveyed and flagged so that he could determine if the wetlands were adjacent or isolated and whether or not they're above or below headwaters. If the wetlands are above headwaters, a Nationwide permit would be needed. He suggested that a Nationwide 26 form would be needed. If the are to be impacted is below 1 acre, we could get a PDN (pre-discharged notification). If the area to be disturbed is over 1 acre, we need an application which is only a couple pages long. They would send the application to be reviewed by the U.S. Fish and Wildlife Service, the Marine Fisheries, the Department of Environemtnal Management (Water Quality) and the Division of Coastal Management. These agencies have five days to tell the Corps if they will be having any comments and then another 15 days to send the comments. Based on these comments, the Corps will make it's decision on whether to grant the permit. There are no fees involved. I asked him about the Nationwide 38 form for hazardous and toxic waste. He said he would have to check into that and asked me to send him more information on the project so he could determine which form we would need.

He also said that if the wetlands were below headwaters or next to waters, we would need an individual permit. This is the most difficult permit to obtain and could take from 60 days to 6 months. They would send that application to baout 20 agencies for comment, and possibly public notification and comments would be required. They would ask us to identify alternatives to the project that would meet the same goals, minimize impacts, or create or restore wetlands elsewhere. There would be a fee if the permit was issued. The amount would depend on how long and how much review is required before the permit is issued.

address:
U.S. Army COE
attn: Mickey Sugg
P.O. Box 1000
Washington, NC 27889-1000
fax: (919)975-1399

Note: Randy Elder later called him that the site will be surveyed in a week or two, and that he would be invited to the permit meeting at Cherry Point. He will look at the surveyed wetlands to help him determine which permit will be needed.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/9/95	TIME: 0230
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Jeff Dellinger	OF:Asbestos Group	PHONE: (919)733-0820
AND: Ellen Bjerklie		

I called Jeff as suggested by Lt. Gray. He said that the Shipment Record will cover the asbestos waste manifests. One Record will be required for each truckload of waste. I also asked him about the "solid waste disposal certificate" and he said he thought that referred to what he calls "trip tickets". These are given to the transporter by the landfill and it's how they do their billing. He also said that depending on the landfill, they may require the waste to be bagged, or depending on the volume of material to asbestos ration, (for the soil) might only require that the waste be transported in a lined dumptruck with a cover and then have a pit to dump the waste into. This can reduce handling and shipment costs. He is sending me a copy of the NC rules for asbestos transportation, a list of transport contractors, NESHAP rules, shipment forms, a list of NC landfills, and OSHA regulations.

HALLIBURTON NUS AND SUBSIDIARIES — *TELECON NOTE*

CONTROL NO: 4435	DATE: 2/9/95	TIME: 0315
DISTRIBUTION: J. Trepanowski D. Wroblewski D. Hutson R. Elder File (CTO191)		
BETWEEN: Bill Moore	OF:DEHNR, NC regional office	PHONE: (919)946-6481
AND: Ellen Bjerklie		

I called to ask him about possible revisions to the current rules for requiring a Stormwater Management Plan. He said that he did not think the new regulations would impact our project. The new rules do not require a Stormwater Management Plan unless there will be development. "Development" inlcudes building impervious or partially impervious surfaces. I told him that we would have a temporary gravel road. He said that would be considered partially impervious but he would be reviewing the Erosion and Sedimentation Plan. He said that we shoul include information on how we will be handlign drainage from the roads in our E&S Plan. We need to describe what kind of road will be built, how many square feet will be put in and whether there will be ditches, grass swells, cross piping, etc. If grass swells are 3:1 slopes or flatter, they and Div. of Land Quality have no problem with this. Ditches (2:1 slopes), drop inlets and catch basins would probably require a Stormwater Management plan.

He will be reviewing the E&S plan and will comment on it and say if we need a Stormwater Management Plan.

APPENDIX D

ASBESTOS DISPOSAL FACILITIES

APPENDIX D
SUMMARY OF LANDFILLS CONTACTED REGARDING ASBESTOS WASTE
MCAS CHERRY POINT, CHERRY POINT, NORTH CAROLINA

Name	Location	Contact/Telephone Number	Accept Waste	Comments
North Carolina				
Piedmont Sanitary Landfill		Keene Kruchenburg/ 919-466-5391	Yes	See Telephone Log.
East Carolina Regional Landfill		Jack Kurfings/ 919-348-3322	Yes	See Telephone Log.
Tennessee				
Dekalb	Dekalb County		No	Berry Atrip at Field Office said that no county landfill in his region accepts out-of-county waste.
Fentress	Fentress County		No	
Macon	Macon County		No	
Overton	Overton County		No	
Smith	Smith County		No	
White	White County			
Chestnut Ridge	Knoxville County	Carl Cressler/ 615-995-2998	Yes	See Telephone Log.
Maryville/Blount	Blount County	Greg McLean/ 615-781-4143	No	
Louden County Demolition and Construction	Louden County	Harry Gilman/ 615-966-0086	No	
Louden County	Louden County	Billy Snyder/ 615-458-2651	No	
Scott City Landfill	Scott County	Payton Robbins/ 615-663-2000 John King/ 615-569-5702	Yes	See Telephone Log for John King.

APPENDIX D
SUMMARY OF LANDFILLS CONTACTED REGARDING ASBESTOS WASTE
MCAS CHERRY POINT, CHERRY POINT, NORTH CAROLINA

Name	Location	Contact/Telephone Number	Accept Waste	Comments
Summit	Hamilton County	General Number/ 615-855-2690	No	
Bradley City	Bradley County	General Number/ 615-476-8118	No	
Mine Road Pr. and C	McMinn County	Ralph DePorter/ 615-745-5900	Yes	See Telephone Log.
South Carolina				
Goose Creek	Berkeley County	Marc Hehn/ 803-572-4400, x3009	No	
Charleston	Charleston County	Greg Varner/ 803-720-7111	No	
Florence	Florence County	Don McCain/ 803-665-3022	No	
Georgetown	Georgetown County	Lawrence Gallagher/ 803-546-4189	No	
Conway	Horry County	Ron Andrews/ 803-347-1651	No	
Camden	Kershaw County	Jim McGuirt/ 803-425-1500	No	
Bishopville	Lee County	Mark Allen/ 803-428-2400	No	
Kingstree	Williamsburg County	Jimmy Seals/ 803-387-5133	No	
International Paper Company Landfill	Georgetown County	C.E. Luguire/ 803-546-6111, x291	No	

APPENDIX D
SUMMARY OF LANDFILLS CONTACTED REGARDING ASBESTOS WASTE
MCAS CHERRY POINT, CHERRY POINT, NORTH CAROLINA

Name	Location	Contact/Telephone Number	Accept Waste	Comments
Chesterfield City	Chesterfield County	Joe McKinney/ 803-623-2535	No	
Sandy Pines Landfill	Dorchester County	Bob Gardner/ 803-563-2672	Yes	
Laidlaw Environmental Pinewood Landfill	Pinewood County	Jerry Lockleer/ 803-452-5003	Yes	
West Virginia				
Meadowfill	Bridgeport City	John McGarvey/ 304-558-6350	Yes	See Telephone Log.
S&S Landfill	Clarksburg City	John Miller/ 304-745-3234	Yes	See Telephone Log.
Han Landfill	Peterstown City	Ronald Mann/ 304-753-9470	Yes	See Telephone Log.

Environmental Permit Report

for

Operable Unit 1, Site 16,

Debris Pile

MCAS Cherry Point

Cherry Point, North Carolina

Atlantic Division

Naval Facilities Engineering Command

Northern Division Contract No. N62472-90-D-1298

Contract Task Order 0191

March 1995

Halliburton NUS
CORPORATION

ENVIRONMENTAL PERMIT REPORT
FOR
OPERABLE UNIT 1, SITE 16,
DEBRIS PILE
MCAS CHERRY POINT
CHERRY POINT, NORTH CAROLINA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Atlantic Division
Commander
LANTNAVFACENGCOM
1510 Gilbert Street
Norfolk, Virginia 23511-2699

Submitted by:
Halliburton NUS Corporation
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

NORTHERN DIVISION CONTRACT NO. N62472-90-D-1298
CONTRACT TASK ORDER 0191

MARCH 1995

SUBMITTED BY:

J. RANDALL ELDER, P.E.
PROJECT MANAGER
HALLIBURTON NUS CORPORATION
PITTSBURGH, PENNSYLVANIA

APPROVED BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
HALLIBURTON NUS CORPORATION
WAYNE, PENNSYLVANIA

TABLE OF CONTENTS

1.0 INTRODUCTION

This Environmental Permits Report (Report) was prepared under Contract Task Order (CTO) 191 under Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62472-90-D-1298. Halliburton NUS is performing engineering and design services and providing construction phase services for the remediation of the debris piles at Operable Unit 1 (OU-1), Site 16 at Marine Corps Air Station (MCAS) Cherry Point, North Carolina.

1.1 BACKGROUND INFORMATION

Site 16 is located on East Prong Slocum Creek adjacent to Sandy Branch near the southern boundary of the Cherry Point Facility. The site consists of approximately 20 acres, which were associated with landfilling activities between 1946 and 1948.

Six debris piles are located in an area on the southeastern portion of the site, adjacent to an unnamed tributary of Slocum Creek. This area was used as a scrap yard and disposal area for an unknown period of time and currently has numerous debris piles, empty storage vessels and other construction debris scattered across its surface.

Halliburton NUS performed a pre-design investigation to determine the presence of contaminants at the site. Organic contaminants at the site are below cumulative risk range of $x10^{-6}$ using the risk based concentration memorandum developed by EPA Region III (memo dated November 8, 1994). PCBs were detected ranging in concentration from 0.078 to 0.49 ppm. The current action level for residential scenarios is 1 ppm. The only metals that were detected above Cherry Point background levels were magnesium and lead. Lead was found in concentrations from 163 to 708 ppm but when included with other contaminants, the risk levels are within the $x10^{-6}$ range.

Asbestos was detected at levels above the regulatory level of 1 percent in 3 of the soil samples and 13 of the debris samples. Due to its presence above the regulatory level, asbestos is considered a driver in this removal action.

TPHs were detected in 5 locations above the preliminary calculated action levels (10 ppm for gas, 40 ppm for diesel, and 250 ppm for oil and grease). Due to its presence above the regulatory level, TPH is considered a driver in this removal action.

1.2 PURPOSE

This Environmental Permits Report was prepared in accordance with Subtask 0250 CTO 191. The purpose of this report is to comply with the amended Executive Order 12088, "Federal Compliance With Pollution Control standards" and to comply with applicable Federal, state, local and interstate pollution control standards governing air quality, water quality, solid waste, and hazardous waste.

This report identifies the type of permits required, the permitting agency, the procedures, times and fees required to complete the permit applications, applicability of waivers or variances, and monitoring associated with applicable permits.

1.3 REPORT ORGANIZATION

This report consists of the following sections:

- Section 1.0 Introduction
- Section 2.0 Proposed Remediation Action
- Section 3.0 Permitting Requirements
- Section 4.0 Permit Applications

Section 1.0 presents a brief introduction and summarizes background information. Section 2.0 describes the removal action project. Permitting requirements are presented in Section 3.0 and information regarding permit applications are presented in Section 4.0.

2.0 PROPOSED REMEDIATION ACTION

2.1 REMOVAL ACTION OBJECTIVES

The objectives of the proposed removal action at Site 16 are to remove asbestos contaminated soil and debris and TPH contaminated soil, dispose of the asbestos contaminated debris and soil, the treatment and disposal of the TPH contaminated soil, and site restoration to the degree of pre-construction site conditions. See Figure 2-1 for Remedial Action Site Plan.

2.2 REMOVAL ACTION DESCRIPTION

The removal action will consist of site preparation, construction of access roads and support facilities, excavation of debris and contaminated soils, landfilling of debris and asbestos contaminated soil, treatment of TPH contaminated soil, and site restoration. The estimated construction period is expected to be approximately 14 weeks. The major items of construction to be performed during the work are summarized as follows:

- **Site Preparation.** Equipment necessary for work will be mobilized on-site. Silt fencing and turbidity curtains will be installed along the down gradient perimeter of the areas to be disturbed. Support Zones and road ways will be cleared and grubbed. These areas will be rough graded and proof-rolled before construction of access roads. The western support zone will be surfaced, office and decontamination trailers will be placed and secured, and temporary phone, electric, water and sanitary utilities will be installed. Equipment decontamination facilities will be constructed. The area to be cleared and grubbed for roads and support areas is approximately 1 acre and the area to be cleared for excavation is approximately 0.9 acre.

- **Construction of Access Roads.** An improved dirt road will be constructed by rough grading and proof-rolling as described under **Site Preparation**. A graveled road will be constructed after rough grading and proof-rolling by laying an 8-oz geofabric on the subase, with an 18-inch overlap at all seams, then 6-inches of crushed stone will be placed and compacted. the western support area will also be constructed of crushed stone.

- **Excavation of Debris and Soils.** Approximately 490 cubic yards of demolition debris, 410 cubic yards of asbestos contaminated debris, 270 cubic yards of asbestos contaminated soils, and 591 cubic yards of TPH contaminated soil will be excavated (of which 52 cubic yards also contain asbestos). During the excavation and handling of asbestos containing materials, techniques such as

THIS PAGE INTENTIONALLY LEFT BLANK

PILE CONTENTS

PILE #1 DEMOLITION DEBRIS (SCRAP METAL, METAL ANTENNA SECTION CONCRETE PIPES), ASBESTOS PIPES

PILE #2 DEMOLITION DEBRIS (TRASH TIRES, METAL ANTENNA SECTION LUMBER, PRE-CAST CONCRETE BEAMS) ASBESTOS PIPES

PILE #3 ASBESTOS PIPES

PILE #4 DEMOLITION DEBRIS (BURIED CORRUGATED METAL AND CONCRETE PIPE), ASBESTOS PIPES

PILE #5 ASBESTOS PIPES, DEMOLITION DEBRIS (SCRAP METAL)

PILE #6 DEMOLITION DEBRIS (CONCRETE PIPES CONCRETE DEBRIS REBAR CORRUGATED METAL PIPE)

TRAILERS

#1 REMEDIATE AND REMOVE (CONTAINS SUSPECTED ASBESTOS CONTAINING MATERIAL)

#2 NO WORK TO BE PERFORMED

LEGEND

- ASBESTOS CONTAMINATED SOIL
- TPH CONTAMINATED SOIL
- LEAD CONCENTRATION >400 PPM
- DEPTH - 0 TO 1 VERTICAL EXTENT OF CONAMINATION
- CREEK BOUNDARY
- OH OVERHEAD LINE
- WETLAND BOUNDARY
- FIRE HYDRANT
- SOIL SAMPLE LOCATION (0-1 AND 1-2)
- SOIL SAMPLE LOCATION (0-1)
- MONITORING WELL

ROOSEVELT BLVD

6" BUNDLES OF HR TIES

SAND/GRAVEL DRIVE

ELEC METER

1 STY FRAME BLDG

AREA LITTERED WITH CONSTRUCTION DEBRIS PRE CAST CONC STRUCTURES UTILITY POLES LUMBER

METAL RAIL

DEPTH - 0 TO 1
SO-10
AS-24

SO-09
SO-10
AS-21

EXISTING SILT FENCE

METAL STOCKPILE

SAND PILE

TRAILER #2

2-275 GAL DRUMS

PILE #1

SO-01
SO-20

MW-12

SO-08
AS-25

PILE #2

DEPTH - 0 TO 1

PILE #3

SO-07

SO-02

SO-06

DEPTH - 0 TO 2

SO-03

O-05

ABOVE GROUND METAL TANKS

UNNAMED TRIBUTARY TO SLOCUM CREEK

SO-04
SB-04

APPROXIMATE EXISTING DIRT ROAD LOCATION

SO-16
SO-18
AS-23

OTHER PIPES

CONCRETE SLAB

TRAILER #1

SO-17
SB-17

CONC TANK

ABOVE GROUND METAL TANK
12'-3" DIA

DEPTH - 0 TO 2

PILE #4

SO-16

PILE #5

SO-15
AS-23

SO-13

SO-14

SO-12
LEAD >400

DEPTH - 0 TO 1

SO-11

PILE #6

SCALE IN FEET

REV	DESCRIPTION	PREP BY	DATE	APPRVD
		DH ENG		

NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL BASE
MARINE CORPS AIR STATION CHERRY POINT
PHILADELPHIA, PA.
CHERRY POINT, NORTH CAROLINA

DEPARTMENT OF THE NAVY

DEBRIS PILE REMEDIATION
EXISTING SITE CONDITIONS

SEAL AREA

SAT ID DATE

CDEK ID NO 00001

SCALE AS SHOWN

SPEC NO 01

CONSTRN CONTR NO N62472- -C-

NAVFAC DRAWING NO

SHEET D | 2-1

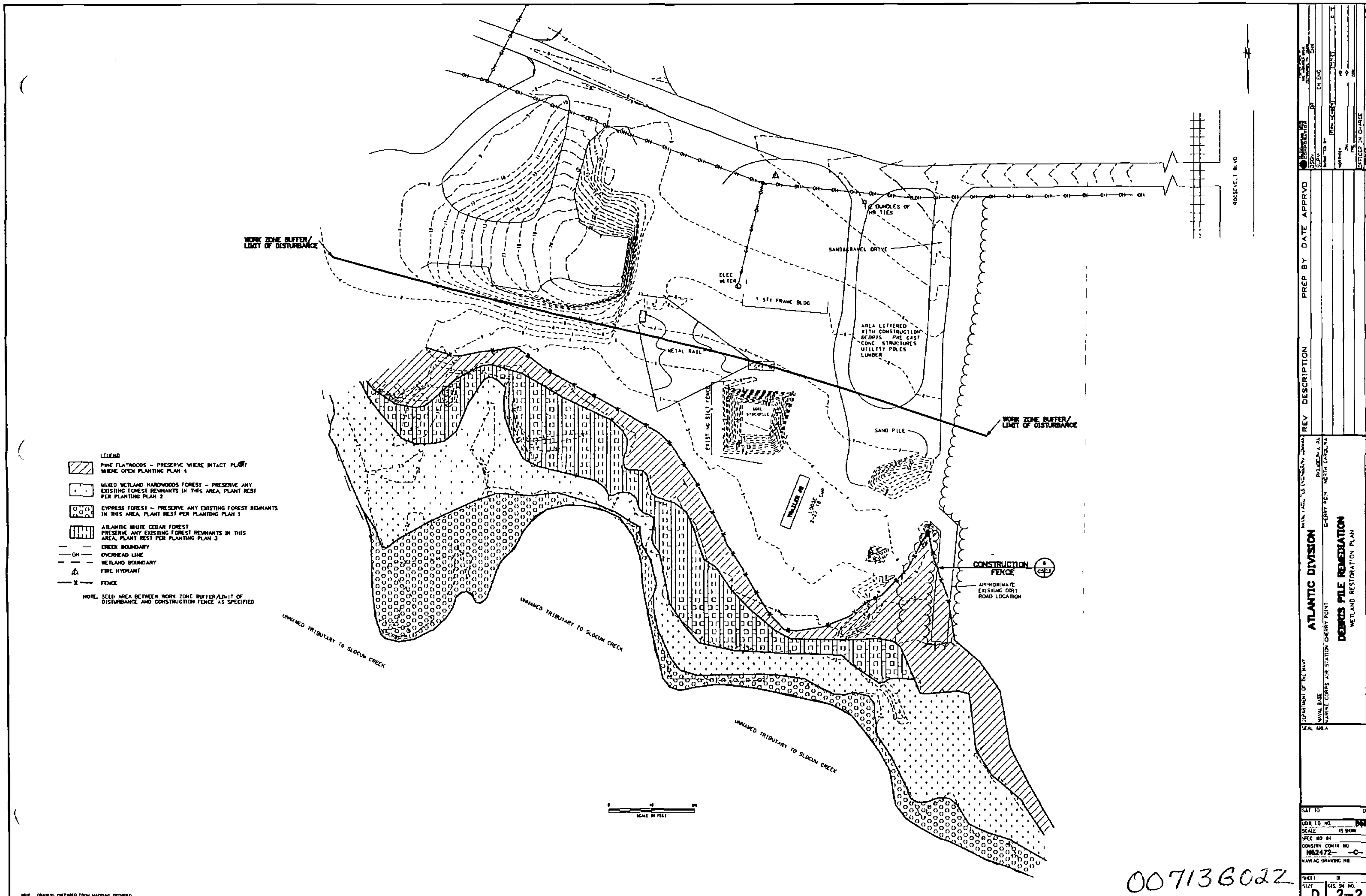
00713601Z

wetting or encapsulation will be employed to eliminate the migration of asbestos fibers. Excavation and treatment/disposal of soils will continue until contaminant action levels have been met (determined by verification sampling).

- **Disposal of Debris and Soils.** Excavated materials will be loaded into DOT approved containers for transportation to the intended treatment/disposal facilities. Demolition debris will be disposed of at the landfill located at MCAS Cherry Point or when unacceptable, to an offsite landfill. Asbestos contaminated debris and soil will be disposed of at an approved, permitted offsite landfill. TPH contaminated soils will be disposed of at an approved, permitted offsite treatment facility. Soils contaminated with TPH and asbestos will be disposed of at an offsite landfill permitted for both contaminants. Scrap Tanks will be reduced to acceptable sizes and disposed of at the Defense Reutilization and Marketing Office (DRMO) located at MCAS Cherry Point.

- **Site Restoration.** All roads and support zones will be removed and the material disposed. the disturbed areas will be regraded and revegetated. Wetland areas will be replanted with native species of trees, vines and ground-cover including cedar, cypress, maple, black and sweet gum, wax myrtle, buttonbush, and loblolly pine. The containerized stock will be fertilized and watered during the first year to ensure viability. All other areas will be revegetated with native grasses and/or trees. The site will be restored as shown on Figure 2-2.

THIS PAGE INTENTIONALLY LEFT BLANK


WORK ZONE BUFFER/ LIMIT OF DISTURBANCE
ELEC METER
1 STY FRAME BLDG
BUNDLES OF RR TIES
SAND&GRAVEL DRIVE
AREA LITTERED WITH CONSTRUCTION DEBRIS PRE CAST CONC STRUCTURES UTILITY POLES LUMBER
METAL RAIL
EXIST NC SILT FENCE
SOIL STOCKPILE
SAND PILE
WORK ZONE BUFFER/ LIMIT OF DISTURBANCE
CONSTRUCTION FENCE
APPROXIMATE EXISTING DIRT ROAD LOCATION
ROOSEVELT BLVD
UNNAMED TRIBUTARY TO SLOCUM CREEK
UNNAMED TRIBUTARY TO SLOCUM CREEK
UNNAMED TRIBUTARY TO SLOCUM CREEK
SCALE IN FEET
LEGEND
PINE FLATWOODS – PRESERVE WHERE INTACT PLANT WHERE OPEN PLANTING PLAN 4
MIXED WETLAND HARDWOODS FOREST – PRESERVE ANY EXISTING FOREST REMNANTS IN THIS AREA, PLANT REST PER PLANTING PLAN 2
CYPRESS FOREST – PRESERVE ANY EXISTING FOREST REMNANTS IN THIS AREA, PLANT REST PER PLANTING PLAN 1
ATLANTIC WHITE CEDAR FOREST PRESERVE ANY EXISTING FOREST REMNANTS IN THIS AREA, PLANT REST PER PLANTING PLAN 3
CREEK BOUNDARY
OVERHEAD LINE
WETLAND BOUNDARY
FIRE HYDRANT
FENCE
NOTE. SEED AREA BETWEEN WORK ZONE BUFFER/LIMIT OF DISTURBANCE AND CONSTRUCTION FENCE AS SPECIFIED
REV DESCRIPTION PREP BY DATE APPRVD
DEPARTMENT OF THE NAVY
NAVAL BASE
MARINE CORPS AIR STATION CHERRY POINT
CHERRY POINT NORTH CAROLINA
ATLANTIC DIVISION
DEBRIS PILE REMEDIATION
WETLAND RESTORATION PLAN
SEAL AREA
SAT ID
SCALE
SPEC NO
CONSTR CONTR NO N62472- -C-
NAVFAC DRAWING NO.
SHEET
SIZE D
DIS. SH. NO. 2-2

00713G022

3.0 REQUIRED PERMITS

Table 3-1 presents a project permit checklist to assess what permits may be required for specific projects to assure regulatory compliance. This table lists the type of permits/license/certification/plan that may be required by government agencies for specific types of projects. As shown on Table 3-1, based on review of the permit checklist the following permits are applicable:

- Asbestos - Notification must be made for both an Asbestos Containing Material Removal Permit and as part of the NESHAP Air Quality Notification.

- Wetlands - A Nationwide permit number 38 will be required due to the excavation and filling to be performed in the wetlands.

- Wetlands - A 401/404 Water Quality Certification will be required to determine the effect of the project on surface water quality.

- Coastal - A Federal Consistency Determination is required to determine if the project is consistent with the State of North Carolina coastal use requirements.

- Erosion and Sediment Control - An Erosion and Sediment Control plan is required to identify measures to be used to mitigate erosion at the site during construction.

TABLE 3-1
PROJECT PERMITS
OPERABLE UNIT 1, SITE 16
MCAS CHERRY POINT, NORTH CAROLINA

Type of Project	Type of Permit	Issuing Agency	Applicability	Reason
Asbestos Containing Material Removal Permit	Removal Notification (Joint application made on NCDEHNR Form 3768)	State of N.C. Asbestos Hazard Management Branch	Applicable	Notification to the state of asbestos work to be performed. Allows review for accreditation of workers.
Asbestos Abatement (Air Quality) - NESHAP requirements	NESHAP Notification (Joint application made on NCDEHNR Form 3768).	State of N.C. Asbestos Hazard Management Branch	Applicable	Notification to the state of asbestos work to be performed.
Wetlands	Nationwide 38	Army COE	Applicable	Required where hazardous materials removal is performed or ordered by a government agency.
Wetlands	401/404 Water Quality Certification	N.C. Division of Coastal Management/Army COE	Applicable	To review the effect of construction activities on water quality.
Coastal	Federal Consistency Determination	N.C. Division of Coastal Management	Applicable	To determine if the project is consistent with the North Carolina Coastal Management Program.
Excavation and Filling in Estuarine Waters	State Dredge and Fill Permit	State Division of Coastal Management	Not Applicable	Slocum Creek is not an estuarine waterway.
Construction requiring a Sediment Control Plan	Stormwater Certification	State of N.C.	Not Applicable	No impervious surfaces will be constructed.
Erosion and Sediment Control	Plan required if over 1 acre	State of N.C. Land Quality Section	Applicable	Required to identify measures to be used to mitigate erosion at the site.
Construction resulting in stormwater discharge into streams	NPDES Permit	State of N.C. Water Quality Section	Not Applicable	Disturbed area will not exceed 5 acres.

4.0 PERMIT APPLICATIONS

The permits required for this project will be applied for through the U.S. EPA, the Army COE, and the State of North Carolina. The Erosion and Sediment Control Plan will be prepared by Halliburton NUS.

4.1 NORTH CAROLINA ASBESTOS RECORD

Notification must be given to the State of North Carolina prior to the start of any asbestos abatement in the form of the National Emission Standards for Hazardous Air Pollutants (NESHAP) and the Asbestos Containing Material (ACM) Removal Permit Application. This notification is made on NCDEHNR Form 3768. Review of this application is necessary prior to receiving a state permit for asbestos containing material removal. The application fee for the ACM removal permit shall accompany the request. The fee is equal to 1 percent of the contract price for asbestos removal. MCAS Cherry Point will complete the NCDEHNR form 3768 that will be sent to the following address for review:

Division of Epidemiology
Occupational Health Section
Asbestos Hazard Management Branch
P.O. Box 27687
Raleigh, NC 27611-0820

4.2 NATIONWIDE PERMIT

A Nationwide Permit number 38 is required to receive authorization for the containment, stabilization, or removal of hazardous or toxic materials which is performed, ordered, or sponsored by a government agency with established legal or regulatory authority. Discharge in special aquatic sites (i.e. wetlands) requires the notification to include a delineation of the affected sites. MCAS Cherry Point will prepare a Nationwide Permit number 38 that will be sent to the following address for review:

Washington Regulatory Field Office
U.S. Army COE
P.O. Box 1000
Washington, NC 27889-1000
Attention: Mr. Mike Bell

4.3 401/404 WATER QUALITY CERTIFICATION

A 401/404 Water Quality Certification is required for any project that results in discharge into navigable waters and is issued by the State of North Carolina Division of Environmental Management, Water Quality Section. The permit required by Section 404 of the Clean Water Act regulates projects which result in the discharge of dredged or fill material into waters or wetlands and is issued by the COE district branch.

An application for a COE Section 404 permit is considered as application for a 401 water quality certification. MCAS Cherry Point will prepare a COE Section 404 permit that will be sent to the following addresses for review:

Washington Regulatory Field Office
U.S. Army COE
P.O. Box 1000
Washington, NC 27889-1000
Attention: Mr. Mike Bell

4.4 CONSISTENCY DETERMINATION

Federal agencies do not need a permit from the North Carolina Division of Coastal Management for activities that take place on coastal wetlands. However they do need to prepare a Consistency Determination to ensure that they are consistent with North Carolina coastal management regulations. MCAS will prepare a Consistency Determination that will be sent to the following address for review:

Consistency Coordinator
North Carolina Division of Coastal Management
P.O. Box 27687
Raleigh, NC 27611-7687
Attention: Mr. Steve Benton

The Division of Coastal Management will distribute the Consistency Determination to other state agencies for review that include:

- North Carolina Division of Marine Fisheris
- North Carolina Wildlife Commission
- North Carolina Division of Environmental Management
- North Carolina Division of Water Resources

4.5 EROSION AND SEDIMENT CONTROL PLAN

An Erosion and Sedimentation Control Plan is required to be prepared by anyone initiating a land-disturbing activity , regardless of size of the disturbance. Developers must plan and implement effective temporary and permanent control measures to retain sediment within the boundaries of the site.

An Erosion and Sedimentation Control Plan must be submitted to the North Carolina Sedimentation Control Commission before any activity starts. They must approve or disapprove the Plan within 30 days of submission. Any revisions to the Plan must be approved or disapproved within 15 days of submission.

An Erosion and Sedimentation Control Plan has been prepared following the guidelines provided by the Division of Land Resources, Land Quality Section of the North Carolina Department of Natural Resources and Community Development. (Erosion and Sediment Control Planning and Design Manual, September 1988) The Erosion and Sedimentation Control Plan is provided in Appendix A and will be submitted by MCAS Cherry Point to the following address for review and comments:

North Carolina DEHNR
1424 Carolina Avenue
Washington, NC 27889
Attention: Mr. Pat McLain

There is a review fee of $30.00 for the first disturbed acre, and $20.00 for each additional whole or fractional acre that is disturbed. The review does not start until the fee has been received. The estimated area to be disturbed is 2 acres.

APPENDIX A

EROSION AND SEDIMENT CONTROL PLAN

Appendix A
Erosion and Sediment Control Plan
for
Operable Unit 1, Site 16,
Debris Pile
MCAS Cherry Point
Cherry Point, North Carolina

Atlantic Division
Naval Facilities Engineering Command
Northern Division Contract No. N62472-90-D-1298
Contract Task Order 0191

March 1995

EROSION AND SEDIMENT CONTROL PLAN
FOR
OPERABLE UNIT 1, SITE 16,
DEBRIS PILE
MCAS CHERRY POINT
CHERRY POINT, NORTH CAROLINA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Atlantic Division
Commander
LANTNAVFACENGCOM
1510 Gilbert Street
Norfolk, Virginia 23511-2699

Submitted by:
Halliburton NUS Corporation
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

NORTHERN DIVISION CONTRACT NO. N62472-90-D-1298
CONTRACT TASK ORDER 0191

MARCH 1995

SUBMITTED BY:

J. RANDALL ELDER, P.E.
PROJECT MANAGER
HALLIBURTON NUS CORPORATION
PITTSBURGH, PENNSYLVANIA

APPROVED BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
HALLIBURTON NUS CORPORATION
WAYNE, PENNSYLVANIA

TABLE OF CONTENTS

FIGURES

1.0 INTRODUCTION

The work to be performed is located at Operable Unit 1, Site 16, MCAS Cherry Point in Cherry Point, North Carolina. Site 16 is a small portion of the MCAS Cherry Point consisting of approximately 3 acres of the total 20 acre facility. The area is located on East Prong Slocum Creek adjacent to Sandy Branch near the southern boundary of the Cherry Point Facility.

This Erosion and Sediment Control Plan Report is for removal of assorted debris piles and asbestos and TPH contaminated soils adjacent to a creek, which were associated with landfilling activities between 1946 and 1948.

Several debris piles are located in an area on the southeastern portion of the site, adjacent to an unnamed tributary to Slocum Creek. This area was used as a scrap yard and disposal area for an unknown period of time and currently has numerous debris piles, tanks, empty storage vessels and other construction debris scattered across it's surface.

1.1 GENERAL PROJECT DESCRIPTION

The areas of asbestos contaminated soils were delineated by by extending debris pile limits approximately 25 feet where contamination was found in soils near the piles. The TPH contaminated soils areas consist of 5 locations containing approximately 2,500 square feet each. Both the asbestos and TPH contaminated areas were verified by use of laboratory soil sample results.

The primary objectives of the proposed removal action are to construct access roads to the areas of the debris piles, remove the debris piles, excavate the contaminated soils areas, and restore the site.

The removal action will consist of loading debris, 3 inches of excavated soils from asbestos contaminated areas and up to 2 feet of excavated soils from the TPH contaminated areas into DOT approved containers and hauling to approved landfills. The site will then be restored to the same as original or better conditions.

The estimated construction period is expected to be approximately 3.5 months. The major items of construction to be performed during the work consist of general site preparation, constructing the access roads, hauling of debris, excavation of contaminated soils, placement of excavated contaminated soils, and restoration of the site.

1.2 SEQUENCE OF CONSTRUCTION

The time to perform the required construction activities is estimated to be approximately 3.5 months of construction for the construction activities is as follows:

- **Step 1 - Install Erosion and Sediment Control Devices.**
  The turbidity curtains and silt barrier fences will be installed.

- **Step 2 - Site Preparation**
  During this task the contractor will construct the access roads throughout the site. The contractor will also perform clearing and grubbing.

- **Step 3 - Debris Removal**
  The debris piles will be loaded into DOT approved containers and hauled to approved landfills.

- **Step 4 - Excavate Contaminated Soils**
  The contaminated soils will be excavated and verification sampling performed.

- **Step 5 - Site Restoration**
  Approved fill will be brought in to return excavated areas to the original grades and areas will be replanted. Where wetlands were disturbed, mitigation will be performed leaving the areas with a land value at least equal to the pre-construction conditions.

- **Step 6 - Remove Erosion and Sediment Control Devices**
  After construction activities are completed, the access roads will be removed and corresponding disturbed area revegetated. Following establishment of temporary vegetation the C&S control devices will be removed.

2.0 ANALYSIS

Technical Release 55 (TR-55) Procedures were used to calculate storm runoff volumes and peak rates of discharge for the 24 hour, 10 year storm events.

Runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, soil moisture, antecedent rainfall, cover type, amount of impervious surfaces, and surface retention. Travel time is determined primarily by slope, length of flow path, depth of flow, and roughness of flow surface. Peak discharges are based on the relationship of these parameters and on the total drainage area of the watershed being considered.

Contract drawings are provided in Appendix B of the Environmental Permits Report.

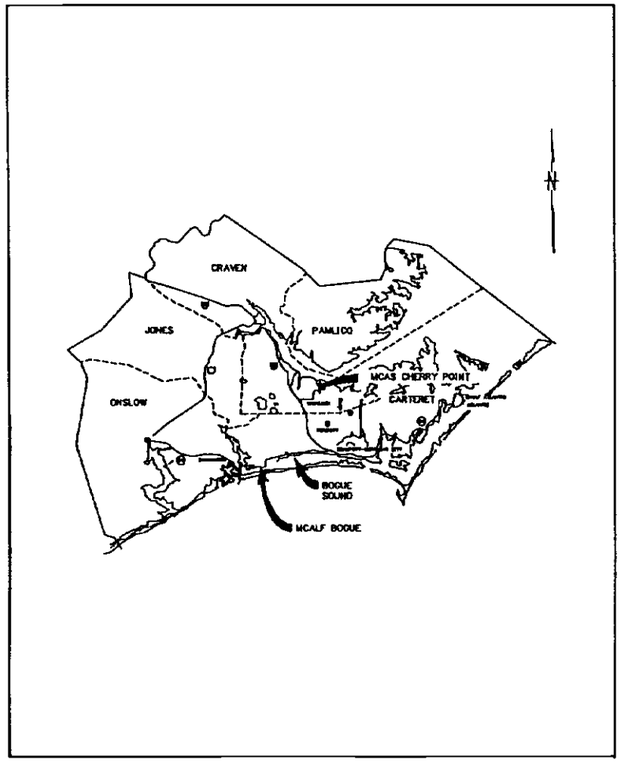
Hydrological and hydraulic calculations for this project are presented in Appendix C of the Environmental Permits Report.

3.0 CONCLUSIONS

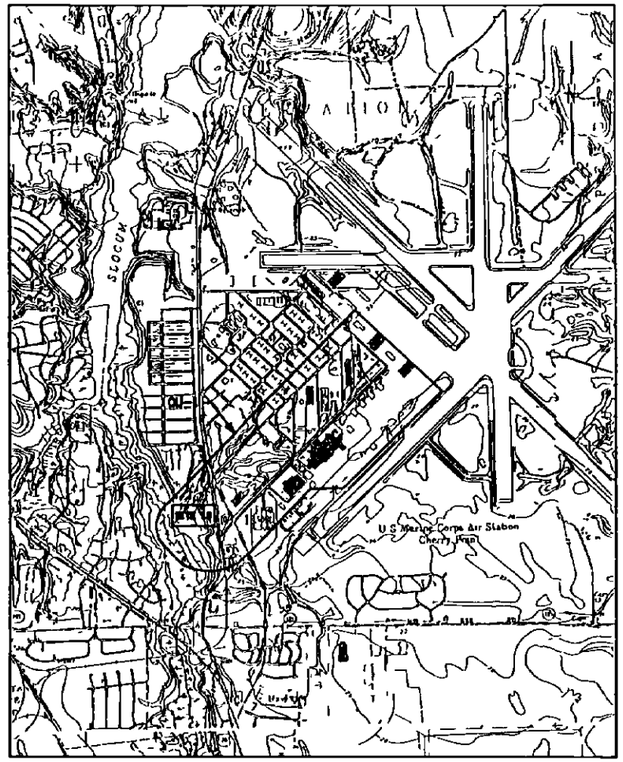
The entire project will disturb a relatively small area (less than 2 acres) and occur in a short time period (3.5 months). Appropriate steps will be implemented to divert runoff around the site during construction and cause a subsequent reduction in the erosion and sediment control potential. Float booms will be placed within the unnamed tributary to Slocum Creek where excavation encroaches on the creek boundaries and silt barrier fences will be installed adjacent to the debris piles and temporarily developed areas as sediment control measures. Immediately following construction, all areas will be seeded in temporary grasses to eliminate erosion during the time necessary for the permanent revegetation to take hold.

APPENDIX B
CONTRACT DRAWINGS

OPERABLE UNIT 1 - SITE 16 DEBRIS PILE REMEDIATION
MCAS CHERRY POINT
CHERRY POINT, NORTH CAROLINA



VICINITY MAP
NTS



LOCATION MAP

GENERAL NOTES

1. ALL AREAS SHALL BE GRADED TO DRAIN
2. MAXIMUM PROTECTION SHALL BE PROVIDED FOR EXISTING UTILITIES WHICH ARE TO REMAIN IN SERVICE. CONTRACTOR SHALL PROVIDE ALL TEMPORARY SERVICE.
3. THE CONTRACTOR SHALL THROUGHLY INSPECT THE SITE PRIOR TO CONSTRUCTION TO VERIFY EXISTING SITE CONDITIONS.

DRAWING INDEX

00713G032

REV DESCRIPTION PREP BY DATE APPRVD

DEPARTMENT OF THE NAVY
NAVAL BASE
NEAR THE CORPS AIR STATION CHERRY POIN
SEAL AREA

ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
PHILADELPHIA, PA.
CHERRY POINT, NORTH CAROLINA

OU-1 SITE 16 - DEBRIS PILES
TITLE SHEET

SAT TO DAR
CON I.D. NO
SCALE AS SHOWN
SPEC. NO. 84
CONSTRN CONTR NO
N62472- -0-
NAVFAC DRAWING NO
SHEET 1 OF 1
SIZE D
DWG NO T-1

PILE CONTENTS

PILE #1 DEMOLITION DEBRIS (SCRAP METAL, METAL ANTENNA SECTION CONCRETE PIPES), ASBESTOS PIPES

PILE #2 DEMOLITION DEBRIS (TRASH TIRES, METAL ANTENNA SECTION LUMBER PRE-CAST CONCRETE BEAMS), ASBESTOS PIPES

PILE #3 ASBESTOS PIPES

PILE #4 DEMOLITION DEBRIS (BURIED CORRUGATED METAL AND CONCRETE PIPE), ASBESTOS PIPES

PILE #5 ASBESTOS PIPES, DEMOLITION DEBRIS (SCRAP METAL)

PILE #6 DEMOLITION DEBRIS (CONCRETE PIPES, CONCRETE DEBRIS, REBAR CORROGATED METAL PIPE)

TRAILERS

#1 REMEDIATE AND REMOVE (CONTAINS SUSPECTED ASBESTOS CONTAINING MATERIAL)

#2 NO WORK TO BE PERFORMED

LEGEND

- ASBESTOS CONTAMINATED SOIL
- TPH CONTAMINATED SOIL
- LEAD CONCENTRATION >400 PPM
- DEPTH - 0 TO 1 VERTICAL EXTENT OF CONTAMINATION
- CREEK BOUNDARY
- OH OVERHEAD LINE
- WETLAND BOUNDARY
- FIRE HYDRANT
- SO SOIL SAMPLE LOCATION (0-1 AND 1-2)
- SB SOIL SAMPLE LOCATION (0-1)
- MW MONITORING WELL

GRID BASED ON NORTH CAROLINA STATE PLANE COORDINATES NAD 83

N 421400.00
N 421500.00
N 421400.00
N 421300.00
N 421200.00
N 421100.00
N 421000.00
N 420900.00

PILE #1
PILE #2
PILE #3
PILE #4
PILE #5
PILE #6

DEPTH - 0 TO 1
DEPTH - 0 TO 2

SO-01 AS-20
SO-02
SO-03
SO-04
SO-05
SO-06
SO-07
SO-08 AS-22
SO-09
SO-10 AS-24
SO-11 SB-11 AS-21
SO-12 LEAD >400
SO-13
SO-14
SO-15 AS-23
SO-16 SB-16 AS-25
SO-17 SB-17
MW-12

METAL FILL UNDERG
EXISTING SILT FENCE
METAL RAIL
BUILDING 1811 1 STY FRAME BLDG
ELEC METER
12 BUNDLES OF AIR TIES
SAND/GRAVEL DRIVE
AREA LITTERED WITH CONSTRUCTION DEBRIS PRE-CAST CONC STRUCTURES UTILITY POLES LUMBER
SAND PILE
TRAILER #2
2-55 GAL DRUMS
APPROXIMATE EXISTING DIRT ROAD LOCATION
ROOSEVELT BLVD
OTHER PAPER
CONCRETE DEBRIS
TRAILER #1
CONC TANK
ABOVE GROUND METAL TANKS
UNNAMED TRIBUTARY TO SLOCUM CREEK

SCALE IN FEET

NOTE: OB WERE PREPARED FROM MAPPING PROVIDED BY HARRIS HODSON WORKS RALEIGH, NC

00713G04Z

REV	DESCRIPTION	PREP BY	DATE	APPRVD

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL BASE
MARINE CORPS AIR STATION CHERRY POINT
CHERRY POINT, NORTH CAROLINA
SEAL AREA

DEBRIS PILE REMEDIATION
EXISTING SITE CONDITIONS

SAT ID DATE
CODE I.D. NO 86681
SCALE AS SHOWN
SPEC NO 84
CONSTRN CONTR. NO N62472- -C-
NAVFAC DRAWING NO
SHEET 1 OF 1
SIZE D
DIS. SH. NO C-1

LEGEND

- ASBESTOS CONTAMINATED SOIL
- TPH CONTAMINATED SOIL
- LEAD CONCENTRATION >400 PPM
- IMPROVED DIRT ROAD
- GRAVEL & ROAD
- DEBRIS PILE
- SILT FENCE
- TURBIDITY CURTAIN
- CREEK BOUNDARY
- OVERHEAD LINE
- WETLAND BOUNDARY
- FIRE HYDRANT
- TRAFFIC DIRECTION

GRID BASED ON NORTH CAROLINA STATE PLANE COORDINATES NAD 83

N 421800.00
N 421500.00
N 421300.00
N 421200.00
N 421100.00
N 421000.00
N 420900.00

E 2627400.00
E 2627500.00
E 2627600.00
E 2627700.00
E 2627800.00
E 2627900.00
E 2628000.00
E 2628100.00

WORK ZONE BUFFER/ LIMIT OF DISTURBANCE
GRAVEL ROAD
METAL RAIL
METAL TUNNELING
IMPROVED ROAD (GRAVEL 6")
SAND RAIL DATA
APPROXIMATE LIMITS OF CONSTRUCTION DEBRIS - PRE CAST CONC. GUIDELINES UTILITY POLES LUMBER
EQUIPMENT DECONTAMINATION PAD
ROOSEVELT BLVD
PILE #1
PILE #2
PILE #3
PILE #4
PILE #5
PILE #6
2 C2E3 TURBIDITY CURTAIN
3 C2E3 TURBIDITY CURTAIN
4 C2E3 SILT FENCE
(UNNAMED) TRIBUTARY TO SLOCUM CREEK
UNNAMED TRIBUTARY TO SLOCUM CREEK
ABOVE GROUND METAL TANKS
OTHER PIPES
CONCRETE MIXER
TRAILER
POND
APPROXIMATE EXISTING DIRT ROAD LOCATION
SCALE IN FEET

NOTE: DRAWING PREPARED FROM MAPPING PROVIDED BY HUNTER HUDSON SACKS, RALEIGH, NC.

REV	DESCRIPTION	PREP BY	DATE	APPRVD

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL BASE
MARINE CORPS AIR STATION CHERRY POINT
CHERRY POINT, NORTH CAROLINA

DEBRIS PILE REMEDIATION
REMEDIAL ACTION SITE PLAN

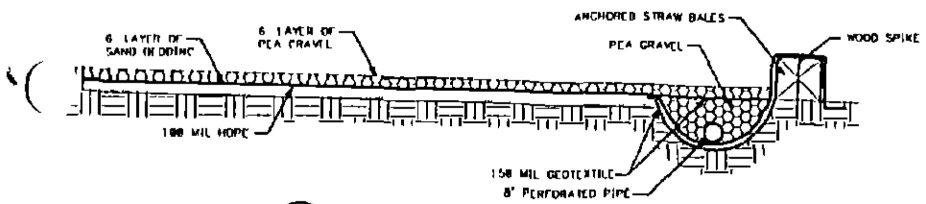
SEAL AREA

SAT ID | DATE

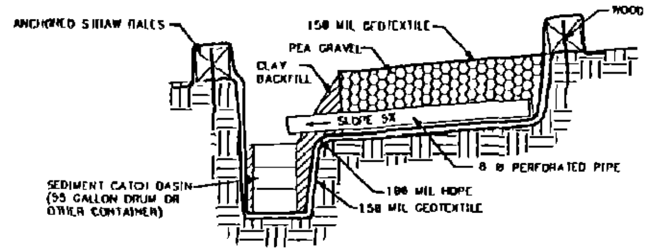
CODE I.D. NO 84681
SCALE AS SHOWN
SPEC NO 84
CONTRACT NO N62472-
NAVFAC DRAWING NO

SHEET 1 OF 1
SIZE D
DIS. SH NO C-2

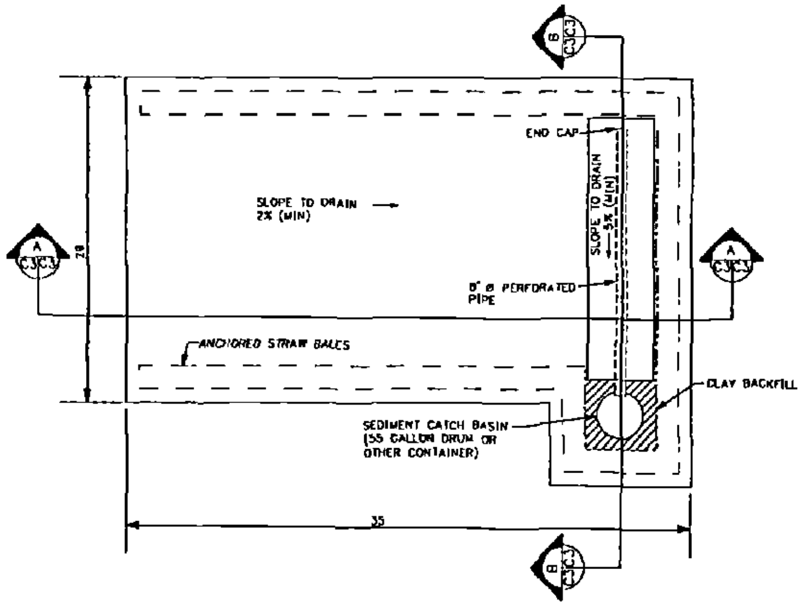
00713G052



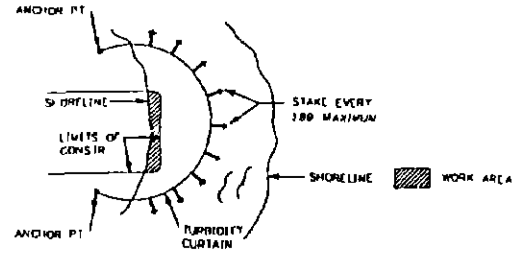
SECTION
NTS



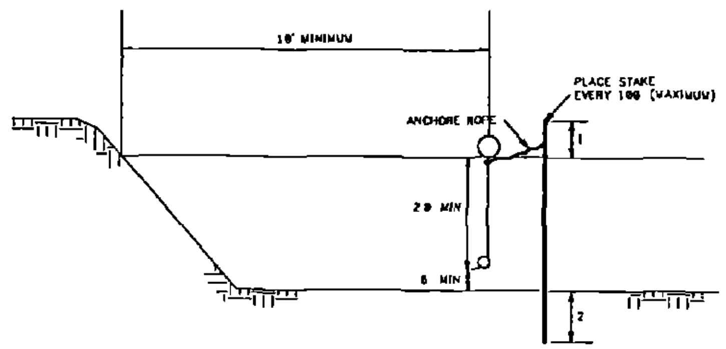
SECTION
NTS



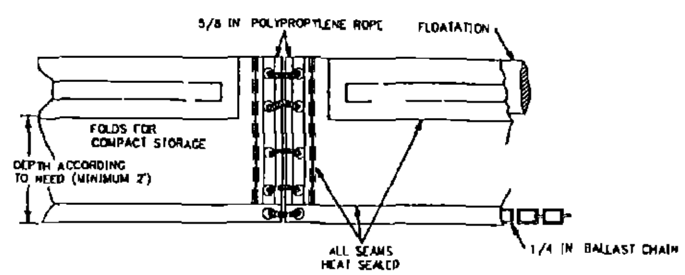
EQUIPMENT DECONTAMINATION PAD
NTS



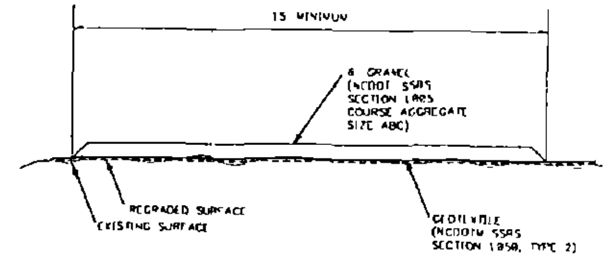
TYPICAL TURBIDITY CURTAIN LAYOUT
NTS



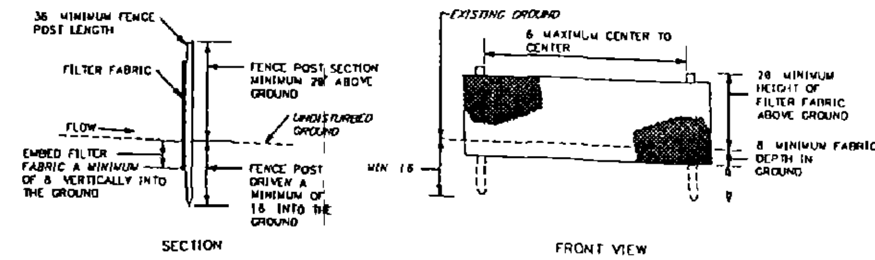
SECTION VIEW
NTS



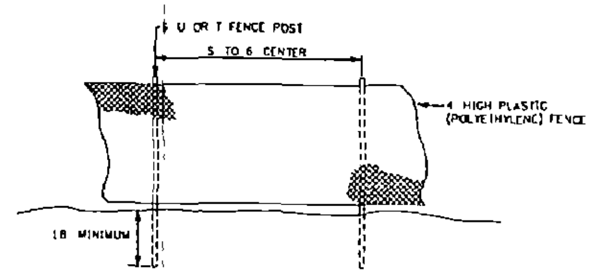
FRONT VIEW
TYPICAL TURBIDITY CURTAIN DETAIL
NTS



GRAVEL ROAD
NTS



TYPICAL SILT FENCE
NTS



TYPICAL CONSTRUCTION FENCE
NTS

00713G062

REV | DESCRIPTION | PREP BY | DATE | APPRVD

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
PHILADELPHIA, PA
ATLANTIC DIVISION
MARINE CORPS AIR STATION CHERRY POINT
NORTH CAROLINA
DEBRIS PILE REMEDIATION
CONSTRUCTION DETAILS

SEAL AREA

SCALE AS SHOWN
CONSTR CONTR NO N62472- -C-
NAVFAC DRAWING NO
D C-3

LEGEND

- OLD FIELD VEGETATION (UPLAND)(U)
- WET MEADOW VEGETATION (PALUSTRINE EMERGENT WETLAND, PERSISTENT/PALUSTRINE SCRUB-SHRUB WETLAND, BROAD-LEAVED DECIDUOUS)(PEM1/SS1)
- PINE FLATWOODS VEGETATION (UPLAND)(U)
- PINE FLATWOODS VEGETATION IN WETLANDS (PALUSTRINE FORESTED WETLANDS, NEEDLE-LEAVED EVERGREEN)(PF04)
- MIXED WETLAND HARDWOODS FOREST (PALUSTRINE FORESTED WETLANDS, BROAD-LEAVED DECIDUOUS)(PF01)
- CYPRESS FOREST (PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED DECIDUOUS)(PF02)
- CREEK BOUNDARY
- OHL — OVERHEAD LINE
- WETLAND BOUNDARY
- FIRE HYDRANT

GRID BASED ON NORTH CAROLINA STATE PLANE COORDINATES NAD 83

N 421500.00
N 421400.00
N 421300.00
N 421200.00
N 421100.00
N 421000.00
N 420900.00

ROOSEVELT BLVD

ELEC. METER

MILITARY TRAIL 1 SIT FRAME HLDG

AREA LITTERED WITH CONSTRUCTION DEBRIS, PINE CAFT CONC STRUCTURES UTILITY POLES LUMBER

METAL STRUCTURES

PILE #1

PILE #2

PILE #3

PILE #4

PILE #5

PILE #6

ABOVE GROUND METAL TANKS

ABOVE GROUND METAL TANK

CONC TANK

UNNAMED TRIBUTARY TO STOCKTON CREEK

SCALE IN FEET

NOTE: DRAWING PREPARED FROM MAPPING PROVIDED BY BURNEY HUDSON SIKES, RALEIGH, NC

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL BASE
MARINE CORPS AIR STATION CHERRY POINT NC

PHILADELPHIA, PA
CHERRY POINT, NORTH CAROLINA

DEBRIS PILE REMEDIATION
EXISTING WETLANDS AND PLANT COMMUNITIES

REV | DESCRIPTION | PREP BY | DATE | APPRVD

A/E NO | DAR
CONTR NO 62791
SCALE AS SHOWN
SPEC NO NA
CONTRN CONTR NO N62472-__-D-__
NAVFAC DRAWING NO

SHEET 1 OF 1
SIZE D | DRAWING NO C-4

00713G072

PINE FLATWOODS – PRESERVE WHERE INTACT PLANT WHERE OPEN PLANTING PLAN 4

MIXED WETLAND HARDWOODS FOREST – PRESERVE ANY EXISTING FOREST REMNANTS IN THIS AREA, PLANT REST PER PLANTING PLAN 2

CYPRESS FOREST – PRESERVE ANY EXISTING FOREST REMNANTS IN THIS AREA, PLANT REST PER PLANTING PLAN 1

ATLANTIC WHITE CEDAR FOREST
PRESERVE ANY EXISTING FOREST REMNANTS IN THIS AREA, PLANT REST PER PLANTING PLAN 3

CREEK BOUNDARY

OH OVERHEAD LINE

WETLAND BOUNDARY

FIRE HYDRANT

FENCE

NOTE.

1 SEED AREA BETWEEN WORK ZONE BUFFER/LIMIT OF DISTURBANCE AND CONSTRUCTION FENCE AS SPECIFIED

2. ONLY RESTORE AREA DISTURBED BY THE REMOVAL ACTION. BLEND WETLANDS MITIGATION WITH EXISTING VEGETATION ALONG THE BOUNDARIES OF DISTURBANCE.

GRID BASED ON NORTH CAROLINA STATE PLANE COORDINATES NAD 83

N 421600.00
N 421500.00
N 421400.00
N 421300.00
N 421200.00
N 421100.00
N 421000.00
N 420900.00

E 2627400.00
E 2627500.00
E 2627600.00
E 2627700.00
E 2627800.00
E 2627900.00
E 2628000.00
E 2628100.00

WORK ZONE BUFFER/ LIMIT OF DISTURBANCE

CLEC METER

BUILDING 1811
1 STY FRAME BLDG

METAL RAIL

EXISTING SILT FENCE

SOIL STOCKPILE

AREA LITTERED WITH CONSTRUCTION DEBRIS PRE-CAST CONC STRUCTURES UTILITY POLES LUMBER

SAND PILE

TRAILER #2

CONSTRUCTION FENCE

APPROXIMATE EXISTING DIRT ROAD LOCATION

UNNAMED TRIBUTARY TO SLOCUM CREEK

UNNAMED TRIBUTARY TO SLOCUM CREEK

UNNAMED TRIBUTARY TO SLOCUM CREEK

SCALE IN FEET

ROOSEVELT BLVD

REV	DESCRIPTION	PREP BY	DATE	APPRVD

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL BASE
PHILADELPHIA, PA
NAVAL AIR STATION CHERRY POINT
CHERRY POINT, NORTH CAROLINA

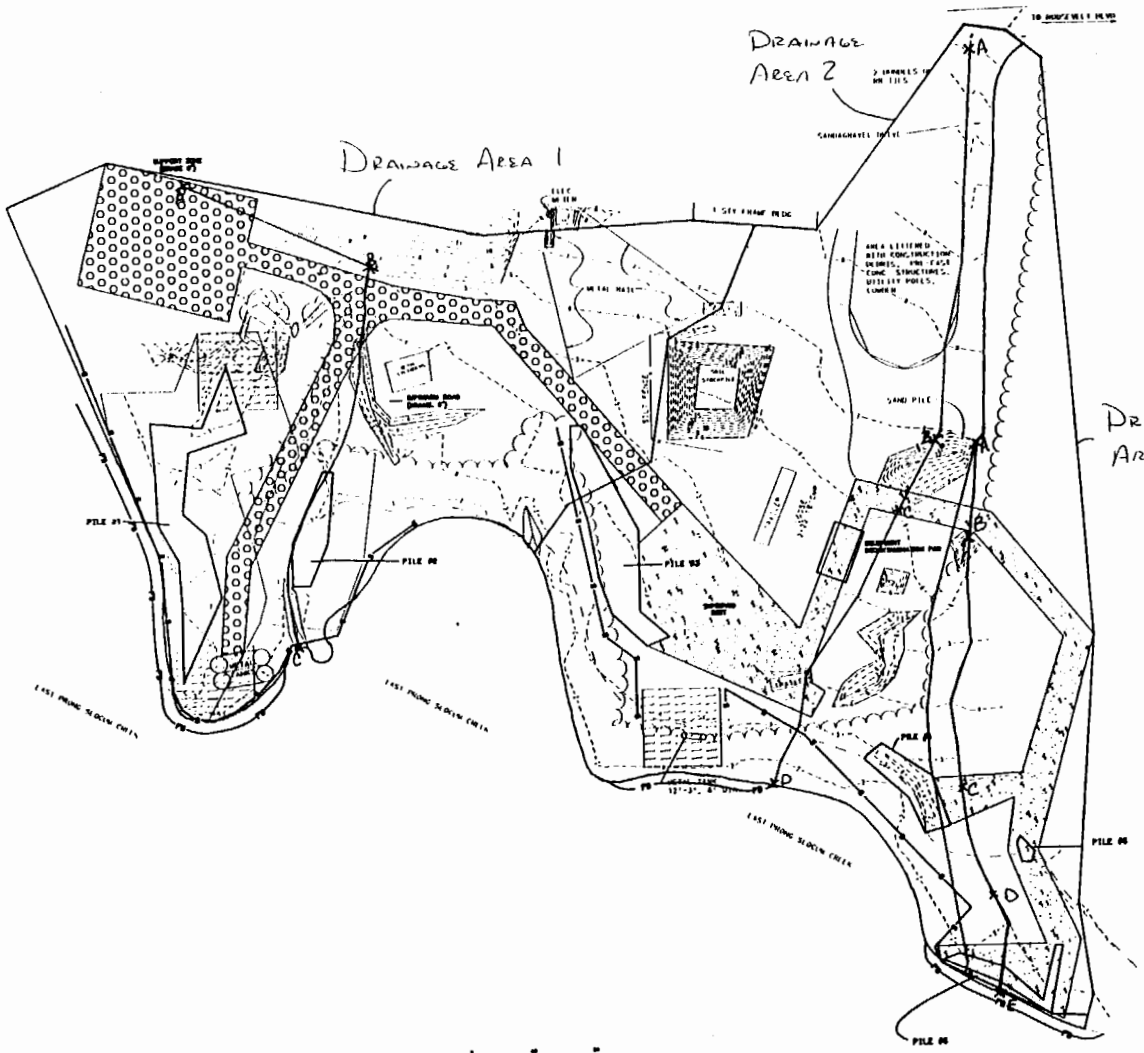
DEBRIS PILE REMEDIATION
WETLANDS RESTORATION PLAN

SEAL AREA

SAT ID 0A11
CONTR ID NO 58481
SCALE AS SHOWN
DRAWING NO 84
CONTRACT NO N62472- -C-
NAVFAC DRAWING NO
SHEET 1 OF 1
IDENTIFICATION NO C-5

00713G082

APPENDIX C
CALCULATIONS



* WATERSHED AREAS AND RUNOFF PATHS DURING CONSTRUCTION ACTIVITIES.

ATLANTIC DIVISION

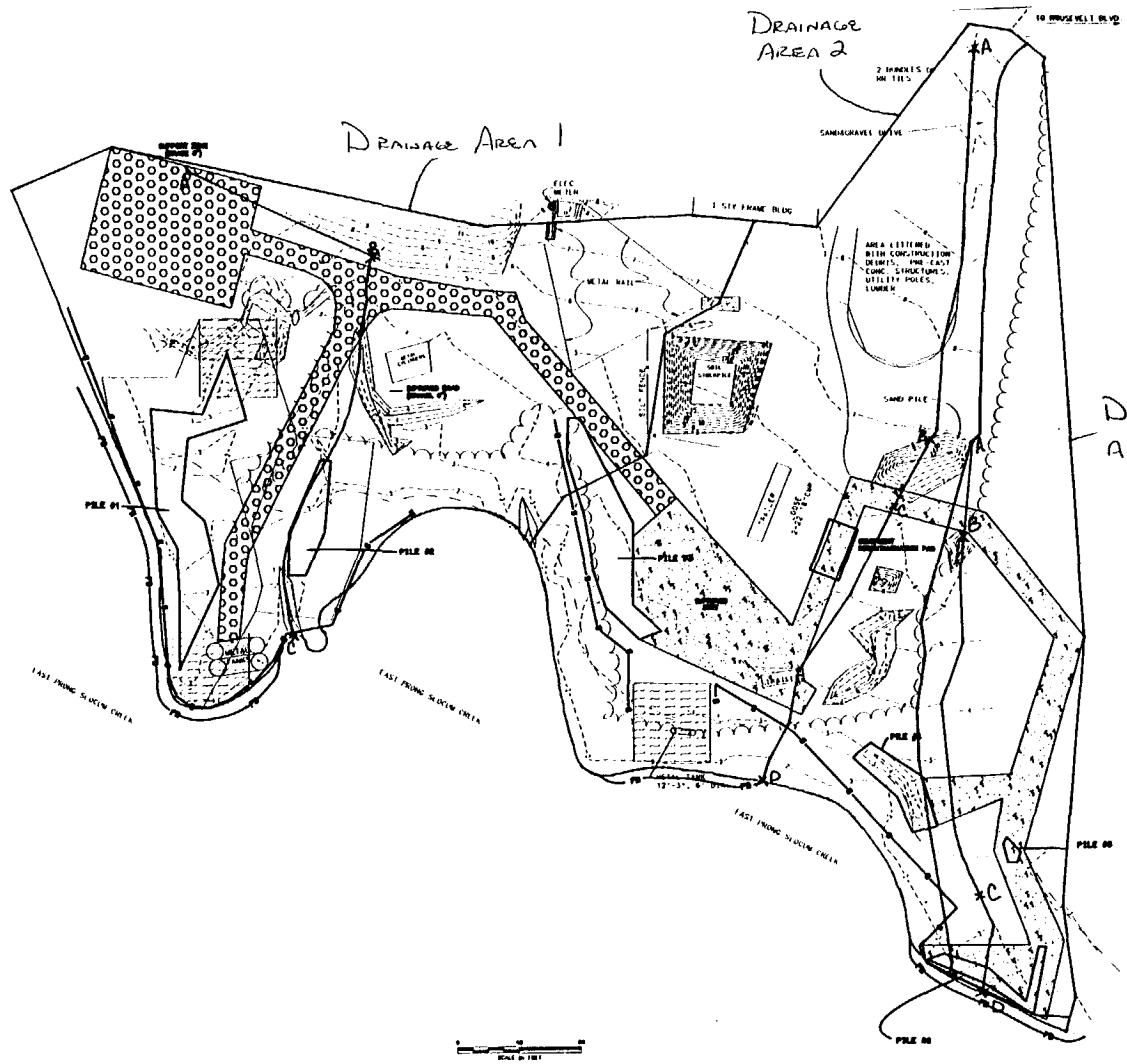
DEBRIS PILE REMEDIATION

REMEDIAL ACTION SITE PLAN

M62472-

D

C-2



ATLANTIC DIVISION

DEBRIS PILE RENEGRATION

REMEDIAL ACTION SITE PLAN

D C-2

SUBAREA 1

DURING CONSTRUCTION

Worksheet 2: Runoff curve number and runoff

Project CHERRY POINT SITE 16 By CRN Date 2/13/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present Developed (DURING) SUBAREA 1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☒%	Product of CN x area
UDORTHENTS, C	BARE SOILS	91			70	
NORFOLK, B	BARE SOILS	86			15	
MASONTOWN D	BARE SOILS	94			15	

1/ Use only one CN source per line. Totals = 100

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = ____ = ____; Use CN = ☐

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Quick TR-55 Ver.5.46 S/N:
Executed: 14:18:24 02-14-1995

This is to calculate the hydrograph for
Drainage Area 1 of Site 16 during
construction.

RUNOFF CURVE NUMBER DATA

Composite Area: Drainage Area 1

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soils - Udorthents C	1.47	91	
Bare Soils - Norfolk B	0.32	86	
Bare Soils - Masontown D	0.32	94	
COMPOSITE AREA --->	2.11	90.7	(91)

Quick TR-55 Ver.5.46 S/N:
Executed: 14:18:24 02-14-1995

This is to calculate the hydrograph for
Drainage Area 1 of Site 16 during
construction.

RUNOFF CURVE NUMBER SUMMARY

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 1	2.11	91

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project CHERRY POINT SITE 16 By CRN Date 2/14/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present Developed SUBAREA 1

Circle one: T_c T_t through subarea ____

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	AB	
1. Surface description (table 3-1)		CULTIVATED SOILS	
2. Manning's roughness coeff., n (table 3-1)		.17	
3. Flow length, L (total L ≤ 300 ft)	ft	129	
4. Two-yr 24-hr rainfall, P_2	in	4.5	
5. Land slope, s	ft/ft	.023	
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		+ =

Shallow concentrated flow	Segment ID		
7. Surface description (paved or unpaved)			
8. Flow length, L	ft		
9. Watercourse slope, s	ft/ft		
10. Average velocity, V (figure 3-1)	ft/s		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+ =

Channel flow	Segment ID	BC	
12. Cross sectional flow area, a	ft^2	2	
13. Wetted perimeter, p_w	ft	4.47	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	.45	
15. Channel slope, s	ft/ft	.024	
16. Manning's roughness coeff., n		.011	
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s		
18. Flow length, L	ft	255	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+ =
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr		

Quick TR-55 Ver.5.46 S/N:
Executed: 14:40:55 02-14-1995 CHERRY4.TCT

This is to calculate the hydrograph for Drainage Area 1 of
Site 16 during construction.

Tc COMPUTATIONS FOR: Drainage Area 1

SHEET FLOW (Applicable to Tc only)

Segment ID		AB	
Surface description		Cltvd Soils	
Manning's roughness coeff., n		0.1700	
Flow length, L (total < or = 300)	ft	129.0	
Two-yr 24-hr rainfall, P2	in	4.500	
Land slope, s	ft/ft	0.0230	
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.18	= 0.18

SHALLOW CONCENTRATED FLOW

Segment ID			
Surface (paved or unpaved)?			
Flow length, L	ft	0.0	
Watercourse slope, s	ft/ft	0.0000	
$Avg.V = Csf * (s)^{0.5}$	ft/s	0.0000	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.00	= 0.00

CHANNEL FLOW

Segment ID		BC	
Cross Sectional Flow Area, a	sq.ft	2.00	
Wetted perimeter, Pw	ft	4.47	
Hydraulic radius, r = a/Pw	ft	0.447	
Channel slope, s	ft/ft	0.0240	
Manning's roughness coeff., n		0.0110	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	%12.2757	
Flow length, L	ft	255	
T = L / (3600*V)	hrs	0.01	= 0.01

TOTAL TIME (hrs) 0.18

Quick TR-55 Ver.5.46 S/N:
Executed: 14:40:55 02-14-1995 CHERRY4.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

This is to calculate the hydrograph for Drainage Area 1 of Site 16 during construction.

Subarea descr.	Tc or Tt	Time (hrs)
Drainage Area 1	Tc	0.18

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

This is to calculate the hydrograph for Drainage Area 1
of Site 16 during construction.

CALCULATED
DISK FILE: CHERRY4 .GPD

Drainage Area	(acres)	2.11	--->	0.0033 sq.mi.
Runoff Curve Number	(CN)	91		
Time of Concentration,Tc	(hrs)	0.18		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	8		
Initial Abstraction, Ia (in)	0.198	0.198	0.198
Ia/p Ratio	0.025	0.000	0.000
Unit Discharge, * qu (csm/in)	582	0	0
Runoff, Q (in)	6.92	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	13	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	581.501	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	581.501	0.000	0.000
* qu (csm)		582	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:30:16
Watershed file: --> CHERRY4 .MOP
Hydrograph file: --> CHERRY4.HYD

This is to calculate the hydrograph for Drainage Area 1
of Site 16 during construction.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
Drainage Area 1	2.11	91.0	0.20	0.00	8.00	6.92	I.02 .10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 2.11 acres or 0.00330 sq.mi
Peak discharge = 13 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 1	0.18	0.00	0.20	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:30:16
Watershed file: --> CHERRY4 .MOP
Hydrograph file: --> CHERRY4.HYD

This is to calculate the hydrograph for Drainage Area 1
of Site 16 during construction.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 1	13	12.3
Composite Watershed	13	12.3

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:30:16
Watershed file: --> CHERRY4 .MOP
Hydrograph file: --> CHERRY4.HYD

This is to calculate the hydrograph for Drainage Area 1
of Site 16 during construction.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 1	1	1	1	3	4	6	10	13	11
Total (cfs)	1	1	1	3	4	6	10	13	11

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 1	8	6	4	3	2	2	1	1	1
Total (cfs)	8	6	4	3	2	2	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
ıage Area 1	1	1	1	1	1	1	1	0	0
Total (cfs)	1	1	1	1	1	1	1	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 1	0	0	0	0	0
Total (cfs)	0	0	0	0	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:30:16
Watershed file: --> CHERRY4 .MOP
Hydrograph file: --> CHERRY4.HYD

This is to calculate the hydrograph for Drainage Area 1
of Site 16 during construction.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	1	14.8	1
11.1	1	14.9	1
11.2	1	15.0	1
11.3	1	15.1	1
11.4	1	15.2	1
11.5	1	15.3	1
11.6	1	15.4	1
11.7	2	15.5	1
11.8	2	15.6	1
11.9	3	15.7	1
12.0	4	15.8	1
12.1	6	15.9	1
12.2	10	16.0	1
12.3	13	16.1	1
12.4	11	16.2	1
12.5	8	16.3	1
12.6	6	16.4	1
12.7	4	16.5	1
12.8	3	16.6	1
12.9	2	16.7	1
13.0	2	16.8	0
13.1	2	16.9	0
13.2	2	17.0	0
13.3	2	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:30:16
Watershed file: --> CHERRY4 .MOP
Hydrograph file: --> CHERRY4.HYD

This is to calculate the hydrograph for Drainage Area 1
of Site 16 during construction.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

SUBAREA 2

DURING CONSTRUCTION

Worksheet 2: Runoff curve number and runoff

Project CHERRY POINT SITE 16 By CLN Date 2/13/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present Developed (DURING) SUBAREA 2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☒%	Product of CN x area
UDORTHENTS, C	BARE SOILS	91			80	
NORFOLK, B	BARE SOILS	86			10	
MASONTOWN, D	BARE SOILS	94			10	
					100	

1/ Use only one CN source per line. Totals =

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = ____ = ____; Use CN = ☐

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Quick TR-55 Ver.5.46 S/N:
Executed: 14:50:25 02-14-1995

This is to calculate the hydrograph for
Drainage Area 2 for Site 16 during
construction.

RUNOFF CURVE NUMBER DATA

Composite Area: Drainage Area 2

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soils - Udorthents C	1.67	91	
Bare Soils - Norfolk B	0.21	86	
Bare Soils - Masontown D	0.20	94	
COMPOSITE AREA --->	2.08	90.8	(91)

Quick TR-55 Ver.5.46 S/N:
Executed: 14:50:25 02-14-1995

This is to calculate the hydrograph for
Drainage Area 2 for Site 16 during
construction.

RUNOFF CURVE NUMBER SUMMARY

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 2	2.08	91

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project CHERRY POINT SITE 16 By CRN Date 2/14/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present Developed (DURING) SUBAREA 2

Circle one: (T_c) T_t through subarea ____

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	AB	BC
1. Surface description (table 3-1)		SMOOTH BARE SOIL	CULTIVATED SOILS
2. Manning's roughness coeff., n (table 3-1)		.011	.17
3. Flow length, L (total L ≤ 300 ft)	ft	250	50
4. Two-yr 24-hr rainfall, P_2	in	4.5	4.5
5. Land slope, s	ft/ft	.024	.018
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	____ + ____	+ ____ = ____

Shallow concentrated flow	Segment ID	CD	
7. Surface description (paved or unpaved)		UNPAVED	
8. Flow length, L	ft	197	
9. Watercourse slope, s	ft/ft	.031	
10. Average velocity, V (figure 3-1)	ft/s		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	____ + ____	= ____

Channel flow	Segment ID		
12. Cross sectional flow area, a	ft^2		
13. Wetted perimeter, p_w	ft		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		
15. Channel slope, s	ft/ft		
16. Manning's roughness coeff., n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s		
18. Flow length, L	ft		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	____ + ____	= ____
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr		____

Quick TR-55 Ver.5.46 S/N:
Executed: 14:57:20 02-14-1995 CHERRY5.TCT

This is to calculate the hydrograph of Drainage Area 2
of Site 16 during construction.

Tc COMPUTATIONS FOR: Drainage Area 2

SHEET FLOW (Applicable to Tc only)

Segment ID			AB		BC	
Surface description			Bare Soils		Cltvd Soils	
Manning's roughness coeff., n			0.0110		0.1700	
Flow length, L (total < or = 300)		ft	250.0		50.0	
Two-yr 24-hr rainfall, P2		in	4.500		4.500	
Land slope, s		ft/ft	0.0240		0.0180	
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$		hrs	0.03	+ 0.09		= 0.12

SHALLOW CONCENTRATED FLOW

Segment ID			CD	
Surface (paved or unpaved)?			Unpaved	
Flow length, L		ft	197.0	
Watercourse slope, s		ft/ft	0.0310	
$Avg.V = Csf * (s)^{0.5}$		ft/s	2.8408	
where:	Unpaved Csf = 16.1345			
	Paved Csf = 20.3282			
T = L / (3600*V)		hrs	0.02	= 0.02

CHANNEL FLOW

Segment ID				
Cross Sectional Flow Area, a		sq.ft	0.00	
Wetted perimeter, Pw		ft	0.00	
Hydraulic radius, r = a/Pw		ft	0.000	
Channel slope, s		ft/ft	0.0000	
Manning's roughness coeff., n			0.0000	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$		ft/s	0.0000	
Flow length, L		ft	0	
T = L / (3600*V)		hrs	0.00	= 0.00

TOTAL TIME (hrs) 0.14

Quick TR-55 Ver.5.46 S/N:
Executed: 14:57:20 02-14-1995 CHERRY5.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

This is to calculate the hydrograph of Drainage Area 2
of Site 16 during construction.

Subarea descr.	Tc or Tt	Time (hrs)
Drainage Area 2	Tc	0.14

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

This is to calculate the hydrograph for Drainage Area 2
for Site 16 during construction.

CALCULATED
DISK FILE: CHERRY5 .GPD

Drainage Area	(acres)	2.08	--->	0.0033 sq.mi.
Runoff Curve Number	(CN)	91		
Time of Concentration,Tc	(hrs)	0.14		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	8		
Initial Abstraction, Ia (in)	0.198	0.198	0.198
Ia/p Ratio	0.025	0.000	0.000
Unit Discharge, * qu (csm/in)	618	0	0
Runoff, Q (in)	6.92	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	14	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	618.492	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	618.492	0.000	0.000
* qu (csm)		618	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:03
Watershed file: --> CHERRY5 .MOP
Hydrograph file: --> CHERRY5.HYD

This is to calculate the hydrograph of Drainage Area 2
of Site 16 during construction.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
Drainage Area 2	2.08	91.0	0.10	0.00	8.00	6.92	1.02	.10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 2.08 acres or 0.00325 sq.mi
Peak discharge = 15 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 2	0.14	0.00	0.10	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:03
Watershed file: --> CHERRY5 .MOP
Hydrograph file: --> CHERRY5.HYD

This is to calculate the hydrograph of Drainage Area 2
of Site 16 during construction.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 2	15	12.2
Composite Watershed	15	12.2

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:03
Watershed file: --> CHERRY5 .MOP
Hydrograph file: --> CHERRY5.HYD

This is to calculate the hydrograph of Drainage Area 2
of Site 16 during construction.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 2	1	1	1	4	5	10	15	12	8
Total (cfs)	1	1	1	4	5	10	15	12	8

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 2	6	4	3	2	2	2	1	1	1
Total (cfs)	6	4	3	2	2	2	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
Drainage Area 2	1	1	1	1	1	1	1	0	0
Total (cfs)	1	1	1	1	1	1	1	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:03
Watershed file: --> CHERRY5 .MOP
Hydrograph file: --> CHERRY5.HYD

This is to calculate the hydrograph of Drainage Area 2
of Site 16 during construction.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	1	14.8	1
11.1	1	14.9	1
11.2	1	15.0	1
11.3	1	15.1	1
11.4	1	15.2	1
11.5	1	15.3	1
11.6	1	15.4	1
11.7	2	15.5	1
11.8	3	15.6	1
11.9	4	15.7	1
12.0	5	15.8	1
12.1	10	15.9	1
12.2	15	16.0	1
12.3	12	16.1	1
12.4	8	16.2	1
12.5	6	16.3	1
12.6	4	16.4	1
12.7	3	16.5	1
12.8	2	16.6	1
12.9	2	16.7	1
13.0	2	16.8	0
13.1	2	16.9	0
13.2	2	17.0	0
13.3	2	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:03
Watershed file: --> CHERRY5 .WOP
Hydrograph file: --> CHERRY5.HYD

This is to calculate the hydrograph of Drainage Area 2
of Site 16 during construction.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

SUBAREA 3

DURING CONSTRUCTION

Worksheet 2: Runoff curve number and runoff

Project CHERRY POINT SITE 16 By CLN Date 2/13/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present Developed (DURING) SUBAREA 3

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☐%	Product of CN x area
UDORTHENTS, C	BRUSH, POOR CONDITION	77			10	
UDORTHENTS, C	WOODS, FAIR CONDITION	73			60	
NORFOLK, B	WOODS, FAIR CONDITION	60			5	
MASONTOWN, D	WOODS, FAIR CONDITION	79			5	
UDORTHENTS, C	BARE SOILS	91			10	
NORFOLK, B	BARE SOILS	86			5	
MASONTOWN, D	BARE SOILS	94			5	
				Totals =	100	

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = ____ = ____; Use CN = ☐

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Quick TR-55 Ver.5.46 S/N:
Executed: 15:20:10 02-14-1995

This is to calculate the hydrograph
for Drainage Area 3 of Site 16 during
construction.

RUNOFF CURVE NUMBER DATA

Composite Area: Drainage Area 3

SURFACE DESCRIPTION	AREA (acres)	CN	
Brush, poor - Udorthents C	0.09	77	
Woods, fair - Udorthents C	0.53	73	
Bare Soils - Udorthents C	0.09	91	
Woods, fair - Norfolk B	0.04	60	
Bare Soils - Norfolk B	0.05	86	
Woods, fair - Masontown D	0.04	79	
Bare Soils - Masontown D	0.05	94	
COMPOSITE AREA --->	0.89	76.8	(77)

Quick TR-55 Ver.5.46 S/N:
Executed: 15:20:10 02-14-1995

This is to calculate the hydrograph
for Drainage Area 3 of Site 16 during
construction.

RUNOFF CURVE NUMBER SUMMARY

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 3	0.89	77

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project CHERRY POINT SITE 16 By CRH Date 2/14/95

Location MCAS CHERRY POINT Checked ____ Date ____

Circle one: Present Developed SUBAREA 3

Circle one: T_c T_t through subarea ____

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	AB	BC
1. Surface description (table 3-1)		DENSE GRASS	DENSE UNDERBRUSH
2. Manning's roughness coeff., n (table 3-1)		.24	.80
3. Flow length, L (total L ≤ 300 ft) ft		60	163
4. Two-yr 24-hr rainfall, P_2 in		4.5	4.5
5. Land slope, s ft/ft		.012	.020
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr			+ =

Shallow concentrated flow	Segment ID	CD	DE
7. Surface description (paved or unpaved)		UNPAVED	UNPAVED
8. Flow length, L ft		77	55
9. Watercourse slope, s ft/ft		.007	.044
10. Average velocity, V (figure 3-1) ft/s			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr			+ =

Channel flow	Segment ID		
12. Cross sectional flow area, a ft^2			
13. Wetted perimeter, p_w ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft			
15. Channel slope, s ft/ft			
16. Manning's roughness coeff., n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s			
18. Flow length, L ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr			+ =

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) hr ____

Quick TR-55 Ver.5.46 S/N:
Executed: 15:38:19 02-14-1995 CHERRY6.TCT

This is to calculate the hydrograph for Drainage Area 3
of Site 16 during construction.

Tc COMPUTATIONS FOR: Drainage Area 3

SHEET FLOW (Applicable to Tc only)

		AB	BC
Segment ID			
Surface description		Dense Grass	Dense Brush
Manning's roughness coeff., n		0.2400	0.8000
Flow length, L (total < or = 300)	ft	60.0	163.0
Two-yr 24-hr rainfall, P2	in	4.500	4.500
Land slope, s	ft/ft	0.0120	0.0200

$$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$$

hrs 0.16 + 0.78 = 0.94

SHALLOW CONCENTRATED FLOW

		CD	DE
Segment ID			
Surface (paved or unpaved)?		Unpaved	Unpaved
Flow length, L	ft	77.0	55.0
Watercourse slope, s	ft/ft	0.0070	0.0440

$$Avg.V = Csf * (s)^{0.5}$$

where: Unpaved Csf = 16.1345
Paved Csf = 20.3282

Avg.V	ft/s	1.3499	3.3844			
T = L / (3600*V)	hrs	0.02	+	0.00	=	0.02

CHANNEL FLOW

Segment ID		
Cross Sectional Flow Area, a	sq.ft	0.00
Wetted perimeter, Pw	ft	0.00
Hydraulic radius, r = a/Pw	ft	0.000
Channel slope, s	ft/ft	0.0000
Manning's roughness coeff., n		0.0000

$$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$$

ft/s 0.0000

Flow length, L ft 0

T = L / (3600*V) hrs 0.00 = 0.00

::

TOTAL TIME (hrs) 0.96

Quick TR-55 Ver.5.46 S/N:
Executed: 15:38:19 02-14-1995 CHERRY6.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

This is to calculate the hydrograph for Drainage Area 3
of Site 16 during construction.

Subarea descr.	Tc or Tt	Time (hrs)
Drainage Area 3	Tc	0.96

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

This is to calculate the hydrograph for Drainage Area 3
of Site 16 during construction.

CALCULATED
DISK FILE: CHERRY6 .GPD

Drainage Area	(acres)	.89	--->	0.0014 sq.mi.
Runoff Curve Number	(CN)	77		
Time of Concentration,Tc	(hrs)	.96		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	8		
Initial Abstraction, Ia (in)	0.597	0.597	0.597
Ia/p Ratio	0.075	0.000	0.000
Unit Discharge, * qu (csm/in)	304	0	0
Runoff, Q (in)	5.27	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	2	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	303.605	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	303.605	0.000	0.000
* qu (csm)		304	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:43
Watershed file: --> CHERRY6 .MOP
Hydrograph file: --> CHERRY6.HYD

This is to calculate the hydrograph for Drainage Area 3
for Site 16 during construction.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
Drainage Area 3	0.89	77.0	1.00	0.00	8.00	5.27	1.07 .10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 0.89 acres or 0.00139 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 3	0.96	0.00	1.00	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:43
Watershed file: --> CHERRY6 .WOP
Hydrograph file: --> CHERRY6.HYD

This is to calculate the hydrograph for Drainage Area 3
for Site 16 during construction.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 3	2	12.7
Composite Watershed	2	12.7

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:43
Watershed file: --> CHERRY6 .WOP
Hydrograph file: --> CHERRY6.HYD

This is to calculate the hydrograph for Drainage Area 3
for Site 16 during construction.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 3	0	0	0	0	0	0	0	1	1
Total (cfs)	0	0	0	0	0	0	0	1	1

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 3	1	1	2	2	2	2	2	1	1
Total (cfs)	1	1	2	2	2	2	2	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
nage Area 3	1	1	0	0	0	0	0	0	0
Total (cfs)	1	1	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 3	0	0	0	0	0
Total (cfs)	0	0	0	0	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:43
Watershed file: --> CHERRY6 .WOP
Hydrograph file: --> CHERRY6.HYD

This is to calculate the hydrograph for Drainage Area 3
for Site 16 during construction.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	0	16.0	0
12.3	1	16.1	0
12.4	1	16.2	0
12.5	1	16.3	0
12.6	1	16.4	0
12.7	2	16.5	0
12.8	2	16.6	0
12.9	2	16.7	0
13.0	2	16.8	0
13.1	2	16.9	0
13.2	2	17.0	0
13.3	2	17.1	0
13.4	2	17.2	0
13.5	2	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-14-1995 16:31:43
Watershed file: --> CHERRY6 .WOP
Hydrograph file: --> CHERRY6.HYD

This is to calculate the hydrograph for Drainage Area 3
for Site 16 during construction.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

SUBAREA 1

POST CONSTRUCTION

Worksheet 2: Runoff curve number and runoff

Project CHERRY POINT SITE 16 By CRN Date 2/13/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present Developed SUBAREA 1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☒%	Product of CN x area
UDORTHENTS, C	BRUSH, POOR CONDITION	77			60	
UDORTHENTS, C	WOODS, FAIR CONDITION	73			10	
NORFOLK, B	BRUSH, POOR CONDITION	67			5	
NORFOLK, B	WOODS, FAIR CONDITION	60			10	
MASONTOWN, D	BRUSH, POOR CONDITION	83			5	
MASONTOWN, D	WOODS, FAIR CONDITION	79			10	
1/ Use only one CN source per line.		Totals =			100	

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = ____ = ____; Use CN = ☐

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Quick TR-55 Ver.5.46 S/N:
Executed: 15:42:38 02-13-1995

This is to calculate the hydrograph for
Drainage Area I of the debris piles.

RUNOFF CURVE NUMBER DATA

Composite Area: Drainage Area 1

SURFACE DESCRIPTION	AREA (acres)	CN	
Brush, Poor - Udorthents C	1.26	77	
Woods,Fair - Udorthents C	0.21	73	
Brush, Poor - Norfolk B	0.11	67	
Woods, Fair - Norfolk B	0.21	60	
Brush, Poor - Masontown D	0.11	83	
Woods, Fair - Masontown D	0.21	79	
COMPOSITE AREA --->	2.11	74.9	(75)

Quick TR-55 Ver.5.46 S/N:
Executed: 15:42:38 02-13-1995

This is to calculate the hydrograph for
Drainage Area I of the debris piles.

RUNOFF CURVE NUMBER SUMMARY

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 1	2.11	75

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project CHERRY POINT SITE 16 By CRN Date 2/14/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present (Developed) SUBAREA 1

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB	
1. Surface description (table 3-1)			DENSE GRASS	
2. Manning's roughness coeff., n (table 3-1)			.24	
3. Flow length, L (total L ≤ 300 ft)	ft		129	
4. Two-yr 24-hr rainfall, P_2	in		4.5	
5. Land slope, s	ft/ft		.023	
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$	Compute T_t	hr		+ ____ = ____
Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)				
8. Flow length, L	ft			
9. Watercourse slope, s	ft/ft			
10. Average velocity, V (figure 3-1)	ft/s			
11. $T_t = \frac{L}{3600\ V}$	Compute T_t	hr		+ ____ = ____
Channel flow		Segment ID	BC	
12. Cross sectional flow area, a	ft^2		2	
13. Wetted perimeter, p_w	ft		4.47	
14. Hydraulic radius, $r = \frac{a}{p_w}$	Compute r	ft	.45	
15. Channel slope, s	ft/ft		.024	
16. Manning's roughness coeff., n			.24	
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$	Compute V	ft/s		
18. Flow length, L	ft		255	
19. $T_t = \frac{L}{3600\ V}$	Compute T_t	hr		+ ____ = ____
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)		hr		

Quick TR-55 Ver.5.46 S/N:
Executed: 10:13:52 02-14-1995 CHERRY1.TCT

This is calculate the hydrograph for Drainage Area 1 of Site 16

Tc COMPUTATIONS FOR: Drainage Area 1

SHEET FLOW (Applicable to Tc only)

Segment ID		AB		
Surface description		Dense Grass		
Manning's roughness coeff., n		0.2400		
Flow length, L (total < or = 300)	ft	129.0		
Two-yr 24-hr rainfall, P2	in	4.500		
Land slope, s	ft/ft	0.2300		
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.09	=	0.09

SHALLOW CONCENTRATED FLOW

Segment ID				
Surface (paved or unpaved)?				
Flow length, L	ft	0.0		
Watercourse slope, s	ft/ft	0.0000		
$Avg.V = Csf * (s)^{0.5}$	ft/s	0.0000		
where: Unpaved Csf = 16.1345				
Paved Csf = 20.3282				
T = L / (3600*V)	hrs	0.00	=	0.00

CHANNEL FLOW

Segment ID		BC		
Cross Sectional Flow Area, a	sq.ft	2.00		
Wetted perimeter, Pw	ft	4.47		
Hydraulic radius, r = a/Pw	ft	0.447		
Channel slope, s	ft/ft	0.0240		
Manning's roughness coeff., n		0.2400		
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	0.5626		
Flow length, L	ft	255		
T = L / (3600*V)	hrs	0.13	=	0.13

TOTAL TIME (hrs) 0.22

Quick TR-55 Ver.5.46 S/N:
Executed: 10:13:52 02-14-1995 CHERRY1.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

This is calculate the hydrograph for Drainage Area 1 of Site 16

Subarea descr.	Tc or Tt	Time (hrs)
Drainage Area 1	Tc	0.22

Worksheet 4: Graphical Peak Discharge method

Project CHERRY POINT SITE 16 By CRH Date 2/14/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present (Developed) SUBAREA 1

1. Data:

Drainage area ..... A_m = 3.29 x 10^{-3} mi^2 (acres/640)

Runoff curve number .... CN = 75 (From worksheet 2)

Time of concentration .. T_c = ____ hr (From worksheet 3)

Rainfall distribution type = III (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = ____ percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr			
3. Rainfall, P (24-hour)	in			
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in			
5. Compute I_a/P				
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in			
7. Runoff, Q ..... (From worksheet 2).	in			
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)				
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs			

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

This is to calculate the hydrograph for Drainage Area 1 of Site 16.

CALCULATED
DISK FILE: CHERRY1 .GPD

Drainage Area	(acres)	2.11	--->	0.0033 sq.mi.
Runoff Curve Number	(CN)	75		
Time of Concentration,Tc	(hrs)	0.22		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	8		
Initial Abstraction, Ia (in)	0.667	0.667	0.667
Ia/p Ratio	0.083	0.000	0.000
Unit Discharge, * qu (csm/in)	550	0	0
Runoff, Q (in)	5.04	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	9	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	549.848	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	549.848	0.000	0.000
* qu (csm)		550	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:25:46
Watershed file: --> CHERRY1 .MOP
Hydrograph file: --> CHERRY1.HYD

This is to calculate the hydrograph for Drainage Area 1 of Site 16.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
Drainage Area 1	2.11	75.0	0.20	0.00	8.00	5.04	I.08	.10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 2.11 acres or 0.00330 sq.mi
Peak discharge = 9 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 1	0.22	0.00	0.20	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:25:46
Watershed file: --> CHERRY1 .MOP
Hydrograph file: --> CHERRY1.HYD

This is to calculate the hydrograph for Drainage Area 1 of Site 16.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 1	9	12.3
Composite Watershed	9	12.3

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:25:46
Watershed file: --> CHERRY1 .MOP
Hydrograph file: --> CHERRY1.HYD

This is to calculate the hydrograph for Drainage Area 1 of Site 16.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 1	0	1	1	2	3	4	7	9	8
Total (cfs)	0	1	1	2	3	4	7	9	8

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 1	6	4	3	2	2	1	1	1	1
Total (cfs)	6	4	3	2	2	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
ge Area 1	1	1	1	1	1	0	0	0	0
Tot (cfs)	1	1	1	1	1	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 1	0	0	0	0	0
Total (cfs)	0	0	0	0	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:25:46
Watershed file: --> CHERRY1 .MOP
Hydrograph file: --> CHERRY1.HYD

This is to calculate the hydrograph for Drainage Area 1 of Site 16.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	1	15.0	1
11.3	1	15.1	1
11.4	1	15.2	1
11.5	1	15.3	1
11.6	1	15.4	1
11.7	1	15.5	1
11.8	2	15.6	1
11.9	2	15.7	1
12.0	3	15.8	0
12.1	4	15.9	0
12.2	7	16.0	0
12.3	9	16.1	0
12.4	8	16.2	0
12.5	6	16.3	0
12.6	4	16.4	0
12.7	3	16.5	0
12.8	2	16.6	0
12.9	2	16.7	0
13.0	2	16.8	0
13.1	2	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:25:46
Watershed file: --> CHERRY1 .WOP
Hydrograph file: --> CHERRY1.HYD

This is to calculate the hydrograph for Drainage Area 1 of Site 16.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

SUBAREA 2

POST CONSTRUCTION

Worksheet 2: Runoff curve number and runoff

Project CHERRY POINT SITE 16 By CLP Date 2/13/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present (Developed) SUBAREA 2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐acres ☐mi² ☒%	Product of CN x area
UDORTHENTS, C	BRUSH, POOR CONDITION	77			80	
NORFOLK, B	BRUSH, POOR CONDITIONS	67			5	
MASONTOWN, D	WOODS, FAIR CONDITION	79			10	
NORFOLK, B	WOODS, FAIR CONDITION	60			5	
				Totals =	100	

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = ____ = ____; Use CN = ____

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Quick TR-55 Ver.5.46 S/N:
Executed: 15:48:35 02-13-1995

This is to calculate the hydrograph
for Drainage Area 2 of Site 16 of the
Debris Piles.

RUNOFF CURVE NUMBER DATA

Composite Area: Drainage Area 2

SURFACE DESCRIPTION	AREA (acres)	CN	
Brush, Poor - Udorthents C	1.67	77	
Brush, Poor - Norfolk, B	0.10	67	
Woods, Fair - Masontown D	0.21	79	
Woods, Fair - Norfolk B	0.10	60	
COMPOSITE AREA --->	2.08	75.9	(76)

Quick TR-55 Ver.5.46 S/N:
Executed: 15:48:35 02-13-1995

This is to calculate the hydrograph
for Drainage Area 2 of Site 16 of the
Debris Piles.

RUNOFF CURVE NUMBER SUMMARY

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 2	2.08	76

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project CHERRY POINT SITE 16 By CRN Date 2/14/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present Developed SUBAREA 2

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	AB	BC	
1. Surface description (table 3-1)		SMOOTH BARE SOIL	DENSE GRASS	
2. Manning's roughness coeff., n (table 3-1)		.011	.24	
3. Flow length, L (total L ≤ 300 ft)	ft	250	50	
4. Two-yr 24-hr rainfall, P_2	in	4.5	4.5	
5. Land slope, s	ft/ft	.024	.018	
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		+	+ =

Shallow concentrated flow	Segment ID	CD		
7. Surface description (paved or unpaved)		UNPAVED		
8. Flow length, L	ft	197		
9. Watercourse slope, s	ft/ft	.031		
10. Average velocity, V (figure 3-1)	ft/s			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	-

Channel flow	Segment ID			
12. Cross sectional flow area, a	ft^2			
13. Wetted perimeter, P_w	ft			
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+	-
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			

Quick TR-55 Ver.5.46 S/N:
Executed: 10:24:07 02-14-1995 CHERRY2.TCT

This is to calculate the hydrograph for the Drainage Area 2
of Site 16.

Tc COMPUTATIONS FOR: Drainage Area 2

SHEET FLOW (Applicable to Tc only)

		AB	BC		
Segment ID					
Surface description		Bare Soil	Dense Grass		
Manning's roughness coeff., n		0.0110	0.2400		
Flow length, L (total < or = 300)	ft	250.0	50.0		
Two-yr 24-hr rainfall, P2	in	4.500	4.500		
Land slope, s	ft/ft	0.0240	0.0180		
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.03	+ 0.12	=	0.15

SHALLOW CONCENTRATED FLOW

		CD		
Segment ID				
Surface (paved or unpaved)?		Unpaved		
Flow length, L	ft	197.0		
Watercourse slope, s	ft/ft	0.0310		
$Avg.V = Csf * (s)^{0.5}$	ft/s	2.8408		
where: Unpaved Csf = 16.1345				
Paved Csf = 20.3282				
T = L / (3600*V)	hrs	0.02	=	0.02

CHANNEL FLOW

Segment ID				
Cross Sectional Flow Area, a	sq.ft	0.00		
Wetted perimeter, Pw	ft	0.00		
Hydraulic radius, r = a/Pw	ft	0.000		
Channel slope, s	ft/ft	0.0000		
Manning's roughness coeff., n		0.0000		
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	0.0000		
Flow length, L	ft	0		
T = L / (3600*V)	hrs	0.00	=	0.00

::

TOTAL TIME (hrs) 0.17

Quick TR-55 Ver.5.46 S/N:
Executed: 10:24:07 02-14-1995 CHERRY2.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

This is to calculate the hydrograph for the Drainage Area 2
of Site 16.

Subarea descr.	Tc or Tt	Time (hrs)
Drainage Area 2	Tc	0.17

Worksheet 4: Graphical Peak Discharge method

Project Cherry Point Site 16 By CZN Date 2/14/95

Location MCAS Cherry Point, NC Checked ____ Date ____

Circle one: Present Developed Subarea 2

1. Data:

Drainage area ..... A_m = 3.25×10^{-3} mi^2 (acres/640)

Runoff curve number .... CN = 76 (From worksheet 2)

Time of concentration .. T_c = ____ hr (From worksheet 3)

Rainfall distribution type = III (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = ____ percent of A_m (____ acres or mi^2 covered)

			Storm #1	Storm #2	Storm #3
2.	Frequency	yr			
3.	Rainfall, P (24-hour)	in			
4.	Initial abstraction, I_a ..... (Use CN with table 4-1.)	in			
5.	Compute I_a/P				
6.	Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in			
7.	Runoff, Q ..... (From worksheet 2).	in			
8.	Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)				
9.	Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs			

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

This is to calculate the hydrograph for Drainage Area 2 of Site 16.

CALCULATED
DISK FILE: CHERRY2 .GPD

Drainage Area	(acres)	2.08	--->	0.0033 sq.mi.
Runoff Curve Number	(CN)	76		
Time of Concentration,Tc	(hrs)	0.17		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	8		
Initial Abstraction, Ia (in)	0.632	0.632	0.632
Ia/p Ratio	0.079	0.000	0.000
Unit Discharge, * qu (csm/in)	590	0	0
Runoff, Q (in)	5.16	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	10	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	590.201	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	590.201	0.000	0.000
* qu (csm)		590	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:26:18
Watershed file: --> CHERRY2 .WOP
Hydrograph file: --> CHERRY2.HYD

This is to calculate the hydrograph for Drainage Area 2 of Site 16.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
Drainage Area 2	2.08	76.0	0.20	0.00	8.00	5.16	I.08	.10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 2.08 acres or 0.00325 sq.mi
Peak discharge = 9 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 2	0.17	0.00	0.20	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:26:18
Watershed file: --> CHERRY2 .MOP
Hydrograph file: --> CHERRY2.HYD

This is to calculate the hydrograph for Drainage Area 2 of Site 16.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 2	9	12.3
Composite Watershed	9	12.3

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:26:18
Watershed file: --> CHERRY2 .MOP
Hydrograph file: --> CHERRY2.HYD

This is to calculate the hydrograph for Drainage Area 2 of Site 16.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 2	0	1	1	2	3	4	8	9	8
Total (cfs)	0	1	1	2	3	4	8	9	8

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 2	6	5	3	2	2	1	1	1	1
Total (cfs)	6	5	3	2	2	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
ge Area 2	1	1	1	1	1	0	0	0	0
(cfs)	1	1	1	1	1	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:26:18
Watershed file: --> CHERRY2 .MOP
Hydrograph file: --> CHERRY2.HYD

This is to calculate the hydrograph for Drainage Area 2 of Site 16.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	1	15.0	1
11.3	1	15.1	1
11.4	1	15.2	1
11.5	1	15.3	1
11.6	1	15.4	1
11.7	1	15.5	1
11.8	2	15.6	1
11.9	2	15.7	1
12.0	3	15.8	0
12.1	4	15.9	0
12.2	8	16.0	0
12.3	9	16.1	0
12.4	8	16.2	0
12.5	6	16.3	0
12.6	5	16.4	0
12.7	3	16.5	0
12.8	2	16.6	0
12.9	2	16.7	0
13.0	2	16.8	0
13.1	2	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:26:18
Watershed file: --> CHERRY2 .MOP
Hydrograph file: --> CHERRY2.HYD

This is to calculate the hydrograph for Drainage Area 2 of Site 16.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

SUBAREA 3

POST CONSTRUCTION

Worksheet 2: Runoff curve number and runoff

Project CHERRY POINT SITE 16 By CLN Date 2/13/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present / Developed SUBAREA 3

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☐ %	Product of CN x area
UDORTHENTS, C	BRUSH, POOR CONDITION	77			10	
UDORTHENTS, C	WOODS, FAIR CONDITION	73			70	
NORFOLK, B	WOODS, FAIR CONDITION	60			10	
MAYODAN, D	WOODS, FAIR CONDITION	79			10	
					Totals = 100	

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = ____ = ____; Use CN = ☐

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr			
Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

Quick TR-55 Ver.5.46 S/N:
Executed: 15:56:49 02-13-1995

This is to calculate the hydrograph
for the Drainage Area 3 of Site 16 of the
Debris Piles.

RUNOFF CURVE NUMBER DATA

Composite Area: Drainage Area 3

SURFACE DESCRIPTION	AREA (acres)	CN	
Brush, Poor - Udorthents C	0.09	77	
Woods, Fair - Udorthents C	0.61	73	
Woods, Fair - Norfolk B	0.10	60	
Woods, Fair - Masontown D	0.09	79	
COMPOSITE AREA --->	0.89	72.6	(73)

Quick TR-55 Ver.5.46 S/N:
Executed: 15:56:49 02-13-1995

This is to calculate the hydrograph
for the Drainage Area 3 of Site 16 of the
Debris Piles.

RUNOFF CURVE NUMBER SUMMARY

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 3	0.89	73

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project CHERRY POINT SITE 16 By C2H Date 2/14/95

Location MCAS CHERRY POINT Checked ____ Date ____

Circle one: Present / Developed — SUBAREA 3

Circle one: T_c / T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	AB	BC
1. Surface description (table 3-1)		DENSE GRASS	DENSE BRUSH
2. Manning's roughness coeff., n (table 3-1)		.24	.80
3. Flow length, L (total L ≤ 300 ft)	ft	60	240
4. Two-yr 24-hr rainfall, P_2	in	4.5	4.5
5. Land slope, s	ft/ft	.012	.016
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	[ ] + [ ]	= [ ]

Shallow concentrated flow	Segment ID	CD	
7. Surface description (paved or unpaved)		UNPAVED	
8. Flow length, L	ft	55	
9. Watercourse slope, s	ft/ft	.044	
10. Average velocity, V (figure 3-1)	ft/s		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	[ ] + [ ]	= [ ]

Channel flow	Segment ID		
12. Cross sectional flow area, a	ft^2		
13. Wetted perimeter, p_w	ft		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		
15. Channel slope, s	ft/ft		
16. Manning's roughness coeff., n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s		
18. Flow length, L	ft		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	[ ] + [ ]	= [ ]
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr		[ ]

Quick TR-55 Ver.5.46 S/N:
Executed: 10:30:31 02-14-1995 CHERRY3.TCT

This is to calculate the hydrograph for Drainage Area 3 of Site 1.

Tc COMPUTATIONS FOR: Drainage Area 3

SHEET FLOW (Applicable to Tc only)

		AB	BC			
Segment ID						
Surface description		Dense Grass	Dense Brush			
Manning's roughness coeff., n		0.2400	0.8000			
Flow length, L (total < or = 300)	ft	60.0	240.0			
Two-yr 24-hr rainfall, P2	in	4.500	4.500			
Land slope, s	ft/ft	0.0120	0.0160			
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.16	1.16	+	=	1.32

SHALLOW CONCENTRATED FLOW

		CD		
Segment ID				
Surface (paved or unpaved)?		Unpaved		
Flow length, L	ft	55.0		
Watercourse slope, s	ft/ft	0.0440		
$Avg.V = Csf * (s)^{0.5}$	ft/s	3.3844		
where: Unpaved Csf = 16.1345				
Paved Csf = 20.3282				
T = L / (3600*V)	hrs	0.00	=	0.00

CHANNEL FLOW

Segment ID				
Cross Sectional Flow Area, a	sq.ft	0.00		
Wetted perimeter, Pw	ft	0.00		
Hydraulic radius, r = a/Pw	ft	0.000		
Channel slope, s	ft/ft	0.0000		
Manning's roughness coeff., n		0.0000		
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	0.0000		
Flow length, L	ft	0		
T = L / (3600*V)	hrs	0.00	=	0.00

::

TOTAL TIME (hrs) 1.33

Quick TR-55 Ver.5.46 S/N:
Executed: 10:30:31 02-14-1995 CHERRY3.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

This is to calculate the hydrograph for Drainage Area 3 of Site 1.

Subarea descr.	Tc or Tt	Time (hrs)
Drainage Area 3	Tc	1.33

Worksheet 4: Graphical Peak Discharge method

Project CHERRY POINT SITE 16 By CRN Date 2/14/95

Location MCAS CHERRY POINT, NC Checked ____ Date ____

Circle one: Present Developed SUBAREA 3

1. Data:

Drainage area ..... A_m = 1.39 x 10^{-3} mi^2 (acres/640)

Runoff curve number .... CN = 73 (From worksheet 2)

Time of concentration .. T_c = ____ hr (From worksheet 3)

Rainfall distribution type = III (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = ____ percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr			
3. Rainfall, P (24-hour)	in			
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in			
5. Compute I_a/P				
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in			
7. Runoff, Q ..... (From worksheet 2).	in			
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)				
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs			

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

This is to calculate the hydrograph for Drainage Area 3 of Site 16.

CALCULATED
DISK FILE: CHERRY3 .GPD

Drainage Area	(acres)	0.89	--->	0.0014 sq.mi.
Runoff Curve Number	(CN)	73		
Time of Concentration,Tc	(hrs)	1.33		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	8		
Initial Abstraction, Ia (in)	0.740	0.740	0.740
Ia/p Ratio	0.092	0.000	0.000
Unit Discharge, * qu (csm/in)	255	0	0
Runoff, Q (in)	4.81	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	2	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	254.880	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	254.880	0.000	0.000
* qu (csm)		255	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:27:12
Watershed file: --> CHERRY3 .MOP
Hydrograph file: --> CHERRY3.HYD

This is to calculate the hydrograph for Drainage Area 3 of Site 16.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
Drainage Area 3	0.89	73.0	1.25	0.00	8.00	4.81	1.09 .10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 0.89 acres or 0.00139 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 3	1.33	0.00	1.25	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:27:12
Watershed file: --> CHERRY3 .MOP
Hydrograph file: --> CHERRY3.HYD

This is to calculate the hydrograph for Drainage Area 3 of Site 16.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 3	2	13.0
Composite Watershed	2	13.0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:27:12
Watershed file: --> CHERRY3 .MOP
Hydrograph file: --> CHERRY3.HYD

This is to calculate the hydrograph for Drainage Area 3 of Site 16.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 3	0	0	0	0	0	0	0	0	1
Total (cfs)	0	0	0	0	0	0	0	0	1

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 3	1	1	1	1	2	2	2	1	1
Total (cfs)	1	1	1	1	2	2	2	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
ıge Area 3	1	1	1	0	0	0	0	0	0
Total (cfs)	1	1	1	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 3	0	0	0	0	0
Total (cfs)	0	0	0	0	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:27:12
Watershed file: --> CHERRY3 .WOP
Hydrograph file: --> CHERRY3.HYD

This is to calculate the hydrograph for Drainage Area 3 of Site 16.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	0	16.0	0
12.3	0	16.1	0
12.4	1	16.2	0
12.5	1	16.3	0
12.6	1	16.4	0
12.7	1	16.5	0
12.8	1	16.6	0
12.9	2	16.7	0
13.0	2	16.8	0
13.1	2	16.9	0
13.2	2	17.0	0
13.3	2	17.1	0
13.4	2	17.2	0
13.5	2	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

Return Frequency: 25 years

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 02-15-1995 08:27:12
Watershed file: --> CHERRY3 .MOP
Hydrograph file: --> CHERRY3.HYD

This is to calculate the hydrograph for Drainage Area 3 of Site 16.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		